2019 Environmental Report

FCC Construcción

Contents

1. Letter from the General Manager

In a world of constant changes, in which waiting for events to happen means not only being left behind, but losing the opportunity to contribute to the global improvement and growth of our society, the role of FCC Construcción goes beyond the fulfilment of its corporate purpose. The notion of "quality" is spread across the life cycle of the products and services that the company offers, as well as across the positive and negative impacts that these have on different stakeholders.

Our vocation is to provide quality infrastructures to society, to contribute to a global social benefit that boosts the economy, communication and well-being. We are implementing since 2015 an international reference framework across our corporate structure: the 17 Sustainable Development Goals (SDGs) that make up the 2030 Agenda approved by the United Nations. To achieve these goals, all actions count, but certain activities of special relevance, such as those related to construction, have a big direct and indirect social, economic and environmental impact on the achievement of these goals. It is for this reason that our 2015 Sustainability Report (published at the beginning of 2016) started to demonstrate our solid contribution to each one of the SDGs through our actions and commitments.

Contributing to sustainable development must be a multifaceted task, in which, for example, the reduction of inequalities is achieved with the construction of regional backbone infrastructures, together with the protection of forests and water. As a company, we focus our commitment to the Principles of the United Nations Global Compact and to the Sustainable Development Goals on areas in which we can contribute the most. In addition, we are aware of the magnitude of our activity's impacts on society, the environment and the economy.

Therefore, we have implemented an **environmental management system** that allows **us to determine the best practices required to mitigate the negative impacts related to infrastructure projects and make progress in the continuous improvement of the overall quality of our activities, based on the identification of the risks and conditions associated with our actions and recording the results of our decisions**. These initiatives boost efficiency as resources are consumed, reduce the generation of waste, mitigate the disturbance caused to the population and the surrounding environments and, in general, mitigate the environmental and social impacts that all construction works inevitably entail.

Involving our collaborators in managing impacts requires us **to boost the identification of environmental risks and opportunities associated with their activities and encourage their management**, either in terms of prevention or correction of its impacts or by taking advantage of the opportunities presented. **We always provide a positive and sustainable response to each request, with a comprehensive vision of the project.**

Since its first edition in 2000, this Environmental Report provides in-depth information about our environmental management practices, contributes to disseminate the actions and guidelines representing the cornerstones of the company's success, which consolidate the application of Principle No. 15 of the 1992 Rio Declaration on Environment and Development: the **precautionary approach**, which invites us to address and consider all environmental risks, regardless of their probability of occurring. The dissemination of this report allows us to make our good environmental and social practices public and turn them into benchmark practices for other companies, while helping us reflect internally on our own actions, increasing our commitment to excellence in business management further under the umbrella of Transparency.

Innovation is key to optimise the eco-efficiency of our current construction processes. In 2018, we have continued to make progress in our projects, such as REFORM2 or POTAMIDES, which focus on reducing our environmental footprint, considering the environmental variable in decision-making processes and promoting the circular economy. A practical example of application related to the efficient use of resources was the replacement of plastic with sheets of paper in the caisson launching and anchoring processes carried out during the execution of FCC Construcción's maritime works.

Our responsibility as agents of change towards a sustainable future is materialised in a unique way with the global implementation and dissemination of the Best Practices® methodology. In many of the countries in which we operate, these examples constitute an opportunity for the creation of trained teams that are already aware of such opportunities, who can transfer this knowledge into other experiences, applying innovative techniques and materials that contribute to improving the life of others with a lower impact on the environment. The analysis of our environmental behaviour also helps

Pablo Colio Abril
Chief Executive Officer of FCC Group

us become active participants in numerous work groups, which are currently developing guidelines and standards related to sustainable construction.

We apply a preventive approach in our projects, based on adequate risk control, aimed at controlling potential current and future impacts. In this regard, 98% of FCC Construcción's permanent centres and construction works executed throughout 2018 have already identified their environmental risks and opportunities. In addition, we are also aware of the fact that our decisions and actions have an impact in the long-term and it is for this reason that we take into account the different stages of the life cycle in environmental planning procedures.

Moreover, we have published the FCC Construcción Climate Change Strategy to help combat climate change, which is perhaps the greatest challenge of our time, and help meet the commitments established in the Paris Agreement, training employees on this strategy and on our methodology for quantifying greenhouse gas emissions.

Such a high level of demand is a factor for success that has allowed us to receive numerous awards for our work, such as those received in 2018 for some of our flagship projects, including the awards received by Mersey Bridge (United Kingdom) or, in Spain, the Almonte viaduct and the Wanda Metropolitano stadium, the first in the world to solely use LED technology, with the consequent advantages in terms of reducing energy consumption and light pollution.

We believe that the most important form of recognition continues to be the trust of our clients and the satisfaction of a job well done. A job that must continue to generate value for those who continue to enjoy durable, resilient buildings and infrastructures in the future, which are increasingly integrated in their environment and which improve the lives of people across the planet.

2.

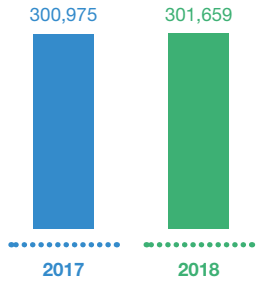
FCC Construcción at a glance

Our main environmental indicators

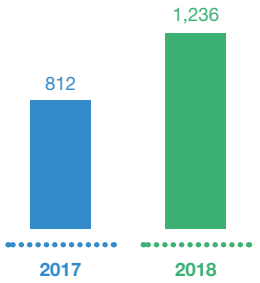
Atmospheric emissions

Emissions produced (t)

GHG

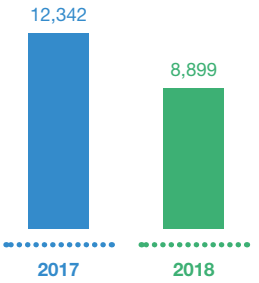


DUST



Emissions avoided (t)

GHG



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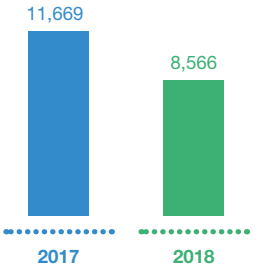
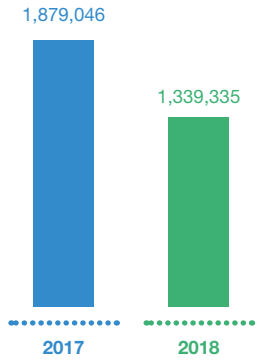


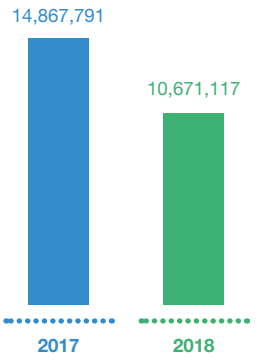
Natural resources

Energy (GJ)

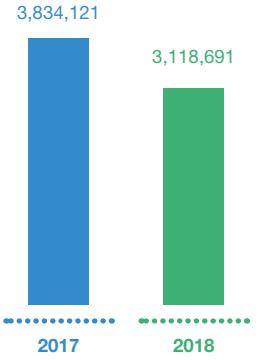


Water (m^3)

Materials (t)



Recycled materials (m^3)



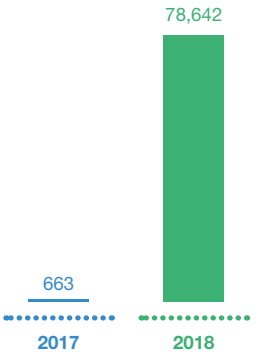
Discharges

Water discharged (m^3)

Recycled water (m^3)

Waste

Hazardous waste (t)



Non-hazardous waste (t)

Our outstanding good practices in 2018

1. SPAIN

- Megaplas Factory
- Viladomat secondary school
- Faculty of Philosophy and Humanities at the Zaragoza University
- Expansion of the Port of Playa Blanca
- Congosto de Isuela-Arguis highway section
- Conservation and maintenance of the N-627, N-623 and A-73 roads
- Dual motorway of Cuenca
- Asón River General Interceptor sewer
- Guzmán thermosolar plant and photovoltaic solar plants in Espejo
- Railway platform for Arroyo de la Charca-Grimaldo
- Vicálvaro asphalt concrete plant

2. PORTUGAL

- Gouvães hydroelectric power dam
- Modernisation of the Covilhã-Guarda railway section

3. ROMANIA

- Section 3 of the Gurasada-Simeria railway

4. SAUDI ARABIA

- Riyadh Metro

5. PERU

- Lima Metro (Line 2)

- Riyadh Metro
- Conservation and maintenance of the N-627, N-623 and A-73 roads
- Section 3 of the Gurasada-Simeria railway
- Railway platform for Arroyo de la Charca-Grimaldo

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- Asón River General Interceptor sewer
- Section 3 of the Gurasada-Simeria railway

- Congosto de Isuela-Arguis highway section

- Faculty of Philosophy and Humanities at the Zaragoza University

- Dual motorway of Cuenca

- Relationship with society
- Atmospheric emissions
- Noise and vibrations
- Effluent discharges
- Occupation, pollution or loss of soils
- Use of natural resources
- Generation of waste
- Land use planning
- Climate change

3.

Building a sustainable future

The SDGs, our framework

Nowadays, society is facing important global challenges. The climate change fight, scarcity of natural resources, over population, loss of biodiversity or growing generation of waste are just a few. Currently, a sustainable and responsible business model must combine good economic results with a clear social and environmental commitment applied to all company operation areas. As a reference company in the construction sector, FCC Construcción not only prepares itself to analyse and integrate all uncertainties and risks associated with these global problems at the core of its business, but also adopts the best practices for their prevention and mitigation.

Approved in 2015 by the UN General Assembly, the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda, are the roadmap and common guide which have been adopted at FCC Construcción as a decision-making framework. FCC Construcción has incorporated the SDGs into its activities and commitment, and its focused on their achievement, in particular when its activities impact on them. The two clear pillars, that guide the company's activities, are promoting the socioeconomic growth of the local communities served by our buildings and infrastructures, and preserving the environment in all the construction stages, by developing more efficient and less polluting construction processes and more resilient infrastructures.

FCC Construcción's commitments to the SDGs

Actions developed by FCC Construcción...

- Progress against climate change
- Transition towards a circular economy
- Innovation in construction processes
- Sustainable construction

... that contribute to achieving the SDGs

Constructing hydraulic infrastructures to improve universal and equal access to drinking water and to treat wastewater.

Building infrastructures to guarantee access to affordable energy services and the transition to renewable energies.

Building sustainable infrastructures that support social well-being and economic development of communities and promote innovation in the process.

Building more sustainable cities which are more resilient and provide citizens with adequate, secure and affordable basic services.

Fostering responsible consumption efficient use of resources and waste reduction.

Achieving a low-carbon economy by reducing emissions at our worksites and adopting greener practices.

The **Good Practices System** plays an essential role in all projects developed by the organisation, as it contributes to ensure that the projects are executed in a respectful way with the environment and the society.

Construction projects represent an opportunity to promote the prosperity of our stakeholders. This is achieved by creating long-term and short-term direct and indirect employment, improving the living conditions of local communities by promoting access to basic services or transferring knowledge and technology to all stakeholders involved. Furthermore, FCC Construcción is aware that its projects have an ecological footprint for the planet, which is minimised by adopting innovative and efficient criteria in the design stage, and by defining environmental action plans to prevent and mitigate potential environmental impacts of the construction stage.

Although all businesses have an impact on most SDGs, FCC Construcción, through its activities, directly contributes to achieving more sustainable cities and communities (SDG 11); works for innovation in the industry and infrastructures (SDG 9) and promotes access to basic services, such as energy (SDG 7) and the supply of clean water and sanitation (SDG 6). Through its responsible management, we contribute to the SDGs related to responsible production and consumption (SDG 12) and climate action (SDG 13). If we translate these corporate goals in their alignment with the Agenda for Sustainable Development to the activities carried out by FCC Construcción, we can affirm that the organisation is working under a paradigm of the responsible use of resources, search for maximum efficiency, innovation in processes, new technologies and the application of production models included in the circular economy.

To overcome these challenges, FCC Construcción has a specific system of indicators that makes it possible to assess the environmental and social footprint of its activities and its environmental performance in different subareas: relationship with society, atmospheric emissions, land and water bodies, the use of natural resources, the generation of waste and biodiversity, to name just a few. Furthermore, the Good Practices System[1] at FCC Construcción, comprising voluntary measures that go beyond the legal requirements, underpin and improve the social and environmental performance of the works performed by the company. At each of the projects undertaken, the decision may be taken to apply the most transcendent actions that generate most social and environmental benefits.

[1] FCC Construcción 2009. “System for evaluating environmental performance through good practices”.

In this Environmental Report, we would like to emphasise the progress made by FCC Construcción in two aspects with a global impact, which are of particular concern for society: climate change and the draining of natural resources. The mitigation and adaptation of our construction projects to climate change and the transition towards a circular economy, which consider the appropriate management of resources and waste, are crucial in overcoming these global challenges and obtaining a more sustainable future.

On the one hand, the commitment to the fight against climate change began in 2010, when the company implemented a protocol for measuring Greenhouse Gases (GHG). Since then, the company annually prepares and verifies its GHG emissions report and, in 2011, became the first Spanish construction company to have this report verified externally. Since 2012, it has held the "Environment Carbon Footprint CO_2 verified" certificate, which accredits both the accuracy of the calculation and the inclusion of GHG management in the organisation's system and strategy. Furthermore, in 2014, FCC Construcción became the first Spanish construction company to register its carbon footprint with the Carbon Footprint, Compensation and Absorption Projects Register, held by the Spanish Ministry for Ecological Transition (MITECO).

The concept of the circular economy, on the other hand, has been included in the company's business practices for years. Its projects include the measures required to mitigate the consumption of water, energy and materials, in addition to harnessing waste, transforming them into new resources and thus completing the circle. FCC Construcción is well aware that the circular economy and climate change are closely related, and that the model of change from a linear to a circular economy is related to the harnessing of resources, and can lead to an improvement in the sustainability of our planet. Therefore, a large part of the efforts of the projects performed by the company focus on these two areas.

The **2019 Environmental Report**, which features environmental indicators and practical cases for the company, represents the eleventh edition published by FCC Construcción since 2000, when it became the first construction company in Spain to publish its environmental results.

Accountability is an essential part of FCC Construcción's commitment to its stakeholders and demonstrates, once again, its transparency in this connection. To this end, the organisation puts its environmental performance on the record through this report, the 2019 Environmental Report, published every two years, containing all the environmental information of the industrial services and FCC Construcción works performed over the course of 2018.

A clear commitment to sustainable construction

FCC Construcción is aware of the social value of a more sustainable approach to construction that is respectful of the environment. To this end, sustainability forms part of the company's strategy, connecting its three pillars (economic, social and environmental) in each project and transversally across all the actions it performs as a company, including the entire life cycle of its projects. Therefore, it considers both the needs of the surrounding communities during the construction and operation stages of projects, and the materials and machinery used during construction, to minimise the environmental footprint generated directly and indirectly by the company's actions.

FCC Construcción is a firm believer in its responsibility to share its experience and participate in establishing a roadmap towards sustainable construction. Only in this way it will guarantee a better future for the generations to come and create value for groups influenced by its activities.

Therefore, combining knowledge and efforts, FCC Construcción will be able to effectively face the social and environmental challenges that the society faces at present. To this end, FCC Construcción actively promotes a sustainable approach of construction and participates in the development of guides, standards and guidelines in collaboration with different national and international working groups.

More specifically, some of the actions performed include the definition of terminology and general principles of sustainable construction, the description for the lifecycle of the building or infrastructure, the definition and use of sustainability indicators and the establishment of an environmental, economic and social performance assessment method for building and civil engineering projects.

Accordingly, worthy of note is our participation on the International Technical Committees ISO/TC 59/SC 17 and CEN/TC350, dedicated to the preparation of technical standards for assessing sustainability in civil engineering works, one of the most important activities at FCC Construcción.

Structures that help to provide communities with a structure, such as the Jaca Santa Cilia bridge, serve as a testament to the creation of added value generated by the work performed by FCC Construcción and that is intrinsic to the development of our business.

The following table contains a number of the organisations and workgroups in which the company is present, to establish sustainability criteria relating to sustainable construction.

Sustainable construction workgroups

ORGANISATION	PARTICIPATION
International Technical Committee **ISO/TC59/SC17** "Building construction/ Sustainability in building construction".	Participation in ISO/TC59/SC17/WG1: General Principles and Terminology.
	Participation in ISO/TC59/SC17/WG2: Sustainability Indicators for Buildings.
	Participation in ISO/TC59/SC17/WG3: Environmental Declaration of Building Products.
	Participation in ISO/TC59/SC17/WG4: Framework for Assessment of Environmental Performance of Buildings and Constructed Assets.
	Presidency of ISO/TC59/SC17/WG5 Civil Engineering Works. Sustainable Civil Engineering Committee.
International Technical Committee **CEN/TC350** "Sustainability of Construction Works".	Participation in the CEN/TC350/Task group: Framework for assessment of buildings.
	Participation in CEN/TC350/WG1: Environmental performance of buildings.
	Participation in CEN/TC350/WG2: Building life cycle description .
	Participation in CEN/TC350/WG3: Product level.
	Participation in CEN/TC350/WG4: Economic performance assessment of buildings.
	Participation in CEN/TC350/WG5: Social performance assessment of buildings.
	Presidency of CEN/TC350/WG6: Civil Engineering Works. Sustainable Civil Engineering Committee.
Technical Committee for Standardisation **AEN/CTN198** "Sustainable Construction".	Vice-presidency of the Technical Committee for Standardisation AEN/CTN198 "Sustainable Construction"
	Participation on the Technical Standardisation Subcommittee AEN/CTN 198/SC 1 "Sustainable building".
	Presidency of the Technical Standardisation Subcommittee AEN/CTN 198/SC 2 "Sustainable civil engineering".
International Initiative for a Sustainable Built Environment **(iiSBE)**	Members.
Green Building Council España **(GBCe)**	Members of this organisation, which constitutes the Spanish Council of the International Association "World Green Building Council", set up as a source in Spain for all the information on the LEED building certification tool.
BREEAM Spain	Members of the Advisory Committee, responsible for defining the development strategy at BREEAM Spain, representing stakeholders in the building sector.

In 2018, the international workgroup ISO/TC59/SC17/WG5 chaired by FCC Construcción, completed the preparation of the standard "ISO 21931-2: Sustainability in buildings and Civil Engineering Works - Framework for methods of assessment of the sustainability performance of construction works - Part 2: Civil Engineering Works", which will be published in 2019. Furthermore, the European workgroup CEN/TC350/WG6 is developing a standard related to calculation methods "Sustainability of construction works - Sustainability assessment civil engineering works - Calculation methods", which will set out specific methods for the assessment of the environmental, economic and social performance of civil engineering works. This standard can be useful as assistance in the decision-making process of a project.

The collaboration of FCC Construcción with workgroups involved in sustainability goes beyond sustainable construction. The company and its teams strive to offer their experience and knowledge in other closely related areas, such as corporate responsibility, innovation, technical aspects and the environment. As a result of these efforts and commitment, FCC Construcción collaborates with a wide variety of organisations, as shown in the following table:

Workgroups in other areas

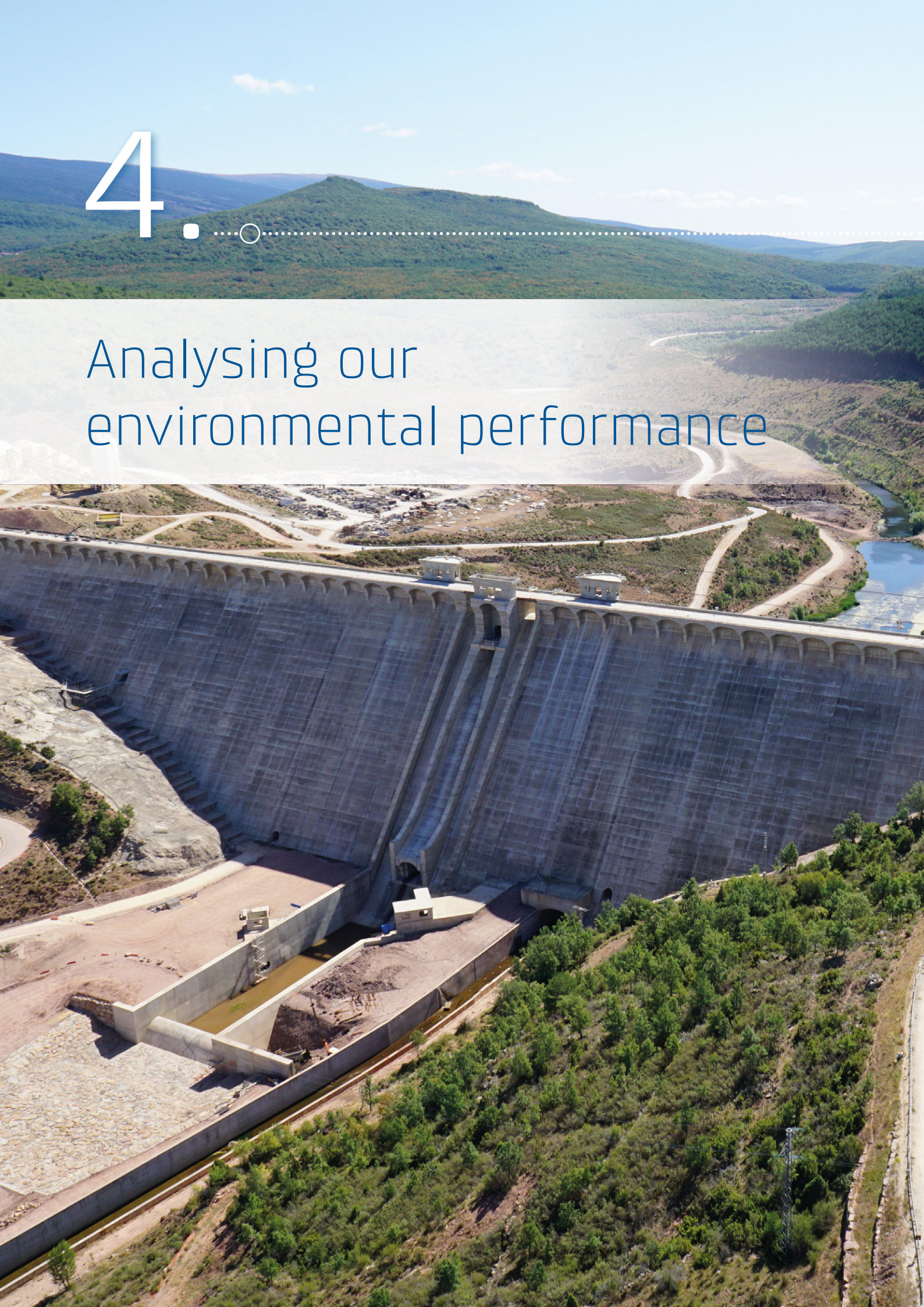
ORGANISATION	PARTICIPATION
International Technical Committee **ISO/TC207** "Environmental management"	Participation in the ISO/TC 207 SC1 Subcommittee: Environmental management Systems.
	Participation in the ISO/TC 207 SC4 Subcommittee: Environmental performance evaluation: Workgroup WG 4 "Data quality".
Technical Committee for Standardisation. **CTN 83** Concrete	Participation in the AEN/CTN 83/SC 10 Subcommittee "Durability"
	Participation in the AEN/CTN 83/SC 11 Subcommittee "Execution"
Technical Committee for Standardisation. **CTN 146** Aggregates	Participation in the AEN/CTN 146/SC 2 Subcommittee "Aggregates for concretes"
	Participation in the AEN/CTN 146/SC 6 Subcommittee "Trials" and the Workgroup on aggregates-alkalis.
Technical Certification Committee, **CTC 015** Cements	Membership for the Technical Certification Committee.
Technical Certification Committee, **CTC 061** EHE 98 Concrete	Membership for the Technical Certification Committee.
Technical Certification Committee, **CTC 079** EHE 08 Concrete	Membership for the Technical Certification Committee.
Spanish National Commission on Large Dams **(SPANCOLD)**	Membership for the Spanish National Commission on Large Dams.
	Presidency of the Technical Commission on "Engineering Activities in Planning".
	Participation on the Technical "Hydraulics for dams" Committee.
	Participation on the Technical "Environment" Committee.
	Participation on the Technical "Concrete dams" Committee.
International Commission on Large Dams **(ICOLD)**	Participation in the Committee on Engineering Activities in the Planning Process for Water Resources Projects (ICOLD), representing Spain.
State Council for Social Corporate Responsibility **(CERSE)**	Participation in the Workgroup on "Transparency".
Madrid Office of the Professional Association of Civil Engineers	Participation on the Transparency and Social Responsibility Committee.
AENOR Advisory Committee of Construction Firms	Participation on the Technical Environment Commission
	Participation on the Quality Commission
SEOPAN	Participation on the Quality and Environment Commission.
	Participation on the Innovation Commission.
Spanish Quality Association **(AEC)**	Participation on the Environment Committee.
	Participation on the Construction Committee.
European Network of Construction Companies for Research and Development **(ENCORD)**	Participation in the Environment and Sustainability Workgroup.
	Participation in the workgroup dedicated to the creation of a Sustainability Declaration for European construction firms.

The “know-how” of FCC Construcción’s professionals shared with the different workgroups in which the company participates promotes the creation of alliances between different stakeholders. These alliances contribute to creating a shared and standardised language that, through the publication of standards, guidelines and technical reports, can be applied to the different construction projects. FCC Construcción is committed to sustainable construction and will continue to be so in the future, since all the related efforts will help to achieve SDGs 9 and 11, while generating corporate and social added value for the organisation.

ORGANISATION	PARTICIPATION
European Construction Technology Platform **(ECTP)**	Management Committee members. Participation in the “Quality of life” area: - Workgroup WG1 “Reduce environmental impact” Workgroup WG3 “Improving the built environment for people”.
Spanish Construction Technology Platform **(PTEC)**	Sponsor of the PTEC Foundation. Participation on the Strategic Line for Sustainable Construction: - Coordination of workgroup 1: “Competitiveness”. - Workgroup 2: “Environment”. Participation on the Strategic Line for the City of the Future. - Workgroup 1: “Efficient city”. Workgroup 2: “Smart city”.
es.BIM BIM Implementation in Spain	Participant of the initiative “es. BIM”, to detect BIM-related innovations in Spain.
Railway Innovation Hub **(RIH)**	Associate member of the initiative to promote technology and knowledge in the railway industry at an international level.
National Confederation of Construction **(CNC)**	Participation on the Environment/Waste Commission.
Spanish Confederation of Employer Organisations **(CEOE)**	Participation on the R&D Commission. Participation on the CSR Commission (WG 2030 Agenda). Participation on the Sustainable Development and Environment Commission.
Sustainable Development and Business Committee for the Economic and Trade Office at the Spanish Embassy in Colombia	Participation in the Workgroup for sustainable development in Colombia.
Spanish Network of the United Nations Global Compact	Partners. “Participant” level.
Spanish Structural Engineering Association **(ACHE)**	Participation in the Workgroup on "Incrementally launched bridge". Participation on Commission 3 "Execution".
Technical Ports and Coasts Committee **(ATPYC)**	Presidency of the Association. Participation on the Technical Port Engineering Committee Participation in the Workgroup on "Seismic design".
World infrastructure association for aquatic transport **(PIANC)**	Presidency of the Maritime Commission.
Association of Tunnels and Underground Works **(AETOS)**	Participation in the Workgroup for the preparation of the “Tunnels Guide”.

4.

Analysing our environmental performance



Given the nature of the activities performed in the construction sector, although on a temporary basis, we engage in interactions with the society and the natural environment. Therefore, preventing and, as applicable, mitigating any impacts that may be caused by the execution of projects is invaluable.

As part of project planning, FCC Construcción considers both environment and social aspects generated by its activities and the impacts they have on the environment. Identifying them and evaluating their scope and importance for the communities in which projects are executed is essential in mitigating the footprint of the company's actions.

At each of FCC Construcción's worksites and production centres, the different environment aspects are identified, the main impacts on the environment established. Moreover, those considered the most significant are identified by assessing their magnitude, level of pollution or disruption and the importance or sensitivity of the receiving environment. Using this mechanism, each centre is capable of prioritising the most significant aspects in its context; in other words, the aspects that pose the greatest risk to the surrounding area and establishing the most appropriate prevention, avoidance or mitigation measures that facilitate operational control and, as a result, the minimisation of the environmental footprint of our operations.

Thanks to the preliminary **identification and assessment** of the most significant environmental impacts that the construction projects may have, FCC Construcción is able to establish the required **prevention or mitigation measures** for each specific project.

Integrated planning process

1 Identification of Environmental Aspects

- Atmospheric emissions.
- Noise and vibration.
- Effluent discharges.
- Occupation of rivers or seabeds and water abstraction.
- Occupation, pollution or loss of soils.
- Use of natural resources (water, fuels, raw materials, energy, etc.)
- Generation and management of waste (hazardous, inert or municipal waste).
- Radiation emissions.
- Land planning/environment/relationship with society.
- Environmental accidents.

2 Environmental aspect assessment criteria

- **Magnitude** of the environmental aspects or environmental alteration degree.
- **Importance** or sensitivity of the receiving system in which the construction work was performed.

3 Definition of actions to be carried out

- Actions brought by the legal requirements and other compulsory requirements applicable to the project.
- Actions trying to prevent or reduce the effects on the environment of the aspects which were assessed as significant.
- Actions to address environmental risks and opportunities.
- Actions that the worksite decides to implement voluntarily.

By extrapolating the combined data of the works performed, FCC Construcción is able to identify the aspects that are more often significant and that are most likely to occur in the construction industry. By doing so, the company is able to define the environmental vectors that must be taken into consideration to improve the organisation's approach to environmental management. This is possible by defining the corporate challenges faced in terms of the environment and by adapting the Good Practices System, which encompasses the actions and projects performed by FCC Construcción worldwide.

The following table contains data from 81 works assessed in 2018, specifying the percentage of works that have identified any environmental and/or social aspect from each of the group of aspects present in the project, whether real or potential, and the percentage of works with significant aspects after their assessment.

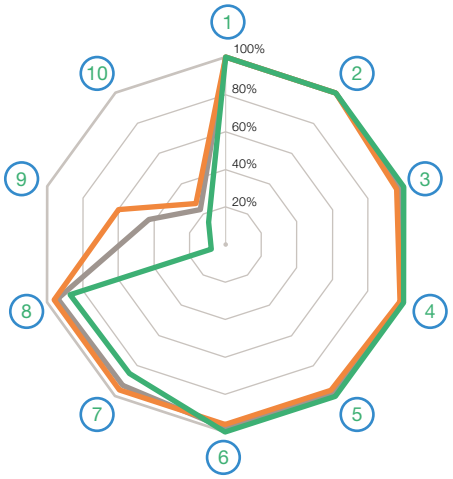
Groups of environmental and social aspects

Groups of environmental and social aspects

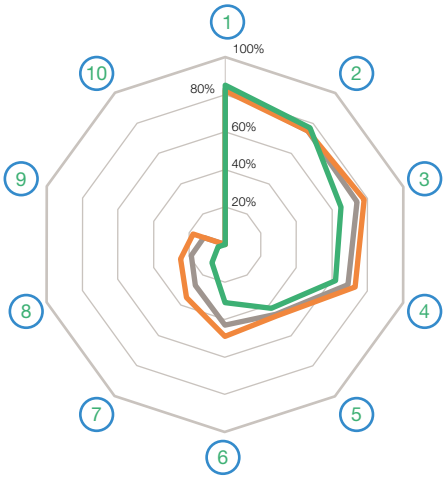
1. Atmospheric emissions
2. Generation of waste
3. Land use planning/urban environment
4. Use of natural resources
5. Environmental accidents
6. Noise and vibrations
7. Effluent discharges
8. Occupation, pollution or loss of soils
9. Occupation of watercourses and seabeds and water collectors
10. Emission of radiation: use of radioactive sources

Building
Civil engineering works
Total

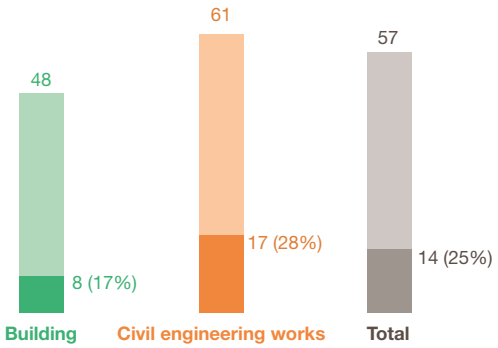
% Works in which aspects are present*



% Works with significant aspects*



General information*



Average number of aspects identified per worksite
Average number of significant aspects per worksite

* Data for FCC Construcción. It does not include data from FCC Industrial.

Prevention in the spotlight

Prevention is always the first step in avoiding the potentially negative impacts caused by the performance of any activity on society and the environment.

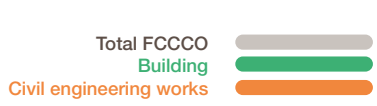
Prevention begins with the identification of environmental and social aspects that may appear as part of a project and defining the risk of occurrence. FCC Construcción identifies the priority aspects for action based on their frequency (those that are significant in a higher number of occasions) and likelihood of occurrence. Thus, it establishes criteria to lead prevention efforts towards aspects where the impact intensity is, or could possibly be, greater.

These efforts are reflected in the application of singular measures for each requirement of the operation and the demands of the communities involved. Thus, the process becomes a lifelong learning process with a feedback acquired from the diversity and scope of actions and method statements: this learning process extends to all our construction works.

The following table contains data of the 81 construction works performed in 2018. The environmental aspects that have been significant in a higher percentage of works, having assessed their scope and importance, are included.

Significant environmental aspects

	% of works in which the environmental aspect is significant*
Effect on the territory / urban environment due to operations that cause dirt at the entrance and exit of sites, mud and loose material.	57% (46/81) 58% (15/26) 56% (31/55)
Effect on the territory / urban environment due to spillage of granular material during transport.	49% (40/81) 54% (14/26) 47% (26/55)
Emission of dust due to machinery traffic.	40% (32/81) 0% (0/26) 58% (32/55)
Emission of dust due to external enclosure and internal partitions and finishing.	36% (29/81) 85% (22/26) 13% (7/55)
Dust emissions from soils and debris transport.	35% (28/81) 8% (2/26) 47% (26/55)
Dust emissions from earthworks: excavations and fillers, stripping and embankments.	33% (27/81) 8% (2/26) 45% (25/55)
Dust emissions from demolitions.	32% (26/81) 19% (5/26) 38% (21/55)
Water consumption for embankments and ground bases watering.	31% (25/81) 8% (2/26) 42% (23/55)
Generation of urban waste from recovery and tiding of installations / works.	31% (25/81) 4% (1/26) 44% (24/55)
Environmental accident due to fire in areas for storage of inflammable / combustible substances (wood, paper, etc.).	30% (24/81) 35% (9/26) 27% (15/55)
Generation of inert or non-hazardous waste: spare soils from excavations.	30% (24/81) 23% (6/26) 33% (18/55)



* Data for FCC Construcción. It does not include data from FCC Industrial.

	% of works in which the environmental aspect is significant*
Generation of inert or non-hazardous waste: non dangerous packages and containers.	30% (24/81) 50% (13/26) 20% (11/55)
Generation of noise by demolitions.	27% (22/81) 19% (5/26) 31% (17/55)
Release of dust by the supply and stockpiling of dusting materials.	26% (21/81) 4% (1/26) 36% (20/55)
Environmental accidents: Fire as consequence of handling explosives, welding equipments, generators and electric / ignition motors or equipments.	25% (20/81) 12% (3/26) 31% (17/55)
Electric energy consumption.	25% (20/81) 8% (2/26) 33% (18/55)
Generation of hazardous waste: Empty contaminated containers (paints, solvents, oil, glue, stripper, de-coffering liquids, silicones, aerosols, explosives, etc).	22% (18/81) 31% (8/26) 18% (10/55)
Noise generated by earthworks: Earthworks: excavations and fillers, stripping and embankments.	22% (18/81) 12% (3/26) 27% (15/55)
Generation of municipal waste from offices, changing rooms and site canteens.	21% (17/81) 4% (1/81) 29% (16/55)
Earth consumption.	20% (16/81) 8% (2/26) 25% (14/55)
Graded aggregate consumption.	20% (16/81) 12% (3/26) 24% (13/55)
Generation of inert or non-hazardous waste: Formwork and moulds.	20% (16/81) 19% (5/26) 20% (11/55)
Vibrations generated by earthworks: earth moving: excavation, backfilling and embankment compaction.	20% (16/81) 8% (2/26) 25% (14/55)
Gasoil, petrol, fuel-oil and coals consumption.	19% (15/81) 4% (1/26) 25% (14/55)
Steel consumption (structural and reinforcement steel).	19% (15/81) 12% (3/26) 22% (12/55)

* Data for FCC Construcción. It does not include data from FCC Industrial.

The **release of dust particles** into the atmosphere due to earthmoving works is a significant environmental aspect and, therefore, it is considered and mitigated in the Good Practices System of FCC Construcción.

As shown in the table, the most significant environmental aspects in 2018 consisted mainly of effects on the landscape, those related to the operations that involve dirt inside and outside the sites due to the construction works or to the dropping of granular material during transport. With prevention and mitigation purposes, FCC Construcción performs different initiatives that make it possible to reduce dirt, both on site and in the surrounding area, such as covering lorries that transport powdery materials or cleaning surfaces or roads that may be affected.

Another group of environmental aspects that are significant in a high percentage of works are those related to the release of dust particles into the atmosphere. In this case, the relevance is, in general, higher at civil engineering works than building works, given their greater size and the earthmoving that this type of work tends to entail. However, these impacts tend to be one-off and local; in other words, limited to the time at which they are performed, the location and surrounding environment. Works can potentially disturb the closest town or city to the site, without generating impacts over a longer period of time.

In 2018, it is worth noting that other group of environmental or social aspects have also been significant at more than 20% of works. These aspects are related to waste generation, consumption of resources, generation of noise and vibrations or potential environmental accidents that may occur on site.

Below, the main impacts grouped together into the corresponding groups of environmental aspects can be consulted, along with the proportion of projects in which they were significant in 2018. In addition, the figures also show the actions that FCC Construcción performs to prevent or mitigate their occurrence.

Identifying the significant aspects of a project is the first step in orienting **prevention efforts** towards aspects where the impact intensity on the surroundings is, or could possibly be, greater.

The a**pplication of good practices** has made it possible to **reduce dust emissions** by **8,566 tonnes** in 2018.

Taking action at the source, reducing dust emissions and dirt at worksites

MOST SIGNIFICANT ENVIRONMENTAL ASPECTS AND INCIDENCE RATES AT PROJECTS

Effect on the territory / urban environment due to operations that cause dirt at the entrance and exit of sites, mud and loose material.	57%
Effect on the territory / urban environment due to spillage of granular material during transport.	49%
Emissions of dust due to machinery traffic.	40%
Emissions of dust due to soil and debris transport.	35%
Emissions of dust from earthworks: excavations and fillers, stripping and embankments	33%
Emissions of dust from demolitions.	32%
Emissions of dust from the supply and stockpiling of dusting material.	26%

Covering lorries significantly reduces dust emissions caused by the transfer of materials, reducing the inconvenience caused to the worksite's surrounding area and to local residents.

GOOD PRACTICES EMPLOYED AS A RESPONSE

- Speed control of vehicles
- Irrigation of paths and stockpiles
- Covering lorries
- Shoots for disposing of rubble from a height
- Paving of paths at worksites
- Use of covered conveyor belts
- Other preventive measures

Minimise waste, a starting point for a strong approach to management

MOST SIGNIFICANT ENVIRONMENTAL ASPECTS AND INCIDENCE RATES AT PROJECTS

Generation of urban waste from recovery and tiding of installations/works.	31%
Generation of inert or non-hazardous waste: spare soils of excavations.	30%
Generation of inert or non-hazardous waste: non-dangerous packages and containers.	30%
Generation of hazardous waste: Empty contaminated containers (paints, solvents, oil, glue, stripper, de-coffering liquids, silicones, aerosols, explosives, etc).	22%
Generation of municipal waste from offices, changing rooms and site canteens.	21%
Generation of inert or non-hazardous waste: Formwork and moulds.	20%

Hazardous waste is classified and stored temporarily at the worksite at areas dedicated to this purpose, before being removed by authorised agents, as established in the applicable legislation.

GOOD PRACTICES EMPLOYED AS A RESPONSE

- Classification of hazardous waste, non-hazardous waste or similar to urban waste
- Management by authorised agents pursuant to the legislation in force
- Correct temporary storage of hazardous waste
- Identification using standardised labels
- Reuse, recycling and recovery of waste generated
- Promotion of the responsible use of materials and natural resources

We calculate the consumption inherent to the project to promote its responsible management

MOST SIGNIFICANT ENVIRONMENTAL ASPECTS AND INCIDENCE RATES AT PROJECTS	
Water consumption embankments and ground bases watering.	31%
Electric energy consumption.	25%
Graded aggregate consumption.	20%
Earth consumption.	20%
Gas oil, petrol, fuel oil, coals consumption.	19%
Steel consumption (structural and reinforcement steel).	19%

The change in the fuel type used in boilers, works equipment and machinery, whenever possible, allows us to reduce the emissions associated with these activities.

GOOD PRACTICES EMPLOYED AS A RESPONSE

- Responsible use of materials and natural resources employed
- Maximum harnessing of natural light
- Use of efficient equipment
- Reuse of effluents to reduce water consumption
- Recycling of stone materials
- Responsible selection of materials with a lower environmental footprint over the course of their lifecycle

Our goal: reduce noise pollution to the minimum

MOST SIGNIFICANT ENVIRONMENTAL ASPECTS AND INCIDENCE RATES AT PROJECTS	
Generation of noise by demolitions.	27%
Noise generated by earthworks: excavations and fillers, stripping and embankments.	22%
Earth moving: excavation, backfilling and embankment compaction.	20%
Emissions of dust due to machinery traffic.	11%
Foundations.	11%
Use of auxiliary equipment.	10%

By appropriately planning works, we are able to ensure that works generating less noise pollution are performed at times when nuisance to local residents and even wildlife is lower. By using modern machinery, subject to proper maintenance, we also mitigate these impacts.

GOOD PRACTICES EMPLOYED AS A RESPONSE

- Installation of acoustic buffers
- Preliminary execution of parts at the worksite that can act as a buffer
- Use of modern, quieter machinery
- Correct maintenance of machines
- Performance of tasks that may generate more noise at times that are best suited to local conditions
- Other actions

Our staunch commitment to safety

MOST SIGNIFICANT ENVIRONMENTAL ASPECTS AND INCIDENCE RATES AT PROJECTS

Environmental accident due to fire in areas for storage of inflammable / combustible substances (wood, paper, etc.).	30%
Environmental accidents: Fire as consequence of handling explosives, welding equipments, generators and electric / ignition motors or equipments.	25%
Underground pipelines break (electrical, phone, hydraulic, liquid or gas oil).	17%
Break of containers for hazardous substances. Tanks for storage of dangerous products	7%
Accidental spillage	4%

To improve the control of hazardous elements, such as fuel tanks, and to reduce the risk of associated accidents, external protection mechanisms and appropriate signposting are employed. This helps all workers to recognise the risks of handling them incorrectly.

GOOD PRACTICES EMPLOYED AS A RESPONSE

- Identification of events using the Emergency Plans
- Preparation of Emergency Plans that include preventive measures
- Creation of Emergency Plans that establish actions to be taken should they occur

The **replanting work** performed during the final stage of recovery and cleaning of the area affected by the project promotes the colonisation of areas subject to geomorphologic changes and **contribute to the recovery of degraded areas**.

The annual identification of the main aspects and their impacts on the environment is related to the characteristics of the works performed during the period, in other words, their scope, nature, location or type of materials required. Thus, in 2018, 15 of the total 139 environmental aspects contained in the FCC Construcción system were not identified at any worksite. This is the case of radioactive emissions, accidents generated by the burning of vegetation or release of dust associated with the use of heating facilities, as an example.

Often, given the nature of building works, these tend to entail a lower number of significant environmental aspects than civil engineering works. Based on 2018 data, on average 8 significant aspects were identified at each building worksite, whereas at infrastructure works, this figure increases to an average of 17 significant aspects per worksite.

FCC Construcción imparts exhaustive training and awareness raising to its in-house teams and subcontractors. The objective is to promote the staff to understand the environmental and social problems caused by its activities and to make them aware of their significance.

Getting involved in improvement

In 2017, FCC Construcción established the guidelines that should follow all works and centres in order to identify the risks and opportunities related to their significant aspects. This is result of the Management System adaptation to the ISO 14001:2015 standard.

To address each risk and opportunity established, the works or centres define an action strategy, this is a series of actions and measures that make it possible to:

- Minimise the possibility of risk appearance.
- Reduce the risk impact and its negative effects on the environmental and social contexts, should it materialise.
- Seize the opportunities identified.

In 2018, a total of 117 FCC Construcción's worksites and premises performed activities to identify their main environmental risks and opportunities. They also established an action plan to address these potential risks. In total, 2,664 heterogeneous risks and/or opportunities were identified, in line with the different activities performed at the different work centres. There is at least one action associated with 99.5% of the risks and opportunities identified over the course of 2018 by the company's worksites and premises.

The following table breaks down the main data on the identification of environmental risks and opportunities at 81 of the organisation's worksites and 39 of its premises.

When information is analysed by significant environmental aspects, we can conclude that the identified risks depend on the work typology. Usually civil engineering works detect a higher number of environmental risks than buildings.

The following table provides a summary of the main risks and opportunities detected, broken down by groups of aspects, along with the percentages and types of centre at which they have been identified.

Workers at FCC Construcción are the most qualified individuals at each centre to identify possible social and/or environmental risks associated with each of their tasks. They are aware of the immediate surroundings and the actions they **propose** represent **the most adequate solutions** for managing possible adverse and positive impacts.

Environmental risks and opportunities of projects under construction

	WORKS			
	Building	Civil engineering works	Premises	Total FCC CO
Number of projects with environmental risk data	26/26 (100%)	53/55 (96%)	38/39 (97%)	117/120 (98%)
Total number of identified risks/opportunities	436	1,979	249	2,664
Average identified risks/opportunities by centre	17	37	7	23
Total number of actions identified to address risks	812	3,787	500	5,099
Average actions identified by centre	31	72	13	44
Percentage of risks/opportunities without defined actions	2.5%	0.1%	0%	0.5%

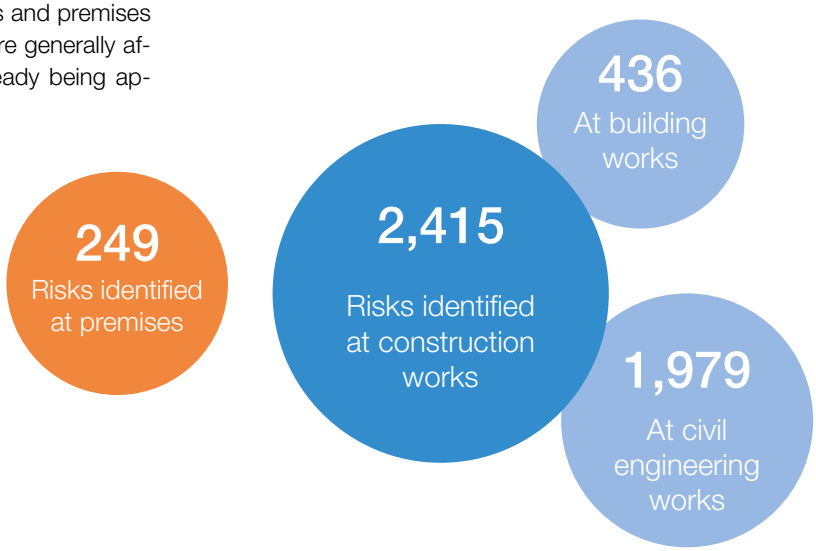
In 2018, the **81 projects** of FCC Construcción identified **an average of 31 environmental risks** and/or opportunities per centre.

Main environmental risks and opportunities

Environmental aspect		Risk/Opportunity detected	Centres at which they were detected	
Atmospheric emissions	Production of concrete	**Risk:** Complaints from residents on account of the high level of particulate matter.	50%	6/12
	Blasting	**Risk:** Impact on wildlife caused by inconvenience associated with blasting, which may lead to the abandonment of offspring.	50%	5/10
	Enclosures and finishes	**Opportunity:** Awareness raising in the subcontracting chain.	43%	15/35
	Circulation of machinery	**Risk:** Complaints from residents on account of the high level of particulate matter.	40%	34/85
Noise and vibrations	Demolitions	**Risk:** Complaints about excessive, unpleasant levels of noise.	50%	21/42
	Aggregate crushing	**Risk:** Impact on wildlife of high levels of noise.	45%	5/11
Effluent discharges	Dragging of aggregate stockpiles and other stockpiles	**Risk:** Pollution of water.	47%	9/19
	Maintenance of machinery	**Risk:** Accidental discharge into the soil/water during machinery maintenance work.	42%	10/24
	Underground water	**Risk:** Pollution of water.	39%	9/23
Occupation of watercourses and seabeds and water collectors	Actions in publicly-owned water or sea/land	**Risk:** Pollution of surface water when performing works.	33%	8/24
Operations that entail occupation, pollution and loss of soil	Aggregate crushing plants	**Risk:** Erosion and loss of fertile soil.	40%	4/10
Use of natural resources	Irrigation of levelled areas and road surfaces	**Opportunity:** Reduction of water consumption.	50%	21/42
	Consumption of electricity	**Opportunity:** Reduction of energy consumption.	35%	35/101
Generation of waste	Surplus soils from excavation	**Opportunity:** Optimisation of waste management.	34%	21/62
	Non dangerous packages and containers	**Risk:** Economic sanctions for failing to comply with legal requirements relating to the transport and management of waste generated.	20%	18/91
Land use planning/ urban environment	Activities that might change biodiversity	**Risk:** Impact on significant plant species due to a change in their habitat.	61%	11/18
	Operations that cause dirt at the entrance and exit of sites, muds and loose material	**Risk:** Fines due to dirt at site entrance and exit points.	54%	38/71
	Spillage of granular material during transport	**Risk:** Fines due to dirt at site entrance and exit points.	50%	31/62
Environmental accidents	Fire in areas used to store flammable/combustible substances	**Opportunity:** Minimisation of the likelihood of the accident occurring.	38%	30/80

This identification of risks and opportunities has made it possible to define strategies to handle their management. As shown in the following table, which provide details on the actions most commonly applied at 117 worksites and premises of FCC Construcción in 2018, these actions are generally affordable and known by teams, which are already being applied or whose application can be guaranteed.

Number of risks identified in 2018



Main actions implemented to address environmental risks

Actions to address environmental risks/opportunities	% centres identifying the action			
	Building	Civil engineering works	Premises	Total
Save the documentation demonstrating the correct management of waste.	50%	45%	29%	41%
Control movements and limit the speed of machinery on site and at entrance ways.	27%	66%	8%	38%
Periodic cleaning of the vehicle entrance and exit at the worksite.	54%	47%	0%	33%
Cover the materials transported that generate dust.	50%	49%	0%	33%
Have different containers in place for different types of waste generated on site.	42%	40%	18%	33%
Prioritise the contracting of subcontractors who apply environmental management systems.	38%	53%	0%	32%
Reduce vehicle driving speed.	27%	51%	5%	31%
Inform employees and subcontractors of the waste to be deposited in each container.	27%	32%	16%	26%
Be aware of firefighting protocols.	19%	26%	29%	26%
Periodically control whether waste is being classified as stipulated in the instructions.	19%	34%	16%	25%
Be aware of evacuation routes.	23%	19%	34%	25%
Classify waste for its separate management.	31%	36%	3%	24%
Signpost containers accordingly, based on the type of waste they contain.	31%	36%	3%	24%
Use certified machines (EC mark, UL mark, ETL mark, CSA mark, etc.) to guarantee that noise emissions are within the specified limits.	27%	38%	0%	23%
Shut down all equipment that is not in use.	4%	23%	37%	23%
Preferably contract local waste transporters and managers.	27%	34%	5%	23%
Manage all hazardous waste using authorised transporters and managers.	19%	26%	21%	23%
Temporarily store them, following the same guidelines applicable to other hazardous wastes.	19%	28%	18%	23%

Our projects, in figures

The satisfaction index of our customers, the production figure or deadline meeting indicators are key in managing a project to the highest standard. They help us to assess our performance. In the case of interactions with the environment and society, having objective data, that helps to measure the environmental and social performance of projects, is necessary.

The **Sustainability Management System** implemented at works makes it possible to assess the social, environmental and economic impacts associated with these works using indicators, which allows FCC Construcción to take better decisions based on the data obtained in real time.

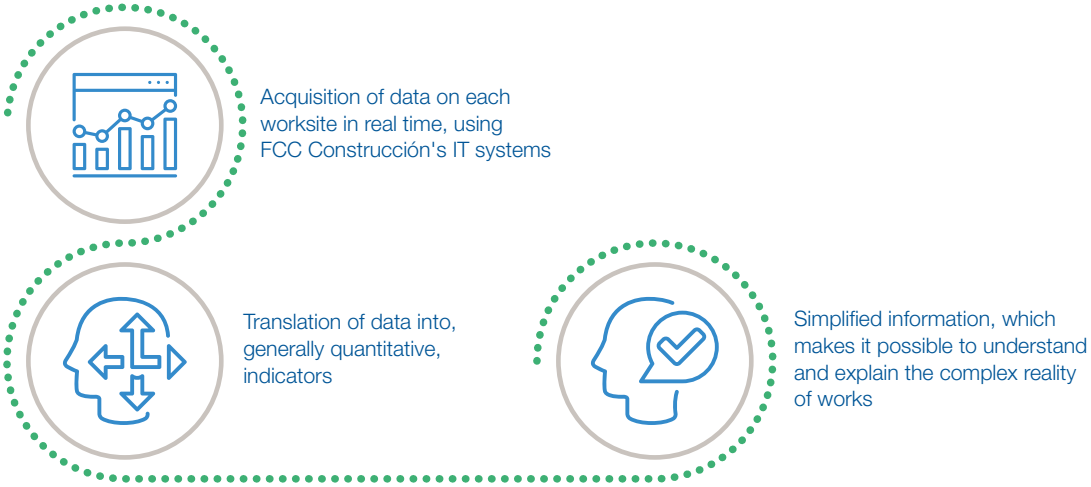
To this end, FCC Construcción's Sustainability Management System defines different indicators relating to environmental, social, economic and productive aspects. On the one hand, these indicators make it possible to assess aspects associated with our activities and, on the other, measure efforts and results, always with a view to improving them.

The system allows the company to revise trends and verify the effectiveness of the operating control employed on site, in addition to harnessing opportunities and synergies generated at the company. Furthermore, it offers reliable and comparable data that can be reported to our stakeholders.

Each of FCC Construcción's works or centres provides information, at least once every four months, thus guaranteeing that the data available is updated at all times. By integrating this data at a corporate level, average values are obtained, as reflected in the tables in this section; thus, the communication of results in different spheres, whether geographic or temporal scopes is facilitated, depending on the needs of stakeholders.

Below are the average values of the indicators corresponding to building works and civil engineering works, in addition to the 81 projects performed in 2018 as a whole. Furthermore, the tables include the proportion of works in which the different scopes have been assessed. The assessment percentages, which may vary depending on the type of project and geographic, environmental and socioeconomic conditions of the surrounding area, demonstrate the quality and representativeness of all data submitted.

FCC Construcción has developed a shared reference system for explaining the interaction of works with the surroundings



Interaction with our surroundings

	Indicators	Average values	% assessed
1	Distance from closest town/city (m)	590.2 1,031.4 889.8	100% 100% 100%
2	Distance to essential services to the community, such as brigade, hospitals, official centres, airports, power stations, telephones (m)	262.5 4,971.3 4,227.8	23.1% 58.2% 46.9%
3	Distance to residential houses or industrial activities (m)	86.1 1,273.3 839.9	88.5% 72.7% 77.8%
4	Distance to final destination of waste (authorised landfills for inert or non-hazardous waste or other worksites) (km)	22.3 20.4 21.0	100% 98.2% 98.8%
5	Distance to water bodies (m)	3,256.1 1,244.3 1,896.7	92.3% 90.9% 91.4%
6	Length of watercourse affected by diversions (m)	 385.0 385.0	 16.4% 11.1%
7	Depth of water table (m)	23.0 29.8 27.5	92.3% 87.3% 88.9%
8	Simultaneous presence of hazardous substances on site (litres)	886.0 8,383.8 5,921.9	84.6% 81.8% 82.7%

Building · Civil engineering works · Total

The **proximity** of centres for the production of materials to the location of works is critical for **reducing impacts associated with the transportation** of materials, such as dust emissions, greenhouse gases or noise from vehicles, mainly, in addition to **reducing the economic cost** for the works and promoting the **contracting of local suppliers**.

To this end, knowledge of distances from the works to industrial activities, the closest town/city or main landfills in the area are considered key data in the initial planning stages.

Characteristics of the works

	Indicators	Average values	% assessed
1	Surface area occupied by the works (m^2)	25,012.2 502,526.8 349,250.5	100% 100% 100%
2	Built surface area (buildings) (m^2)	36,860.2 5,073.3 17,130.4	84.6% 65.5% 71.6%
3	Surface area of offices (m^2)	519.6 4,037.0 2,766.8	100% 83.6% 88.8%
4	Surface area of workshops (m^2)	72.0 127,209.0 109,046.6	3.9% 10.9% 8.6%
5	Surface area of the work in which HW or HS are moved or present* (m^2)	1,639.7 183,006.4 119,79.0	57.7% 50.9% 53.1%
6	Pavement or road surface area occupied by the project (m^2)	334.7 21,971.4 12,956.1	57.7% 38.2% 44.4%
7	Area of publicly-owned water or sea/land resources affected by the work (m^2)	12,981.0 24,504.5 24,024.3	3.9% 41.8% 29.6%
8	Number of persons at the works (unit)	72 159 131	96.2% 100% 98.8%
9	Number of persons at the office (unit)	12 28 22	96.2% 81.8% 86.4%
10	Number of auxiliary installations, aside from site offices (plants, workshops, prefabricated, quarries, landfills, machinery parks, etc.) (unit)	1 3 2	92.3% 87.3% 88.9%
11	Number of internal combustion engine vehicles and machines on site (except power generators) (unit)	7 34 26	80.8% 83.6% 82.7%
12	Number of power generators present on site for more than 5 days (unit)	2 5 4	38.5% 74.6% 62.9%
13	Number of road diversions (unit)	5 13 11	50.0% 61.8% 58.0%

* HW: Hazardous Waste. HS: Hazardous substances

Building · Civil engineering works · Total

The construction of infrastructures generates landscape alterations Therefore, the **previous studies** necessary to minimize the impact and establish, from the beginning, mechanisms to **preserve the ecosystems** close to the worksite are performed. An a**dequate forecast** of the displacements, surface area to be occupied, duration of work and natural resources affected, in addition to other factors, makes it possible to **reduce impacts**.

Production of materials

	Indicators	Average values	% assessed
1	Production at the concrete plant (m^3)	67,340.0 67,340.0	20.0% 13.6%
2	Production at the asphalt concrete plant (t)	22,274.2 22,274.2	1.8% 1.2%
3	Production at the aggregates plant (t)	33,269.3 33,269.3	18.2% 12.4%
4	Spreading bituminous mix at the site (t)	271.9 3,064.3 2,655.7	23.1% 63.6% 50.6%
5	Spreading concrete at the site (m^3)	4,078.6 17,257.7 12,864.7	100% 94.6% 96.3%
6	Amount of steel used on site (t)	422.2 1,633.4 1,224.4	100% 92.7% 95.1%
7	Percentage of electricity consumption at night	6.7 10.4 9.0	92.3% 74.6% 80.3%
8	Amount of non-ferrous metal used on site (t)	15.3 7.9 12.4	92.3% 29.1% 49.4%
9	Surface area of the brick factory (m^2)	9,774.3 2,588.9 6,780.4	80.8% 27.3% 44.4%
10	Surface area of glass (m^2)	4,003.9 7,754.3 5,254.1	100% 23.6% 48.2%

Building · Civil engineering works · Total

The **appropriate design** of a building and the associated activities makes it possible to **optimise** the consumption of materials and **reduce** waste generation, while contributing to **minimising the subsequent use of energy**, thus reducing the environmental impact on the area during the entire lifecycle of the project.

Large-scale earth movements are common in most of the construction projects. The minimisation of environmental impacts associated with these movements involves **appropriately planning** soil management, optimising the use of resources and promoting the r**euse of material from the worksite itself**, thus reducing the production of waste and emissions and other impacts associated with transport.

Volumes managed

	Indicators	Average values	% assessed
1	Volume of flammable/combustible substances store (wood, paper, etc.) (m³)	3.7 6.7 5.7	73.1% 76.4% 75.3%
2	Volume of harmful or hazardous substances stored that could break accidentally (m³)	6.6 420.5 322.3	53.9% 81.8% 72.8%
3	Volume of aggregates and other material collected that lead to water turbidity (m³)	1,935.1 13,676.1 11,719.2	11.5% 27.3% 22.2%
4	Volume of river water extracted (m³/year)	4,500.0 42,069.6 39,386.1	3.9% 23.6% 17.3%
5	Volume of well water extracted (m³/year)	7,838.0 1,180.2 1,655.8	3.9% 23.6% 17.3%
6	Volume of water consumed in different concrete production activities and the irrigation of levelled areas and road surfaces (m³/year)	1,381.0 5,718.6 3,904.7	88.5% 58.2% 67.9%
7	Volume of topsoil needed on site (m³)	158.9 4,900.7 4,246.6	15.4% 45.5% 35.8%
8	Volume of demolitions (m³)	4,566.6 3,302.7 3,504.9	30.8% 76.4% 61.7%
9	Volume of blasting (m³)	 24,888.8 24,888.8	 20% 13.6%
10	Volume of bulk material employed on site (soil, graded aggregates, aggregates and concrete) (m³)	7,942.4 84,482.0 62,158.0	80.8% 92.7% 88.9%
11	Volume of earth moving (excavations plus filler, clearings plus embankments) (m³)	9,479.8 148,579.8 102,800.0	100% 96.4% 97.5%

The **use of water** is essential in performing construction activities. The **correct planning**, construction of effective storage systems and use of control mechanisms, such as counters or the analysis of water quality, allow both the consumption and composition of waste disposal to be monitored. Therefore, this contributes to **reduce the impact on natural sources**, like rivers or lakes, while promoting the **reuse of water** at the site itself.

	Indicators	Average values	% assessed
12	Volume of loans and quarries operated (m^3)	34,809.0 34,808.96	20% 13.6%
13	Volume of land and debris sent to landfills (m^3)	8,767.07 56,880.29 39,807.85	84.6% 72.7% 76.5%
14	Expected volume of landfill (m^3)	37,264.12 37,264.12	30.9% 20.9%
15	Volume of soil contaminated by factors outside the work's control (m^3)	155.6 14,251.6 10,224.2	15.4% 18.2% 17.3%
16	Volume of dredged inert sludge or non-hazardous waste forecast (m^3)	42,743.8 42,743.8	7.3% 4.9%
17	Volume of containment sludge used (bentonite) (m^3)	174.8 10,741.0 8,819.9	7.7% 16.4% 13.6%
18	Volume of paints, solvents, release agents, concrete curing liquids, accelerators, concrete liquefiers, antifreeze and epoxy resins employed (m^3)	217.3 40.03 98.3	88.5% 85.5% 86.4%
19	Volume of land dedicated to filling tasks extracted from the site itself (m^3)	8,448.8 48,415.1 40,120.2	42.3% 76.4% 65.4%
20	Volume of land dedicated to filling tasks extracted loans or other works (m^3)	1,069.8 27,517.2 22,331.4	38.5% 74.6% 62.9%
21	Volume of graded aggregate on site (m^3)	1,254.5 4,212.2 3,569.2	38.5% 65.5% 56.8%

Building · Civil engineering works · Total

Our System of Good Practices

FCC Construcción's environmental objectives are reflected in its Good Environmental Practices System®[1] an in-house model that set the trend in the sector when it was first established by the company in 2000.

The system comprises a series of actions performed voluntarily at FCC Construcción's sites, which define environmental targets that are more demanding than those established by the applicable environmental legislation or the requirements of customers or third parties. The application of these good practices ultimately seeks to prevent or minimise the environmental impact of the projects.

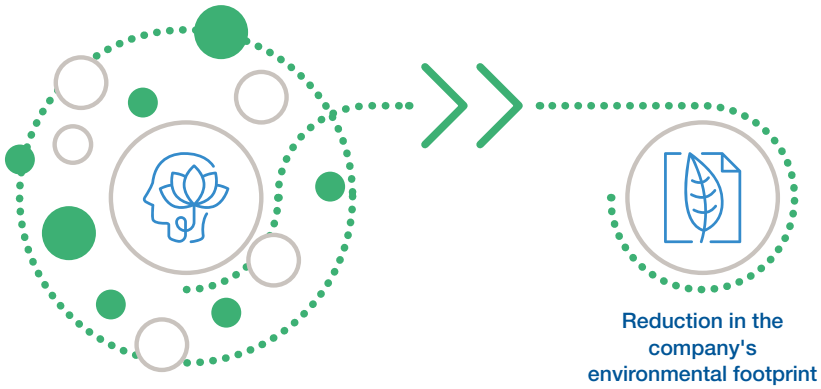
FCC Construcción's Good Practices System includes actions that are standard practice in the industry, as is the case of irrigation of roads to reduce dust emissions, the use of rubber cloaks or intermediate barriers to reduce impacts caused by blasting or the reuse of inert waste from other sites as filling material. By systematising the application of these actions at all FCC Construcción's sites, they have formed part of a comprehensive planning process, which includes the preliminary identification of impacts and the quantification of the environmental footprint of actions. As part of this process, merging measurement criteria facilitates the interpretation and comprehension of the good practices, which in turn helps us to learn from our mistakes and achievements and identify improvement opportunities.

In the daily activities on worksites, the Good Practices System is applied as follows: depending on their appropriateness and applicability, each work selects the actions and degree of application that can be implemented, from a series of measures defined by the system. Each action is scored to assess its scope, which is the most representative indicator of efforts in the application of good practices by the site.

Best practices are assessed based on two parameters: the importance of the best practice and its implementation degree or target (magnitude).

By multiplying these two parameters, a score is obtained for this specific action. When adding together the scores of all best practices applied on site, the total must be higher than the minimum target set by the company. Regardless of the good practices selected for each project, which are more specific and relevant, all sites must implement voluntary actions that improve their environmental performance. When translating these actions into a scoring system, FCC Construcción is able to systematise and measure the environmental performance of the project.

Elements of the Good Environmental Practices System



Voluntary actions implemented at FCC Construcción works

- Economically feasible
- Positive for the community

Reduction in the company's environmental footprint

[1] FCC Construcción 2009. "System for evaluating environmental performance through good practices".

The **System of Good Environmental Practices** at FCC Construcción allows us, through **voluntary actions** on site, to exceed the requirements of environmental legislation and achieve, in addition to excellence and quality in projects, a constant assessment and control over their environmental impact.

Parameters for the assessment of good practices

Importance

Indicates the importance to the organisation.

Assessed on a scale of 1 to 3: if the impact of the action on improving ultimate environmental quality is higher or its application requires greater economic, technical or logistic efforts, the highest score is awarded (3). If it is lower, a score of 2 or 1 (minimum score) is awarded.

Magnitude

Indicates the degree to which the practice has been developed.

The highest score (3) is awarded when the implementation of the action is more widespread or technological improvements are applied. If the implementation degree is lower, the score will be 1.

Result of the assessment

General data on Good Environmental Practices

	Total FCC Construcción: 84 works		
	Building: 28 works	Civil engineering works: 56 works	Total
Works contributing data on the good practices	27 (96%)	54 (96%)	81 (96%)
Average number of good practices applied per worksite	21	25	24

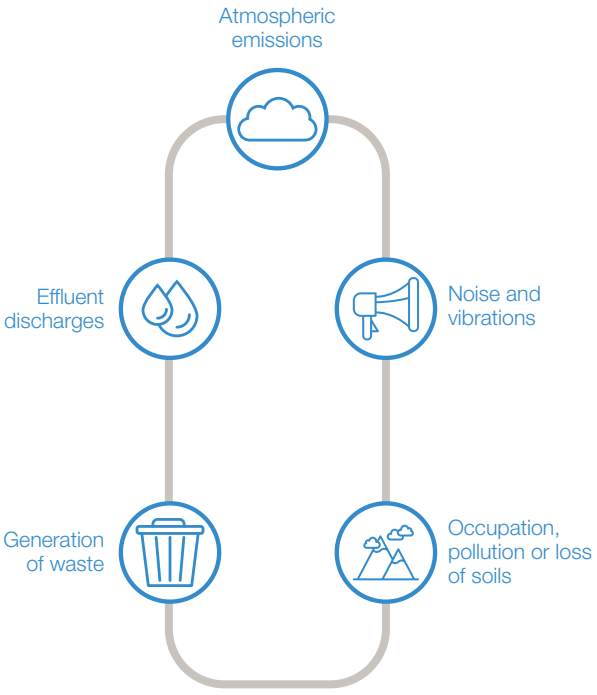
Data of works executed by FCC Construcción in 2018. Does not include data of FCC Industrial.

FCC Construcción **assesses** voluntary actions to improve the effort required in the application of Good Environmental Practices at works using a scoring system, then systematises these actions to **measure the environmental performance of each project**.

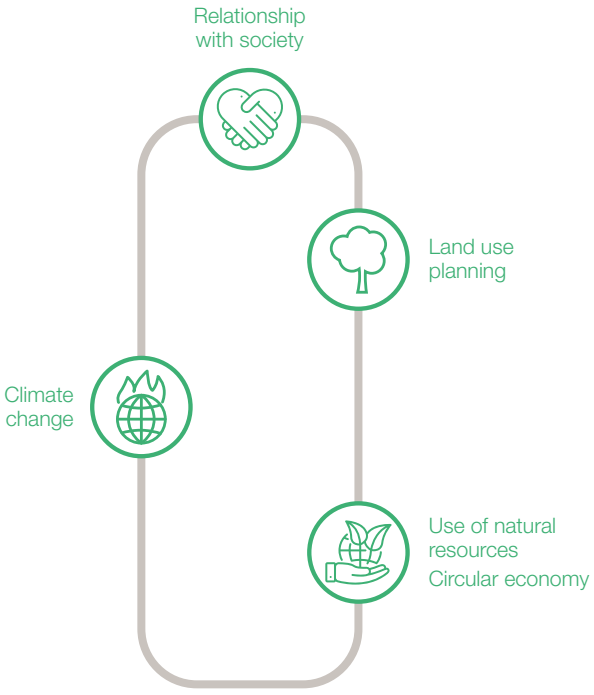
The Good Practices System provides FCC Construcción with a range of data on its actions, which are presented with standardised, shared criteria across all projects. This facilitates the internal management of information, the continuous measurement of performance and, in particular, the learning and continuous improvement process. The cycle is rounded off with the dissemination of information to stakeholders, for example, this Environmental Report. This exercise helps to promote respect for the social and environmental surroundings among all the organisation's stakeholders.

The good practices of FCC Construcción can be divided into the following categories

One-off impacts



Impacts on a larger scale



From the data obtained through monitoring actions on the 81 projects reporting on good practices in 2018, the following conclusions can be extracted:

- Given the relevance of training in-house staff and subcontractors to correctly implement good practices, specific actions were scheduled for completion. In 2018, these included the environmental course for workers at FCC Construcción, completed by production staff at 90% of the worksites, and the environmental awareness raising talks on subcontracted activities, of one hour length, imparted at 91% of worksites. To support this training and promote compliance, 92% of projects have employed environmental signposting on site, with in order to inform and raise awareness among staff working there.
- In 2018, 92% of the works involved subcontractors that apply some form of environmental management system, which contributes to improving the environmental performance of the project.
- To reduce dust emissions generated by construction work as much as possible, the most frequent good practices employed have been irrigating roads and stockpiles with water, performed at 93% of works, and limiting the speed of vehicles travelling around worksites, which has been applied in 90% of all cases.
- To minimise the inconvenience that may have been caused due to the noise and vibrations generated, bearing in mind the conditions of the surrounding area when planning the work schedule is essential. This practice has been performed in 94% of projects. Furthermore, 92% of works have used modern, more efficient and silent machinery.

Training and raising awareness among staff are essential in effectively implementing good environmental practices, while making it possible to obtain their input to improve the environmental initiative implemented as part of FCC Construcción's Good Practices System.

Information on the implementation of **good practices** was provided by **96% of worksites** performed by FCC Construcción in **2018**.

The use of **modern machinery**, accompanied by good practices in preparing worksites at which work is performed, allows for both the **noise and dust emissions** associated with the movement of vehicles **to be reduced**.

One good practice that **minimises impacts** on water bodies is the placement of **barriers to prevent the turbidity of water**, which catch solid waste.

- The potential pollution of water and soil in the areas around works has been avoided at 86% of sites, with chute washing areas waterproofed and signposted accordingly.
- To prevent other impacts on ecosystems, treating water before it is disposed of is essential. Therefore, at 84% of works, basins were used to separate effluents, with or without using additives, in effluent discharges and processing water.
- Both during the execution of projects and once they have been completed, measures must be implemented to prevent long-term impacts on soils or landscape. Thus, 88% of projects undertaken involved work to restore the environment in the areas affected by the worksite. Furthermore, to minimise the occupation and compaction of the soil, occupied areas were limited at 94% of works and access areas at 93% of works.
- At 89% of the works performed in 2018, guidelines were established to prevent accidental spills. Therefore, should any spill happen, the impact on the land and immediate surroundings would be mitigated insofar as possible.
- Given that dirt at works entrance and exit points and the occupation of pavements are two elements that cause most inconvenience to nearby towns and cities, measures have been applied to relieve these impacts: at 86% of our works, in terms of entrance points, and at 88% of our works, in terms of the occupation of pavements.
- At 94% of our projects, we have managed to reduce inert wastes which were destined for landfills, compared to the initial project forecasts. It is also worth noting that in 89% of projects, loans were lower than initially expected. These measures clearly contribute to promoting the circular economy in the construction industry.

Washing the wheels of lorries when they exit the worksite, using specially designed platforms, is one of the most common good practices to reduce dirt and minimise our impact on the urban or rural environment closest to our operations.

Transplantations make it possible to improve the aesthetic results of work and prevent plant species from being directly affected, which are removed before any work is carried out and subsequently returned to their place of origin.

- Actions were implemented at 87% of worksites to manage surplus excavation and 92% of worksites reused topsoil that had been removed. These actions seek to reduce the consumption of natural resources and the associated generation of waste.
- Transplantations were performed at 93% of worksites to preserve the original plant life and the associated ecosystem functions.
- Finally, we would like to emphasise the efforts made to promote a better relationship with local communities. In addition to registering claims and complaints from stakeholders at 89% of worksites, at 96% of worksites, actions have been performed to improve the general relationship with stakeholders. At 88% of projects, these measures specifically focussed on residents affected by the works.

The information gathered in 2018 by the Good Practices System is addressed in greater detail in chapters 6 and 7, where a description of the actions in each category is performed with the corresponding implementation percentage. In addition, the effects of these preventive measures on reducing the environmental risks of projects are described. The implementation of good practices is reflected in different case studies that describe their application, usefulness and results in specific circumstances.

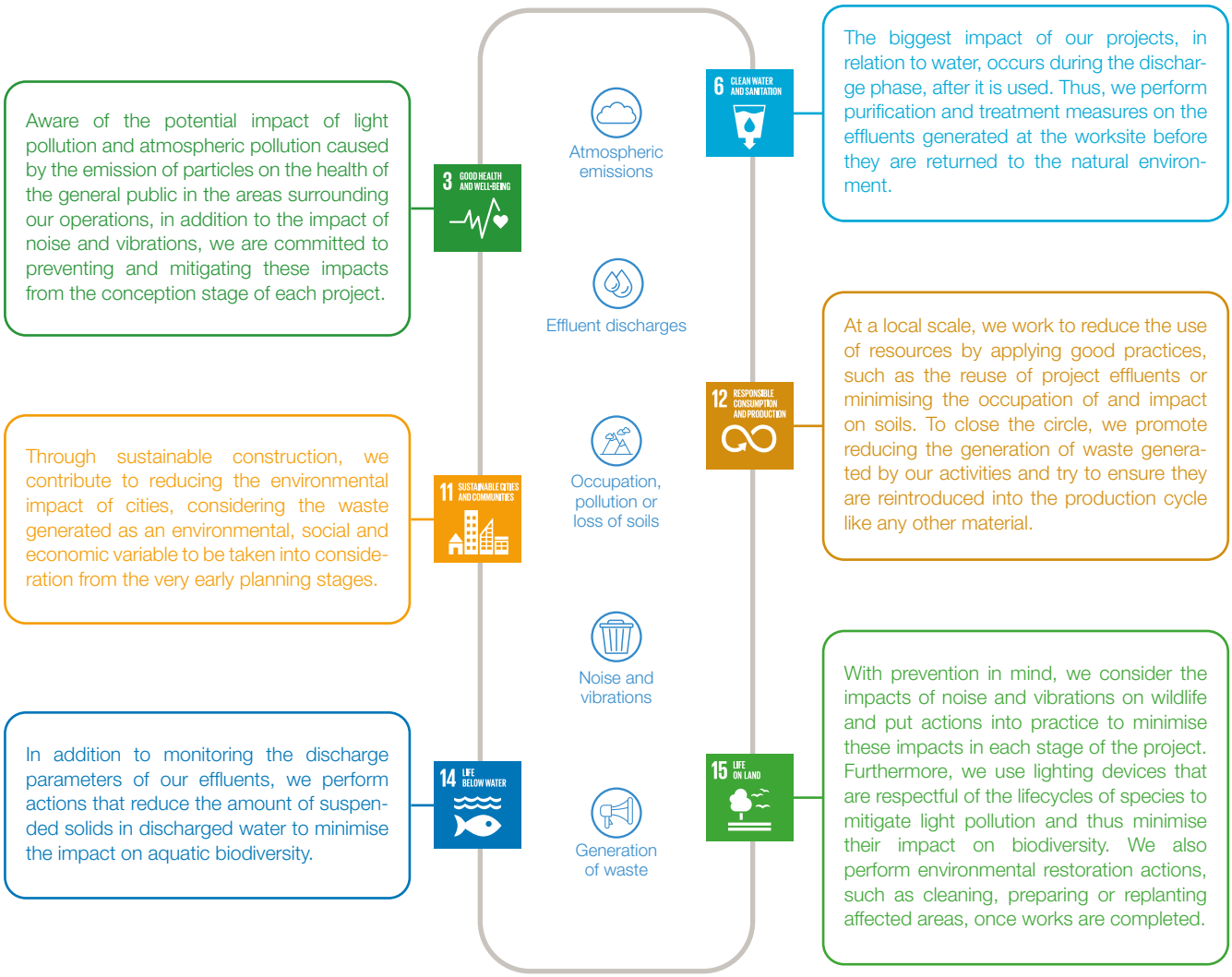
5.

At the right time and place

FCC Construcción is aware of the impact of its activities on the immediate surroundings. Construction activities are designed to improve the general public's quality of life. However, until this objective is achieved, the areas surrounding the works are subject to the temporary impacts and disturbances that FCC Construcción seeks to prevent or reduce by implementing effective preventive and corrective measures from the very beginning of the project.

The real benefit of projects for society as a whole must be defined at the conception stage through to the end of its useful life. With this objective, daily actions and good practices that prevent or, as applicable, minimise any potential environmental and social impact have to be described.

Our local contribution to the Sustainable Development Goals



Emissions

Construction is an activity sector that does not generate significant atmospheric emissions. However, they exist and require our attention. The most significant emissions, proportionately, are dust particles, and their impact may be considered occasional and localised close to the worksite.

To a lesser degree, pollutants such as NOx, SOx and VOCs are generated as a result of the use of motorised devices, combustion processes and other processes, such as paving work. These substances, unlike dust particles, can have an impact beyond the limits of the project's boundaries. Moreover, when there are high concentrations in the atmosphere, they can cause phenomena like smog and the formation of tropospheric ozone (phenomena inherent to metropolitan areas) as well as acid rain.

Other significant emissions generated by combustion as part of transport and the use of machinery are greenhouse gas emissions. These emissions contribute to climate change and, in essence, comprise of CO_2, CH_4 and H_2O molecules (steam water). These molecules can be found naturally in the environment, but an increase in their concentration in the atmosphere is causing impacts on a global scale. Aware of the importance of climate change and with a view to complying with SDG 13 on climate change, FCC Construcción has included the fight against climate change in its Global Strategy. These efforts have been reflected in this Environmental Report under the section dedicated to Climate Change, which can be found in the next chapter.

Finally, the light pollution generated as a result of work performed at night must be taken into consideration. This phenomenon can have an impact on the sleep patterns of both humans and animals, and change the lifecycles of plant and animal species.

Risks and opportunities

USE OF PERSONAL PROTECTIVE EQUIPMENT AND THE RATIONAL USE OF EQUIPMENT...

1. Irrigation of paths and stockpiles
2. Use of screens
3. Use of dust control systems
4. Use of shoots for disposing of rubble
5. Creation of value by improving on levels required
6. Adequate maintenance of machines
7. Speed limits
8. Control and limiting the use of lights at night

...REDUCTION IN RISKS ASSOCIATED WITH EMISSIONS GENERATED AT WORKS

- Climate change
- Increase in the index of particulate matter (dust)
- Increase in VOCs
- Reduction in environmental quality
- Light pollution

Good practices

Given the importance of atmospheric emissions (mainly, dust particles), all works performed by FCC Construcción incorporate good practices to mitigate these impacts insofar as possible, based on the type of project and specific characteristics of its location.

In addition to other good practices, this includes preventive maintenance on equipment, which are handled using energy efficiency criteria; the irrigation of surfaces; limiting the use of lights at night and the use of different covering systems in activities that involve transporting debris.

The following table contains the good practices relating to all types of atmospheric emissions that were applied at the works performed by FCC Construcción in 2018.

Good practice	Importance	Magnitude (degree of implementation)		
	% of application	1	2	3
Reduction of dust by spraying tracks and stockpiles with water.	2 82% 98% 93%	Sporadic application. 17% 13% 14%	Frequent application. 72% 56% 60%	Systematic application. 11% 31% 26%
Use of additives in spray water to create surface crust, paving of tracks and other lasting dust control practices.	1 100% 50% 60%	Sporadic application. 0% 50% 33%	Frequent application. 100% 50% 67%	Systematic application. 0% 0% 0%
Use of screens to prevent dust dispersion.	1 75% 67% 69%	In more than 30% of the perimeter of the site where the dust is generated. 33% 38% 36%	Idem, more than 60% 0% 38% 28%	Idem, more than 90% 67% 24% 36%
Use of molecular crushers in installations that generate dust, such as aggregates treatment plants, etc.	2 0% 50% 50%	Crushers in more than 30% of dust generation points. 0% 33% 33%	Idem, more than 60 % 0% 67% 67%	Idem, more than 90 % 0% 0% 0%
Use of drilling machinery with dust damping system, use of water curtain in the outlets of ventilation ducts or other systems for collecting dust.	3 100% 75% 77%	Implementation in one activity. 100% 56% 60%	Implementation in two or more activities. 0% 33% 30%	Implementation in five or more activities. 0% 11% 10%
Improvement over the levels required by law relating to controlled parameters (opacity of discharges, suspended particles, etc.)	3 50% 40% 43%	Systematic obtaining of pollution levels better than those required in more than 5% of all controlled paraments. 100% 50% 67%	Idem, in more than 15%, or in more than 30% of half of the controlled parameters. 0% 0% 0%	Idem, in more than 30% of all controlled parameter. 0% 50% 33%
Suitable maintenance of machinery operating on site.	2 86% 76% 79%	Preventive maintenance –additional to that required by law– in at least 30% of machines operating on the worksiite 50% 34% 39%	Preventive maintenance –additional to that required by law– in at least 60% of machines operating on the worksite. 17% 34% 29%	Preventive maintenance –additional to that required by law– in at least 90% of machines operating on the worksite. 33% 32% 32%
Environmentally-friendly night lighting	1 82% 75% 77%	Directional instead of area lighting over at lest 30% of the area or automatic switching on and off. 56% 61% 59%	Directional instead of area lighting over at least 60% of the area or automatic switching on and off. 44% 22% 30%	Directional instead of area lighting over at least 90% of the area or automatic switching on and off. 0% 17% 11%
Use of ducts for tipping rubble from heights and covering of containers with canvas.	1 67% 57% 63%	In more than 30% of containers. 50% 0% 30%	Idem, more than 60%. 33% 25% 30%	Idem, more than 90%. 17% 75% 40%
Suitable control of vehicles' speed on the site.	1 75% 94% 90%	More than 30% of the tracks on the site have speed limit signs. 11% 16% 15%	Idem, more than 60%. 22% 38% 35%	Idem, more than 90%. 67% 46% 50%

Good practice	Importance	Magnitude (degree of implementation)		
	% of application	1	2	3
Reduction of dust emission in auxiliary premises.	2 50% 29% 33%	Shielding of some elements of the premises. 100% 50% 67%	Individual enclosure of some dust producing equipment of the premises. 0% 50% 33%	Enclosure of the premises as a whole. 0% 0% 0%
Appropriate selection of the location for dust producing machines and activities.	1 75% 82% 80%	There is written/graphical planning of the areas where the machines and activities that can generate dust will be located. 33% 45% 42%	In addition, the planning considers the surrounding environment to locate these areas as far away as possible from potential receptors. 0% 33% 25%	In addition, the planning is dynamic and considers the relocation of these areas in accordance with the determining factors of the project and the environment. 67% 22% 33%
Paving of the worksite's tracks in order to reduce dust dispersion.	2 100% 78% 80%	Paving of entrances and exits. 0% 14% 13%	Paving of entrances and exits and more than 10% of the site's tracks. 0% 14% 13%	Paving of entrances and exits and more than 20% of the site's tracks. 100% 72% 74%
Reduction of the fuel gas emissions from vehicles and machines.	2 67% 79% 75%	Motors' turning-off from vehicles and machines which are not being used. 75% 36% 47%	In addition, minimisation of the construction traffic on site. 25% 55% 47%	In addition, usage of low-sulphur fuel. 0% 9% 6%

Building
Civil engineering works
Total

Protection elements, such as shoots for disposing of debris, are a simple measure that make it possible to reduce dust emissions into the atmosphere and that facilitate keeping work sites clean as they concentrate dirt.

By using machinery that is as modern as possible, that is the most suited to the task in question and ensuring that ideal conditions are maintained, we are able to ensure that fuel consumption is efficient and avoid increasing atmospheric emissions.

Data and key indicators

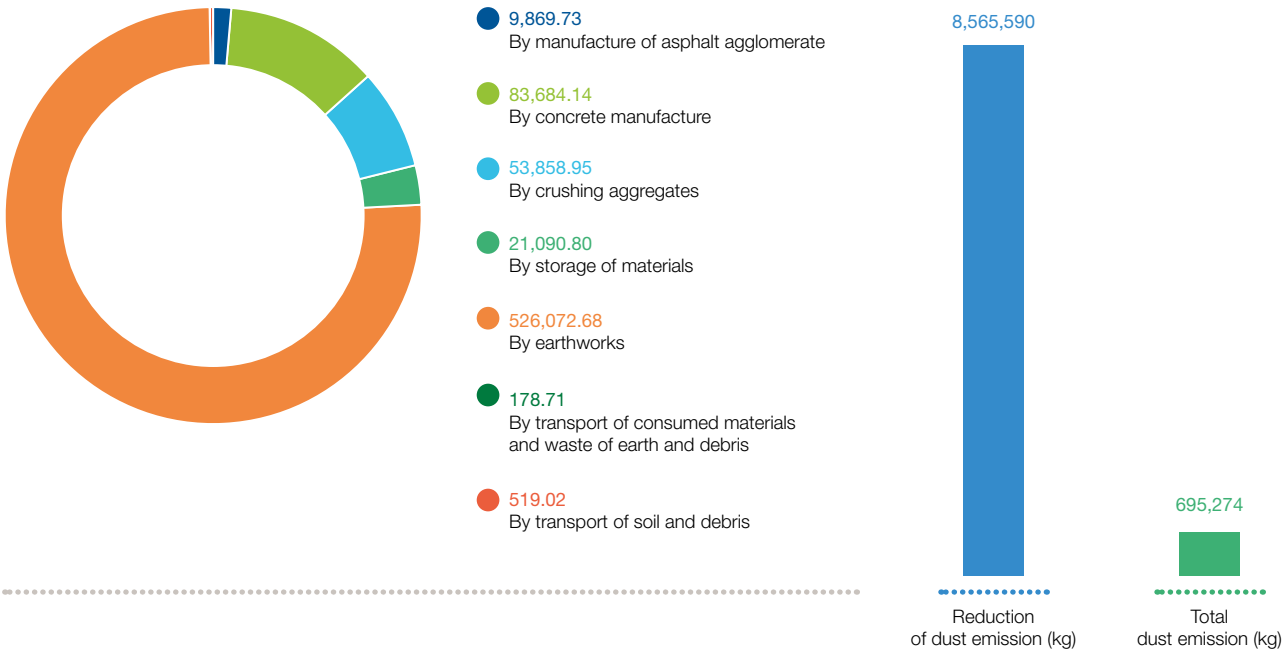
Earthworks, the use of construction materials, their transportation and, in many occasions, activities such as drilling, blasting or demolition are just a few of the actions commonly performed at worksites that generate atmospheric emissions that can have an impact on **atmospheric quality**.

Dust emissions represent the most significant part of emissions generated by construction projects. In 2018, a range of measures were implemented at works performed by FCC Construcción to reduce dust emissions and mitigate their impact on the surrounding areas. The irrigation of paths and stockpiles, performed at 93% of worksites, is worth particular mention, as are the speed limits to which vehicles are subject in the areas surrounding worksites, implemented at 90% of worksites. Furthermore, at 80% of works, dust emissions have been reduced by paving entrances and exits and by dynamically planning the location of machinery and points at which activities generating the highest levels of emissions are performed.

The efficient and responsible use of vehicles and machinery is essential for reducing the emissions of combustion gases associated with these devices. This responsible use is specially significant in the case of machinery used to perform earthworks, which is a particularly relevant works unit at practically all construction projects. In this connection, 75% of the projects performed in 2018 have implemented initiatives to this end, for example, shutting down vehicle engines when they are not in use and, of these, 7% have used fuel with a low sulphur content. Furthermore, preventive maintenance on machinery, which ensures it works correctly, and the efficient use of fuel, has been performed at four out of five works, 79%.

The application of good practices implemented to reduce the **dispersion of dust** in 2018 has seen these emissions reduced by **8,566 tonnes**.

Dust emissions (kg)*



*Data for all construction work executed by FCC Construcción in 2018, excluding data from FCC Industrial

At each site, the lighting conditions respond to operating and security needs, while ensuring respect for the surrounding area.

Emission of pollutants not associated with greenhouse gases

Emission of pollutants (kg)	Construction Area*	FCC Construcción
Total NOx emissions	102,404.43	102,273.69
Total SOx emissions	2,518.53	2,518.45
Total particulate emissions	697,811.62	695,274.04
Total emissions	**802,734.58**	**800,066.18**

* The Construction Area includes FCC Construcción and FCC Industrial. FCC Construcción is the part of the organisation responsible for executing building and civil engineering projects. FCC Industrial is an own brand that brings together various specialised companies. It includes data on FCC Industrial and Energy Infrastructures (FCC IIE), Matinsa, Prefabricados Delta and Megaplas.

Excess light at night can affect the lifecycles of humans and animals, causing stress and other health problems. Therefore, it is increasingly more common for projects to consider the impacts of **light pollution**, in such a way that the lighting systems used at night at works are respectful of natural lifecycles.

In 2018, 77% of the work performed by FCC Construcción used a lighting system at night that was respectful of the environment, making it possible to reduce the consumption of electricity in turn. To this end, timers were installed that make it possible to automate on and off times, and motion detectors or directional lighting systems allowed a single area to be illuminated. The type of lighting and its control depend on the type and needs of the project, in addition to the characteristics of the surrounding area.

CASE STUDIES

Lima Metro

Client Ministry of Transport and Communication. Peru.

Period of execution 62 months

_Problem detected

One of the environmental aspects to which FCC Construcción pays most attention is the release of dust into the atmosphere since it may produce the detriment of air quality, effect on the health of individuals and ecosystems, and have a significant impact on the climate.

In the case of Lima Metro (Peru), repairing cracks in the paving slabs at stations has involved a process of cutting concrete. This process consist of applying a special treatment to the cracked material, a dry grinding process, which has the undesired effect of generating dust.

_Adopted solutions

To prevent dust emissions to the environment, generated along cutting concrete process, enclosures were designed using moistened raschel mesh. These structures were specifically placed depending on the direction of the wind to avoid the dispersion of particles and, therefore, reduce the impact on air quality.

This type of mesh is manufactured using high-density polyethylene (HDPE) woven at different densities and treated to resist contact with UV rays. Therefore, it is particularly easy to handle and useful as a measure of preventing the release of dust into the air.

_Results

We have verified that this method substantially reduces the release of dust particles into the atmosphere in the cutting area, as they are captured by the mesh around the enclosure. As a result, the adverse impact on air quality has been reduced, improving the well-being and health of both operators on site and residents in the nearby area.

An operator dampens the raschel mesh around the concrete cutting area.

The mesh is easily positioned depending on the direction of the wind to prevent the dispersion of particles.

Noise and vibrations

Among the main environmental impacts associated with construction operations, the generation of noise and vibrations are worth particular mention. Workers on site, local residents and wildlife in the area are subject to an impact that is intense and, sometimes, prolonged.

Constant exposure to noise and vibrations is not only a significant inconvenience, it can also have an impact on the health of individuals and the balance of habitats, leading to insomnia and influencing the way of life of different animal species residing in the surrounding area.

Risks and opportunities

MITIGATING THE NOISE AND VIBRATIONS GENERATED BY OUR ACTIVITIES...

1. We use noise and vibration reducing devices
2. We consider the conditions of the environment during planning
3. We reduce the impacts of blasting
4. We go beyond the requirements of the regulations
5. We use modern machinery
6. We limit the speed of vehicles
7. We use machinery rationally

...REDUCING THE ASSOCIATED RISKS THAT AFFECT THE ENVIRONMENT

- Noise pollution
- Inconvenience caused to local residents
- Impact on the reproduction cycle of wildlife

The integrated planning process considers the environmental conditions, with the purpose of limiting the noisy activities to times of the day or of the year when they cause less nuisance, so that they have a reduced impact on local communities or animal species that live in the surroundings of the project.

Good practices

Noise and vibrations are two aspects that must be assessed and prevented in all stages of the lifecycle of construction projects. This control contributes to mitigate their adverse impacts from the planning stage through to the execution of the works.

The following table contains the good practices adopted at FCC Construcción works in 2018 to reduce noise and vibrations. In addition to the degree of progress achieved, the table also specifies the magnitude reached by our buildings and civil engineering works.

Good practice	Importance	Magnitude (degree of implementation)		
	% of application	1	2	3
Use of devices to reduce noise and vibration in installations or machinery on site, with silencers, anti-noise barriers, shock absorbers, etc.	3 75% 74% 74%	Presence of these devices in some equipment that is considered critical. 100% 50% 58%	Idem, in 50% of the equipment considered critical and in 50% of that used at night. 0% 21% 18%	Idem, in 100% of both critical equipment and that used at night. 0% 29% 24%
Rubber lining in hoppers, mills, sieves, containers, buckets, etc.	2 100% 33% 40%	Presence of rubber lined elements. 100% 67% 75%	More than 30% of these elements are protected against noise. 0% 33% 25%	Idem, more than 60% 0% 0% 0%
Consideration of environment conditions in the work programme.	2 93% 94% 94%	Limitation of noisy activities to times when they cause less nuisance. 100% 73% 80%	Limitation of noisy activities to times or the year when they cause less nuisance. 0% 15% 11%	Frequent temporary interruption of work as a function of external conditioners. 0% 12% 9%
Reduction of the effects of blasting.	2 0% 56% 55%	Protection of the area affected using rubber blankets, placement of intermediate barriers between the area affected and the origin of the blasting or protection using canvas, meshes or any other device of sensitive elements. 0% 80% 17%	In addition, use of low-density explosives. 0% 0% 33%	In addition, reduction of the quantity of explosives using micro delay in blasting or preparation of de-coupling or spacing out the explosives. 0% 20% 50%
Improvement over the levels required by law for controlled noise levels.	3 50% 56% 68%	Systematic obtaining of sound levels better than those required by 5%. 100% 80% 62%	Idem, more than 15%. 0% 0% 23%	Idem, more than 30%. 0% 20% 15%
Use of modern machinery.	2 92% 91% 92%	Percentage of machinery with CE mark (own and that of sub-contractors) > 50%. 14% 19% 17%	Idem, more than 70%. 0% 19% 12%	Idem, more than 90%. 86% 62% 71%

Building
Civil engineering works
Total

Data and key indicators

FCC Construcción's Good Practices System contains different measures to prevent or mitigate the harmful effects caused by the noise and vibrations generated by our projects. The use of modern machinery or the corporate requirements to establish stricter limits than those established in the regulations for noise levels are two of these good practices. Another important task in this field is the consideration of the environmental conditions in our work programmes. Furthermore, specific noise and vibration reducing devices are fitted to equipment, if needed.

In 2018, FCC Construcción performed preliminary studies related to the environmental conditions of the surrounding area in 94% of the projects. This helped to reduce the adverse impact on neighbouring areas and the surrounding natural environment, limiting noisier activities to hours of the day or times of the year when least nuisances are caused. In addition the noise levels required by the legislation were improved at 55% of the worksites. Furthermore, 92% of the projects used modern machinery bearing an EC approval mark, that is quieter and more respectful of the environment. Specifically, at 55% of worksites where blasting takes place, the impact of this work activity has been mitigated by using rubber blankets and low-density explosives.

At **74% of projects**, devices are used to decrease noise and vibrations, such as dampening devices, buffers or anti-noise barriers.

The use of modern machinery ensures that noise pollution is reduced insofar as possible, both in terms of intensity and time during which neighbours are exposed to its effects.

The use of advanced technology makes it possible to analyse the intensity of noise at worksites in real time and, as a result, reduce response times to implement corrective measures that reduce the impact on residents and the natural environment.

CASE STUDIES

Playa Blanca pier

Client Ports of the Canary Islands

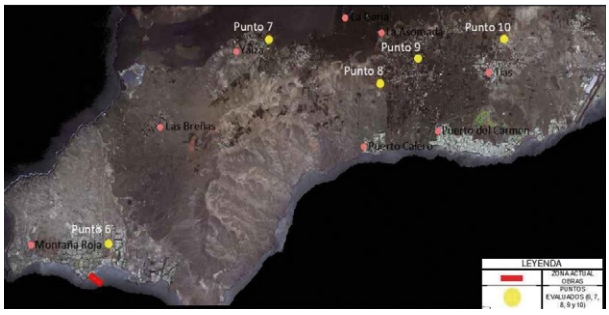
Period of execution 48 months

_Problem detected

Noise is harmful to local residents and wildlife. It is commonplace as part of construction projects to perform the noisiest activities at specific times or seasons to reduce the impact on residents (school hours, medical services, at night, etc.) or wildlife (mating and reproductive seasons, etc.).

The project to expand Playa Blanca pier in Yaiza (Lanzarote) was completed in an urban area that is home to commercial, port and residential activities. With a view to reducing the impact of works, a metrological control was performed on noise levels, using calibrated equipment that was positioned close to population hubs and the worksite, in addition to areas close to the quarries supplying material to the worksite.

The results demonstrated that at some times of the year, noise levels exceeded the limits set out in the legislation (65 dB during the day and 55 dB at night). The most affected areas were the road taken by lorries to reach the port and around the former sailing school.



Noise sampling points outside the worksite

Noise sampling points close to the worksite.

_Adopted solutions

In order to prevent the generation of noise beyond the legal limits and, as applicable, act immediately to reduce these levels, a range of different initiatives were performed. First, the noise levels generated close to the worksite were measured on a regular basis. Second, a barrier was set up along the perimeter of the worksite to act as an acoustic buffer. Furthermore, checks were performed to make sure working hours respected the activities of local residents, especially at night.

Furthermore, actions were implemented to verify the suitability of the preventive measures taken. To this end, machinery used at the worksite was subject to appropriate maintenance and activities were planned insofar as to avoid the concentration of vehicles and machinery.

_Results

As a result of the measures taken, noise levels taken from all control points were reduced in successive months. In some cases, the figure returned was better than required by noise legislation.

At all FCC Construcción projects, we consider, from start to finish, possible noise emissions given the inconvenience they cause to humans (their wellbeing, health and social life) and wildlife in the surrounding area.

The barrier set up along the perimeter of the worksite acts as an acoustic buffer.

Effluent discharges

The use of water in construction activities generates a series of impacts that can have an effect on the ecosystems linked to water resources. These impacts are due to the quality of water discharged into the natural environment, the extraction of water for use at the worksite or the impact on the morphology of watercourses, as they are diverted or temporarily occupied.

To minimise the impacts insofar as possible, each project must be planned to protect water resources and select the most suitable practices to achieve this. The most effective measures in this regard are those that treat effluents before they are returned to the natural environment, by means of purification or neutralising the pH of water. Similarly, those that reduce possible erosion in site sections or that employ containment elements that prevent solids from reaching the water are also very effective. Furthermore, actions on site seek to reduce consumption and optimise the use of this natural resource; to this end, measures are taken in terms of the use and reuse of wash water, wherever possible.

The use of settling ponds makes it possible to control suspended solids in effluent discharges and process water.

The most common problem in relation to effluent discharges is the increase in suspended solids swept away by runoff water. Despite not being pollutants, these solids have an impact on the natural conditions of aquatic ecosystems and can affect the wildlife and plant life due to the increase in water turbidity, the reduction in the amount of light and impact on photosynthesis and reproduction of aquatic life.

Another effect of discharges, although less common, is the eutrophication caused by the increase in nutrients in the water, mainly nitrogen and phosphorus, increasing the presence of phytoplanktonic organisms, which affects the concentration of oxygen in the water and, as a result, the dynamics of the system.

Furthermore, the discharge of concrete wash water and other non-neutralised building materials can effect on the receiving environment, increasing water pH, with the consequent harmful effects on aquatic wildlife.

FCC Construcción requests administrative authorisation, at its worksites and production centres, for discharges (whether direct or indirect) or water of residual products that could affect water masses. Therefore, these activities can be duly supervised by the corresponding environmental organisation. Furthermore, at most projects, an initial analysis is performed on residual water to establish whether it complies with the quality parameters established or whether the effluents need to be treated before they are discharged.

Risks and opportunities

SPECIFIC MEASURES APPLICABLE TO THE DISCHARGE OF RESIDUAL WATER...

1. Sanitary water treatment
2. Settling ponds for effluents
3. pH treatment
4. Prior aeration of the discharge
5. Creation of value by improving on levels required
6. Reuse of process water
7. Selection of appropriate cleaning systems

...ACTIONS TARGETING ASSOCIATED RISKS THAT MAY AFFECT WATER QUALITY

- Generation of large volumes of discharges
- Pollution of water
- Increase in pH and subsequent impact on water wildlife and plant life
- Loss of scarce resource
- Increase in temperature and subsequent impact on water wildlife and plant life
- Eutrophication

Good Practices

Below, details of the good practices implemented by the company to manage discharges at works performed by FCC Construcción in 2018 are provided, indicating the importance of each practice in addition to the degree of implementation.

Good practice	Importance	Magnitude (degree of implementation)		
	% of application	1	2	3
Use of portable wastewater treatment plants or recoverable prefabricated septic tanks for treating sewerage water.	3 100% 67% 68%	Installed in at least the outlet with the highest flow. 100% 64% 66%	Installed in at least 50% of the points that generate waste. 0% 29% 27%	Idem, with elements recovered from other sites. 0% 7% 7%
Effluent decanting pools, with or without use of additives, in effluent discharges and process waters.	2 0% 84% 84%	That control greases and suspended solids. 0% 62% 62%	In addition, pH. 0% 25% 25%	In addition, the effluent has no colouring. 0% 13% 13%
Neutralisation with acid of the pH of basic effluents.	2 0% 50% 50%	Neutralisation with HCl, or H_2S0_4 at least one tipping point. 0% 50% 50%	Idem, in 50% or at least two tipping points. 0% 0% 0%	Idem, in 100% or at least three tipping points. 0% 50% 50%
Improvement of the levels required by legislation or by the discharge licence in controlled parameters.	3 0% 50% 50%	Systematic obtaining of pollution levels better than those required by more than 5% of all parameters. 0% 100% 100%	Idem, by more than 15% or by more than 30% of half of the controlled parameters. 0% 0% 0%	Idem, by more than 30% of controlled parameters. 0% 0% 0%
Re-use of concrete mixer washing water.	3 80% 57% 62%	Re-use on site for spraying tracks. 0% 58% 43%	Re-use on site for later washing of mixers. 0% 17% 13%	Re-use in the concrete plant. 100% 25% 44%
Neutralisation with CO_2 of pH of basic effluents.	3 0% 50% 40%	Neutralisation with CO_2 at least one tipping point. 0% 50% 50%	Idem, in 50% or at least two tipping points. 0% 0% 0%	Idem, in 100% or at least three tipping points. 0% 50% 50%
Concrete washout area for chutes.	1 94% 82% 86%	Definition of some points (distant from water table and watercourses) for washing out the chutes of concrete mixers. 59% 19% 33%	In addition, these points are waterproofed. 18% 26% 23%	In addition, these points will be covered and restored at the end of the project. 24% 55% 44%

Building
Civil engineering works
Total

Mixer chutes are washed in specially designated areas, thus preventing untreated effluents from being directly discharged into the soil or natural watercourses.

The use of barriers prevents the turbidity of water since solids that may affect the quality of water are captured. In this way, barriers keep the water in similar conditions to those previous to the execution of the project. Thus, barriers make it possible to reduce the impact on aquatic wildlife and plant life, minimising the impact on their lifecycles.

Data and key indicators

The most commonly applied good practices in 2018 were in relation to washing the chutes of mixers. They were applying at 86% of works including the definition of the most appropriate places for performing washing tasks and, in some cases, waterproofing the area and its subsequent restoration. Directly discharging residual water into water bodies or onto the soil is thus avoided. Furthermore, at 84% of the works, settling decanting pools were installed to minimise the amount of suspended solids in effluents. To this end, other practices were also performed, such as the reduction of erosion in areas close to watercourses or the placement of containment elements, such as straw or geotextile barriers.

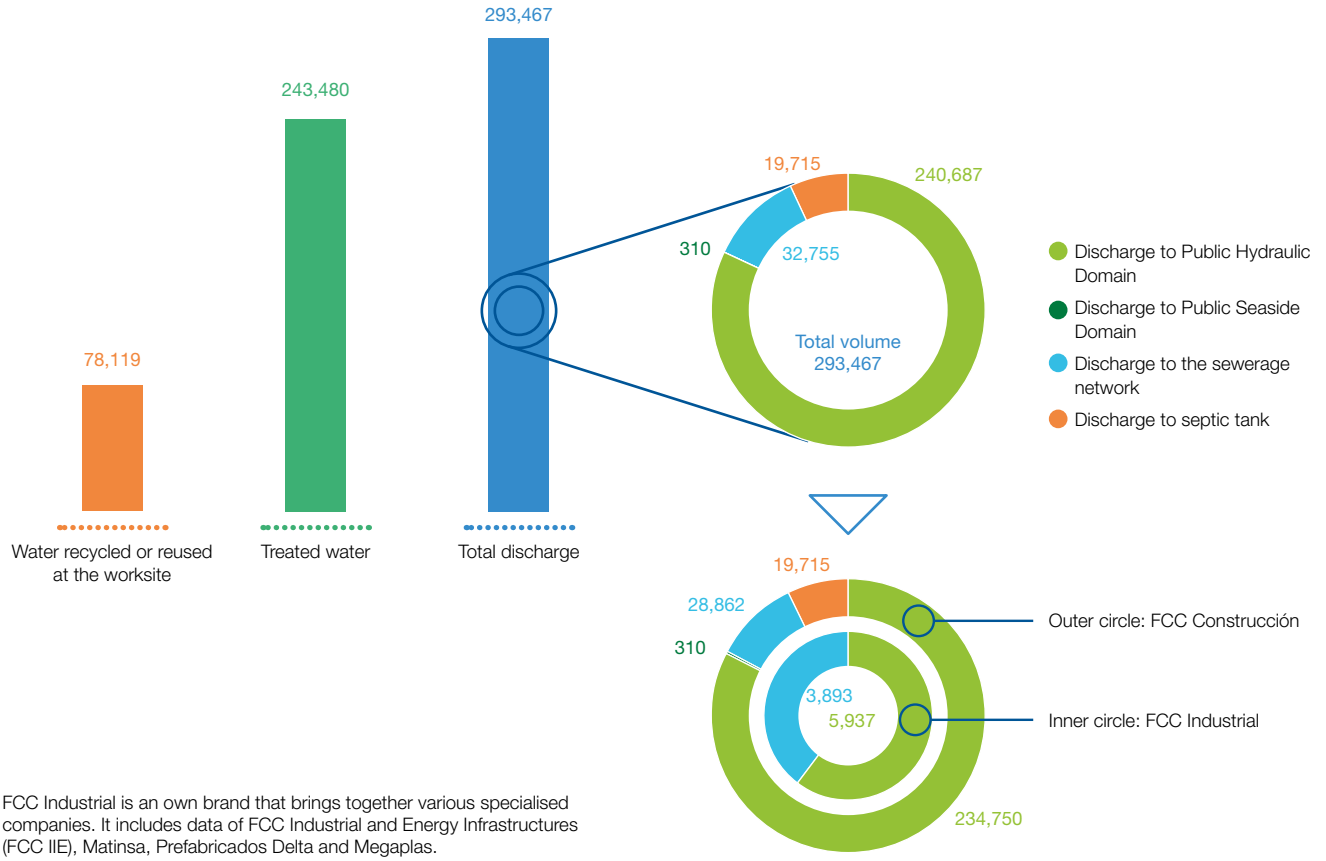
At 62% of the works performed by FCC Construcción, concrete bucket wash water was reused for other purposes, such as washing lorries, washing other buckets or reuse at the concrete plant for future mixing tasks. This practice, which makes it possible to reduce consumption and the amount of water discharged, can be performed provided that the corresponding physicochemical requirements are fulfilled.

Thanks to the measurement of water collected, consumed and discharged, it is possible to assess the effectiveness of these good practices. They also allows us to quantify the impact on the environment and suggest opportunities for improvement.

The following table shows discharge data for FCC Construcción and FCC Industrial, according to their destination. It can be seen here that the main destination for discharges was the public hydraulic domain (8 out of every 10 cubic metres generated), whereas almost 10% of residual water was discharged directly into the sewage network.

The reuse of water is an essential element in resolving water scarcity problems. To this end, 62% of the projects performed by FCC Construcción in 2018 used concrete bucket wash water for other purposes, thus converting a potential effluent into a resource.

Effluent discharges (m^3)



FCC Industrial is an own brand that brings together various specialised companies. It includes data of FCC Industrial and Energy Infrastructures (FCC IIE), Matinsa, Prefabricados Delta and Megaplas.

Furthermore, the organisation's Environmental Management System records accidental spills at our various locations, to guarantee that the required mechanisms aimed to prevent them have been established. Specifically, there were 37 accidental spills in 2018; its total volume was approximately 35 cubic metres.

FCC Construcción also identifies the significant discharges of its construction works and production centres. The company also determines which of these are located near to areas with a high environmental or social value, such as a protected natural area or an area of special relevance to local communities. These factors define the projects where the treatment of effluent discharges must be undertaken with particular care.

Water resources affected by significant discharges

Type of impact	Number of works[1]
Significant discharges in protected natural areas	6
Significant discharges in areas of high value for biodiversity	3
Significant discharges into watercourses of very high value for local communities and indigenous populations	2
Significant discharges into watercourses with a relevant value for local communities and indigenous populations	10
Significant discharges along natural coastline	5
Total works with significant impacts[2]	**17**

[1] Data for all construction work executed by FCC Construcción in 2018, excluding data from FCC Industrial.

[2] The total number of works does not correspond to the sum of the number of works, since the same project may have spills with different impact types; for example, it may affect a riverbed that is relevant to a local community and that, in addition, is part of an area with a high value for biodiversity.

CASE STUDIES

A-23 Dual carriageway, between Congosto de Isuela and Arguis

Client Ministry of Public Works – General Department of Roads

Period of execution 32 months

_Problem detected

The construction of the Mudéjar A-23 Dual carriageway, between Congosto del Isuela and Arguis, includes a tunnel measuring approximately 900 m in length. To perform this work, the New Austrian tunnelling method (NATM), also known as the sequential excavation method, was used. The boreholes were drilled before blasting using a wet process, with the subsequent generation of cloudy water discharges inside the tunnel.

Another of the sources of water that had to be controlled as part of these works were the upwelling of water from the rock through which the tunnel was carved, the flow of which increased notably during the rainy season, mixing with solid particles from the shotcrete used to support the excavation of the tunnel.

To this end, there was a discharge of water with a high level of suspended solids and a pH beyond the legal limits, which, had it been discharged directly into the river, would have been harmful to the River Isuela and would have had a huge impact on biodiversity.

_Adopted solutions

In anticipation of the flow of water that would be generated during the works and to reduce its impact on the environment, the efluents discharged during the tunnel construction process was diverted to a series of pools laid out one after another. As part of this system of pools, water was transferred from one to another, gradually depositing the solids, eventually obtaining water with a much smaller volume of suspended solids at the end of the process.

_Results

Using the settling pools, it was possible to decrease the concentration of suspended solids to the levels permitted under the discharge limit allowed. In terms of correcting the pH, in most cases, rainwater, given its low level of acidity, was sufficient to decrease the pH of the settling water. However, when rainwater was not enough to neutralise the pH and, therefore, the limits set out in the permit (pH=9) were not met, hydrochloric acid was added on a one-off basis to achieve the desired value.

To obtain immediate pH data from the pools, test strips were used. This facilitated the comprehensive control of pH before discharging water into the river.

Furthermore, a fortnightly analytical control of physico-chemical parameters of the River Isuela itself (the final destination of the discharge) was performed both upstream and downstream, to verify that the discharge was not affecting the ecological quality of the river.

The discharge generated by drilling and upwelling was diverted to the settling ponds.

The use of these ponds makes it possible for suspended solids to be deposited before the water is discharged into the river.

CASE STUDIES

Gouvães Hydroelectric Power Station dam

Client Iberdrola

Period of execution 42 months

_Problem detected

FCC Construcción, through its subsidiary company, Ramalho Rosa Cobetar, works in the construction of a hydroelectric dam in the town of Gouvães da Serra (Portugal), and of the access road to the town along the crest of the dam.

The excavation works on the bank and bed of the River Torno, in addition to the raising of the embankment, led to a high level of water turbidity on account of the high level of suspended solids, to the point at which operators had to periodically stop their activity until the water was clearer.

_Adopted solutions

The decision was taken to install a geotextile containment barrier for suspended solids along the excavation and embankment raising area to reduce the level of turbidity.

The aim of this solution was to contain particulate matter in a limited area to prevent its dispersion downstream and eliminate the risk of having to suspend the work on account of the conditions of the river.

_Results

The containment barrier retained the majority of suspended solid, reducing the impact on the quality of water and making it possible to continue work for longer periods of time, reducing the period of execution of the work and, therefore, leading to a reduction in costs.

Although suspended solids are not pollutants, the turbidity they cause in the river has a direct impact on aquatic ecosystems, reducing the amount of light reaching the riverbed and, therefore, affecting the wildlife and plant life as their ability to perform photosynthesis is reduced.

The geotextile barrier retains particulate matter around the worksite.

This barrier consists of a floating part and another anchored to the riverbed, which retains the cloudy water and filters it.

Occupation, pollution and loss of soils

Soil is a limited resource that is vulnerable to human activities and one of the utmost importance, as it serves as the home to natural ecosystems and anthropogenic activities. Construction activities consume large amounts of this resource, projects are built on the land itself, including the surface occupied by both the infrastructure itself and auxiliary premises, machinery yards, stockpiling areas, access roads or the premises required to produce construction material. In this context, a strong approach to environmental management is essential to prevent soil being contaminated by discharges or accidental spills. Furthermore, works entail earthwork, excavations and other aspects that can affect the natural dynamics of the soil, in addition to increasing erosion and ultimately affecting vegetation. In light of the foregoing, FCC Construcción applies good practices relating to this aspect in practically all its works, as this resource is intrinsically connected to its activities and is of the utmost importance to the environment.

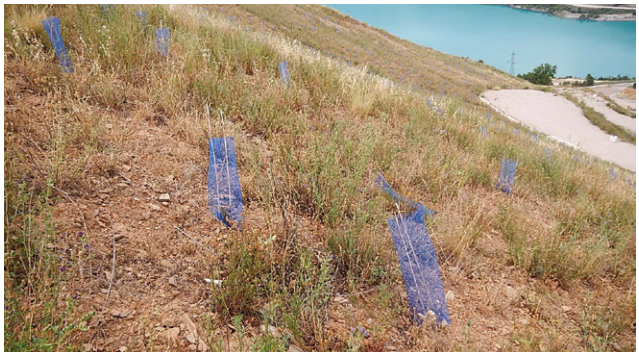
Risks and opportunities

APPLYING BEST PRACTICES RELATING TO MINIMISING OCCUPATION AND SOIL CONTAMINATION...

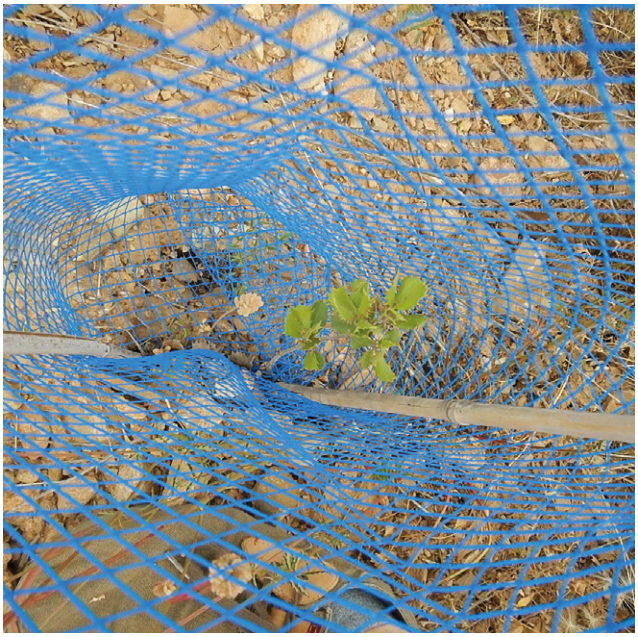
1. Restoration of affected areas
2. Limiting occupied areas and access areas
3. Avoiding the occupation of areas of environmental value
4. Concentration of auxiliary premises
5. Prevention of accidental discharges
6. Correct execution of loading and unloading operations
7. Adequate maintenance of machines

...REDUCING RISKS THAT DETERIORATE THE SOIL AND LEAD TO A LOSS OF VALUE

- Occupation of land
- Visual impact on the landscape
- Soil contamination
- Destruction of the regenerative capacity of vegetation
- Loss of potential uses



Hydroseeding on embankments or replanting tasks on soil affected by works contribute to the ultimate restoration of these areas, by securing the soil or developing a plant cover, which prevents potential erosion in the future.



Good Practices

The following table lists the percentages of good practices implemented at works performed by FCC Construcción in 2018.

Good practice	Importance	Magnitude (degree of implementation)		
	% of application	1	2	3
Restoration of the areas affected by site installations.	2 81% 91% 88%	Cleaning and removal of elements foreign to the environment or with no later use with the written and/or graphical planning of actions. 81% 47% 58%	In addition, de-compacting of the soil and landscaping to match the surroundings. 14% 31% 25%	The same but adding plants and ornamental elements integrated into the resulting or pre-existing environment. 5% 22% 17%
Limitation of the access areas.	2 86% 96% 93%	There is written or graphical planning of road accesses that is respected throughout the site. 6% 14% 11%	The same but including physical signposting to delimit them in situ. 44% 50% 49%	The same but limiting road accesses to existing ones. 50% 36% 40%
Limitation of occupied areas.	1 89% 95% 94%	There is written/graphical documentation of the areas that can be occupied by machinery and personnel. 24% 22% 22%	In addition, there is physical delimitation or signposting of these areas. 18% 39% 33%	In addition, these areas are limited to the area occupied by the site. 59% 39% 45%
Prevention of accidental discharges.	2 83% 90% 89%	There are physical barriers and/or deterrent signposting in the perimeter of the containers area for storage of dangerous substances or hazardous wastes, aiming to prevent unwanted access and avoid collisions. 70% 39% 46%	There is an additional protection in the supply area of the containers for storage of dangerous substances or hazardous wastes. 10% 26% 23%	There are also platforms or protected areas for handling and maintenance operations that must be carried out on the site or centre. 20% 35% 31%
Appropriate planning of the construction of access roads.	2 0% 81% 81%	Use of existing roads or tracks. 0% 53% 53%	Search for a permanent use for the temporary access roads. 0% 12% 12%	Both previous options. 0% 35% 35%

Building
Civil engineering works
Total

Perimeter fences aimed at limiting the area in which construction works will take place contribute to the protection of natural or sensitive areas, and to the reduction of their impact in soil.

Data and key indicators

The restoration of land affected by the works is essential in preventing and/or minimising impacts on the landscape in the short, medium and long-term. These interventions include cleaning and removing foreign objects from the site, preparing the land to restore its morphology or replanting the area. In 2018, 88% of the works performed by FCC Construcción have applied at least one of these measures, contributing to the environmental integration of the affected area.

Likewise, to minimise the occupation and compaction of the soil and the impact thereof, access areas were limited at 93% of works performed, whilst occupied areas were limited at 94% of projects. These boundaries, in the form of physical barriers or dissuasive posters, contribute to preventing changes to areas with a high environmental value.

By adequately planning access roads during the execution of the works, the occupation and compacting of the soil is reduced, which also represents a cost saving for the company. This planning focuses on utilising existing roads, avoiding the impact of creating new alternatives. On other occasions, a subsequent use is sought at the end of construction works for the access roads, although this is not always possible. In 2018, this form of planning was employed at 81% of the works performed by FCC Construcción.

On the other hand, preventive actions were taken at 89% of the works to combat accidental pollutant discharges. These included operations such as taking particular care during loading and unloading tasks, greasing machines or cleaning, maintaining and equipping machinery, all of which pose a considerable risk in terms of discharges onto the soil. Additionally, to prevent the unwanted pollution of the soil, properly equipped tanks for storing hazardous substances or hazardous waste are in place.

Furthermore, before in the beginning of the project, Emergency Plans are drawn up to establish the procedure for action and measures to be applied in the event of an accidental discharge.

More than **90% of the works** performed in 2018 **limited both physical access** to access areas and certain areas occupied by the works. By decreasing the accessible areas, impacts such as compaction and the possible contamination of the soil or impacts on nearby vegetation are minimised.

To prevent small diesel and/or oil spills during refilling operations that are commonly performed on generators at the worksite, waterproof trays are installed that simultaneously facilitate the collection and subsequent management of pollutants.

CASE STUDIES

Modernisation of the Covilhã-Guarda railway section

Client IP – Infraestruturas de Portugal, SA

Period of execution 18 months

_Problem detected

During the work to modernise the section of railway between Covilhã and Guarda on the Beira Baixa line, actions have been performed such as integrated refurbishment of 36 km of track, the complete electrification of the section, the rehabilitation of six railway bridges, the remodelling of stations, the automation and removal of crossings and the construction of drainage systems, and the performance of slope stabilisation works.

Some of these works entailed a high level of potential risk, both for human health and the environment, as in work areas hazardous substances were used and accidental discharges were detected.

_Adopted solutions

During these works, discharge containment tanks were put in place that made it possible to collect fluids containing pollutant particles stored on site, before they came into contact with the soil. The placement of the tanks was chosen based on the site's accessibility and the use of pollutant materials. Furthermore, movable basins were used at the front of the works.

Furthermore, to protect the health of those working on site, environmental emergency kits were handed out to foremen and environmental training imparted to teams.

_Results

The immediate benefits of the actions to collect discharges included the notable reduction in accidental spills on site.

Applying this type of measure, not only was it possible to minimise the risk of soil pollution by hazardous substances, it was also possible to prevent the exposure of those working on site and any pedestrians from being exposed to these substances. As such, we contributed to achieving Development Goal 3 (health and wellbeing) and 15 (life on land).

Environmental emergency kits handed out to foremen.

Discharge containment tank.

CASE STUDIES

Conservation and maintenance of the N-627, N-623 and A-73 roads

Client Ministry of Public Works

Period of execution 48 months

_Problem detected

During conservation and maintenance works on the N-627, N-623 and A-73 roads, performed by MATINSA in the province of Burgos, the need to find a solution for securing land on an embankment close to San Martín de Ubierna was identified. Actions to prevent the loss of soil were demanded, as the soil was coming loose, representing a risk of collapse or landslide towards the public road.

_Adopted solutions

With a view to securing the soil on the embankment, ditches were dug to plant trees and shrubs. Species that take hold easily and that have deep roots were chosen, as they would prevent the movement of the soil.

Furthermore, to control the risk of landslides on the slope after the trees and shrubs were planted, an organic coconut fibre mesh was put on the slopes to minimise the surface area exposed to erosion caused by rain or wind.

This type of mesh is produced using ecological coconut fibres that, when they decompose, form part of the soil, increasing the amount of organic matter in the soil, enhancing its capacity to retain water and hold the soil.

_Results

The preparatory work ultimately performed on the embankment did not coincided with the work originally planned, due to the stony conditions of the soil and the restrictive climate. However, by installing the organic coconut fibre mesh and planting small trees and shrubs, it was possible to improve the characteristics of the soil, increasing the stability of the embankment, as well as landscaping the area. In spring, this practice will be repeated to control our objective, with a view to the bushes enhancing the strength of the embankment.

Dry land with loss of soil.

Evergreen species planted on the embankment.

Generation of waste

The activities performed by FCC Construcción generate a significant amount of construction and demolition waste (CDW). Most of this CDW are non-hazardous, which also have a high recycling or reuse potential. The main challenge is therefore to effectively reduce the generation of waste, thus reducing the use of natural resources, a smaller need for space to manage these resources and a reduction in the associated cost.

Therefore, the company's priority is structured around reducing, reusing and effectively harnessing waste. This is based on the circular economy model that preserves the value of products, materials and resources in the economy for as long as possible, reducing the generation of waste to a minimum.

In recent years, international regulations have established minimum reuse values for this type of waste. For example, the European Waste Framework Directive stipulates that 70% of non-hazardous construction and demolition waste generated in 2020 must be reused or recycled. To achieve this, FCC Construcción follows the integrated waste management framework set out by law: prevention, preparation for reuse, recycling, energy recovery and, as a final option, removal to authorised landfills in order to reduce the impact insofar as possible.

Improving the efficiency of the use of resources and ensuring that waste is recovered and used as a resource will facilitate the transition towards a more sustainable approach to material management and a circular economy model, which will be beneficial to the environment in that greenhouse gas emissions will be reduced.

To facilitate the correct classification of hazardous wastes, all containers are labelled, with the name, code and pictogram reflecting the hazard posed by the waste.

Risks and opportunities

RESPECTING THE WASTE TREATMENT HIERARCHY...

1. Improvements in the design and construction process
2. Reduction of packaging waste
3. Purchase of material in bulk and appropriate recipients
4. Correct identification and storage of waste and containers
5. Classification and separate management of CDW
6. Mass diagram compensation
7. Management of surplus excavation materials
8. On site recovery

...REDUCING THE RISKS ASSOCIATED WITH THE GENERATION OF WASTE

- Generation of large volumes of CDW
- High amount and diversity of packaging
- Generation of HW and associated risk
- High levels of surplus soil and other material during excavation work
- Increase in the generation of waste due to inadequate storage
- Increase in the generation of waste due to inadequate transport

Good practices

The good practices implemented by FCC Construcción in terms of waste mainly seek to ensure its effective management, reflected in a reduction in both waste generated whose ultimate destination is a landfill and the consumption of natural resources, by harnessing materials that, in principle, are considered surplus.

The table below displays the percentage application of the different actions performed at works in 2018.

Good practice	Importance	Magnitude (degree of implementation)		
	% of application	1	2	3
Reduction of inerts taken to landfill compared to the volume forecast in project.	3 91% 95% 94%	Reduction greater than 5%. 65% 71% 69%	More than 15%. 20% 7% 11%	More than 30%. 15% 22% 20%
Classification/segregation of construction and demolition wastes for its individual management.	2 88% 82% 84%	The construction and demolition wastes are segregated in one more category in addition to those requested by law. 60% 49% 52%	The construction and demolition wastes are segregated in two more categories in addition to those requested by law. 27% 24% 25%	All the construction and demolition wastes are segregated and recycled/reused. 13% 27% 23%
Changes in the design or in the building system with regard to the use of materials that generate hazardous wastes such as asbestos, de-coffering liquids, additives, resins, varnishes, paints, etc., generating wastes of less or no danger.	3 50% 40% 43%	Some hazardous wastes, which were predicted to be produced in the project, are not generated in at least one activity/unit on site; e.g. applying water-based paints instead of paints with organic solvents. 100% 50% 67%	Idem, in three or more activities. 0% 0% 0%	Idem, in five or more activities. 0% 50% 33%
Reduction of packaging waste through practices such as requesting materials with packaging that is returnable to the supplier, re-use of polluted packaging, reception of elements in bulk that are normally provided in packages, etc.	2 57% 88% 79%	Applied to two or more materials. 75% 80% 78%	Idem, to five or more. 25% 7% 11%	Idem, to ten or more. 0% 13% 11%
Management of excavation wastes.	2 100% 81% 87%	More than 1% on other site for restoration of degraded area. 20% 40% 33%	More than 30%. 53% 40% 44%	More than 50%. 27% 20% 23%
Valuation of rubble.	2 73% 82% 79%	Re-use or recycling on another site or external plant. 91% 66% 73%	Re-use on same site. 9% 30% 24%	Recycling of stones in a plant on the site itself. 0% 4% 3%
Use of devices to reduce waste volume (paper, cardboard, metals, etc.).	1 75% 61% 64%	Applicable to one type of waste. 67% 55% 57%	Applicable to two types of waste. 33% 36% 36%	Applicable to three or more types of waste. 0% 9% 7%

Building
Civil engineering works
Total

Data and key indicators

Prevention from the very start of works represents the basis for effectively minimising the waste generated by FCC Construcción's activities. Applying simple measures, such as purchasing materials in returnable containers to the supplier, re-using contaminated containers or purchasing bulk materials, in 2018, the volume of waste generated from containers was reduced by 79% across all projects.

Furthermore, at 43% of works, waste that was either less harmful or not at all harmful were generated by applying changes in the design and construction system, in relation to the use of materials that generate hazardous waste, such as fibrocement, formwork removal agents, resins, paint, etc.

Furthermore, at 64% of works, resources have been employed to reduce the volume of waste, such as paper, cardboard or metals. This helps to reduce both the space required to store waste and the actual volume of waste transported and, as a result, the emissions generated by its transport.

In terms of construction and demolition waste (CDW), at 84% of worksites, this type of waste was classified for its separate management into at least one category more than required by the legislation.

There was a reduction in inert materials disposed of to landfill in comparison to the initial volume forecast at 94% of the works performed in 2018. This good practice is mandatory at all worksites at which it is possible.

Furthermore, another series of good practices applies at FCC Construcción worksites, which contribute to reducing the about of inert wastes whose final destination is the landfill. For example, at 87% of the projects performed in 2018, excavation surpluses were managed efficiently for their use at other worksites or to restore degraded areas. In addition, at 79% of worksites, rubble was either reused or recycled during the same year, either at the site itself, at another site or through external recovery plants.

To achieve the environmental management objectives proposed at FCC Construcción and FCC Industrial centres, all waste generated as part of each project is constantly monitored. During 2018, the total amount of waste came to 1,720,181 tonnes, as can be consulted in the following table.

At **94% of worksites**, the volume of **inert materials** disposed of to landfill was **lower** than the initially forecasted.

Correctly separating waste from the very beginning of the project, so that it can be properly handled, is critical. To this end, separation areas and collection points are set up on site, which must be signposted accordingly.

Generated waste (t)

	FCC Industrial*	FCC Construcción				Total
		Spain	Rest of Europe	Latin America	Middle East	
Hazardous waste	215	282	77,655	256	234	78,642
Non-hazardous waste	51,246	309,079	383,533	356,371	541,310	1,641,539
TOTAL	**51,461**	**309,361**	**461,188**	**356,627**	**541,544**	**1,720,181**

* FCC Industrial is an own brand that brings together various specialised companies. It includes data on FCC Industrial and Energy Infrastructures (FCC IIE), Matinsa, Prefabricados Delta and Megaplas.

The proper handling, treatment and management of hazardous wastes is critical, given the highly harmful nature of their environmental impacts. Therefore, the hazardous wastes generated at works (whether owned directly by FCC Construcción or through a subcontractor) must be stored in signposted areas, which are closed off and prepared accordingly. For cases in which this type of waste is stored temporarily, the regulations in force apply, which required that they are labelled with a pictogram reflecting the hazard posed and identifying the producer and storage start date.

The projects performed by FCC Construcción generate no significant amounts of hazardous waste (less than 5% of all waste generated in 2018). Nonetheless, they are identified at the start of each project, ensuring compliance with the legislation in force at all times.

Below is a more exhaustive list with the amount of waste generated exclusively by FCC Construcción's worksites and centres (excluding FCC Industrial), divided by type and hazard level.

Waste generated by type**

HAZARDOUS WASTE		**78,427,131**
Empty HW containers (kg)		**28,766**
15 01 10*	Empty packaging containing residues of DS or contaminated by DS	10,740
15 01 10*	Empty plastic packaging containing residues of DS or contaminated by DS	2,890
15 01 10*	Empty metal packaging containing residues of DS or contaminated by DS	15,136
Solid hazardous waste (kg)		**78,044,435**
15 02 02*	Absorbents and wiping cloths contaminated by DS	25,270
16 01 07*	Oil filters	1,746
16 02 13*	Discarded electrical and electronic equipment containing hazardous components	4,731
16 05 04*	Gases in pressure containers containing DS	2,860
16 06 01*	Lead batteries	2,222
16 06 02*	Ni-Cd batteries	18
16 06 03*	Mercury- containing batteries	550
17 02 04*	Glass, plastic and wood containing or contaminated by DS	863,012
17 03 01*	Bituminous mixtures containing tar	2,332
17 05 03*	Soil and stones containing DS	77,085,338
17 06 01*	Insulation materials containing asbestos	23,000
17 06 05*	Building materials containing asbestos	15,408
19 08 06*	Saturated or spent ion exchange resins	17,550
20 01 21*	Fluorescent tubes and other mercury-containing waste	390
20 01 31*	Cytotoxic and cytostatic medicines	8
Used oils (kg)		**41,820**
12 01 12*	Spent waxes and fats	126
13 01 13*	Hydraulic oils	1,474
13 02 05*	Mineral-based chlorinated engine, gear and lubricating oil	14,922
13 03 08*	Motor, synthetic insulating and heat transmission oils	25,298
Liquid hazardous waste (kg)		**312,110**
06 02 05*	Waste alkaline solutions	5,140
08 01 11*	Waste paint and varnish waste containing organic solvents or other DS	3,146
08 01 19*	Aqueous suspensions containing paint or varnish containing organic solvents or other DS	260
08 04 09*	Waste adhesives and sealants containing organic solvents or other DS	159
12 03 01*	Aqueous washing liquids	493
13 05 08*	Mixtures of wastes from grit chambers and oil/water separators	635
13 07 03*	Fuels (including mixtures)	1,333
14 06 03*	Solvents and solvent mixtures	692
16 01 21*	Release agents, curing liquids, plasticizers, liquidisers	3,353
16 05 06*	Laboratory chemicals consisting of or containing DS	5,980
16 07 08*	Wastes containing oil	290,919

To correctly manage this waste, an initial forecast is made when organising each worksite concerning the type of waste to be produced and the amount thereof. This helps to define the work's needs in terms of the handling, separation, storage and most feasible management alternative for each type of waste. Once the works are completed and real waste generation data is obtained, the initial forecast is compared against the end result. The company extracts useful information from this comparison, as it is used to improve waste production forecasts, enhancing the approach to managing this waste in future projects.

NON-HAZARDOUS WASTE		**1,590,293,379**
Inert materials (m^3)		**1,039,681,309**
17 01 01	Concrete	80,008
17 01 03	Tiles and ceramics	159
17 01 07	Mixtures of concrete, bricks, tiles and ceramics not containing DS	480,815
17 05 04	Soil and stones not containing DS	478,700
Municipal wastes (kg)		**16,844,305**
20 02 01	Compostable waste	2,215,700
20 03 01	Mixed municipal waste	14,582,785
20 03 07	Bulky municipal waste	45,820
Other non-hazardous wastes (kg)		**533,767,766**
08 03 18	Waste printing toner	656
10 11 03	Fiberglass wastes	715
12 01 13	Welding wastes	42
15 01 01	Paper and cardboard packaging	9,883
15 01 06	Non-hazardous mixed packaging	39,331
16 01 03	End of life tyres	21,665
16 02 14	Discarded electrical and electronic equipment not containing hazardous components	397
16 06 04	Alkaline batteries (except mercury- containing batteries)	74
17 02 01	Wood	5,338,875
17 02 02	Glass	5,990
17 02 03	Plastic	593,185
17 03 02	Bituminous mixtures not containing coal tar	863,240
17 04 07	Mixed metals	7,083,927
17 04 11	Cables not containing dangerous substances	18,762
17 06 04	Insulation material containing, non containing asbestos or dangerous substances	17,343
17 08 02	Gypsum-based construction materials other than those mentioned in 17 08 01	7,820
17 09 04	Mixed non-hazardous construction and demolition wastes.	185,005,453
19 08 05	Sludge from treatment of urban waste water.	334,645,783
20 01 01	Paper and cardboard	114,625
TOTAL WASTES		**1,668,721,204**

** Data for FCC Construcción, excluding FCC Industrial

CASE STUDIES

Riyadh Metro

Client AR Riyadh Development Authority (RDA)

Period of execution 60 months

_Problem detected

The risk of soil and groundwater pollution associated with accidental spills of hydrocarbons used by work machinery is inherent to construction activities. Furthermore, another possible source of pollution of these resources is the storage of chemical products or harmful waste. These two risks were identified as part of the project to construct lines 4, 5 and 6 of the Riyadh metro (Saudi Arabia).

The prevention of these sources of pollution is of significant importance, as they can affect the quality of groundwater and soil, with a subsequent impact on the corresponding habitats.

_Adopted solutions

To minimise these risks, the following activities were carried out:

- A company certified by the environmental agency of the Kingdom of Saudi Arabia (Presidency of Meteorology & Environment) was contracted to provide a system for segregating hazardous and non-hazardous waste.
- Collection of leachate generated by rainfall and subsequent treatment to minimise the risks of handling and disposal.
- To prevent accidental spills, specific areas were designated for storing substances (at a distance from rain runoffs or natural watercourses), equipped with a sun shed to reduce the impact caused by direct sunlight, a perimeter concrete wall and correct signposting in the waste stockpile area. Furthermore, chemical products were organised in this area to prevent incompatibilities.
- Location of diesel operated generators and fuel oil tanks covered by a sun shed, making it possible to temper the changes in extreme climate conditions, insulate them and prevent the runoff of hydrocarbons in the event of an accident.
- Supply of kits for staff to use in the event of a spill and training on how to use them, in addition to training on the correct segregation of chemical products.

_Results

The adopted measures have resulted in a reduction in the risk of soil and water pollution due to infiltration, the prevention of pollutants seeping into runoff water that could reach water traps, a reduction in the risk to which the health of ecosystems and humans are exposed and an improvement in the physical and chemical control of pollutants.

Furthermore, contracting an external company led to improvements in the way hazardous waste is handled and their correct environmental management.

Signs in areas used to store hazardous waste.

CASE STUDIES

Lima Metro

Client Ministry of Transport and Communication. Peru.

Period of execution 62 months

_Problem detected

Given the characteristics of the hazardous waste involved, including its explosiveness, corrosiveness, flammability, irritability, harmfulness or toxicity, it may pose a risk to the health of humans and/or ecosystems. Therefore, this type of waste must be managed correctly, and subject to stricter conditions, than other types of waste: it must be carefully separated and classified, it requires specific storage conditions and systems, its collection must be performed and determined by an authorised agent, etc. as established in the applicable environmental legislation.

For large scale projects, as is the case of the construction of Line 2 of the new Lima Metro, the management of waste can be hampered both by the large volumes generated and the number of staff on site and subcontractors. This means that an unspecified number of people is responsible for the identification, classification and management of waste, who have not always received specific training on this topic.

_Adopted solutions

With a view to facilitating the identification and correct separation, in real time, of waste generated at the Lima Metro works, individuals staff are being provided with cards with colour codes to help with the separation and classification of non-hazardous waste. Furthermore, they are being provided with information about the identification and management of hazardous waste.

These cards can be inserted in the personal ID pouch they must carry with them to access and remain on site. Therefore, if necessary, the operator can refer to the colour codes and information on the card at any time to confirm that they are segregating the waste correctly. Furthermore, to enhance and improve this approach, training and awareness raising initiatives are being held on how to correctly manage hazardous solid wastes on site.

_Results

Following the implementation of this measure, it has been found that the segregation of waste by categories is more efficient, as all staff, including new recruits, are provided with this card to improve the way in which they handle waste.

The correct management of waste is helping to improve important aspects such as ensuring the health and safety of individuals and care for the environment.

The idea of simply having this information at hand to correctly recycle material is a testament to the company's commitment to extending awareness of environmental safety to all staff at the company in addition to our partners and customers.

Colour code and information on hazardous waste, which can be consulted when performing waste segregation tasks.

Cards with colour codes to segregate waste are inserted in personal ID pouches and are always at hand.

6.

Global challenges, lasting responses

Aware that the financial activities of FCC Construcción cannot be considered successful unless we take the planet's limits into account, we pay particular attention to the environmental impacts of our projects, including those that persist once work has been completed and that go beyond time and geographical boundaries.

In this connection, as a company that operates on a global scale, FCC Construcción has decided to set its sights beyond the limits of its activities and include social, environmental and economic factors relating to our stakeholders in the decision-making process. With this vision in mind, we will be able to apply good practices locally that contribute to addressing the many global challenges we face.

Our global contribution to the Sustainable Development Goals

Environmental training and awareness raising among our employees, subcontractors and suppliers is essential in promoting an appropriate environmental performance on site.

We calculate our carbon footprint by monitoring energy consumption. We are also committed to the energy efficiency of our production processes, adjusting the energy needs of each project to the availability of resources.

As a construction firm, we contribute to the sustainability of cities by designing and constructing more efficient buildings and infrastructures, investing in innovation and technology to offset the pressure that property development exerts on natural resources. We apply preventive measures to minimise the inconvenience caused by works on residents in the areas we operate in.

FCC Construcción promotes the efficient use and adequate management of resources, in addition to the prevention, reduction, reuse and recycling of waste to increase their longevity and availability over time.

Given that the company's activities cause environmental changes, FCC Construcción is particularly concerned about the implementation of measures that do not affect animal or plant species that are sensitive to the works carried out.

We quantify our greenhouse gas emissions and verify our carbon footprint externally. By applying the Good Practices System, we establish measures that avoid the release of GHGs into the atmosphere. The emissions avoided by reusing soil at the same worksite, rather than transporting them to the landfill, are worth particular note.

FCC Construcción promotes the exchange of knowledge and information with stakeholders. This is possible by establishing two-way dialogue mechanisms for communicating concerns, proposals for improvement and collaboration requests. We participate in initiatives and forums for disseminating our experience and promoting the achievement of the sustainable development goals, as we believe that joint action and innovation are key processes in achieving these goals.

Our goal is to be perceived as a responsible, straightforward organisation. This is why transparency is one of the pillars on which our relationship with stakeholders is based and that serves as the basis for generating trust.

Relationship with society

The business undertakings of FCC Construcción are inextricably linked to society, and one cannot be separated from the other. Therefore, this relationship with society and its management through a dialogue with the company's stakeholders is of the utmost importance. One of the main priorities of FCC Construcción is active listening and the strategic integration of the stakeholders needs. This relationship not only allows us to generate new business opportunities and competitive advantages, but it is also essential in generating value for society as a whole.

As part of this creation of mutual value, the dissemination of information on FCC Construcción's activities is of vital importance for two reasons. First, to maintain a transparent and trust-based relationship with society and stakeholders with which the company collaborates. Second, to internally and externally communicate the efforts being made to manage environmental factors with the highest levels of stringency and excellence.

Risks and opportunities

PROMOTING A TRANSPARENT RELATIONSHIP WITH STAKEHOLDERS...

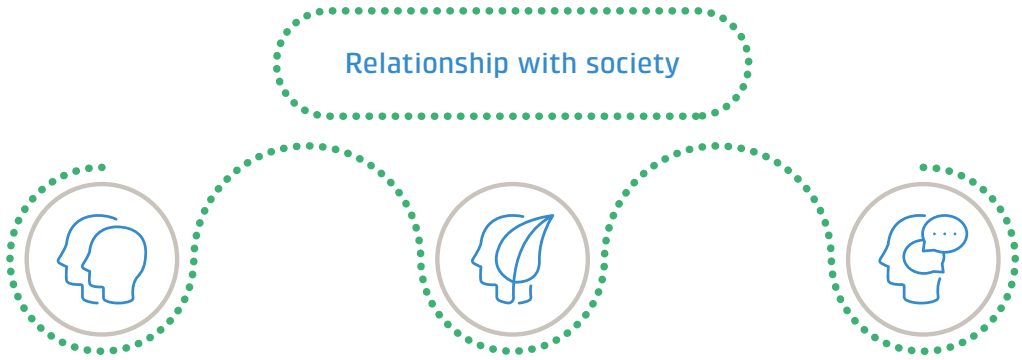
1. Environmental training for staff
2. Contracting subcontractors who are committed to the environment
3. Involvement of customers in management
4. Communication and transparency with society
5. Attention to claims, complaints and suggestions
6. Appropriate environmental management recognised by society
7. Environmental improvements implemented in the project
8. Environmental signposting

...PROMOTING EFFECTIVE RISK MANAGEMENT

- Shortcomings in the relationship with others
- Inefficient management of resources and high generation of waste
- Insufficient waste separation
- Lack of awareness
- Insufficient environmental training
- Limited communication with the affected parties
- Projects with an impact on the environment

Good practices

Environmental and social training imparted to FCC Construcción staff, environmental performance of suppliers, subcontractors and partners, or active client involvement in the environmental management of the works are just a few of the most important aspects of the company's Good Practice System in relation to the "Relationship with society".



Stakeholders engagement

- Involvement of the clients in environmental management.
- Subcontractors that apply environmental management system.
- Environmental behaviour of subcontractors.
- Ethical behaviour of subcontractors.
- Complaints and claims management.

Environmental and social training

- Environmental training: production personnel.
- Environmental training: foremen and operators.
- Raising environmental awareness of subcontracts.
- Social training: production personnel and subcontracts.
- Adoption of environmental signposting on site.

Communication

- Relationship with interested parties.
- Relationship with populations that are affected by the project.
- Obtaining social recognition.
- Environmental improvements introduced in the original project.
- Diffusion of the knowledge acquired.
- Communication Plan.

Below, details of the good practices implemented at works performed in 2018 are provided, indicating the degree of implementation at building projects and civil engineering works.

Good practice	Importance	Magnitude (degree of implementation)		
	% of application	1	2	3
FCC Construcción production personnel (up to foremen) who have taken the environmental training course organised by the company.	3 92% 89% 90%	> 30 % of project personnel. 4% 17% 12%	> 60 % of personnel. 17% 34% 28%	100 % of personnel. 79% 49% 60%
Sub-contractors who have received environmental awareness and training talks of at least one hour from FCC Construcción related to the sub-contracted activities.	3 96% 89% 91%	> 30% of subcontractors. 21% 28% 25%	> 60% of subcontractors. 29% 32% 31%	> 90% of subcontractors. 50% 40% 44%
Sub-contractors who apply an environmental management system.	2 84% 95% 92%	At least one subcontractor has an ISO 14001 or EMAS certificate. 69% 52% 57%	Idem, > 10 %. 25% 38% 34%	Idem, > 25 %. 6% 10% 9%

Good practice	Importance	Magnitude (degree of implementation)		
	% of application	1	2	3
Sub-contractors' environmental behaviour.	3 71% 81% 78%	> 30 % of subcontractors carry out actions related with the optimisation of wastes, have the relevant permits and licences and have contractual environmental requirements with which they comply. 60% 76% 72%	> 75 % of subcontractors carry out actions related with the optimisation of wastes, have the relevant permits and licences and have contractual environmental requirements with which they comply. or > 30 % of subcontractors carry out actions related with the optimisation of wastes, have the relevant permits and licences and have contractual environmental requirements with which they comply, and in addition, nonconformities arising from their actions either do not occur or are identified and reported by them. 20% 14% 15%	> 75 % of subcontractors carry out actions related with the optimisation of wastes, have the relevant permits and licences and have contractual environmental requirements with which the comply, and in addition, nonconformities arising from their actions either do not occur or are identified and reported by them. 20% 10% 13%
Relationship with interested parties.	3 88% 100% 96%	All aspects that could provide significant relevant impacts have been discussed with the client and the solution to be adopted has been agreed. 42% 44% 44%	Those that most affect society have been discussed with the authorities or with the associations and individuals potentially affected. 29% 28% 28%	Those that most affect have been discussed with the authorities and with the associations and individuals potentially affected. 29% 28% 28%
Complaints and claims.	3 82% 94% 89%	All the complaints and claims received have been discussed with the affected persons. 39% 32% 35%	The solutions to be adopted have been agreed with them. 39% 49% 45%	These actions have been carried out and there is written acceptance from at least 50% of the cases. 22% 19% 20%
Achievement of social recognition.	3 58% 75% 67%	A congratulatory note has been received from the client or the local authorities with regard to environmental behaviour. 86% 78% 81%	A publication outside the company has praised the environmental behaviour. 14% 11% 13%	A prize has been received that specifically mentions the environmental behaviour. 0% 11% 6%
Involvement of the clients in environment management.	3 95% 89% 92%	The owner knows of the implementation of the environmental management system in the project. 55% 49% 53%	The owner has actively participated in some aspects of developing the environmental management programme. 35% 38% 36%	A formal presentation has been made of the environmental management programme in a specific session with slides or other audiovisual media. 10% 13% 11%
Environmental training of at least 4 hours' duration for production personnel from foremen to operators.	3 85% 64% 71%	100% of foremen. 45% 50% 48%	100% of foremen and > 20% of operators/ overseers 55% 33% 42%	100% of foremen and > 50% of operators/ oversees 0% 17% 10%

Good practice	Importance	Magnitude (degree of implementation)		
	% of application	1	2	3
Improvements introduced in the original project, in order to minimise the impacts to the environment or society.	3 78% 69% 73%	An environmental/social improvement has been proposed for the original project but it was not finally admitted. 86% 11% 44%	An environmental/social improvement to the original project has been admitted. 14% 56% 37%	More than one environmental/social improvement to the project has been admitted. 0% 33% 19%
Adoption of environmental signposting on the site that helps to inform and make aware the personnel working on the site.	2 88% 94% 92%	Standard environmental waste signposting is used throughout the site. 13% 20% 18%	Complete standard environmental signposting is used throughout the site. 17% 31% 26%	Complete standard environmental signposting is used throughout the site together with awareness posters. 70% 49% 56%
Diffusion of the knowledge acquired in environmental and/or social matters.	2 50% 60% 58%	At least one experience to be transmitted, or a good practice example (related to the environmental management or to social initiatives) is elaborated and published on the local office, zone or technical services corporative net, for its usage in other projects. 100% 22% 36%	Idem with 2 experiences to be transmitted or good practices examples (related to the environmental management or to social initiatives). 0% 56% 46%	Idem with 3 experiences to be transmitted or good practices examples (related to the environmental management or to social initiatives). 0% 22% 18%
Relationship with populations that are affected by the project.	3 0% 88% 88%	The affected communities receive information about the social, economic, environmental and cultural impacts, the duration of the activities, the affected communities and the project's compensations and benefits. 0% 42% 42%	In addition, consultation and participation mechanisms with the potentially affected communities have been established. 0% 29% 29%	In addition, after the participation process, the affected communities have given their prior, free and informed consent. 0% 29% 29%
Training in social issues for FCC Construcción production personnel and for sub-contractors.	3 0% 40% 33%	> 30% of project personnel and > 30% of sub-contractors. 0% 0% 0%	> 60% of project personnel and > 60% of sub-contractors. 0% 50% 50%	100% of project personnel and > 90% of sub-contractors 0% 50% 50%
Sub-contractors' ethical behaviour.	3 83% 64% 70%	>25% of sub-contractors have a Code of Conduct or contractually agree and comply with the Code of Ethics of FCC. 20% 33% 29%	>50% of subcontractors have a Code of Conduct or contractually agree and comply with the Code of Ethics of FCC. 0% 56% 36%	>75% of sub-contractors have a Code of Conduct or contractually agree and comply with the Code of Ethics of FCC. 80% 11% 35%
Communication plan in environmental, social or cultural heritage matters.	3 33% 67% 58%	A communication plan for diffusion of the project in environmental, social or cultural heritage matters is developed and implemented in collaboration with the affected communities. 100% 17% 29%	In addition, institutional organisms do also collaborate. 0% 50% 43%	In addition, corresponding public ministries (of Culture, Environment, etc.) do also collaborate. 0% 33% 28%

Building
Civil engineering works
Total

The staff training and awareness raising actions are supported by the adequate use of signposting on site, informing staff about how to perform environmental management tasks accordingly.

FCC Construcción has imparted **training on social matters** to its in-house staff and subcontractors at **33% of the projects** undertaken in 2018.

Data and key indicators

To correctly implement the Good Practice System, FCC Construcción imparts **environmental training** to its employees and subcontracted workers. This training allows them to obtain the environmental and social knowledge, skills and capacities that, in addition to helping achieve maximum efficiency in all environmental management processes, will contribute to raising awareness and motivating all individuals involved in each project.

In 2018, 90% of works staff received the environmental training provided for in the FCC Construcción Training Plan and environmental training courses lasting at least four hours were imparted at 71% of works to all production staff, from foremen down to operators. In addition, at 91% of sites, environmental training and awareness raising talks were held for subcontractors.

These training actions seek to ensure the excellence of management and to raise awareness among all staff involved in each project for the annual milestones established in the Good Practices System to be accepted and achieved, thus achieving the objectives, requirements and commitments of the company to its stakeholders.

The goal of FCC Construcción is to ensure the **involvement of stakeholders** in each project, as they play an essential role in the development and achievement of the environmental milestones established. Thanks to the two-way and open communication, local stakeholders can provide the company with their knowledge of the surroundings in which works are being performed. This contributes to the identification and anticipation of possible impacts and to find the most efficient solutions in resolving them.

At **92% of the works** performed, the **subcontracts** contracted **had an environmental management system**, with a view to extending our environmental commitments to the supply chain.

Maintaining a fluid dialogue with local communities facilitates the planning of works in line with the conditions of the surroundings. Moreover, by involving those who will benefit from the project in the future during the execution phase, their acceptance is more likely.

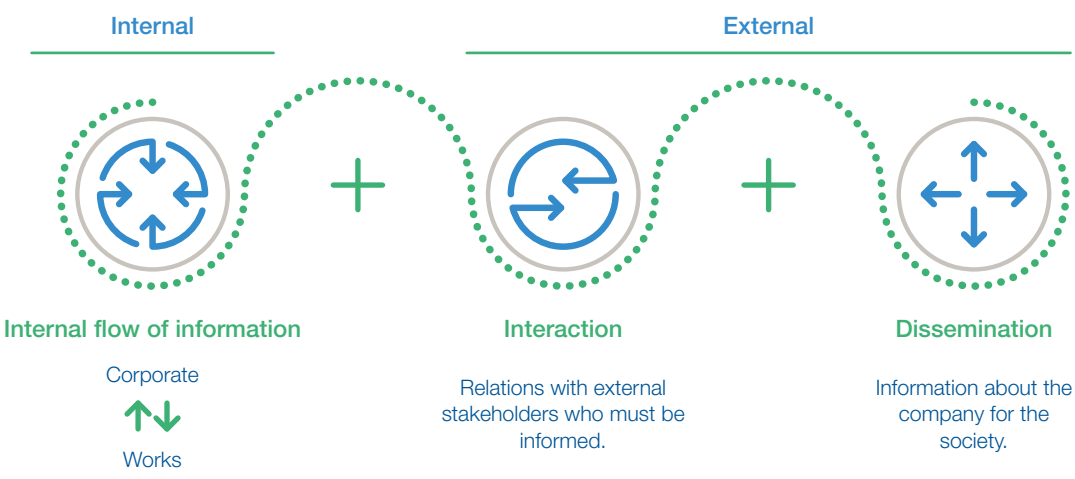
In this connection, in 2018, client involvement in environmental management tasks was achieved at 92% of the works performed. The client, a key figure throughout the entire process, was actively informed about the implementation and development of the Environmental Management Programme, including the environmental milestones set and the work performed to reach them.

Additionally, when selecting subcontractors (another key agent in the process), environmental criteria are employed, such as the use of an environmental management system or evidence that their environmental performance is positive. This was the case in 78% of the works performed in 2018, where subcontractors performed actions to optimise resources, submitted the corresponding permits and licences and satisfied contractual environmental requirements. Another important criterion is their performance in terms of ethics. It was found that 70% of subcontractors have their own code of conduct or adhere to FCC's code of ethics.

Furthermore, at 89% of the works performed, claims and complaints received from different stakeholders were handled, with an agreement reached on how to proceed in 40% of these cases.

Trust-based relationships and the creation of mutual value are underpinned by **transparent, two-way communication**. This provides the company with highly valuable constant feedback on project management and the achievement of its objectives.

FCC Construcción takes action in three different areas to ensure it achieves inclusive and efficient information:



FCC Construcción's workers are a key part in establishing a fluid and rewarding dialogue with the communities in which we operate, in addition to respecting the environment in which works are performed.

FCC Construcción has established different internal and external channels of communication, which make it possible for the necessary information on environmental concerns, proposals for improvement, collaboration requests or environmental guidelines to be sent and received. This constant flow of information allows for stakeholders' demands to be included in its Sustainability Management System.

Internally, communication and awareness raising are essential in promoting respect for their surroundings among works staff. To this end, 99% of projects used the company's standard environmental signage.

Taking external stakeholders into consideration, direct communication was established with residents affected by 88% of the works performed in 2018, providing them with information on the towns and cities affected, the duration of works and the possible impacts. Furthermore, they were offered information on the benefits and rewards of the project they were affected by, establishing consultation and participation mechanisms in some cases. In addition, 58% of the works developed a communication plan to provide environmental, social and cultural information on the project. Social or environmental initiatives were prepared for 58% of the works; this information was then published on the organisation's internal networks, meaning that the knowledge acquired was available to other works performed by the company.

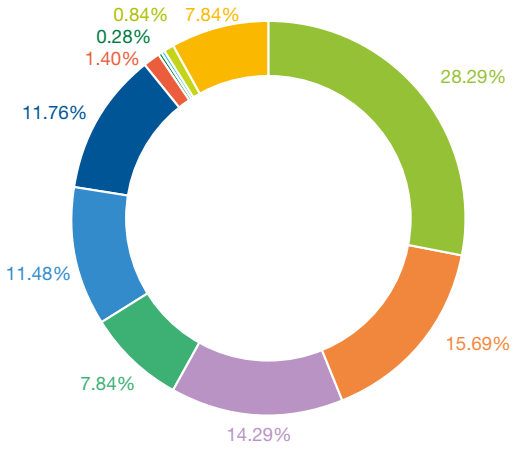
Thanks to the efforts made as part of these informational and environmental initiatives, 67% of the works performed by FCC Construcción have obtained social recognition, whether in the form of congratulations, an award or mention in relation to its environmental performance.

The following charts show how FCC Construcción and its stakeholders communicated over the course of 2018. The total number of environmental communications has been organised based on the matter in question and type of institution involved in the dialogue.

As a result of these internal and external dialogues with interested parties, at 73% of works, environmental improvements not included in the original project were proposed and implemented. Furthermore, this dialogue contributed to practically all projects (96%) establishing a fluid dialogue with stakeholders, addressing aspects that could give rise to significant impacts on the client, the authorities or potentially affected associations and individuals.

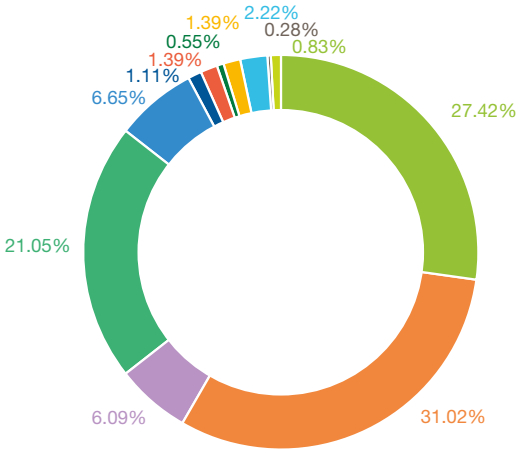
The implementation of competitions or awards for the best subcontractors who demonstrate their commitment to the environmental management of the project, as was the case in the construction of line 2 of the Lima Metro, promoted good practices and continuous improvement in the environmental performance of works.

Subject matter of the communications



- 28.29% Sending information or documentation to interested parties in response to prior request
- 15.69% Collaboration request
- 14.29% Communication of actions generating potential environmental risks
- 7.84% Resolution of complaints and claims from interested parties
- 11.48% Reception of guidelines or instructions
- 11.76% Public dissemination (communications, announcements, advertisements, advertising, awards, mailing and congratulations, publication of texts, site visits)
- 1.40% Proposal for improvements and suggestions
- 0.28% Public participation and institutional support
- 0.28% Any event; stone-laying and inaugural ceremonies
- 0.84% Staff management of the worksite/centre
- 7.84% Others

Communication with stakeholders



- 27.42% Supranational, national, regional or local environmental administration
- 31.02% Supranational, national, regional or local administration different from the environmental one
- 6.09% River basin institutions
- 21.05% Public companies. Autonomous agencies and official institutions.
- 6.65% Private businesses
- 1.11% Academic community, sectoral and professional associations, foundations
- 1.39% Individuals
- 0.55% Local Community (trade unions, NGOs, religious congregations, native communities, etc.)
- 1.39% Employees (construction staff, quality and environmental technicians, local or central technical services or Senior Management)
- 2.22% Customers (client representatives, technical assistances on site)
- 0.28% International institutions (UN, World Bank, etc.)
- 0.83% Others

CASE STUDIES

Expansion project of the Faculty of Philosophy and Humanities at the Zaragoza University

Client University of Zaragoza

Period of execution 19 months

_Problem detected

The expansion project of the Faculty of Philosophy and Humanities at the University of Zaragoza included the integrated refurbishment of its central building, designed by the architect Regino Borobio and categorised by the General Land Use Planning of Zaragoza as being subject to a (B) protection rating on account of its architectural value. The main lobby is home to a mural of great value, created using pieces of ceramic by local ceramic artist and surveyor Ángel Grávalos in 1972.

The refurbishment project included transferring eastern panel of the mural, the conservation status of which had been degraded over time. The uniqueness of the mural, its fragile conservation status and its original location, overlapping the other panels that could not be affected, made the transfer of the eastern panel a delicate and highly complex operation.

_Adopted solutions

To transfer the eastern panel of the mural with all the necessary guarantees, a company specialising in this type of work and the restoration of works of art was contracted. Its technicians performed a preliminary study on the condition of the mural before it was touched and defined the operations that would be necessary to dismantle and conserve the parts, in addition to numbering and cataloguing them, including data such as their location and position. They also assumed responsibility for supervising the work to remove the slabs to ensure both their integrity and traceability.

The remainder of the mural was protected during the rehabilitation work using geotextile sheets, which were positioned in direct contact with the ceramic, covered with fibre panel and held up by a wooden plank structure.

_Results

Thanks to measures employed, we were able to guarantee the conservation status of the mural during the work to refurbish the building and that the transfer of the eastern panel was performed in such a way to fully protect the pieces removed, and that they would be repositioned in line with the original layout designed by the Aragonese artist.

FCC Construcción is concerned for anything that improves the life of its stakeholders. As part of this project, the mural represented an essential element for local society, in particular for teachers, staff and students at the university. Therefore, special efforts were made to protect it with all the necessary guarantees and, as a result, allow them to enjoy this work of art created by a local artist in 1972 once more.

Frame that supports the geotextile protection for the part of the mural that remained on the building.

Mural by Ángel Grávalos dating to 1972 for which the panel had to be transferred.

CASE STUDIES

Megaplas Factory

_Problem detected

As part of all the activities performed by FCC Construcción, we prioritise respect for the environment and people, minimising any possible adverse effects and generating opportunities to contribute to improving the environments in which we operate. At the factory owned by Megaplas, a company renowned for the production and assembly of signs, very ambitious criteria are in place to ensure that none of the products selected place the health or operators, nor the environment, at risk.

To this end, it was found that two products used (aerosols) posed a risk to the health of workers and the environment. These products were solvents and degreasers used to clean surfaces and the products used to prevent spattering during welding work.

_Adopted solutions

With a view to minimising risks, alternative products were sought that preserved the level of performance without compromising on human health and the environment. With this in mind, both of these products were replaced with alternatives with an aqueous composition, the application of which is simpler and, generally speaking, not harmful to human health. Furthermore, they are supplied in the form of a spray rather than an aerosol, meaning they contain no propellants and, therefore, represent a lower risk to the environment.

_Results

The paint department at Megaplas was responsible for testing the product for cleaning surfaces, whilst the locksmith department tested the anti-splatter material for welding. Both confirmed it was suitable in terms of performance and the quality of work.

In addition to selecting both products on account of their lower level of harmful emissions, consideration was also given to the fact that the product comes in reusable containers, as is the case of conventional sprayers.

Even though this change may only appear small, the selection of products based on environmental and social criteria, without compromising on the quality of our services, demonstrates Megaplas' commitment to the health of its workers and the environment.

Painting process in Megaplas facilities.

CASE STUDIES

IES Viladomat

Client Infraestructures de la Generalitat de Catalunya, S.A.U.

Period of execution 13 months

_Problem detected

The Autonomous Government of Catalonia tasked FCC Construcción with building a new school located at Eixample Esquerra district of Barcelona, home to the public space known as Jardins Emma, which had been recently opened, and that served as a recreational space and playground for local residents. Furthermore, close to these works was the "Pla Buits": a plot assigned temporarily to the Germanetes Association, which featured a geodesic canopy of tubes, prefab modules, a small bar and area destined for use as an urban vegetable garden. A range of local organisations held meetings and events using this space, and every two weeks, a section of Consell de Cent Street, between Viladomat Street and Comte Borrell Street was closed to host an ecological farm market.

Unfortunately, the lack of information about the works taking place caused inconvenience amongst local residents who had been using the space, and they filed complaints with the company.

_Adopted solutions

The first measure employed was to create an information space for communication between the work team and frequent contacts, including the neighbours' association and the Germanetes Association. Thanks to this initiative, it was possible to confirm that most people using the space around the works were unaware of the project to construct the school, nor about the company's environmental commitments or deadlines. This open channel of communication created a dialogue with stakeholders and allowed for solutions to the conflicts arising as a result of the performance of the work, in the form of official meetings, to be reached.

In the work area adjacent to the "Pla Buits" space, the building was due to have a double-sided wall of 6 m in height. After several meetings with those responsible for the space, the Eixample Local Council, the Consortium of Education and the Project Management team, the decision was taken to extend the work boundaries to ensure the safety of third parties.

The replacement of urban furniture, trees and the services affected by the works were organised. It should be noted that the meetings were held in relation to the public lighting system, the displacement of a public fountain, the removal of trees or transfers to nurseries, the recovery of covers and valves, the request for a connection to the sewerage network, the recovery and relocation of mobile and urban vegetable gardens and existing wood flooring, in addition to items dedicated to sports, such as basketball hoops and ping-pong tables.

_Results

The company managed to win the trust of local residents and social organisations active in the surrounding area thanks to its generous response to their requests, constant communication with technicians and the supervisor of the works team and, most importantly, the information provided concerning the work and progress therewith.

As procedures and spaces for communication had been set up involving the parties affected by the works, no further incidents were registered. All the agreements reached at official meetings were reflected in the meeting minutes or FCC Construcción's form number 420, which reflects our relations with stakeholders.

Jardines Emma were used as normal, despite their proximity to the works, and it was possible to minimise the potential impact of the work on local residents.

As a result, the rewards of having a school in the area and the company satisfying its promise of completing the build in a reduced time frame (just 13 months) strengthened the coexistence of the works with local residents and the social environment.

The trees at Jardines Emma were removed under the "dignified death" protocol and based on advice from the City Council's Parks and Gardens Department.

Land use planning

The current pace at which land use is being transformed means that in addition to considering its social and economic development, we must bear in mind the measures needed to conserve, protect and recover the ecological processes in the affected areas.

FCC Construcción is aware that its projects, especially those involving civil engineering because of their size, have an impact on the land in various ways. These projects cause changes in the reliefs and landscapes and interfere with the life of the animal and plant species present in the areas in which the works are being carried out. They also affect nearby local communities and their ways of life.

For this reason, FCC Construcción, in order to minimise the impact that its activity may cause on the immediate natural and social environment, integrates into the different phases of the project, from its planning, construction, operation and until the end of its useful life, the aspects that must be taken into account in order to reduce these negative effects on the environment and on urban or rural populations. Among them, a study of the natural environment and the effects that each project will have on it is of particular importance. This allows us to be aware of the biodiversity present in the area in which the work is planned to be undertaken and how it will be affected by the construction activity.

FCC identifies the possible negative repercussions and environmental risks on the natural and social environment of its projects and, based on this, establishes the necessary action measures.

The construction of large infrastructures, such as motorways, ports or airports, affect the natural environment, which must be taken into account in the planning of the project, in order to minimise and offset them as much as possible.

Risks and opportunities

THE STUDY OF THE NATURAL AND SOCIAL ENVIRONMENT AND THE POSSIBLE EFFECTS OF PROJECTS...

1. Protection of flora specimens
2. Transplants
3. Use of native species in restoration
4. Work planning (life cycles, critical stages...)
5. Transfer of nests or individuals
6. Use of resources to avoid the presence of dirt
7. Use of markers, protection and road signs for the reduced occupation of pavements and roads

...MINIMISES THE IMPACT OF CONSTRUCTION ACTIVITY

- Vegetation removal
- Erosion, desertification
- Impact on wildlife
- Loss of biodiversity
- Visual impact on the landscape
- Dirt in the environment
- Interference with traffic and outdoor installations

Good practices

Different conservation, protection and recovery good practices are carried out in the FCC Construcción works. These are selected according to the type of work, its requirements and the characteristics of the physical environment and landscape of the area. When the planning of the work includes the preparation of an environmental impact study, all these elements are considered in the analysis.

The following table shows the degree of application of the different good practices that were implemented in the works executed in 2018, with the aim of reducing the impacts on biodiversity and the urban environment.

In the 2018 a Biodiversity Plan was developed in FCC Construcción works that ran through sensitive sites where biodiversity may be affected. These are conducted with the aim of analysing the areas in which the works are being carried out, identifying the animal and plant species present in them, paying special attention to protected species, and designing appropriate measures to preserve, conserve or, when this is not possible, compensate for the loss of biodiversity in the area.

When project execution interferes with biodiversity, good practices are implemented. These include transplanting plant species to new locations where they can maintain their life cycle or transferring nests or individual important animal species. These actions were carried out in 93% and 63% of FCC Construcción works, respectively.

In 73% of civil works, the planning of works was adapted to the life cycles of the species, even beyond the project's forecasts. This restructuring of activities is a key action to maintain habitat conditions in the highest stages of vulnerability for different species, such as breeding or reproduction.

Good practice	Importance	Magnitude (degree of implementation)		
	% of application	1	2	3
Physical protection of individual items.	1 60% 79% 75%	All individual items affected by the project are protected. 67% 80% 77%	Idem, for all individual items. 0% 20% 17%	In addition, care and maintenance is carried out. 33% 0% 6%
Transplants.	1 100% 93% 93%	An individual item affected by the project is transplanted. 0% 31% 29%	Idem, for all individual items. 100% 46% 50%	In addition, over 80% of transplants are successful. 0% 23% 21%
Adaptation of the project planning to the life cycles of the most valuable species.	2 0% 73% 73%	The project's forecast are improved on. 0% 87% 87%	It is not taken into account in the project and it is carried out. 0% 0% 0%	In addition, the individuals affected are tracked for more than six months. 0% 13% 13%
Movements of nests or individuals.	1 50% 67% 63%	Some movements are made. 0% 25% 20%	A general movement is made 100% 50% 60%	In addition, the individuals affected are tracked for more than six months 0% 25% 20%
Use of measures to avoid dirt at the site entrance and exit.	2 86% 86% 86%	Entrances and exits are swept systematically. 90% 62% 72%	The wheels of all trucks are cleaned before they join the public road. 5% 25% 18%	A fixed device is used for the above (water troughs at the exits, sprays, etc.) 5% 13% 10%
Occupation of pavements and roads	2 86% 88% 88%	Protective measures are adopted (fencing, signposting, separation of pavement/roads, etc.) 52% 34% 42%	In addition, alternative routes are provided. 37% 57% 48%	In addition, the maximum authorisation time or space is reduced. 11% 9% 10%

The **protection of plant species** present in the project area is a priority for FCC Construcción. As a result, in **93% of the works**, trees were transplanted to safer areas.

The construction work on the Yesa dam on the Esca river in Navarra required the temporary drying up of a section of the river, so it was necessary to rescue the fish that inhabited the river itself and then release them into another section of the river.

Good practice	Importance	Magnitude (degree of implementation)		
	% of application	1	2	3
Precautionary measures for avoidance of falling debris to the public road or adjacent buildings.	1 57% 43% 48%	Placing of “protection tray” in the façade’s front (hanging scaffold which overhangs from the façade with a vertical protection). 0% 50% 30%	Placing of a mesh type enclosure around the building’s structure. 75% 0% 30%	In addition to placing of “protection tray” or mesh type enclosure, signposting of the installed protection measures. 25% 50% 40%
Use of means to minimise the barrier effect and avoid animals’ accidents.	2 100% 0% 20%	Setting-up of specific wildlife crossings to help the crossing of animals. 100% 0% 100%	Setting-up of protection enclosures hunting type or dissuasive signposting to avoid the crossing of animals. 0% 0% 0%	Both previous options. 0% 0% 0%
Setting-up of fauna shelters (refuges) with artificial structures.	1 0% 50% 33%	Setting-up of fauna shelters (refuges) with artificial structures. 0% 0% 0%	Setting-up of temporary shelters for, at least, two animal species. 0% 100% 100%	Setting-up of temporary shelters, which become permanent at the end of the project. 0% 0% 0%
Biodiversity plan.	1 100% 100% 100%	An initial ecological inventory is undertaken in order to define the habitats and vegetal or animal species that are to be found at the worksite. 0% 20% 14%	The initial inventory is used to define and implement measures aimed at reducing or compensating the biodiversity loss. 0% 0% 0%	In addition, the implemented measures are monitored for longer than six months. 100% 80% 86%

Building
Civil engineering works
Total

One of the objectives pursued by the implementation of good practices in our works is to avoid habitat fragmentation. When unavoidable, appropriate measures such as tree transplanting are taken to conserve the affected species.

Previous studies allow us to understand how the most valuable species in the area will be affected by the work and, with this information, to organise the necessary means to minimise the negative effects. Subsequently, the affected populations are monitored, which helps to assess the real impact and act on the consequences.

Another detrimental effect of the works is habitat fragmentation. FCC Construcción attempts to reduce the "barrier effect" for the different species produced by the interruption of ecosystems by applying measures that respect the location and, as much as possible, the movement needs of the different species, which allows for a suitable distribution of local wildlife and flora.

With regard to the effects on the urban environment, a series of good practices also stand out, such as the irrigation of dirt roads and the cleaning of the wheels of the machinery to avoid dirt at the entrance and exit of the work, which was implemented in 86% of the projects. Likewise, the limitation and demarcation of the occupation of pavements and roads, avoiding the obstruction of the movement of citizens was applied in 88% of the works and the installation of elements for the prevention of falling debris on the public road and adjoining buildings was carried out in 48% of the projects.

Land adjacent to or located in protected natural areas or unprotected areas with high biodiversity

Type of impact	No. of Construction Works	Surface area (million m²)
Location in natural sites that are protected or highly valuable for biodiversity	9	5.22
Location where the landscape is catalogued as relevant	10	13.76
Impact on natural watercourses of a protected site	6	0.30
Impact on natural watercourses that are protected or located in areas of high biodiversity value	4	8.44
Impact on watercourses of very high or relevant value for local or indigenous communities	13	8.90
Impact on catalogued or protected flora	12	13.85
Impact on catalogued or protected wildlife	12	13.67

Restoration and protection of spaces

Protective measures	Surface area (ha)
Restoration of affected areas	58.19
Protection of vulnerable areas	47.82

CASE STUDIES

New railway platform for the Arroyo de la Charca-Grimaldo section

Client Administrador de Infraestructuras Ferroviarias (ADIF Alta Velocidad)

Period of execution 18 months

_Problem detected

The route of the new railway platform of the Arroyo de la Charca-Grimaldo section, integrated in the Talayuela-Cáceres branch of the Madrid-Extremadura High Speed Line and with a length of 6.4 km, runs parallel to the Dual-Carriageway of Plata A-66 and the N-630 National Motorway, and has a number of viaducts, embankments and clearings, two underpasses and eight drainage works.

The vicinity of the project has an abundant presence of lagomorphs (hares, rabbits and other placental mammals, such as pikas), with a high level of mobility and capacity to dig the ground for burrows. As usual practice in linear infrastructures, in order to prevent this type of animal from entering the railway platform, the lower part of the enclosure is buried up to 40 centimetres deep in the ground. However, this burying is slow and costly, and is sometimes even not sufficient enough to prevent the entry of these small mammals.

In addition, the usual location of service roads following suitable drainage works for the crossing of wildlife interferes with the routes where these lagomorphs travel, increasing the risk of them being run over.

_Adopted solutions

Where the enclosure passes close to the ditch, a decision was taken to anchor the flap to the ground with screws, thus avoiding the need to dig a 40-centimetre-deep ditch and cover it again. In addition, in those areas where it was possible, the location of the perimeter fence was modified to bring it closer to the longitudinal ditches. Although it was not possible to implement this solution in the whole section, it was possible to significantly reduce and speed up the execution of the enclosure.

In addition, in order to reduce the risk of mammals being run over, the drainage works were slightly lengthened in order to be able to move the service roads over them and to reduce the intersections at level between the cross-sectional works and the service roads that run parallel to the track.

_Results

The solution of anchoring the perimeter fence flap to the longitudinal ditch to the track platform obtained results similar to those of the areas in which the fence was buried, but with lower cost and greater speed, without this having led to any loss of its functionality. In addition, in cases where the drainage works were designed as wildlife crossings, the risk of it being run over was reduced.

FCC is aware of the alterations produced by its activity on the environment in which it operates, although sometimes these are very limited interferences which, nevertheless, have important effects on ecosystems and biodiversity. Therefore, finding simple and efficient solutions is one of our objectives. The work on the Charca-Grimaldo section contributed to reducing the impact of habitat fragmentation that linear infrastructures have on the land.

Cross-sectional drainage work prepared as passage for wildlife.

Perimeter fence to avoid the entry of small mammals.

CASE STUDIES

Helios Patrimonial photovoltaic plants and Guzmán thermosolar plant

Client JV Helios and Guzmán Energía, S.L

Period of execution 24 months

_Problem detected

FCC Industrial is responsible for the operations and maintenance of two Helios Patrimonial solar photovoltaic plants in Espejo and the Guzmán Thermosolar Plant in Palma del Río, all of which are located in the province of Córdoba. These renewable energy generation plants are located in rural areas, where there is a significant growth of herbaceous vegetation in the spring months. When summer arrives, this grass dries up and, as a consequence, the risk of fire increases in the plant installations and in the adjacent land.

_Adopted solutions

In order to carry out preventive maintenance, which is sustainable and respectful of the environment, controlling of herbaceous vegetation was carried out with livestock in the area. For this purpose, shepherds from nearby populations were contacted, who showed interest in gradually introducing herds of sheep and cattle. This livestock management made it possible to reduce the volume of plant biomass in plant facilities, taking advantage of differences in the diets of sheep and cows. In this way, the maintenance work of the facilities was integrated with the rural activity of the local population, obtaining a mutual benefit.

_Results

The results of this initiative were positive. Firstly, the risk of fires in and around the site was reduced. It also significantly improved the relationship of the companies involved in plant management with the local population by integrating the management of the activity of both sectors to their mutual benefit.

The controlling of herbaceous vegetation in the facilities of the thermosolar plant is achieved through the grazing of cattle from nearby livestock farms.

Grazing on the grounds of the solar photovoltaic plant facilities located in Espejo controls the growth of herbaceous vegetation and reduces the risk of fires.

CASE STUDIES

Gurasada-Simeria railway section

Client SNCF CFR SA (Romanian National Railway Company)

Period of execution 36 months

_Problem detected

The construction and renovation works of the Gurasada-Simeria (Romania) railway section run through two areas of special natural value. Along a 40 km section, the road crosses the river Mureş between Branisca and Ilia (Site of Conservation Interest, LIC ROSCI 0373) and passes near the Mureş gorge (LIC ROSCI 0064). Both are areas of great importance for biodiversity conservation.

The effectiveness of measures to reduce the impact of works depends on their proper planning, so it is necessary to monitor their implementation.

_Adopted solutions

The monitoring of measures to reduce the impact of the works was the method selected to monitor their effectiveness throughout the project. The monitoring process began with an analysis of the project and the aspects that could have an impact on the environment, a literature review was carried out on the state of conservation of biodiversity in that area, wildlife and flora were sampled prior to the start of the work and remote monitoring equipment was installed (cameras).

The wildlife sampling consisted of the installation of 15 monitoring stations for reptiles, amphibians and Chiroptera (bats) and 16 stations for invertebrates, birds, mammals and flora.

_Results

Quarterly monitoring data in 2018 showed a great diversity of species in the area. Three animal and plant species of Community interest were identified (*Helix pomatia, Lucanus cervus* and *Lycaena dispar*), as well as species of special conservation interest, including invertebrates, amphibians, reptiles, fish, mammals (especially otters and beavers), bats and birds (some of which are included in Annex 1 of the Birds Directive 2009/147/EC on the conservation of wild birds).

The results confirmed that the actions carried out by FCC Construcción have been properly implemented to ensure that there is no significant impact on the wildlife populations that live in the impact zones of the works.

Maintaining control of the area's biodiversity throughout the execution of work in the first few years of operation makes it possible to ensure compliance with the measures adopted, to record particular situations and to intervene rapidly if necessary to protect the ecosystem.

Top photography: Observation of the area to define the control points.
Bottom photography: Monitoring of mammal nocturnal habits through the installed cameras.

Delimitation of control zones of the ictiofauna of the Mureș river.

Climate change

Concern about climate change already dominates the concerns and interests of today's society. The concentration in the atmosphere of gases that exacerbate the greenhouse effect has been causing, for years, average increases in the planet's temperatures. These are directly linked to changes in the rainfall patterns or in the behaviour of animal and plant species in the environment, as well as extreme weather events, as evidenced by increasingly compelling reports by experts from the IPCC (Intergovernmental Panel on Climate Change). According to its October 2018 publication, meeting the Paris commitments would require at least a 45% reduction in greenhouse gas emissions over the next decade.

At the Paris Summit (COP21) in December 2015, 195 countries signed the first binding global climate agreement, the Paris Agreement. This agreement, flexible in terms of instruments, establishes a global action plan that places the global warming limit well below 2ºC. At the last meeting, held in December 2018 in the Polish city of Katowice, a rulebook has been approved for the implementation of this Agreement in 2020.

As a global company, FCC Construcción is aware of the importance of tackling climate change and that the transition to a low-carbon economy is a process that offers no room for turning back. The challenges posed extend to all agents and are closely related to the achievement of the Sustainable Development Goals. For this reason, FCC Construcción's contributions are mainly to make its activity more respectful of the environment, improving the efficiency of its processes, optimising the consumption of resources and designing infrastructures that are more resilient and have fewer maintenance needs.

In 2010, FCC Construcción began to integrate the concept of climate change into its organisation by designing and implementing a protocol for measuring greenhouse gases (GHG) in construction, becoming the first Spanish company in the sector to submit its emissions for external verification by AENOR. Since then, the company has annually prepared and verified its GHG emissions report and, in addition, since 2012, it has held the " Verified CO2 Carbon Footprint" certificate, which accredits both the accuracy of the calculation and the inclusion of GHG management in the organisation's system and strategy. This initiative was awarded in 2012 with a runner-up award in the "Management for Sustainable Development" category of the European Environment Awards, promoted by the Fundación Entorno.

FCC Construcción was also the first Spanish company in this sector to register its carbon footprint in the carbon footprint, offset and absorption projects register, created in 2014 by the former Spanish Ministry "Ministerio de Agricultura, Pesca y Alimentación" o (MAPAMA), now the Spanish Ministry "Ministerio para la Transición Ecológica" (MITECO), where FCC Construcción's carbon footprints from 2012 to 2017 are now registered.

In 2016, the company extended the scope of its registration by obtaining the "Calculate and Reduce" seal, based on the carbon footprint for 2015, by accrediting a national reduction in emissions in the period 2013-2015 compared to the period 2012-2014. The reduction also occurred in the following two years, 2016 and 2017, leading to the obtaining of the corresponding seal. This seal, in addition to recognising the implication and the ability to quantify and verify its Greenhouse Gas emissions, distinguishes the company as one of the organisations that reduces its carbon footprint effectively.

Given the current situation, FCC Construcción wants to respond to the challenges of climate change with transparency and a clear commitment to support the fight against climate change and its corresponding effects, aware of the need to tackle it with the coordinated efforts of citizens, companies and governments.

Greater investment in more sustainable energy infrastructure will be key to containing climate change.

Reports on greenhouse gas emissions published by FCC Construcción since 2010.

In 2017 FCC Construcción published its climate change strategy, which establishes the action guidelines to deal with both the challenges and the opportunities that arise. The strategy articulates over four main axes (mitigation, adaptation, communication and innovation) the work carried out and the results obtained since 2010. In short, it is a question of fighting global warming and, at the same time, finding genuine actions for FCC Construcción to continue to tackle climate change, with mitigation and adaptation measures and instruments for measuring and controlling it.

FCC Construcción operates in the international market. Many of the projects it builds, mainly civil works, are located in countries that are particularly vulnerable to climate change. For this reason, FCC Construcción established among its 2017-2020 Management Objectives the extension of the greenhouse gas (GHG) emissions inventory verification to the international sphere, so that by 2020 it would have 100% of its activity verified under the ISO 14064-1 standard. In this way, the company's effort in measuring its carbon footprint and identifying improvement actions is now externally recognised, reinforcing its credibility and facilitating the dissemination of good practices to stakeholders in all the countries in which the company operates. In order to meet this objective, 2018 was the first year in which the GHG emissions in Panama, Portugal and Peru, as well as those in Spain, were verified by AENOR.

The seal of approval awarded to FCC Construcción by the Spanish Ministry recognises companies that decide to register their carbon footprint and their efforts to reduce and improve, encouraging other organisations to make progress in the fight against climate change.

In the short and medium term, FCC Construcción will work to set ambitious reduction targets that are approved by the Science Based Target Initiative[1] and, above all, to further the adaptation to climate change, evaluating the impacts and analysing the vulnerability and opportunities of the company in the different locations in which it operates.

[1] The SBTI initiative, led by CDP, United Nations Global Compact, World Resources Institute (WRI), WWF and We Mean Business, aims to help companies set science-based climate targets to reduce greenhouse gas emissions and limit global warming to below 2ºC, taking advantage of opportunities during the transition to a low-carbon economy.

Risks and opportunities

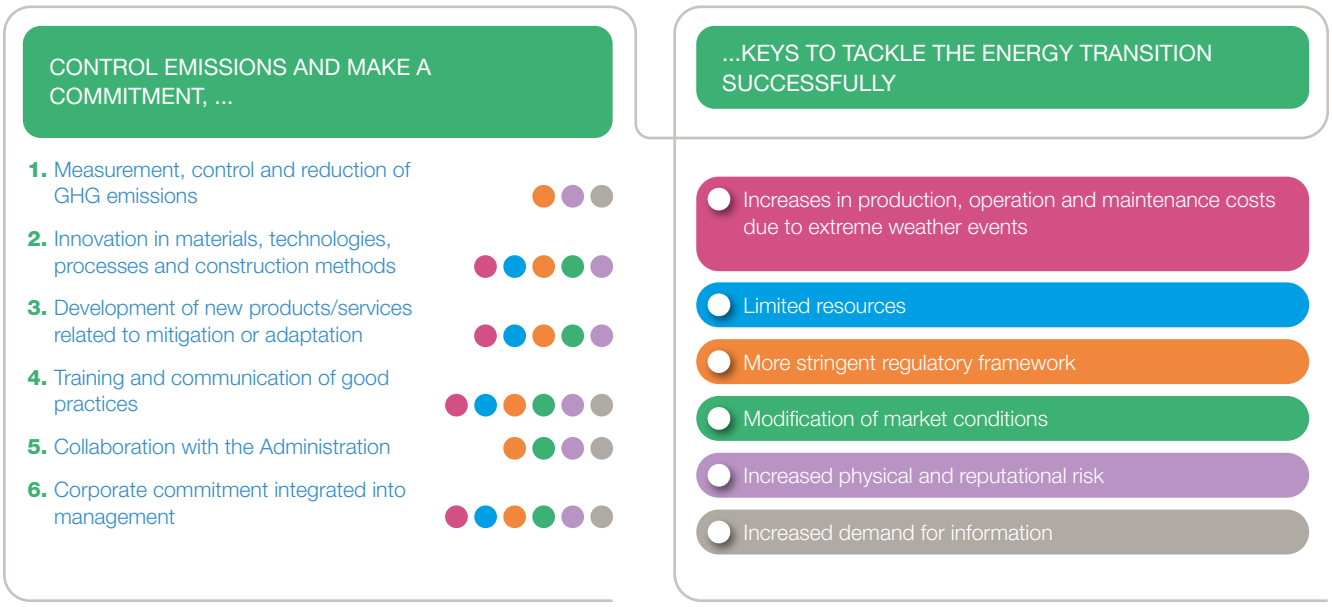
Different bodies, from the European Union to the Global Risks Report published annually by the World Economic Forum, not forgetting the report published in October 2018 by the United Nations Intergovernmental Panel of Experts on Climate Change (IPCC), which warns of very serious and irreversible effects, revealing, year after year, the difficulties that all countries are encountering in making progress in containing climate change.

The solution to this global problem is to increase work on mitigation and adaptation. In this sense, FCC Construcción now includes in its decisions the risks that climate change entails for the company, whether physical, financial or, of course, regulatory. Together with them, opportunities are opening up all over the world associated with the aforementioned adaptation and mitigation tasks, which must be identified and taken advantage of.

The acceleration of the effects of climate change predicted in the last report will lead, among other repercussions, to an increase in extreme weather events, which can cause significant damage to infrastructure and pose a major risk to the construction sector. It is estimated that by 2030, losses from increased natural disasters caused by climate change will amount to $314 billion per year, more than double the losses of this type in 2012. For this reason, FCC Construcción believes it essential to identify the main impacts that may arise for the organisation as a result of climate change and the new socio-economic environment that is taking shape on a global scale as a result of the implementation of measures aimed at containing it.

The risks associated with climate change are substantial and significant. Regarding infrastructure, its importance does not only stem from damage that may occur directly and promptly as a result of an extreme weather event. Many of these risks will materialise and evolve over the years, changing the profile of infrastructure use and the developments planned for projects. These include transport infrastructure, if there are changes in patterns of use, energy infrastructure or buildings and civil works, which may be vulnerable to climate change due to their materials, design or location.

It will be essential to build infrastructures that respond to the requirements of the coming years, but it is also necessary to adapt the existing ones to make them capable of withstanding pressures that were not foreseen in their design. It is a challenge, but also an opportunity of enormous significance on a global scale, supported by different investment entities and supported by multilateral bodies. The European Union's Green Climate Fund, aimed at particularly vulnerable countries, and the Adaptation Fund of the United Nations Framework Convention on Climate Change, among others, finance projects to build resilient infrastructure.



The planet is increasingly vulnerable to climate change. Each year, the desertification of the land continues, worsening the surface water and groundwater situation. Adaptation work to contain this progress and to have suitable water collection and storage infrastructures will be increasingly necessary.

FCC Construcción's main responses to adapting infrastructures to climate change

1. Use resilient structural strengthening systems.
2. Use structures and materials that withstand maximum temperatures and fluctuations in temperature.
3. Strengthen existing infrastructures to improve their resilience in the face of climate change.
4. Promote innovative solutions.

Some of FCC Construcción's innovation projects in this area are:

ROBIM Project:
Aimed at the development of an automated, active and multidisciplinary technology for inspection, evaluation and diagnosis of the composition and state of conservation and energy efficiency of the enclosures of building assets, which facilitates the obtaining of accurate and sufficiently detailed information on construction systems and conditions, as well as an exhaustive analysis of the building, caused, for example, by natural disasters that may cause structural damage.

STARPORTS Project:
Aimed at developing a smart platform capable of providing in real time detailed and multiple pieces of information on the state of any coastal and maritime infrastructure, capable of measuring, automatically and intelligently, changes over time such as conditions or other anomalies. In addition, advanced sensor networks will be developed that can be integrated within the same infrastructure to obtain meaningful and reliable data on its condition.

Good Practices

Climate change is a new paradigm that requires companies to adopt mitigation and adaptation strategies, along with a firm corporate commitment. Therefore, FCC Construcción has established a series of actions or good practices to address the challenges arising from the fight against climate change in these two areas.

The reuse of materials in the work itself instead of moving them to landfill has avoided the emission of **7,266 t CO_2** into the atmosphere, as the associated transfers have not taken place.

Good practices for acting on climate change

Initiatives to mitigate the effects of climate change on construction

- Measurement, control and reduction of GHG emissions.
- Application of Good Environmental Practices to avoid the emission of GHGs into the atmosphere.
- Use of materials with a longer lifespan, that are easy to recycle and have a low energy consumption.
- Reduction of waste generated and its reuse in the production chain.
- Promotion of energy efficiency and restoration of buildings.
- Training and communication of good practices to reduce the impact of workers on the environment.

Initiatives to adapt construction to climate change

- Research on the application of new construction materials that improve energy efficiency in installations.
- Promotion of the circular economy model: material reuse and design improvement to minimise resource consumption.
- Innovation to extend the life of materials.
- Actions regarding the surroundings of the works to make them more resilient to the effects of climate change.
- Improve the design of buildings and infrastructures incorporating new construction criteria that increase the resilience of these constructions, improve their efficiency and allow affordable maintenance.
- Cost-benefit analysis approach and risk management plans.

FCC Construcción's commitment to continuous improvement and the fight against climate change is reflected in the inclusion of actions to reduce emissions in the Good Practices System.

During 2018, FCC Construcción has implemented different Good Environmental Practices on its works, which have led to a reduction in emissions of CO_2 and therefore a reduction in the organisation's carbon footprint.

The following table shows the emissions avoided by each of the good practices applied, among which the reuse of materials on site instead of transferring them to landfill stands out, followed by the effect resulting from proper maintenance of machinery and construction vehicles.

Emissions avoided by the application of good practices (t CO_2e)

	Total(*)	Total verified(**)
Due to reusing the material in the work itself and not taking it to landfill	7,266	3,240
Due to neutralisation of the pH with CO_2	49	49
Due to proper maintenance of machinery operating on site	1,535	505
Due to control of the speed of vehicles on site	42	19
Due to the use of electric vehicles	7	0
Total emissions	**8,899**	**3,813**

(*) Emissions reported by different organisations and countries; not verified by third parties.
(**) Emissions verified by AENOR. Scope: FCC Construcción works and centres located in Spain, Portugal, Peru and Panama.

Data and key indicators

The measurement of the carbon footprint requires prior identification of the main sources of greenhouse gas (GHG) emissions from FCC Construcción's works and premises, as well as the definition of the scope of calculation, taking into account the limits of the organisation and the operational limits. To do so:

- Each production centre compiles and reports its activity data through a corporate tool, defining the emission factors and through which FCC Construcción quantifies emissions of Scope 1, 2 and 3.
- With a centralised approach, FCC Construcción integrates the activity data received from each of the works and premises and measures corporate GHG emissions. The information may also be broken down by project, geographical area, organisational area, type of project, etc.

The following table shows the GHG emissions in 2018. It should be noted that emissions from centres located in Spain, Portugal, Peru and Panama are subject to external verification, which means that 56% of FCC Construcción's emissions and 49% of the Construction Area's emissions are verified.

In works and installations, signs are used to raise awareness among staff and collaborators for an efficient consumption of resources. Turning off lights or the computer before leaving the office is a small daily gesture that also contributes to reducing GHG emissions.

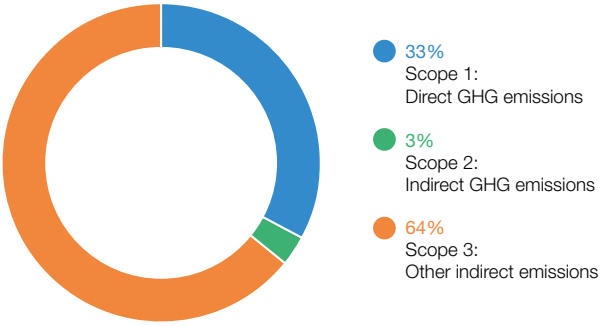
Direct and indirect emissions of greenhouse gases

Emissions sorted by scopes (t CO_2e)	Construction Area(*)	FCC Construcción in Spain(**)	FCC Construcción in Portugal(**)	FCC Construcción in Peru(**)	FCC Construcción in Panama(**)
Scope 1: Direct GHG emissions	**98,611**	**7,805**	**650**	**195**	**9,140**
Associated with fuel used at projects	74,369	5,076	632	190	560
Associated with fuel used at premises	24,242	2,729	18	5	8,580
Scope 2: Indirect GHG emissions	**10,972**	**2,262**	**147**	**470**	**1,334**
Associated with electricity used at projects	7,665	1,269	125	466	388
Associated with electricity used at premises	3,307	993	21	4	946
Scope 3: Other indirect emissions	**192,076**	**68,740**	**16,638**	**37,041**	**3,181**
Associated with the production and transport of purchased materials	159,003	55,717	13,581	35,002	2,828
Associated with the subcontracted works units	7,429	3,702	344	955	33
Associated with the transport and management of waste and surplus materials	19,410	4,449	2,702	1,034	134
Associated with employee business travel	5,648	4,743	0	0	0
Derived from losses during electricity transmission and distribution	585	128	11	50	187
Total emissions	**301,659**	**78,807**	**17,435**	**37,706**	**13,655**

* Emissions reported by different organisations and countries; without third party verification.

** Emissions verified by AENOR.

Construction Area GHG Emissions



FCC Construcción is directly responsible for certain emission sources linked to the carrying out of its activity and subject to the control of the company. This is the case of those produced by the use of machinery, generators, auxiliary material manufacturing plants or the use of vehicles that use fuel invoiced to FCC Construcción and generate direct emissions (Scope 1). To these are added the indirect emissions resulting from the consumption of electricity in works and premises (Scope 2).

However, taking into account the nature of FCC Construcción's activity and the points in its value chain where emissions are generated, it can be seen that most GHG emissions are located outside the company's operating control perimeter: there are Scope 3 emissions, which occur as a result of the company's activity, in sources that are neither controlled nor owned by the organisation, and in which FCC Construcción does not have the capacity to control. Emissions associated with the production and transport of materials consumed on site, which constitute 53% of the organisation's carbon footprint, and 83% of Scope 3, stand out among them. Emissions associated with the execution of subcontracted works units, such as earthworks, as well as those linked to the transport and management of waste and surplus materials, which together account for 8% of total emissions in 2018.

In conclusion, FCC Construcción's progress in aspects related to climate change is structured around the four main blocks proposed by the report of recommendations drawn up by the Financial Stability Board (FSB) working group on climate change.

Governance

- Inclusion of GHGs in the organisation's system.
- Verification of the annual emissions report.

Strategy

Strategy structured around:

- Mitigation.
- Adaptation.
- Communication.
- Innovation.

Risk management

- Definition of impacts and risks and opportunities associated with climate change.
- FCC Construcción's responses to adapting infrastructures.

Metrics and objectives

- Carbon footprint calculation.
- In-house, customisable tool.
- Application of good practices and setting objectives.

CASE STUDIES

Vicálvaro plant for the manufacture of asphalt concrete and concrete

_Problem detected

FCC Construcción has an asphalt concrete manufacturing plant located in Vicálvaro (Madrid). The production of the factory, which is applied in plans involving municipal asphalting, urbanisations or construction and maintenance of roads, among others, is used in the company's own works and is also supplied to clients.

The fuel used for manufacturing was fuel oil, which entailed a high economic and environmental cost, since its ratio of greenhouse gas emissions per tonne of asphalt agglomerate produced is higher than that of other fuels. In addition, it is also important to point out that the use of recycled fuel led to mechanical problems in the machinery, which reduced its useful life.

_Adopted solutions

Pursuing the dual objective of minimising technical problems and reducing the carbon footprint of the agglomerate produced, a decision was taken to replace the fossil fuels used to date (both fuel oil and diesel) with natural gas from the supply network, which had already been installed in the Vicálvaro Industrial Estate.

Natural gas entails, compared to fuel oil and gas oil, lower greenhouse gas emissions (CO2, NOx, SO2 y CH4), and absence of any kind of impurities and residues, which rules out any emission of solid particles, soot, smoke, etc.

_Results

The cost of the installation necessary to make the transition to natural gas has not been excessive and, furthermore, is compensated by savings in fuel used for the manufacture of asphalt agglomerate, as well as in the maintenance needs of machinery.

However, in addition to the reduction in resource consumption and the increase in equipment efficiency, the most important thing for FCC Construcción is that the use of the new fuel means a notable reduction in greenhouse gas emissions, thereby helping to minimise our impact on global warming and, therefore, on the process of climate change.

Natural gas supply pipes in the agglomerate manufacturing plant in Vicálvaro.

With the transition to natural gas, we have sought to eliminate technical problems in the machinery, which has increased its efficiency.

Circular economy and use of resources

Overexploitation of natural resources is another major environmental challenge facing society today. The linear economic model, in which resources are consumed and eliminated, is unsustainable and threatens the planet's carrying capacity: resources are not infinite, nor are the possibilities for absorbing or eliminating waste from human activities unlimited.

FCC Construcción, aware of the need to transform the production model from linear to circular at a global level, signed in 2017, together with other economic and social agents, the Circular Economy Agreement, thereby ratifying its commitment to this new paradigm.

The need to use large quantities of water and materials, as well as the occupation of large areas of land, are some of the factors that make the construction sector a large consumer of natural resources. Aware of the urgent need to establish consumption habits that respect the environment, in recent years construction companies have been promoting the concept of the efficient resource use, which involves the consideration of these aspects throughout the life cycle of projects, from their conception to their final conclusion, with the restoration of land, where appropriate.

This chapter describes the main challenges and opportunities identified by FCC Construcción with regard to the consumption of resources and the actions recorded in the Good Practices System for mitigating and rectifying the effects of this consumption, together with the associated performance indicators. Finally, it details FCC Construcción's commitment to the principles of the circular economy and the mechanisms that have been established for their application in the company's operations, aimed at responsible management of available resources together with maximum use of waste. Therefore, with the reintroduction into the production cycle of what is usable, the consumption of resources is kept to a minimum and the economic and environmental costs of waste management are reduced.

Responsible use of natural resources involves both limiting consumption and providing the means to return them to nature in optimal conditions.

Risks and opportunities

ACTIONS THAT HAVE A DIRECT IMPACT ON THE RATIONAL USE OF AVAILABLE RESOURCES...

1. Reuse of inert materials
2. Reusing removed topsoil
3. Mass Diagram Compensation
4. Use of elements recovered from other sites
5. Exchanges of surplus materials with other works
6. Reuse of effluents and process wastewater
7. Reduction of water and energy consumption

...CONTRIBUTES TO OPTIMISING THE USE OF RESOURCES AND REDUCING THE IMPACT OF THE ACTIVITY

- Overexploitation of natural resources
- Drought
- Climate change
- Difficulty obtaining loans

Good practices

The construction stage is the point in the value chain where the capacity for direct control over the consumption of resources is greatest for a construction company. Therefore, it is where FCC Construcción implements various good practices to promote the reuse of materials or reduce, whenever possible, the consumption of water and energy, using recycled water or renewable energy sources.

The following table shows the FCC Construcción works that in 2018 applied good practices aimed at optimising the consumption of natural resources as a proportion of the total.

Good practice	Importance	Magnitude (degree of implementation)		
	% of application	1	2	3
Re-use of inerts from other sites.	3 100% 67% 78%	More than 1% of inerts (fillings). 17% 25% 21%	More than 5%. 50% 25% 36%	More than 15%. 33% 50% 43%
Use of recoverable elements in site processes such as removable walls (traditionally of concrete for later demolition) in aggregates crushing installations, etc	2 0% 43% 43%	Use of some system in at least 50% of possible cases in carrying out an activity. 0% 67% 67%	Idem, in 2 or more activities. 0% 33% 33%	Idem, in 5 or more activities. 0% 0% 0%
Reduction of borrow-pits compared to the volume forecast in the project.	3 78% 95% 89%	Reduction greater than 5%. 86% 67% 72%	More than 15%. 14% 19% 18%	More than 30%. 0% 14% 10%
Re-use of effluents wastewaters from processes.	2 100% 38% 43%	More than 15%. 100% 60% 67%	More than 30%. 0% 0% 0%	More than 60%. 0% 40% 33%
Re-use of removed topsoil.	2 67% 94% 92%	Separation of topsoil in horizontal layers less than 2.5 metres thick. 100% 56% 58%	In addition, overturning of topsoil stockpiled for more than six months. 0% 25% 24%	In addition, seeding and fertilising of stockpiled topsoil. 0% 19% 18%
Usage of elements recovered from other projects, like portable water treatment plants, containers, etc.	2 63% 83% 78%	Usage of 1 elements. 20% 55% 48%	Usage of up to 3 elements. 20% 25% 24%	Usage of more than 3 elements. 60% 20% 28%
Use of recycled water for watering, if it complies with the necessary quality requirements.	2 50% 60% 58%	More of 30% of watering uses recycled water from the worksite itself. 0% 50% 43%	More of 80% of watering uses recycled water from the worksite itself. 100% 33% 43%	It is used recycled water, from an external supplier or other external sources. 0% 17% 14%

Good practice	Importance	Magnitude (degree of implementation)		
	% of application	1	2	3
Use of renewable energies.	3 50% 25% 33%	It is used a renewable energy source (photovoltaic solar panels, solar water heaters, biomass boilers, etc.) to achieve self-supply of the worksite offices. 100% 0% 50%	It is used a renewable energy source (photovoltaic solar panels, solar water heaters, biomass boilers, etc.) for some activities during the construction process. 0% 100% 50%	Both previous options. 0% 0% 0%
Use of recycled aggregates, instead of filler material from borrow pits.	2 25% 91% 73%	More of 5% of the total needed aggregates are recycled aggregates. 100% 50% 55%	More of 15% of the total needed aggregates are recycled aggregates. 0% 30% 27%	More of 30% of the total needed aggregates are recycled aggregates. 0% 20% 18%

Building
Civil engineering works
Total

Thanks to the reuse of materials on site, the need for aggregate extraction is reduced, as well as the generation of construction and demolition waste.

Likewise, these actions imply significant environmental and financial savings related to the transport needed to bring the materials to work and to manage the waste produced in their different destinations: landfill, recovery or other location.

In **92% of the works**, topsoil previously removed for clearing and stripping was reused

Soil is the natural resource most affected by construction activities, both due to their occupation and the earthworks that the execution of the works involves. In order to reduce the consumption of land, whenever possible, clearings and embankments within the same project are compensated with materials extracted from the work itself. Beforehand, a verification of the fulfilment of the appropriate characteristics and requirements is carried out, in order to maintain the quality of the works and safety in the execution.

The different good practices applied allow improving the environmental and also economic performance in the works, both as a result of the lower consumption of natural resources and the reduction in the generation of waste.

In 2018, 89 per cent of the works reduced the necessary volume of material loans compared to the volume initially planned. In addition, 78% of the projects used inert material from other works, which avoided having to use quarry material, and prolonged the useful life of the material, reducing the waste generated. Moreover, 73% of the works used recycled aggregates instead of loan contribution material, thereby reducing the extraction of raw materials. In 78% of the FCC Construcción works executed in 2018, auxiliary elements such as portable treatment plants, trays or site sheds were reused, which increased the useful life of the materials.

Data and key indicators

Monitoring the consumption of natural resources in the centres and the projects carried out is key to promoting a more rational use of these resources and suggesting possibilities of reuse or recovery, after the service provided to the project. All these actions result in a lower consumption of natural resources and a better management of the waste produced in the works, as they are considered as one more input in the project and not as a surplus of it.

The following table details the consumption of the main materials and raw materials used by the projects of FCC Construcción and FCC Industrial in 2018. Among these resources are the inert wastes that have been reinserted into the production cycle after revaluation, in accordance with the principles of the circular economy.

Consumption of resources (t)

Consumed resource	FCC Industrial*	Spain	Rest of Europe	Latin America	Middle East	Total
Raw materials and materials*	**1,798,859**	**4,080,100**	**2,423,969**	**1,215,512**	**1,152,677**	**10,671,117**
Asphalt concrete*	1,702,549	49,275	8,697	28,993	23,695	1,813,209
Concrete*	21,224	957,700	216,959	582,293	669,115	2,447,291
Steel*	27,697	34,398	14,226	25,626	21,599	123,546
Bricks*	32	5,633	244	0	327	6,236
Glass and metals*	417	1,154	3,041	176	441	5,229
Aggregates, soils and graded aggregate	46,341	2,907,066	2,100,021	562,291	437,179	6,052,898
Topsoil	149	115,251	80,475	13,914	0	209,789
Paints, solvents, release agents, concrete curing liquids, accelerators, concrete liquefiers, antifreeze and epoxy resins	384	4,516	281	1,442	3	6,626
Oil, grease and other harmful and hazardous substances	66	5,107	25	777	318	6,293

* FCC Industrial is an own brand that brings together various specialised companies. It includes data on FCC Industrial and Energy Infrastructures (FCC IIE), Matinsa, Prefabricados Delta and Megaplas.

Consumed resource (m^3)

	Consumption
Resources from the recovery of inert waste *	**3,118,691**
Excess earth or rock	3,107,700
Clean rubble remains	10,991

* FCC Construcción, excluding FCC Industrial

Most construction activities also require energy consumption, the type of which varies depending on the project, location or machinery used. Whenever possible, we encourage the use of renewable energies and try to use equipment as efficiently as possible.

The decontamination of crushed stone allows both the reduction of waste generated and a contribution to the circular economy in the execution of works, by reintroducing into the production cycle materials that would otherwise be discarded.

Although the measurement of energy consumption is not simple, given the different types and location of the works, the company has systems that allow the recording of consumption of all production centres and the extraction of information in different formats and for different periods of time. The tracking system also makes it possible to monitor the organisation's carbon footprint.

The following tables detail, by geographical area, the energy and water consumption of FCC Construcción's construction projects in 2018.

Energy consumption (GJ)

Energy type	FCC Industrial*	Spain	Europe	Latin America	Middle East	Total
Direct energy consumption	**121,788**	**109,297**	**46,992**	**155,918**	**798,230**	**1,232,225**
Fuel-oil consumption	8,887	20,328	0	6,591	22,760	58,566
Natural gas consumption	2	151	1,661	0	0	1,814
Gasoil consumption	111,302	88,680	45,148	140,692	769,453	1,155,275
Petrol consumption	1,516	138	183	8,635	6,017	16,489
Propane and butane	81	0	0	0	0	81
Indirect energy consumption	**53,192**	**19,862**	**5,993**	**26,705**	**1,358**	**107,110**
Consumption of electricity	53,192	19,862	5,993	26,705	1,358	107,110
Total	**174,980**	**129,159**	**52,985**	**182,623**	**799,588**	**1,339,335**

* FCC Industrial is an own brand that brings together various specialised companies. It includes data on FCC Industrial and Energy Infrastructures (FCC IIE), Matinsa, Prefabricados Delta and Megaplas.

It is important to remember the importance of water use in construction activities, where it is mainly used for the preparation of materials or the cleaning of machinery and tools. Although consumption is not particularly heavy, its importance for life is beyond any doubt. FCC Construcción therefore applies criteria of saving, use and reuse to its management. The company is focused on responsible water consumption, so that in 43% of the projects carried out the effluents and process wastewater were reused, while in 58% of these projects recycled water was used to irrigate roads and stockpiles of powdery materials.

The following table shows the water consumption of the FCC Construcción and FCC Industrial centres, differentiating by origin of the water consumed and geographical area.

In the construction of the Loeches Environmental Recycling Complex (Spain), rainwater accumulated in an intermediate pond, so that it could be collected by a water tank and reused for road irrigation.

Water consumption (m^3)

Source of water consumption	FCC Industrial*	Spain	Europe	Latin America	Middle East	Total
Surface water	0	531,091	7,010	125,901	0	664,002
Groundwater	16,222	1,843	15,000	87,838	0	120,903
Municipal water supply	64,306	50,251	32,689	58,420	360,689	566,355
Water recycled or reused from the worksite	0	77,517	0	602	0	78,119
Total	**80,528**	**660,702**	**54,699**	**272,761**	**360,689**	**1,429,379**

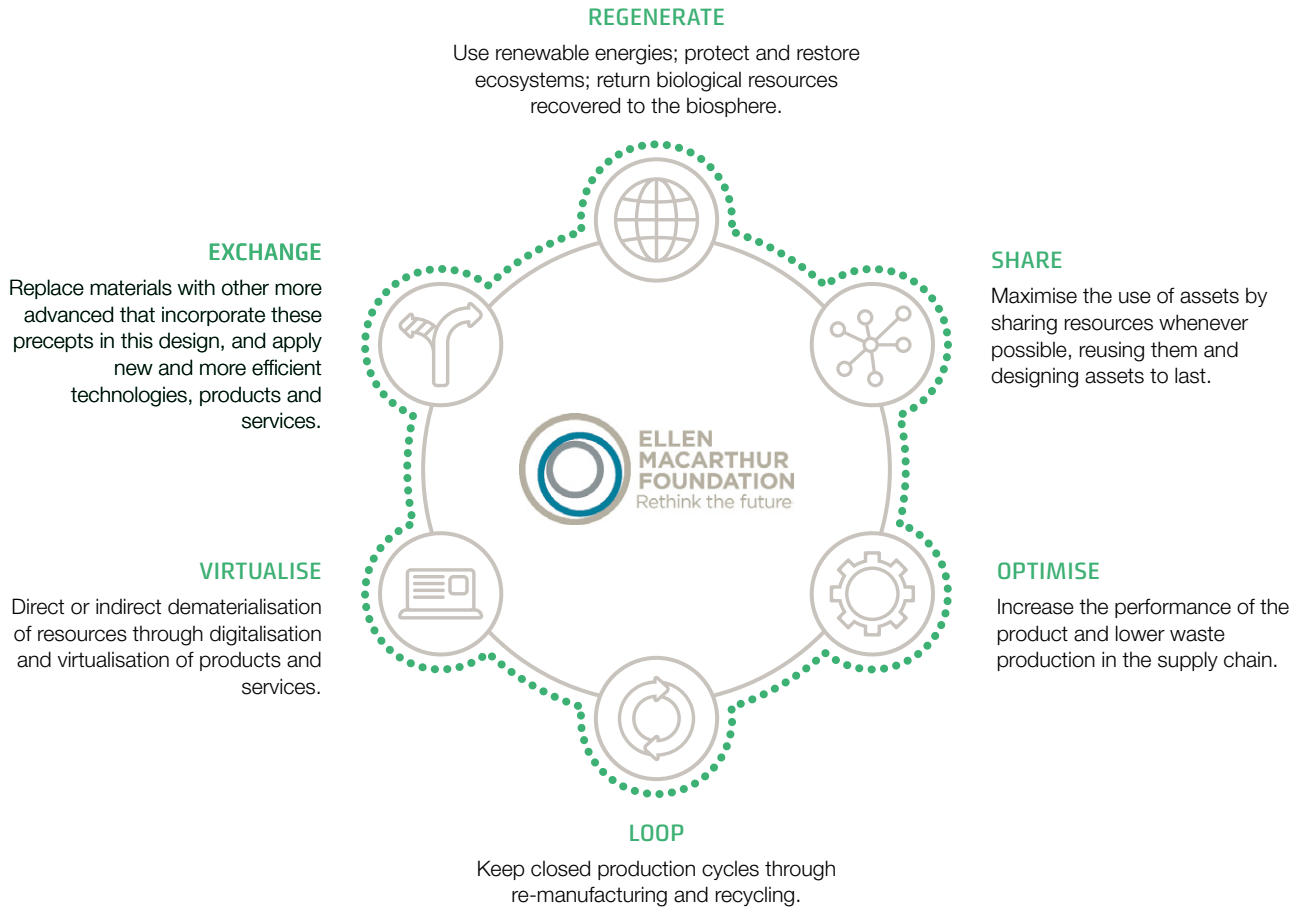
* FCC Industrial is an own brand that brings together various specialised companies. It includes data on FCC Industrial and Energy Infrastructures (FCC IIE), Matinsa, Prefabricados Delta and Megaplas.

Having analysed the risks and opportunities, and having a clear picture of the company's consumption of resources, FCC Construcción works to reduce, as far as construction projects allow, the use of non-renewable natural resources. Moreover, the company is focused on the reusing the materials contained in the waste as secondary raw materials in the production cycle, always guaranteeing people's health and protecting the environment.

This is the paradigm of the **circular economy**, which the organisation considers a key source of financial and environmental opportunities.

Since 2017, FCC Construcción has structured its progress towards the circular economy around the six areas of action defined by the ReSOLVE framework, created in 2012 by the Ellen MacArthur Foundation, the global leader in this area. This framework facilitates the control and measurement of the development of organisations towards the circular economy and encourages the identification of business opportunities linked in each area to this transition process, essential for progress towards sustainable development.

Action areas proposed by the Ellen MacArthur Foundation in its ReSOLVE framework



In accordance with this work schedule, which is closely linked to the company's commitment to continuous improvement, management integrates the application of the waste hierarchy principle, seeking the reintroduction of materials in some of the phases of the production cycle. This principle first promotes the prevention of waste generation, encourages reuse and the use of what is generated and, if this is not possible, advocates recycling or other forms of recovery.

The following is a description of FCC Construcción's actions in each of the areas that make up the ReSOLVE framework.

Regenerate

The analysis of the life cycle of products and the conception of each project as a regenerative system developed by FCC Construcción allows optimum knowledge of the materials and the selection of the most appropriate ones to increase the resilience of buildings and infrastructures and optimise for those with the best performance throughout their useful life.

This in turn means reducing waste as much as possible, but also conceiving it as a resource, thereby extending its useful life and potential for recovery.

The use of high quality materials, optimal for the conditions of each terrain, allows communities to have solid and lasting infrastructures.

Share

The aim is to maximise the life of resources and products by optimising their use and reuse.

Some good practices that contribute to the optimisation of resource consumption and, therefore, to its reduction, are the existence of the company's own machinery parks. From the machinery parks the company can manage the available machinery for the different construction projects, the reuse of machinery and equipment from one work site at another, reducing the need for purchasing, renting versus the purchase of new technology, or the use of common spaces for different projects or even areas of the same organisation. The donation of equipment and materials that is carried out in some works generates, in addition to the environmental benefit, social and financial returns in the beneficiary communities.

The use of spaces in which to store machinery and tools allows resources to be shared between different projects, reducing the consumption of materials.

Optimise

It is a question of seeking greater productivity for the resources, at the same time achieving an increase in the efficiency of the company and processes, with an optimal use of the materials and resources.

Optimisation is part of a process of continuous improvement that involves, along with other practices, the promotion of innovation and eco-design in the company to achieve new forms of sustainable consumption.

Innovative techniques reduces the waste produced. Intelligent deconstruction and selective demolition, as well as manufacturing, modular design and 3D printing for the manufacture of building materials or the manufacturing process of components and products according to an open and efficient system of subsequent assembly on site, are some examples.

The reuse of materials makes it possible to optimise their use. The following table details the expected and actual amount of surplus clean earth and rubble that was recycled and reused by FCC Construcción projects in 2018. These actions make an important contribution to the circular economy, since in the construction sector these materials are generated in high volumes and, thanks to their physico-chemical characteristics, can be reintroduced into the production cycle as raw materials.

Recycled/used materials (m^3)*

	Expected Quantity	Real Quantity
Excess earth or rock		
Obtained expressly (loans)	1,458,337	885,340
Used from other projects	512,897	322,074
Used in the same project (compensation-excavation-fill)	2,287,493	2,785,626
Temporary stockpiling (prior to its final use)	154,025	514,997
Disposed in landfill	3,922,685	1,297,817
Used in other projects	370,682	84,736
Total excavation	6,687,674	4,339,369
Total fill	4,258,727	3,650,434
Clean rubble (concrete, mortar, bricks, prefabricated elements, other)		
Disposed in landfill	148,319	383,135
Used at the site	134,708	7,991
Used from other projects	7,949.07	3,000
Used in other projects	38.06	8,004.25
Delivered to a recovery installation	133,885	279,015

* Data of works executed by FCC Construcción (does not include data of FCC Industrial).

Closing the circle

According to the Ellen MacArthur Foundation's guide, this area is one of the areas with the greatest profit potential in the construction sector. Each FCC Construcción project is planned from this perspective and includes both the treatment of products and materials in the life cycle and the re-manufacturing of products and components, the recycling of materials and the reuse of natural resources. Closing the circle means maximising the use of recycled materials and minimising the need for raw materials.

The awareness-raising and awareness work carried out by the company to prevent valuable materials from being sent to landfill and to make use of valuable materials deserves a special mention. Also noteworthy are other measures such as the reuse of water in construction processes, the reuse of grey water from toilets and rainwater, or the use of recycled aggregates in graded aggregate, gravel or mortar to produce concrete.

As stated in this chapter, in 2018 different good practices have been carried out in this area, such as the management of excavation surpluses, the recovery of rubble or initiatives focused on the reduction of packaging waste through the purchase of bulk products or the reuse of containers.

In the restoration of the railway line Frontiera – Curtici – Simeria, in Romania, platforms were established to store the rubble resulting from the dismantling that were later crushed, which allowed its reuse in the work itself, avoiding the need to acquire new material on loan.

Virtualise

FCC Construcción promotes digitalisation as a key element in its strategy to reduce the consumption of resources, insofar as technology facilitates the carrying out of maintenance tasks, minimising the necessary resources and therefore reducing costs for the company.

The line of research in Building Information Modelling (BIM) developed by FCC Construcción several years ago, is one of the company's most important contributions to digitalisation and is promoted through the participation of working groups of the Executive Committee of the BIM's National Implementation Strategy.

The ROBIM Project, in turn, is focused on research work on autonomous robotics that allow the inspection and evaluation of existing buildings with integration of BIM. The aim of the project is obtaining accurate and detailed information on construction systems and possible conditions of the analysed buildings. In addition, the BIMCHECK project, using the BIM methodology and Blockchain technology, aims to improve FCC Construcción's productivity by automating the quality control and management processes of projects and works.

The digitalisation of processes is also targeted with other objectives, such as the automation of infrastructure monitoring in linear civil works through the use of drones. This is the objective of the PWDRON R&D project, which would make it possible to coordinate the collection of data, the production of a digital model based on it and the obtaining of results applicable to the requirements of civil works in each of the stages of the construction process.

Exchange

The notion of "exchange" covers the entire life cycle of projects: replace materials with more advanced ones, apply new technologies to materials and choose new products. By prioritising the use of renewable energies in the different phases that require energy input or promoting the use of new materials that are more efficient and easier to recycle and reuse, prioritising the use of renewable energies and sustainable materials, value is created both for FCC Construcción and for other industries that will be able to integrate waste as recycled materials in new projects. Replacing traditional solutions with advanced technologies also offers longer life cycles for products and developments, lower maintenance costs and flexibility for improvement.

The use of more resistant and durable materials reduces the need for maintenance of FCC Construcción infrastructures, which means reducing the consumption of resources and minimising the generation of waste from the design phase.

CASE STUDIES

Gurasada-Simeria Railway

Client SNCF CFR SA (Romanian National Railway Company)

Period of execution 36 months

_Problem detected

The railway lines, due to the passing of trains and the machinery used for their maintenance, contain moderate levels of pollution due to oils and fuels in their ballast. For the railway renovation project on the Frontier-Curtici-Simeria section of Pan-European IV corridor, an estimated 126,955 tonnes of contaminated ballast has been calculated.

The challenge has been to find a solution to process such a large volume of contaminated ballast, which ensures full recovery of the material in a reasonable time and without major deviations in the budget.

_Adopted solutions

The technical report of the project provided for the decontamination of ballast impregnated by petroleum products and heavy metals.

A decision was taken to decontaminate the ballast on site, with the aim of minimising the risk of dispersing the pollutant, using natural and non-toxic substances.

The first step was to separate the stone from the sand and other materials (wood, plastic, etc.). The decontamination of the stone was carried out with a specific machine, a Doppstadt SM 620 Trommel Screening Machine, in a closed circuit to collect the wash water, reuse it and dispose of it. The water used to clean the ballast continues to be reused again and again in the process and, if necessary, the circuit is refilled to the appropriate volume. Finally, the residues resulting from the washing are managed by companies authorised by the Romanian Accreditation Association.

_Results

The efficient technology selected by the work has managed to decontaminate the ballast in time and maximise its reuse.

The use of this machinery, compared to others used in the market, means a significant reduction in the volume of water used in the process and a very significant increase in the percentage of reusable stone material.

The initial target for reuse of materials resulting from decontamination was 50% and, following the use of this technique, the percentage of stone reused in the production process of the material for the railway substrate reached 100%.

In addition, decontamination of the ballast on site helps to minimise key environmental impacts, such as the risk of soil pollution in the collection areas and atmospheric pollution, as greenhouse gas emissions associated with the transport of the material are avoided.

With the Doppstadt SM 620 Trommel Screening Machine a closed circuit is generated to decontaminate the ballast, allowing the water used to be reused and waste to be properly disposed of.

Surfaces authorised to carry out ballast decontamination in places close to the tracks.

CASE STUDY

Renovation of the Cervera del Llano installations on the A-3 dual carriageway

Client Autovía Conquense, S.A.

Period of execution 19 years, since the concession

_Problem detected

In line with MATINSA's commitment to controlling energy consumption in work centres, the renovation works at the Cervera del Llano installations, which serves the A-3 dual carriageway, were used to propose a sustainable strategy for reducing diesel consumption, i.e., allowing the facility to be self-sufficient and improving its carbon footprint.

In addition, the removal of vegetation is a key task in the maintenance of a road to ensure the safety of road users. This task is carried out annually to prevent reduced visibility, possible collapse of drainage channels and increased fire risk. In the case of the A-3 dual carriageway, the campaign to clear the vegetation on the banks produces large volumes of waste that the organisation must manage.

_Adopted solutions

The combination of both circumstances resulted in an efficient system of waste management and minimisation of resource consumption, as a decision was taken to install a biomass boiler in the work centre, to generate hot water and heating for the installations (offices and warehouse) of the dual-carriageway itself.

To convert vegetation residues into pellet fuel, a bio-shredder was installed with the capacity to fragment branches from the clearing to the size of sawdust, and then allow them to dry and be pressed into pellet format.

_Results

The biomass generated by the clearing of the banks was sufficient to supply fuel to the workplace and generate all the energy needed for a full year, so it has turned out to be a self-sufficient and sustainable system.

In this way, the new energy supply system for the installations of the A-3 dual carriageway in Cervera del Llano has resulted in a reduction in the costs of managing plant waste, which has once again been reintroduced as a resource in the production cycle, as well as a reduction of diesel consumption, with the consequent reduction in the associated greenhouse gas emissions.

Bio shredder to reduce the size of branches.

Second phase of crushing to produce sawdust.

CASE STUDY

Asón River General Interceptor Collector

Client General Department of Water – Confederación Hidrográfica del Cantábrico.

Period of execution 22 months

_Problem detected

The work of the general interceptor collector of the Asón river, between the towns of Ampuero and Colindres (Cantabria), runs close to the riverbed and crosses areas where vegetation grows in abundance. In order to carry out construction work, the work area needs to be cleared, generating a large volume of plant waste that is not usually used.

_Adopted solutions

Instead of managing the plant remains as waste, the aim of the work was to prevent their eventual disposal to landfill, reusing the plant remains as fuel, substrate or ornamental elements.

For this purpose, the logs with the largest diameter were distributed among the local population so that they could be used as fuel in kitchens and fireplaces. Furthermore, to manage the branches and shrub vegetation, firewood crushing equipment was used; the material resulting from the process was added to the biomass stockpiles that are used as substrate on the ground.

_Results

With the recycling of plant material, a triple objective was achieved: social, environmental and financial.

- From a social point of view, the reuse of the remains of trees, shrubs and herbs helped to strengthen ties with nearby communities and reduce the consumption of other types of fuel in the homes of neighbouring residents.
- From an environmental point of view, the organic substrate used as fertiliser improved the properties of the soil, both from a physical point of view, an increase in soil moisture, and from a biological point of view, contributing to diversification of the soil fauna that participates in the carbon cycle.
- In addition, reusing the plant remains prevented them being sent to landfill, with the consequent financial savings.

This case study shows that respect for the environment also contributes to strengthening social cohesion with people and communities in the areas in which FCC Construcción operates.

Small branches and shrubs were shredded with a wood chipper to create the plant substrate.

7.

Committed to change

"Real generosity toward the future lies in giving all to the present"

(Albert Camus)

If we could ask, our oldest buildings and infrastructure would have a lot to tell the new ones today. In recent decades, they have seen significant social and environmental changes, such as the development in the uses of technology, new mobility or greater public awareness of environmental issues, with their differences in the different countries in which they have been built. They have suffered from increased pollution in cities and rising temperatures, which have brought less rainfall, new animal and plant species, extreme weather events... changes that are highlighted in the increasingly forceful IPCC reports. According to what was published in October 2018, in order to meet the Paris commitments it would be necessary to reduce emissions by 45% in a decade.

Faced with this challenge when, moreover, the world's population continues to grow, mainly in cities, the UN Agenda 2030 for Sustainable Development is presented as a hopeful global commitment not to leave anyone behind.

And the role that FCC Construcción, as a responsible organisation, wants to play is to integrate into its business strategy the opportunities deriving from global challenges and, in line with the Sustainable Development Goals, to adopt solutions that make everyone's lives better.

This commitment is not new. It is based on the use of the Good Practices System®[1], which is the unifying element of the company's commitments to respect for the environment and the creation of social value, the results of which have been reflected throughout this Environmental Report.

All the projects we develop have an intrinsic social added value of which we are deeply proud. It is the primary contribution of our business activity to society, to current and future generations.

[1] ® FCC Construcción 2009. "System for evaluating environmental performance through good practices".

In order to meet our primary objective of developing and contributing to sustainable construction, it is essential to have a team of professionals who are motivated and committed to our vision and mission.

Our commitment to sustainable construction involves participating in more than 50 working groups in 2018, investing more than €2 million in R&D or increasing resources to increase the implementation of the BIM methodology in works.

Because innovation is the axis of our way of thinking and also a way of doing, which we demonstrate through the development of specific methodologies and indicators, together with the training of our teams in sustainability evaluation schemes, among which we would like to highlight SAMCEW©, FCC Construcción's own methodology for evaluating the sustainability of civil works.

By consolidating and strengthening the involvement of all our stakeholders, we will boost all the entire value generating ability of alliances, foster the digital transformation of the company and the adoption of new technologies, for improvements in the circular economy or to build infrastructures that are more resilient to climate change. There are many challenges and we know that, in order to continue leading sustainable construction, the collaboration of those capable of providing the best is essential.

In this regard, we need tools to help us measure social and environmental costs and benefits, such as our system of environmental indicators or the inventory of greenhouse gas emissions, the verification of which we want to expand to 100% of the countries in which FCC Construcción is present.

Being aware of impacts, in order to reduce their occurrence, requires assessing their relevance and adopting the most effective practices. As described in this Communication, the implementation and development of good environmental practices, together with the consideration of life cycle stages in environmental planning procedures, has enabled us to identify environmental risks and opportunities in 98% of FCC Construcción's works and premises.

Achievements can only be accomplished through awareness raising and a high degree of personnel involvement. Understanding that each environmental impact always extends beyond the works, is the cornerstone of our understanding of quality: A job well done is one that manages to bring benefits to society, without compromising its capacity for development.

At FCC Construcción we continue to make progress along a strategic line that today makes us a leader in good practices and value creation, fully prepared for the times to come.

Facing the future with commitment and determination.

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