
FCC
Construcción
Environmental
Report
2015

The environmental management system and good practices

Our Environmental Management System at FCC is based on the identification of environmental aspects most commonly found in our works.

To facilitate their identification and the adoption of measures, aspects and actions are classified into a number of different groups. Criteria have been developed to evaluate the impact of each environmental aspect on a given project in terms of magnitude and importance; as a result, the significance of every aspect is rated as part of the integrated planning process that takes place at the start of each project.

Once the significant environmental aspects have been selected, their potential impact has been evaluated and the significant environmental aspects have been defined for each location, the actions on site are then planned homogeneously throughout the organisation.

To minimise impacts at the planning stage, each project identifies which environmental and social aspects are present and evaluates their significance depending on their magnitude or the amount of pollution or disturbance, and the importance and sensitivity of the impacted area.

The following chart summarises real and potential environmental aspects identified at the works evaluated in 2014 and out of these, aspects identified as significant after its evaluation:

Social and environmental aspects

	Works with aspects (%) *			Works with significant aspects (%)*		
	BD	CEW	TOTAL	BD	CEW	TOTAL
Waste production	99%	99%	99%	56%	60%	59%
Atmospheric emissions	100%	99%	99%	44%	67%	56%
Use of natural resources	99%	99%	99%	50%	61%	56%
Land planning	96%	96%	96%	37%	70%	55%
Environmental accidents	94%	95%	94%	28%	39%	34%
Noise and vibrations	99%	98%	98%	29%	33%	32%
Water discharges	91%	93%	92%	12%	26%	20%
Use, contamination or loss of soils	91%	96%	94%	3%	32%	19%
Occupation of rivers or seabed and water collection	5%	59%	35%	0%	22%	12%
Radiation emissions	6%	32%	21%	0%	0%	0%

General data*

	BD	CEW	TOTAL
Average number of identified aspects at the worksites	44	56	51
Average number of significant aspects identified at the worksites	5 (11%)	13 (24%)	10 (18%)

* Data from FCC Construcción, not including FCC Industrial.
BD: Buildings/CEW: Civil Engineering Works

FCC Construcción has implemented a system of Good Practices® , which adds to legal, contractual and other requirements, actions aimed at guaranteeing a real improvement in environmental performance.

There is a catalogue of Good Practices that can be selected by projects and applied as and where applicable.

These Good Practices are weighted by their importance; that is, a higher value is assigned to those that are more beneficial to the environment, as well as those that are intrinsically better, and those Good Practices that are more innovative or involve greater effort for the works, be it in terms of investment, research, management or ingenuity required.

The real actual scope of the Good Practice adopted is also taken into account for valuation, so that a degree of greater implementation, a wider generalisation of the measure adopted, a higher number of interventions, or, all in all, a further scope of the Good Practice means a better score.

Each works can select the Good Practices they consider to be most appropriate or applicable depending on their activities; thus obviating the difficulty posed by the huge diversity of project types which prevent the blanket application of a given practice.

Good Practices are evaluated on the basis of a standardised quantification of these parameters:

- Importance: this indicates the importance of the Good Practice, assigning a higher value (3) when the practice is more important or more difficult to put into effect, and a minimum value (1), when it is less important or easier to put into effect.
- Target: this indicates progress, assigning a higher value (3) when the implementation is more generalised or the best technologies are used, and a minimum value (1) when the implementation is lower.

The result, obtained as the multiplication of the degree of implementation achieved by the importance of good practices required internally, provides a score; this score is the true indicator of the environmental performance and effort in the implementation of good practices at worksites. The current target is a total of 57 points in all our works.

Good Practices are proposed within the following environmental areas:

- Relationship with society (training / attitude of people, communication and awareness)
- Atmospheric emissions
- Noise and vibrations
- Water discharge
- Use, contamination or loss of soils
- Use of natural resources
- Waste production
- Regional Planning (biodiversity, urban environment)

A software application manages the Environmental Planning at the company´s worksites and other locations, guaranteeing the reliability and availability of data by:

- Identifying environmental and social aspects by means of a checklist in which those parts of the project that can affect the environment are selected; and evaluating their importance in order to highlight a need for intensified action to those that are most significant.
- Selecting the environmental legislation to be applied to each aspect.
- Preparing a performance programme that gives compliance with legal and other requirements.
- Tracking the management of waste production at worksites, through a Waste Management Record Sheet and the origin and destination of debris and soils.
- Assisting the planning, monitoring and control of Environmental Practices deployed at the worksites.

The information generated at each worksite, and used by works for environmental management, enters in a database that provides a snapshot of the company's environmental performance, and enables to undertake improvement actions and share the information with society.

A demanding system of internal audits and inner checks within the different integration processes, validate the accuracy of the data.

® FCC Construcción 2009. "Environmental performance assessment system through good practices".

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Chairman´s statement

Although Planet Earth is our home, we are not its sole owners. We share the earth with other living beings, and we enjoy the use of this asset belonging to a humanity extending in time, into the future. It is therefore our responsibility to take care of it and manage its resources responsibly.

The construction sector has a huge potential to shape our environment, and whilst bad practices in this profession can significantly damage our natural environment, the fact of adopting best practices that, of course, fulfil our obligations, but go further, has the ability to shape a better world.

In this Environmental Report that you have in your hands, which was a pioneering initiative in the sector with its first edition back in 2000 and is published on a biennial basis ever since, we aim to analyse our environmental performance, through our results, our endeavours, some remarkable cases and our contribution.

This year, despite the difficult circumstances experienced, we have not held back. We have made progress in the expansion of the scope of our environmental management system, extending it to cover all countries where we operate; we have incorporated new environmental criteria to our decision making process throughout the lifecycle of our projects, from the bidding stage to the purchases, execution, handing over or operation stage; we have improved tools, adapting them to our company´s international situation, increased the available information, incorporated a sustainability assessment for civil engineering works, developed new guidelines to improve considerations for biodiversity and cultural heritage; we have, in short, grown in our capacity to make things right and prove it.

The comprehensive implementation of the Good Practices methodology in all the countries where we operate has yielded remarkable results that we are proud to include in this report. Our commitment to the fight against climate change is leading us to adopt preventive initiatives, both in mitigation and adaptation areas, also shown here. Optimising the management of natural resources and wastes, and this means the flow between the two categories, is implying significant savings and excellent environmental results.

Furthermore, it is my pleasure to share with you that this is all done from a business point of view, which, ultimately, ensures that it is done, and done right. Because this is a win win situation, for nature, and for the company. We optimise the management of resources (reduced spending on electricity, fuel, water and raw materials, and saving in the treatment of emissions, discharges or waste), we avoid penalties and delays in our works, we improve our image and relationship with the stakeholders, and we get prepared for tomorrow. A Tomorrow in which customers and society will demand even more from us, but a tomorrow that subsequent generations will be able to enjoy, and with whom we have an unavoidable commitment that we neither can, nor want to neglect. We are not perfect, but we believe we are on the right track, and we are fully committed to moving ahead.

Miguel Jurado Fernández
President of FCC Construcción


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Purpose of the document

All individuals, companies and societies leave their mark on the planet, influencing their surroundings through decisions and lifestyle habits.

Knowing that FCC Construcción services have a considerable impact on the economy, environment and society, we work on a daily basis to build a more sustainable construction model.

Aiming at reducing the effects on the population and environment, at FCC Construction we identify the impact of our activities year on year and we calculate our environmental footprint, using a system of indicators that defines the organisation´s environmental performance in different sub-areas: climate change, relationships with society, water resources, natural resources, waste and biodiversity. From the year 2000, in addition to its measurement, we are informing stakeholders of our projects' environmental and social performance, their development over time and the progress made, through the company´s regular environmental reports. More specifically, this environmental report you have in your hands is the ninth edition and includes data relating to all our industrial services and projects for the financial year 2014.

The fact that 50% of all FCC Construccion´s business in the last year was made up of international projects in key areas such as the Middle East or Latin America, has been particularly challenging when modifying management processes to adapt them to new market demands and frame them within our Sustainability Management System. Another challenge arising from the company´s internationalisation is the continuing need for environmental training and awareness amongst workers in the different countries where we operate, adapting ourselves to new realities and new professionals. This effort is essential, resulting in an improved environmental performance on our works, as well as promoting a more environmentally friendly behaviour towards society, a reduction in the consumption of natural resources and the minimisation of emissions or waste from our processes. In short, this is the first step in improving our brand, our reputation, our footprint on the planet.

We would like to emphasize that our commitment to climate change has only grown, since the implementation in 2010 of a protocol for measuring Greenhouse Gases, when we became the first Spanish construction company to verify our GHG emissions report. In 2014, FCC Construcción once again became pioneer in this field, as the first construction company to list its carbon footprint in the National Register of Carbon footprint, Carbon offsetting and Carbon dioxide absorption projects of the Spanish Ministry of Agriculture, Food and the Environment (MAGRAMA).

One of FCC Construcción´s most solid bets is its active participation in several working committees for the development of necessary standards of sustainable construction, having recently published Technical Specification ISO/TS 21929-2 on the framework for the development of sustainability indicators for civil engineering works. Building on our experience in this field, in 2014 we have developed SAMCEW, a methodology for assessing the sustainability of our civil engineering works, which will be tested in the future on the company´s large international projects.

All our efforts and achievements in environmental and social issues are further reinforced by the systematic application of our Good Practices System, consisting of voluntary measures that go beyond the legal requirements, and aim to achieve an improvement in our performance. Due to the large diversity of geographical, environmental and social circumstances, all clearly dependent on the location in which our works are executed, each project selects and implements those actions that generate the greatest benefit for the three dimensions of sustainability, making their application more beneficial in every way.

The 2015 Environmental Report aims to continue making our environmental management visible and comprehensible for all those who are involved or affected in one way or another by the company's activities.

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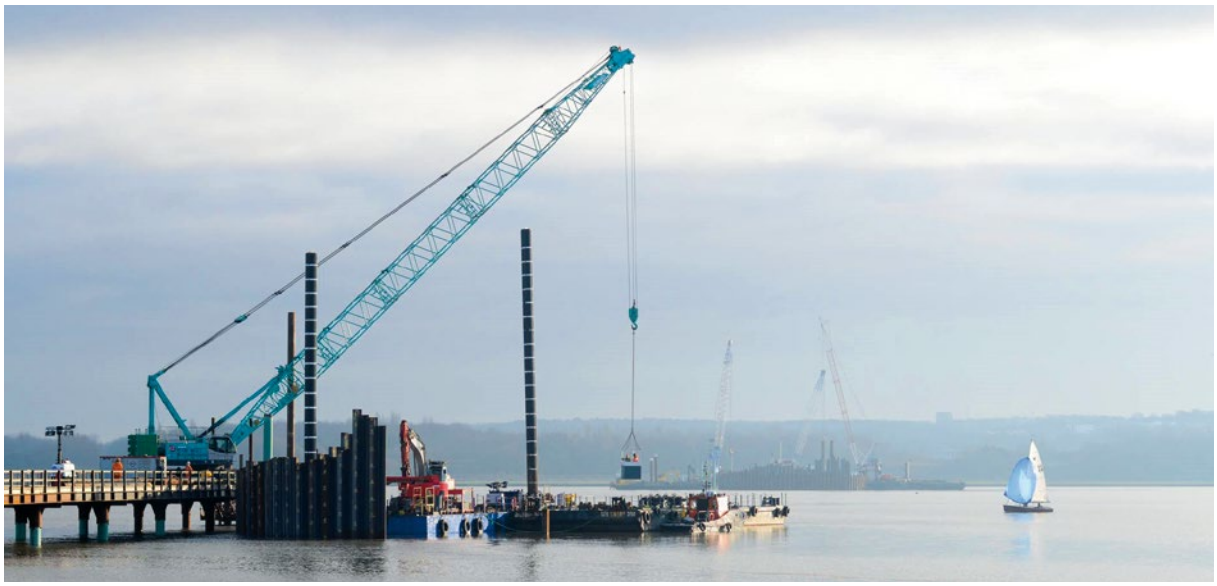
The role of FCC in sustainable construction

Nowadays the increased awareness and understanding of social and environmental problems is a clearly tangible reality, and hence the incorporation of sustainability criteria in the corporate strategy.

At FCC Construcción we took up the challenge some time ago of achieving a more a sustainable construction, respecting nature and people whilst being economically viable. We believe that the three dimensions of sustainability should not only be applied to the company´s own actions, but should also be encouraged throughout the entire project life cycle, taking into account materials and equipment used during the construction process, in order to minimise the environmental footprint caused directly or indirectly by our actions.

We do not want to be mere event spectators, nor let the trends of our field of activity pass us by, we want to actively participate in the development of standards, guidelines and directives that allow us to move forward on the path of respect for the environment, in its three aspects of sustainability. As a responsible company, which interacts with the social and natural environment in many diverse locations, and which constantly seeks improvement, it is our duty to contribute with our personal view of sustainable construction, analysing the evolution of our environmental footprint, learning from mistakes and defining criteria and solutions that allow us to achieve our established objectives.

Therefore, FCC Construcción has a background of great experience participating in numerous work groups for the development of various standards of sustainable construction, amongst which we can highlight the International Technical Commitee ISO/TC59/SC17 and CEN/TC350, in particular the workgroups directed at establishing principles for sustainability in civil engineering works, one of the company´s predominant activities at international level.



Work in the Mersey Bridge (United Kingdom)

The following table shows some of the most relevant organisations with which FCC actively collaborates in preparing standards and guidelines which include sustainability in the habitual working framework of the construction sector.

Working Groups related to sustainable construction

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 Declarations 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", which deals with the sustainability of civil engineering works.
International Technical Committee CEN/TC350 "Sustainability of Construction Works".	• Participation in 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".
Technical Standardisation Committee AEN/CTN198 "Sustainable Construction".	• Vice-presidency of the Technical Standardisation Committee AEN/CTN198 "Sustainable Construction" • Participation in the Technical Standardisation Sub-committee AEN/CTN 198/SC 1 "Sustainability in building". • Presidency of the Technical Standardisation Sub-committee AEN/CTN 198/SC 2 "Sustainability in civil engineering works".
International Initiative for a Sustainable Built Environment (iiSBE)	• Members.
Green Building Council Spain (GBCe)	• Members of this organisation, who makes up the Spanish Council of the international association "World Green Building Council", serves as a channel for providing all the information in Spain on LEED buildings assessment method.
BREEAM España	• Members of the Advisory Council, responsible for setting out the development strategies for BREEAM Spain, representing the stakeholders of the building sector.

Construction of a breakwater at Puerto Açu, Río de Janeiro (Brazil)

Although FCC Construcción´s participation in work groups related to sustainable construction is one of our main channels for sharing our knowledge and experience with society, it is not the only one. Our awareness of situations that surround us, has led us to also colaborate in the definition of criteria in other areas of social responsiblity, quality and the environment, technological innovation or hydraulic planning. These working groups are outlined in the Table below:

Working groups from other environmental areas

Organisation	Participation
International Technical Committee ISO/ TC207 "Environmental management"	• Participation in Sub-committee ISO/TC 207 SC1:"Environmental management Systems". • Participation in Sub-committee ISO/TC 207 SC4: "Environmental performance evaluation". - Working Group WG 4 "Data quality".
Spanish National Committee on Large Dams (SPANCOLD).	• Committee member of the Spanish National Committee on Large Dams (SPANCOLD). • Presidency of the Technical Committee "Activities of the Engineer in Planning". • Participation in the Technical Committee "Environment".
International Committee 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 Corporate Social Responsibility (CERSE)	• Participation in the Working Group "Transparency".
AENOR's Advisory Board for Construction Company Certification	• Participation in the Environment Committee. - Working Group "Environmental indicators in construction".
SEOPAN	• Participation in the Quality and Environment Committee.
Spanish Quality Association (AEC)	• Participation in the Environment Committee. • Participation in the Construction Committee.
European Network of Construction Companies for Research and Development (ENCORD).	• Participation in the Environmental and Sustainability working group. • Participation in the working group for developing a declaration of sustainability for European construction companies.
European Construction Technology Platform (ECTP).	• Member of the Steering Committee. • Participation in the area "Quality of life" - Working Group WG1 "Reduce environmental impact". - Working Group WG3 "Improving the built environment for people".
Spanish Construction Technology Platform (PTEC).	• Sponsors of the PTEC Foundation • Participation in the Strategic Plan for Sustainable Construction. - Coordination of Working Group 1: "Competitiveness" - Working Group 2:"Environment" • Participation in the Strategic Plan for the City of the Future. - Working Group 1: "Efficient city" - Working Group 2: "Intelligent city"

Whilst it is true that all of this implies additional work on top of the organisations own business activities, we aware of our responsibility to share what we have learnt, to participate in the setting up of guidelines to be followed in the field of construction, to generate knowledge and to prepare ourselves for the new demands that may arise over the following years.

Glancing back, our presence is clearly evident in a number of existing standards and procedures which we have actively developed and incorporated into the functioning of our organisation. And we will continue to work in this direction, learning from others and sharing our knowledge to help in the preparation of guidelines to standardise the sustainability of infrastructure projects or to calculate the environmental performance of an organisation and its environmental impacts.

This is our responsible way of understanding the construction business: pushing forward with our projects, actions and strategies, the sustainable development of societies in which we operate and adding value for our stakeholders, local communities with whom we interact and ultimately for future generations.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Main
figures
as indicators

When evaluating the impact of our operations on the social and environmental surroundings, we need objective data to assist us in the measurement of the organisation´s environmental footprint and to control potential impacts.

Our Sustainability Management System integrates indicators relating to environmental, social, economic, and production aspects of our works, making this the most valuable tool for monitoring our environmental performance over time, analysing trends, communicating results to society and checking the efficiency of our actions and good practices implemented.

We have made a huge effort to define a common language and a reference system that we can share with our stakeholders, and our IT applications provide us currently with real time data from each of our projects which are converted into indicators, mainly quantitative, aiming at having simplified information. As such, this information enables us to understand and explain the interaction of our projects with the environment and its complex reality.

Each project or facility prepares reports on a four-monthly basis, so that we have up to date and accurate information at all times. This data is incorporated at corporate level, supplying us with average values that are outlined in this section.

The conclusions drawn from the analysis of these indicators are used to make both the public and those within the organisation aware of our progress in environmental issues. Thanks to the tools available to us, we are able to provide information regarding our environmental footprint at both geographical and temporal levels, depending on stakeholders and petitioner requirements.

In this section we outline the average figures taken from indicators of buildings and civil engineering works, as well as for all works carried out in 2014. These tables also show the percentage of the projects in which each of the different figures have been evaluated. The percentages evaluated, which vary according to the nature of the project and the geographical and social characteristics of the surroundings, give us an idea of the quality and representativeness of the data provided.

Our system of indicators, which relies on information from our worksites and permanent centres, allows us to monitor the company´s environmental performance, highlighting accomplished objectives and opportunities for improvement.

Interaction with the environment

Indicators	Average Values	% Projects Evaluated
Distance to the nearest population (x 10 m)	36.80 142.80 95.20	95% 95% 95%
Distance to essential community services such as fire services, hospitals , local authorities, schools, airports, power stations ,telephones (x 100 m)	15.52 60.92 43.7	45% 56% 51%
Distance to housing or industrial activity (x 10 m)	38.70 155.30 104.80	70% 75% 73%
Distance to authorised non-hazardous or inert landfill (Km)	19 15 16	95% 96% 95%
Distance to water masses (x 100 m)	33.21 16.93 24.23	88% 88% 88%
Channel length affected by diversion (x 10 m)	20.80 20.80	---- 13% 7%
Depth of water table (m)	15 11 13	90% 82% 86%
Simultaneous presence of hazardous substances on site (x 100 l)	60.97 62.72 61.92	71% 68% 69%

Buildings Civil Engineering Works Total

Optimising the transportation of materials, equipment, machinery or generated wastes during the execution of the works is an eco-efficient measure, as it allows for the reduction of economic costs as well as a reduction in associated GHG emissions. Therefore, knowing the distances from the worksite to the closest local community, industrial activities, landfills or water masses is crucial information in the initial planning stages.

Characteristics of the works

Indicators	Average Values	% Projects Evaluated
Surface area occupied by works (x 10,000 m²)	1.78 92.16 52.35	95% 98% 97%
Built area (buildings) (x 1,000 m²)	16.45 1.03 9.82	78% 48% 62%
Office space (x 10 m²)	20.40 63.00 41.50	80% 64% 71%
Workshop space (x 10,000 m²)	20 20	---- 3% 2%
Surface area of works with movement or presence of HW (hazardous waste) or DS (dangerous substances) (x 1,000 m²)	1.25 89.28 50.36	54% 55% 55%
Surface area of pavement or road occupied by works (x 100 m²)	3.50 33.20 15.60	62% 34% 47%
Surface area of Water Public Domain or Maritime Terrestrial Public Domain affected by works (x 1,000 m²)	24.46 21.33 21.50	3% 37% 21%
Number of people on site (ud)	55 134 98	95% 92% 93%
Number of people in the offices (ud)	8 18 13	78% 64% 70%
Number of auxiliary installations excluding worksite office (plants, workshops, prefab units, quarries, landfills, machinery depots) (ud)	0.80 2.50 1.70	69% 69% 69%
Number of combustion engine powered vehicles or machinery on site (not including generators) (ud)	5.40 25.70 15.8	77% 67% 71%
Number of generators on site for more than 5 days (ud)	2.30 4.00 3.30	50% 60% 56%
Number of road closures (ud)	1.70 15.10 9.50	51% 57% 55%

Buildings Civil Engineering Works Total

The proper design of a building and associated areas allows for a reduction of energy in the use stage, thereby reducing its environmental impact on the surroundings.

Production of materials

Indicators	Average Values	% Projects Evaluated
Concrete plant production (x 1.000 m³)	3.21 68.40 51.02	5% 12% 9%
Production of the asphalt agglomerate plant (x 1.000 t)	33.04 33.04	---- 6% 4%
Production of the aggregate plant (x 1.000 t)	0.57 41.22 38.96	1% 18% 10%
Use of asphalt agglomerate on site (x 100 t)	6.34 78.43 64.85	17% 58% 40%
Use of concrete on site (x 100 m³)	31.33 133.91 89.56	86% 92% 89%
Amount of steel used on site (%)	11.97 22.46 17.57	80% 74% 76%
Percentage of night-time electricity consumed	6 10 8	77% 61% 68%
Amount of non-ferrous metals used on site (t)	18 5 14	35% 10% 21%
Amount of bricks used on site (x 10 t)	62.20 26.80 53.30	54% 15% 32%
Amount of glass used on site (x 10 t)	6.40 16.00 7.90	55% 8% 29%

● Buildings ● Civil Engineering Works ● Total

Developing a quantitative inventory of the most relevant materials to be used along the construction stage allows for the possibility of designing strategies to reduce consumption, prioritising the use of recycled or reusable materials and the selection of local suppliers, located in the surrounding areas of the worksite.

Dangerous substances used and managed during construction works must be stored safely and correctly labelled to avoid possible environmental accidents. To this end, it is important to know the volumes to be handled so that adequate storage facilities with the right size and characteristics can be prepared in advance.

Volumes managed

Indicators	Average Values	% Projects Evaluated
Volume of inflammable/combustible substances stored (wood, paper, etc.) (m³)	8 59 36	64% 61% 63%
Volume of harmful or hazardous substances stored which may get accidentally broken (m³)	29 34 32	64% 67% 65%
Volume of aggregates and other materials collected with may cause turbidity in the water (x 10 m³)	40.50 473.50 409.50	5% 24% 15%
Volume of water extracted from rivers (x 10 m³/año)	329.24 317.89	1% 30% 17%
Volume of water extracted from wells (x 10 m³/year)	384.90 475.90 472.20	1% 25% 14%
Volume of water consumed in different concrete manufacturing activities and for spraying levellings and surfaces (x 10 m³/year)	157.40 599.30 360.40	77% 53% 64%
Volume of vegetable soil needed on site (x 100 m³)	1.77 99.17 68.95	23% 42% 33%
Volume of demolition work (x 10 m³)	182.40 319.20 270.30	39% 56% 48%
Volume of blasting (x 100 m³)	749.86 749.86	---- 20% 11%
Volume of bulk materials used on site (earth, aggregates, agglomerates and concrete) (x 1,000 m³)	6.61 298.50 168.63	85% 79% 82%
Volume of earth movements (excavations and backfills, cuttings and embankments) (x 1,000 m³)	10.69 298.50 168.63	95% 94% 94%
Volume of borrow pits and quarries operated (x 1,000 m³)	1.52 234.22 223.64	1% 22% 13%
Expected volume of earth and rubble (x 100m³)	85.59 901.06 524.69	69% 66% 67%
Volume of landfill expected (x 1,000 m³)	5.25 177.76 153.80	6% 32% 21%
Volume of contaminated earth (not caused by work site) (m³)	39 702 525	5% 12% 9%
Expected volume of inert or non-hazardous dredged mud (x 100 m³)	0.57 431.85 345.60	1% 4% 3%
Volume of containment sludge used (bentonite) (x 10 m³)	39.10 158.10 101.70	11% 10% 11%
Volume of paint, solvents, release agents, cement curing liquids, accelerants, fluxing ingredients, antifreeze, epoxy resin (m³)	245 94 166	85% 76% 80%
Volume of earth for backfills from own works (x 100 m³)	36 848.74 525.22	53% 65% 59%
Volume of earth for backfills (borrowed or from other works) (x 100 m³)	6.80 896.90 577.38	36% 52% 45%
Volume of aggregates used on site (x 10 m³/year)	8.24 92.33 68.30	26% 52% 40%

Buildings Civil Engineering Works Total


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Environmental
impacts
of construction

The fact of knowing our environmental and social impacts and evaluating its magnitude and importance is the first step when defining a strategy aimed at minimising our activities' impact in the environment.

Defining our environmental footprint

At FCC Construcción we are fully aware that all our activities have an effect on surroundings, to a greater or lesser extent, due to their interaction with the environment and nearby communities. Despite the fact that our activities are generally temporary, not particularly dangerous and our centres take measures to minimise any impact on the surroundings, we know that the execution of our work will always affect the latter to some extent.

Each project or production centre at FCC Construcción identifies the environmental aspects that may have a significant impact on the environment. It is on these aspects which we have to act as a priority, in order to minimise the footprint that we may leave during our work.

Identifying and valuing the impacts caused by our actions allows us to select the best practices to mitigate any negative effects we may cause.

More specifically, the present environmental aspects are identified within the integrated planning process and their relevance is evaluated depending on the extent or amount of contamination or disruption, and the importance and sensitivity of the receiving area. Environmental aspects identified in our construction work can be classified into the following groups:

- Atmospheric emissions
- Noise and vibration pollution
- Effluent discharge
- Occupation of rivers or sea beds and water abstraction
- Occupation, pollution or loss of soils
- Use of natural resources (water, fuels, raw materials, energy, etc.)
- Production and management of waste (dangerous, inert or urban)
- Radiation emissions
- Land management / environment
- Environmental accidents.

Prioritisation of significant impacts

Once we have identified the environmental aspects and assessed their importance, we can determine which of the aspects present in our works and centres are of most significance, this is to say, which aspects have a greater risk for society and for the environment and consequently must be acted on, in order to establish avoidance or mitigation measures that help us reduce our environmental footprint.

By extrapolating data from all FCC Construcción works and incorporating the results at corporate level, we can prioritise those aspects which are significant on more occasions, and more likely to occur in the construction sector. This helps us define where we should intervene to improve the company´s environmental management.

Anti-turbidity barriers retain solids thereby protecting more sensitive areas from civil engineering works in protected waters with gentle swell.

The table of the following page shows results from information gathered in 2014. It shows the environmental aspects identified in our projects and in particular those that have proven to have a higher proportion of significance after the assessment of its magnitude and importance.

Following the analysis of this data, it is worth noting that the groups of aspects that have proven to be significant in the majority of the projects are those related with the impact on the land or urban environment due to debris from the transportation of materials, dust emissions, waste generation, alterations to the landscape and consumption of materials and natural resources.

We must highlight the impact on the urban environment due to operations causing dirt at the entrance and exit of the sites, and due to the spillage of materials during transport, as these two aspects have proven to be significative in 35% and 31% of works respectively, with both figures higher for civil engineering works.

Based on the results, these aspects have a significant impact on the surrounding environment and in order to minimise these inconveniences to the population, we have introduced a series of measures designed to reduce the dirt inside and outside our sites. The most widespread measures are the cleaning of access areas and public roads affected, the cleaning of vehicles on exiting the work site or the covering of the lorries with dusting materials during transport.

Other environmental aspects that appear to be significant in the majority of projects are those related to dust emission, whilst other types of emissions such as greenhouse gases or volatile organic compounds are not particularly significant. Proof of this is that among the most significant environmental aspects identified across the total of projects for 2014, five are related to the production of dust, with a much higher percentage in civil engineering works than building works, since it is in these works where major movements of earth over longer distances occur.

Some of the Good Practices habitually implemented to reduce our impact on the immediate environment surrounding of the works are the cleaning of lorry wheels on exiting the site or the systematic use of sweeping machines at the entrances and exits of the work sites, as well as on the roads where the vehicles and machinery circulate.

Significant environmental aspects

CODE	Description of the environmental aspect	% of projects in which the environmental aspect was signiificant*					
		Building		CEW**		FCCCO total	
U-06	Impact on land / urban environment due to operations that cause dirt at the entrance and exit of sites, from mud and loose material	32%	(25/78)	38%	(36/96)	35%	(61/174)
U-07	Impact on land / urban environment due to spillage of granular material during transport	27%	(21/78)	34%	(33/96)	31%	(54/174)
A-09	Dust emission due to heavy machinery traffic	1%	(1/78)	49%	(47/96)	28%	(48/174)
A-06	Dust emission due to earth moving: excavations and backfills, cuttings and embankments	3%	(2/78)	39%	(37/96)	22%	(39/174)
A-10	Dust emission due to transport of earth and rubble	3%	(2/78)	38%	(36/96)	22%	(38/174)
R-02	Production of non-hazardous or inert waste: Surplus earth from excavations	15%	(12/78)	26%	(25/96)	21%	(37/174)
A-04	Dust emissions due to demolitions	19%	(15/78)	20%	(19/96)	20%	(34/174)
N-53	Steel consumption (structural and reinforcement steel)	19%	(15/78)	20%	(19/96)	20%	(34/174)
W-02	Generation of noise due to demolitions	19%	(15/78)	18%	(17/96)	18%	(32/174)
R-28	Production of hazardous waste: contaminated empty containers (paints, solvents, oil, glue, paint strippers, release agents, silicone, aerosols, explosives....)	21%	(16/78)	16%	(15/96)	18%	(31/174)
R-62	Production of urban waste from the restoration and cleaning of works/installations	4%	(3/78)	29%	(28/96)	18%	(31/174)
U-01	Impact on land/urban environment due to activities that affect the landscape and cultural heritage	3%	(2/78)	28%	(27/96)	17%	(29/174)
M-02	Environmental accidents due to fires in storage areas of inflammable/combustible substances (wood, paper, etc.)	22%	(17/78)	11%	(11/96)	16%	(28/174)
N-21	Consumption of gasoil, fuel-oil, petrol or coal	3%	(2/78)	26%	(25/96)	16%	(27/174)
N-41	Electric energy consumption	10%	(8/78)	20%	(19/96)	16%	(27/174)
A-08	Dust emission due to the supply and stockpiling of dusting materials	1%	(1/78)	26%	(25/96)	15%	(26/174)
N-02	Water consumption for embankments ground watering	1%	(1/78)	26%	(25/96)	15%	(26/174)
R-06	Production of non-hazardous or inert waste: Formworks and moulds	12%	(9/78)	18%	(17/96)	15%	(26/174)
R-61	Production of urban waste from offices, changing rooms and site canteens	5%	(4/78)	23%	(22/96)	15%	(26/174)
R-22	Production of hazardous waste: Paints, solvents, stripping liquids, polishing liquids, epoxy resins, accelerants, antifreeze, accelerators, release agents and concrete curing liquids outside of specifications	13%	(10/78)	16%	(15/96)	14%	(25/174)
U-02	Impact on land / urban environment due to interference with the surrounding traffic outside the worksite	6%	(5/78)	21%	(20/96)	14%	(25/174)
N-12	Consumption of graded aggregates	3%	(2/78)	23%	(22/96)	14%	(24/174)
R-05	Production of non-hazardous or inert waste: Non-hazardous containers and packages	22%	(17/78)	6%	(6/96)	13%	(23/174)
N-31	Consumption of vegetal soil	3%	(2/78)	21%	(20/96)	13%	(22/174)
R-12	Production of non-hazardous or inert waste: other non-petrous debris (asphalt agglomerate, gypsum, scrap metal, glass, wood, fibreglass, etc.)	9%	(7/78)	16%	(15/96)	13%	(22/174)

* Data from FCC Construcción, not including FCC Industrial
** CEW: Civil Engineering Works

The watering of tracks and stockpiles is a very simple and effective action for reducing the spread of dust particles and subsequently any inconveniences to the surrounding population.

The main cause of these dust emissions has been the machinery traffic, significant in 49% of civil engineering works, followed by excavation and backfill, cuttings and embankments (22% of the total works, 39% of the civil engineering works), and the transport of earth and debris (22% of all works, 38% of civil engineering works) and demolitions (20% of all works).

Since this is the main source of air pollution, FCC Construcción has implemented various preventive measures at its work sites such as watering roads and stockpiles, limiting vehicle speed, covering transported materials that produce dust, use of chutes for rubble disposal from heights, paving of road surfaces, the use of covered conveyors or reduced activity in periods of high winds, amongst others.

During 2014, other significant environmental aspects included "Production of urban waste from the restoration and cleaning of facilities or works" (18%), the "Production of non-hazardous or inert waste from formworks and moulds"(15%), the " Production of urban waste from offices, changing rooms and site canteens"(15%), the "Production of hazardous waste from paints, solvents, stripping liquids, polishing liquids, epoxy resins, accelerants, antifreeze, accelerators, release agents and concrete curing liquids outside of specifications" (14%), the "Production of non-hazardous waste from containers and packages" (13%) and the "Production of non-hazardous or inert waste from other debris not including stone (asphalt agglomerate , plaster, scrap metal, glass, wood, fibre glass, etc." (13%).

Waste generated at our facilities is managed according to its nature (hazardous, non-hazardous or considered equivalent to urban waste), given that the scope for action is largely determined by its characteristics and corresponding current legislation. In the case of hazardous waste, operational control includes temporary storage (never exceeding six months); in which each container is clearly identified using standard labelling and managed by managers authorised to do so.

Waste generated during construction must be correctly segregated in areas specified for this use, so that they can be dealt with correctly and to avoid accidental spills. Hazardous waste must be stored in an area with containment systems in order to avoid contamination of water or land. Furthermore, we promote Good Practices in all of our works, designed to reduce waste and employees are properly trained to ensure they are stored correctly.

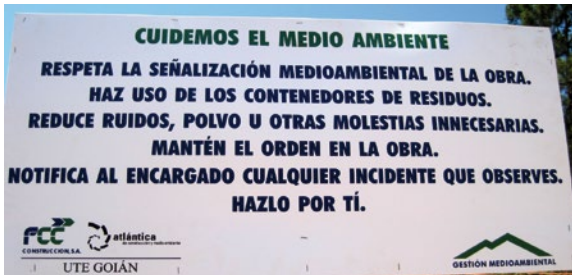
In the case of inert or non-hazardous waste, good practices designed to reduce the volume or quantity of landfill waste are widely implemented in our works. That is to say we promote reuse, recycling and recovery of waste produced during construction to keep the footprint left from the works as small as possible. To maximise these reuse, recycling and recovery procedures, waste is separated according to its nature. At FCC Construcción, in addition to Good Practices related to waste generation, we promote the responsible use of materials and natural resources, which in itself means a reduction in generated waste.

Other land conditions that have occurred symbolically in works carried out in 2014 are alterations in landscape and heritage and interference to road traffic not from the works, significative in a 17% and 14% respectively, of the company´s works.

To mitigate the negative effects produced in the first case, the measures set out in the environmental impact study are implemented in all works and include an environmental restoration phase so that where possible, the disruption caused the during construction phase is kept to a minimum when the latter has finished. With regards to road traffic interference, advance planning is carried out to ensure that users of the transport network are inconvenienced as little as possible during road closures.

The construction project´s typology and characteristics condition the use of resources such as water, energy sources and building materials. Although these are necessary consumptions for the execution of the works, it is still important to quantify them and to try to apply Good Practices to reduce them, by means of reuse, recycling and recovery.

In all activities related to our works the appropriate prevention and mitigation measures are implemented. These are selected according to the characteristics of the region and surrounding area, activities to be carried out, the possible impact detected and its relevance.

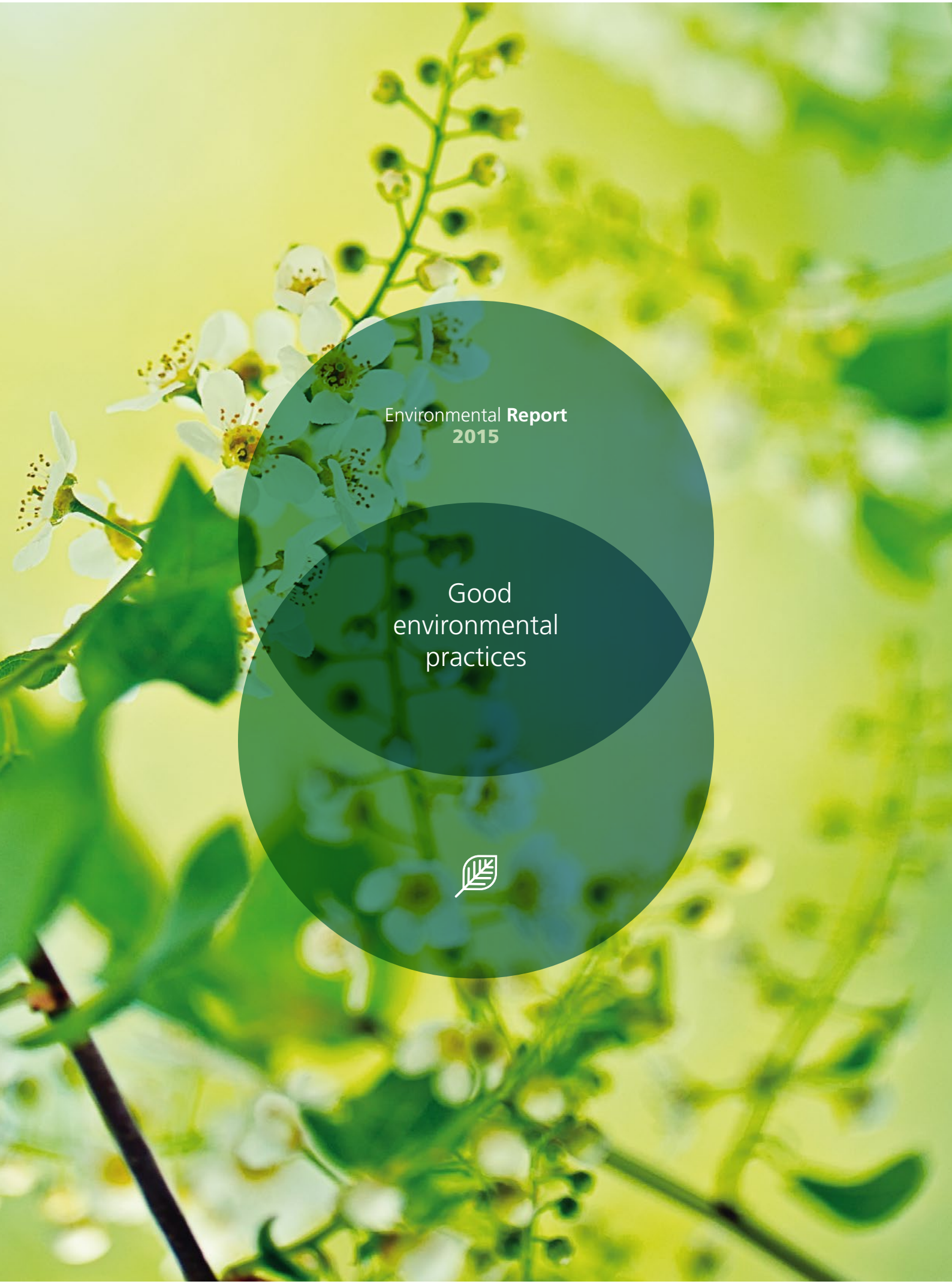


Taking care of the environment is a priority in FCC Construcción activities. Because of this signposts displaying the environmental values are posted at all our work sites, to help remind of the importance of these resources and to encourage respect and care for the surroundings.

Inn 2014, five environmental aspects from the group "Consumption of Resources" have proven to be significative in more than 10% of works. These include "Steel consumption", significant in 20% of all projects, "Gasoil, fuel-oil and coal consumption" (16% of total projects; 26% in civil engineering projects), the "Electrity consumption" (16% and 20% respectively), "Graded aggregate consumption" (14% and 21% respectively) and "Vegetal soil consumption" (13% and 21% respectively).

Here at FCC Construcción we promote measures aimed at the responsible and rational use of natural resources, which are inevitably consumed during the course of our activity. Some of the implemented measures include the maximum exploitation of natural light, the use of more efficient equipment, the reuse of effluents to reduce water consumption, recycling of stone materials for re-use in urbanisation works or as drainage material, and the careful and responsible selection of materials with a smaller environmental footprint throughout their lifecycle.

All of this is only possible because our employees and subcontractors are conscious of the environmental issues we face. We believe in training our employees to increase their awareness of environmental problems, in the conservation of natural values, in the protection of fauna and flora and in the reduction of the footprint we leave on the environment.



Environmental **Report** 2015

Good environmental practices

FCC Construction´s commitment to the environment and society can be clearly seen in our System of Good Environmental Practices®, pioneer in the sector since its establishment in the year 2000.

This system is made up of a series of voluntary actions in our works which lead to a set of demanding objectives (exceeding those required by law) with the aim of minimising our environmental footprint, providing that their application is economically viable and beneficial to nearby local communities.

Many of the Good Practices applied in our projects consist of traditional construction procedures, such as washing trucks, covering trucks to avoid dust emissions, or the use of construction waste as filling to reduce the consumption of natural resources. The evaluation of our environmental performance together with the quantification of the reduction of our print on surroundings clearly depends on the effectiveness of the actions in question. However the advantage of combining this conduct into a common system for all our projects is that we are able to unify our measurement criteria, quantifying the improvements achieved, as well as detecting opportunities for improvement, in the interest of a promoting a more respectful environmental and social behaviour.

By reporting and following up on the Good Practices put into place on our works, we are able to use the experience and knowledge acquired to improve existing systems. Lessons learnt from the systematic application of Good Practices are shared internally between projects and other external interested parties, the latter being one of the main objectives for preparing and distributing this Environmental Report.

The implementation and systematisation of Good Environmental and Social Practices, allows us to identify, understand and organise actions taken. In short, by interpreting our actions we are able to learn and progress, bringing us closer to a more sustainable performance in its three dimensions.

® FCC Construcción 2009. "Environmental performance assessment system through good practices".

General Data on Good Environmental Practices

	BD	CEW	TOTAL
Projects that contributed data on Good Practices	79/82 (96%)	96/102 (94%)	175/184 (95%)
Average number of Good Practices implemented per project	20	25	33

BD: Building/CEW: Civil Engineering Works
* Data for FCC Construcción, does not include FCC Industrial

The way in which our Good Practices system is structured means that each project can select the measures to be implemented depending on their characteristics and potential impact. Furthermore, each of these practices can be implemented to a greater or lesser degree, with different scores assigned to each. This score must always exceed the company objective of 57 points.

Good Practices are assessed on importance and objective. Greater importance is assigned to those with a more significant impact on the final environmental quality, and to those which require greater economic, technical or logistical effort. Each Good Practice is evaluated on a 1-3 points scale depending on the degree of implementation, with 3 for achieving objectives requiring the greatest effort or broadest scope of application.

FCC Construcción Good Practices can be classified within the following environmental categories:

- Relationship with society
- Atmospheric emissions
- Noise and vibrations
- Effluent discharge
- Use, pollution or loss of soils
- Use of natural resources
- Waste generation
- Land planning (biological diversity, urban environment)

A suitable control of vehicles' speed on site contributes to the minimisation of dust emissions and noise, both aspects being intrinsic to these operations.

During the financial year 2014, 95% of projects reported on the Good Practices implemented.

The following conclusions can be drawn from the data obtained relating to the implementation of Good Practices in 2014:

Training and awareness of personnel is reinforced with correct signing of material and waste storage areas.

- In 98% of projects, personnel attended the environmental training course prepared by the company. In 99% of projects Subcontractors received environmental awareness and training talks from FCC lasting at least one hour. Thanks to this training and awareness, Good Practices were effectively implemented during the execution of the works.
- Spraying trucks and stockpiles with water in 98% of works reduced the emission of dust and particles produced during construction.
- In 97% of projects, areas affected by installations underwent an environmental restoration. Furthermore, in 95% of these cases, other measures to ensure land conservation were introduced, such as limits to accesses and occupied areas, or the prevention of accidental spills.
- In 97% of projects, to avoid contamination of surrounding land and waters, gutter washing areas were adequately waterproofed and clearly signposted.
- In 97% of cases, measures were taken to reduce inconveniences caused by works to the urban environment. These included limiting the occupation of pavements and tracks or the application of measures to avoid dirt spreading at works entrances and exits.
- 93% of works utilised EC marked machinery, in order to reduce, where possible, noise and vibrations by using the best technology on the market.
- 90% of works undertook different actions to reduce GHG emissions. These include preventative machinery maintenance or the use of speed limit signposts.
- 90% of works reduced the quantity of inert waste taken to landfills compared to the volume estimated in the initial project planning.
- 89% of works used portable treatment plants or prefabricated recoverable sealed pits for sewage prior to discharge.

The use of construction waste as filling reduces waste taken to landfills and utilisation of works resources.

In addition to the physical protection and transportation of flora, indigenous species are replanted to environmentally restore and adapt the landscape in the area of the works.

To limit the impact on the land and waterways adjacent to the works, gutters and cement mixers are washed in designated areas, thereby avoiding elevated concentrations of suspended soils and other chemical components which may affect the aquatic environment.

- To reduce the consumption of natural resources, 88% of works in 2014 reused topsoil for environmental restoration and recovery works.
- The efficiency of re-use and optimisation measures meant that 88% of works were able to reduce estimated project loans.
- Waste generated during construction work was separated and classified for individual handling in 88% of works. Furthermore, 83% of works took measures to reduce the volume of waste.
- Where the water quality was acceptable, 85% of works re-used the wash water from concrete vats, resulting in reduced consumption of this scarce resource.
- In 81% of works, decantation tanks were installed, reducing the quantity of suspended soils in the effluent and maintaining the quality of nearby watercourses.
- In order to protect certain plant species affected by construction, 86% of projects physically protected the plants and 80% transplanted them to more secure areas, suitable for their development.

Information gathered in 2014 on the implementation of Good Practices is outlined in the following sections. Case studies show practices applied in specific situations and the results obtained

The widespread implementation of the Good Practices system at all projects of FCC Construcción allows us to identify the existent risks, but also to detect improvement opportunities and to use the generated knowledge for minimising our environmental footprint.

Relationship with society

Accesses to Sagrera Station

Case study

Client: **ADIF- BSAV** • Completion deadline: **78 months**

Problem detected:

Uncatalogued archaeological remains belonging to a Roman Villa were discovered during earth moving works in the area of Nuevo Puente del Trabajo. These remains would interfere with planned projects for infrastructure, platform, track, and building work necessary for the construction of rail and road access for the future station at La Sagrera.

The discovery of archaeological remains causes inevitable delay to any project, as any archaeological intervention must be authorised by the competent body and include collaboration from the appropriate technical professionals for each case. The discovery of archaeological remains also implies a series of obligations such as the preparation of an inventory and labelling of recovered material, consolidating pieces obtained and the preparation of reports and a memoir on the results of the intervention.

Solutions adopted:

The Government of Catalonia's Department of Culture was consulted in order to carry out a proper archaeological intervention together with the assistance of two chief archaeologists, six technical archaeologists and more than sixty assistants to carry out the excavation of the located remains. The excavation work lasted four months, from the 7th July to the 28th October 2011, during which time approximately 1,100 m2 were excavated. During these four months a Roman Villa of great scientific value was discovered on this archaeological site, dating back to the I-II centuries AD and in use until the IV or V centuries AD.

Archaeological intervention on site

Results:

The Roman Villa´s state of preservation allowed the discovery of: the urbana (main house), an extension of the urbana and an open patio; It was also discovered that renovations had been carried out during the villa´s occupancy to construct structures of an industrial nature.

The excavation documented a large group of silos dating back to Iberian or late Republican times as well as a series of wall foundations from the I-II centuries BC. A large amount of ceramic material was also documented, representing the two periods of occupation; a collection of metal elements, especially iron and brass; a numismatic set of 40 coins. Wall paintings were removed from the walls of the central patio together with a mosaic from the thermal area for subsequent restoration. In addition to all of these elements, sediment, carbon and cladding samples were collected to carry out the corresponding analysis.

This operation demonstrates that by actively incorporating the Protection of the Archaeological Heritage in the project, the discovery and appreciation of key parts of the cultural heritage of a region can be achieved, contributing to its social sustainability.

Hydraulic adjustment of the Bogotá River

Case study

Client: **the Regional Autonomous Corporation of Cundinamarca (CAR)** • Completion deadline: **24 months**

Problem detected:

This project presents important benefits for neighbouring regions: firstly, the expansion of the hydraulic section of the river minimises the risk of flooding; secondly, the generation of oxygen processes will improve the dynamics of the river and water quality as well as finally allowing for urban and landscape integration, by means of a landscape project and the restoration of areas of ecological interest such as wetlands and former meanders, and the creation of an environmental corridor alongside the river, where more than 100.000 native trees will be planted.

However, this large investment to restore the river pool is pointless if the community is not aware of how their daily activities directly affect the river and its surroundings. Making the local communities environmentally aware was identified as the key to conserving the river and its corridor. However this in itself was a challenge as they had not received the corresponding environmental education and therefore did not bestow the river the environmental value it deserved.

Building of Parque San Nicolás.

Tree planting. Environmental Education Campaigns.

Solutions adopted:

In order to motivate the local communities into valuing the project and developing a responsible attitude towards the environment, the following measures were taken:

- Environmental campaigns were held with the community and project officials. In particular the campaign "Sembrando agua, recogemos vida" (sowing water we gather life) was aimed at reminding citizens of the importance of preserving river pools and involving the local communities in the conservation projects.
- Environmental workshops were developed with different educational centres in the area.
- Pamphlets were handed out in different areas informing of the objectives and benefits for the community.
- Support was offered to different organisations interested in hearing about the progress and benefits of the project.
- The Parque San Nicolás (Saint Nicholas Park) was built, thereby creating an environmental leisure area for use by the San Nicolás community.

Results:

Through the implementation of measures aimed at increasing environmental awareness, the local young population has gained long lasting awareness of the need to preserve the environment in the river corridor. The integration of communities has meant that they are aware of the importance of looking after the planted trees and not throwing debris or waste into the river.
These measures have a positive effect for the environment, both in the long and short term, as the community establishes a link with their surroundings and collaborates in its protection.

	Actions-Opportunities							
Risks	Personnel Training in environmental matters	Contracting of environmentally committed subcontractors	Customer involvement in management	Communication/ /transparency with society	Attending complaints, claims and suggestions	Suitable environmental management recognised by society	Environmental improvements in the project	Environmental signposting
Shortcomings in relationships with people	●		●	●	●	●		●
Wastage of resources and increased waste generation	●						●	●
Insufficient segregation of the waste	●							●
Lack of awareness	●	●		●				●
Insufficient environmental training	●	●						●
Limited communication with affected parties			●	●	●	●		
Projects which affect the environment						●	●	

Collective value

At FCC Construcción we are aware that a strong relationship with the community adds a value which, although sometimes intangible in the short term, is vital for long term success. This is why our strategic objective is to create a collective value. In order to do this, we need to know and interact with our stakeholders and thus focus on what is important to them. In this way we can discover opportunities that contribute in a positive manner, both to the company´s competitivity as well as society as a whole.

Complying with our information transparency policy, we make our environmental commitments and examples of our environmental protection measures available to our employees and stakeholders, in order to achieve environmental awareness and obtain feedback on it.

The environmental and social education of employees, the environmental behaviour of subcontractors, the relationship established between the company with stakeholders, especially with the people affected by the works and the implication of the client in the environmental management of the works are all fundamental aspects for the correct functioning of the Good Practices system.

The table placed in the following pages shows the Good Practices implemented in the category "Relationship with Society" and the extent to which they were implemented in works, separating out construction work and civil engineering work for all projects.

Good practice		I			Goal (degree of implementation) 1			2			3		
0a	FCC production personnel (up to foreman) who have taken the environmental training course organised by the company.	3			> 30% of project personnel			> 60% of project personnel			100% of project personnel		
	implementation rate	97	98	98	11	22	68	23	44	33	18	34	49
0b	Subcontractors who have received environmental awareness and training talks of at least one hour from FCC Construcción related to the sub-contracted activities.	3			> 30% of subcontractors			> 60% of subcontractors			> 90% of subcontractors		
	implementation rate	96	94	95	67	27	6	61	28	10	64	28	9
0c	Subcontractors who apply an environmental management system.	2			At least one subcontractor has an ISO 14001 or EMAS certificate			Idem > 10%			Idem > 25%		
	implementation rate	86	87	86	67	22	11	70	21	9	69	22	10
0d	Subcontractors' environmental behaviour.	3			> 30% of subcontractors carry out measures related to the optimisation of wastes have the relevant permits and licences and have contractual environmental requirements with which they comply.			> 75% of subcontractors carry out measures related to the optimisation of wastes provide the appropriate permits and licences and have contractual environmental requirements with which they comply. or > 30% of subcontractors carry out measures related to the optimisation of wastes, provide the appropriate permits and licences and have contractual environmental requirements with which they comply, and non-conformities as a result of their actions do either not occur or are identified and communicated by them.			> 75% of subcontractors carry out measures related to the optimisation of wastes, provide the appropriate permits and licences and have contractual environmental requirements with which they comply, and non-conformities as a result of their actions do either not occur or are identified and communicated by them.		
	implementation rate	97	94	95	68	14	18	58	27	15	61	23	16
0e	Relationship with interested parties.	3			All aspects that may give rise to relevant significant impacts have been addressed with the client and the solution to be adopted has been agreed.			Those that most affect society have been addressed with authorities or with potentially affected associations and individuals.			Those that most affect society have been addressed with authorities and with potentially affected associations and individuals.		
	implementation rate	96	94	95	41	43	15	40	49	12	40	46	13
0f	Complaints and claims.	3			All complaints and claims have been dealt with directly with affected parties.			The solutions to be adopted have been agreed with them.			These measures have been carried out and written acceptance has been given in 50 % of cases.		
	implementation rate	73	53	60	82	18	0	76	24	0	79	21	0
0g	Achievement of social recognition.	3			Receipt of a letter of congratulation regarding environmental behaviour from the client or local authority.			Any external publication has praised environmental performance.			Receipt of prize specifically mentioning environmental performance.		
	implementation rate	73	53	60	82	18	0	76	24	0	79	21	0

Building · Civil engineering works · Total

Good practice		I			Goal (degree of implementation) 1			2			3		
0h	Involvement of the clients in the environmental management.	3			The client is aware of the implementation of the Environmental Management System in the project.			The client has actively participated in certain aspects of the development of the Environmental Management Programme.			A formal presentation of the Environmental Management System has been made in a specific session with slides or other audio-visual media.		
	implementation rate	98	95	96	82	12	6	54	28	18	67	21	12
0i	Environmental training of at least four hours duration for production personnel from foremen to operators.	3			100% of foremen.			100% of foremen and > 20% of operators/ overseers.			100% of foremen and > 50% of operators/ overseers.		
	implementation rate	93	84	88	51	27	22	37	35	29	43	31	26
0j	Improvements introduced in the original project, in order to minimise the impacts to the environment or society.	3			A Social/Environmental improvement has been proposed for the original project, although finally not admitted.			A Social/Environmental improvement has been proposed for the original project.			More than one social/ environmental improvement has been proposed for the original project.		
	implementation rate	80	88	86	33	58	8	29	45	26	30	48	22
0k	Adoption of environmental signposting on site to inform and spread awareness amongst personnel.	2			Standard environmental waste signposting is used throughout the works.			Complete standard environmental signposting is used throughout the works.			Complete standard environmental signposting is used throughout the works as well as awareness signs.		
	implementation rate	99	99	99	17	22	61	22	34	44	20	29	51
0l	Diffusion of the knowledge acquired in environmental and/or social matters.	2			At least one experience to share or example of Good Practices is prepared (relating to environmental management or social initiatives) which is published on the Delegation´s, Areas or Technical Services intranet so that it is available to other works.			Idem with 2 experiences to share or examples of Good Practice (in relation to environmental management or social initiatives).			Idem with 3 experiences to share or examples of Good Practice (in relation to environmental management or social initiatives).		
	implementation rate	45	47	46	80	20	0	57	21	21	63	21	16
0m	Relationship with populations that are affected by the project.	3			The affected communities are given information on the social, economic and cultural impact, the duration of the activities, the regions affected and the benefits and compensations of the project.			In addition, consultation and participation mechanisms with the susceptible communities affected by the work.			In addition, following the participation process the affected communities give prior, free and informed consent.		
	implementation rate	0	70	70	-	-	-	57	29	14	57	29	14
0n	Training in social issues for FCC Construccion production personnel and for sub-contractors.	3			> 30% of works staff and > 30% of subcontractors staff			> 60% of works staff and > 60% of subcontractors staff			100% of works staff and > 90% of subcontractors staff		
	implementation rate	100	57	63	0	100	0	50	0	50	40	20	40
0o	Sub-contractors' ethical behaviour.	3			>25% of subcontractors have their own code of conduct or contractually accept FCC Ethics Code.			>50% of subcontractors have their own code of conduct or contractually accept FCC Ethics Code.			>75% of subcontractors have their own code of conduct or contractually accept FCC Ethics Code.		
	implementation rate	100	50	55	100	0	0	80	20	0	83	17	0
0p	Communication plan in environmental, social or cultural heritage matters.	2			A communication plan is developed and implemented to inform on environmental, social and cultural heritage topics of the project. Affected communities assist in the preparation of this plan.			Institutional bodies also assist.			Corresponding Ministries also assist (Culture, Environment, etc.).		
	implementation rate	0	67	67	-	-	-	33	50	17	33	50	17

Building Civil engineering works Total

Environmental training

The training of staff involved in FCC Construcción projects is essential for the correct and efficient application of Good Practices. Through courses given by the company, we aim to give impetus to the cognitive learning of competencies, knowledge and skills. Furthermore, this training seeks to increase awareness amongst our personnel, in order to create a corporate culture of commitment to the environment.

The fact that employees, suppliers and subcontractors acquire the necessary knowledge to carry out their work efficiently and at the same time respect their surroundings avoids improper actions and enables and appropriate environmental management.

Some of the works tasks can have a significant impact on the environment. The training of workers in environmental issues is key to making them aware of the possible impacts and teaching them the techniques that most respect the environment.

In this regard, production staff on 98% of works carried out in 2014 completed an environmental course included in the company´s Training Plan. In addition, courses in environmental training were given to production staff (from supervisors to operators) at 88% of our works, and lasted at least four hours. FCC Construcción also gave subcontractors from at least 99% of works, talks on awareness raising and environmental training related to the sub-contracted activities.

Raising awareness amongst personnel in direct contact with works is a beneficial measure to prevent possible environmental impacts. Thanks to this environmental training, FCC employees and subcontractors are able to apply their acquired knowledge during their daily work, complying with the company's commitment to protecting the environment.

Stakeholder involvement

Involving interested parties in environmental management is crucial to achieving our objectives. On the one hand, thanks to the company´s broad knowledge of the environment, society and work customs, we are able to identify the potential impacts of our interaction with local communities and search for efficient solutions. On the other hand, our experience and commitment to environmental matters means that these solutions are correctly implemented and the organisation´s environmental footprint is reduced. A two-way dialogue is established between our company and stakeholders, to join efforts and unify criteria, thereby strengthening their involvement in the application of Good Practices.

In 2014, 95% of our works used subcontractors with some environmental management system in place (ISO 14001 or EMAS). Furthermore, 86% of subcontractors have demonstrated correct environmental behaviour, carrying out actions related to the optimisation of waste products, providing relevant permits and licenses and complying with all contractual requirements in terms of environmental protection.

The client is a key figure within our interested parties, and therefore FCC Construcción ensures that they receive information regarding the works´ Environmental Management System and are actively involved in developing the Environmental Management Programme. In 2014 we succeeded in involving clients in this area in 96% of our works.

The aim of FCC Construcción works such as the improvement of transport networks or water and energy supply installations is to serve and develop society. Taking one step further our role as infrastructure builders, we establish relations with local communities by developing initiatives or projects to help improve the people's quality of life. An example of this is the Valdeza Community in Panama where, amongst other actions, leisure facilities have been built and healthcare services have been provided.

Communication

The basis for a trusting relationship with our interest groups lies in communication based on transparency. FCC Construcción establishes a two-way communication system to discover what our stakeholders expect from the company and thereby maximise their satisfaction and perfect our management system. Furthermore, a fluid communication between the company and interested parties contributes to minimising possible risks throughout the works life cycle.

In order for our communications to constitute an integrated vision and be truly effective, FCC Construcción upholds a threefold communication system with society. To achieve this, we promote an upward and downward flux of internal information at all levels of the company, from works or production centres to corporate level. But we do not limit ourselves to internal communication; we also establish relationships with stakeholders and present the image of FCC Construcción to society in general.

To achieve this we set up external and internal communication channels to receive and transmit information regarding environmental concerns, proposals for improvement, collaboration requests or environmental guidelines.

In this way, communication was established with communities affected by the works in 70% of projects in 2014. They were provided with information on the length of the project, impact and affected regions; as well as explaining the benefits and compensations that the project would bring, establishing consultation and participation mechanisms.

Our works are equipped with signposting to inform and spread awareness with regards to our environmental management programme amongst workers and other agents (suppliers, subcontractors or clients). This contributes to achieving correct environmental behaviour at each works.

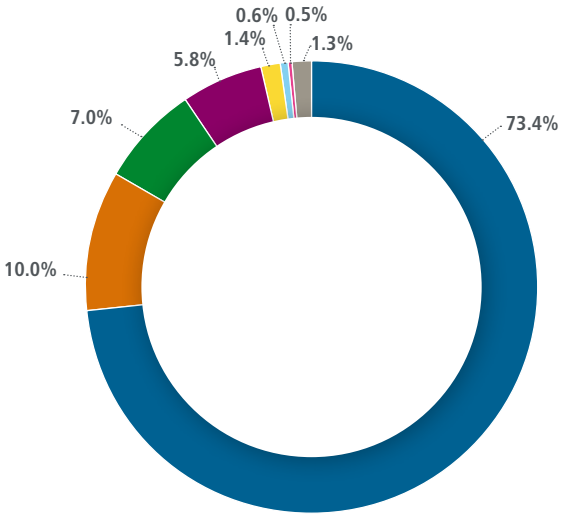
Interaction between FCC Construcción and all parties involved is essential for carrying out our activity in the construction sector. We strive to understand the needs of everyone with whom we interact as well as their expectations with regards to our environmental management. To obtain this information, we establish bilateral communication channels through which we provide and receive information.

In 95% of works, claims and complaints have been managed, agreeing solutions with individuals in 46% of projects.

Furthermore, we have received social recognition in the form of congratulation notes, prizes or specific mentions regarding environmental behaviour in 60% of our works.

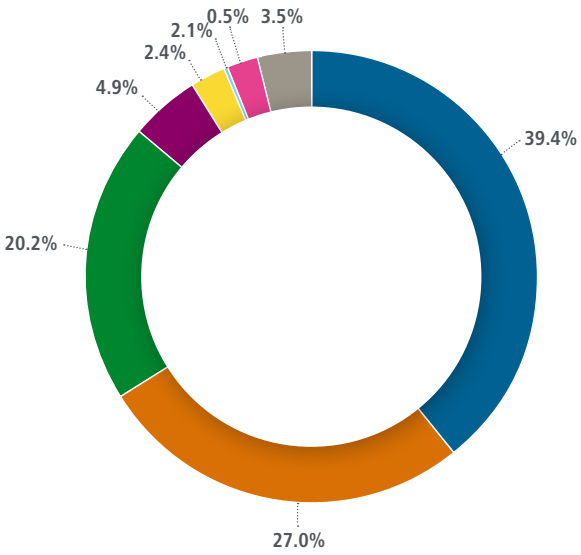
During 2014 communication with interested parties was conducted as indicated in the following graphs showing the number of environmental relationships established in one sense or another. All the environmental communications are structured according to the communication matter and the type of institution with which dialogue was established.

Communication matter



- Information or documentation sent to stakeholders in response to previous request
- Communication of actions generating potential environmental risks
- Reception of guidelines or instructions
- Request for collaboration
- Resolution of complaints and claims from stakeholders
- Proposal for improvement and suggestions
- Public dissemination (communications, advertising, publicity, awards and honours, mailing and congratulations, publication of texts, works visits)
- Others

Communications with stakeholders



- Supranational, state, regional or local Environmental Administration
- Supranational, state, regional or local administration not connected to environment
- River Basin organisation
- Public companies and bodies, autonomous organisations and official institutions
- Private companies
- FCC employees (in works, local offices, Technical Services or Senior Management)
- Universities, industry associations, professional associations and foundations
- Others

As a result of environmental communications with stakeholders, 95% of works in 2014 dealt with aspects which can give rise to significant impacts relating to the organisation or institution directly involved. Furthermore, in 86% of works, proposals for improvement not included in the original project were made, to reduce the effect on the social or environmental surroundings.

In relation to internal on site communications, 99% of works used FCC Construction's standard environmental signposting to inform and raise awareness amongst personnel. On the other hand, 46% of works published examples of experiences to pass on or Good Practices, on intranet so that they can be accessed by personnel from other works.

Atmospheric emissions

National Route Nº 1, Cañas-Liberia Highway

Case study

Client: **National Highway Council of Costa Rica (CONAVI)** • Completion deadline: **30 months**

Problem detected:

Dust emissions occur at all works as a result of construction activities. However, due to the region where the work is located, these emissions were accentuated by the shortage of rainfall, characteristic of the province of Guanacaste and a predominance of silicic soil with little organic matter that favours infiltration.

Another problem encountered during the execution of the work was the fact that vehicles used to transport materials in the work generally did not respect the speed limits and sometimes they were switched on unnecessarily. These two circumstances contributed to increasing atmospheric emissions in the form of combustion gases, and dust.

Watering of trucks, use of tarpaulins during material transportation and speed limit measures.

Solutions adopted:

To solve the problem of dust emission due to construction work, a number of mitigation measures were implemented. The first was to establish the obligatory use of tarpaulins during transportation of materials, and another was the irrigation of works roads.

On the other hand, the problem of excess speeding of vehicles and their unnecessary ignition presented an added difficulty, since the road is 50 km long, and one of the country´s main commercial and tourist routes, making the control of heavy machinery circulating the works very complex. The solution adopted was the installation of a GPS in vehicles and the preparation of weekly reports, including vehicles exceeding the established speed limits of 80km/h when transporting concrete (as high temperatures could affect the material) and 60km/h for all other vehicles. This was reinforced using speed limit signposts at 1km intervals and 500m before a turn off. These signposts were placed at 100m intervals for diversions.

In order to further reduce GHG emissions from transport, vehicles parked with the engine running for longer than 15 minutes were monitored. These events were also incorporated into the report prepared by the Security Department.

Drivers, who exceeded the speed limit and/or left the vehicle running unnecessarily for too long, received a written warning. This was allowed up to 3 times per driver, and after this point, they were considered repeat offenders, and withdrawn from the work.

Results:

Dust emissions during construction fell sharply to reach the objective set, in part due to implementation of good practices and also due to controlling vehicle speed.

This speed control, together with the control of unnecessary engine ignition times, resulted in a decrease in fuel consumption, which meant a reduction in emissions of pollutant gases into the atmosphere.

Risks	Actions-Opportunities							
	Spraying of roads and stockpiles	Use of screens	Use of dust control systems	Use of pipes to dump rubble	Creation of value due to improvement of levels demanded	Suitable maintenance of the machinery	Speed restriction	Control and restriction of night lighting
Climate change						•	•	
Increase of particles in suspension (dust)	•	•	•	•	•		•	
Increase in COVs					•	•		
Decrease of environmental quality	•	•	•	•	•	•	•	•
Light pollution					•			•

Atmospheric emissions from construction works are one of the most common impacts of our activity and which, as well as affecting the area where the work is carried out, can also affect areas beyond the projects boundaries, be they natural areas or communities. The main emissions produced by works are dust, and to a lesser extent GHG and volatile organic compounds (VOCs), as well as light pollution that can be caused by night lighting it if is needed for execution of works. These emissions, as well as being a nuisance for the community, can also have negative effects on the health of neighbouring communities and on biodiversity in general.

To reduce atmospheric emissions during the course of a project, FCC Construcción implements a series of Good Practices designed to reduce the harmful effects these emissions may have on the environment and population. Depending on the type of project and the specific characteristics of its location, a series of actions to be performed are selected. These actions may include watering tracks and stockpiles to reduce dust emissions, improving emission levels in controlled settings, as required by legislation, preventive machinery maintenance or limiting night lighting.

Project Team on a structure at the Port of Açu in Rio de Janeiro, Brazil.

Good practice		I			Goal (degree of implementation) 1			2			3		
1a	Reduction of dust by spraying tracks and stockpiles with water.	2			Sporadic application.			Frequent application.			Systematic application.		
	implementation rate	97	99	98	34	15	23	54	47	50	12	39	27
1b	Use of additives in spray water to create surface crust, paving of tracks, and other lasting dust control practices.	1			Sporadic application.			Frequent application.			Systematic application.		
	implementation rate	0	30	25	-	100	100	-	0	0	-	0	0
1c	Use of screens to prevent dust dispersion.	1			In more than 30% of the perimeter of the site where dust is generated.			Idem in more than 60%.			Idem in more than 90%.		
	implementation rate	83	53	66	80	44	63	20	11	16	0	44	21
1d	Use of molecular crushers in installations that generate dust, such as aggregates treatment plants etc.	2			Crushers in more than 30 % of dust generation points.			Idem in more than 60%.			Idem in more than 90%.		
	implementation rate	0	13	11	-	100	100	-	0	0	-	0	0
1e	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			Implementation in one activity.			Implementation in two or more activities.			Implementation in five or more activities.		
	implementation rate	71	75	74	60	80	75	40	20	25	0	0	0
1f	Improvement of the levels required by law relating to controlled parameters (opacity of discharges, suspended particles, etc.).	3			Systematically obtaining of pollution levels better than those required in more than 5% of all controlled parameters.			Idem in more than 15%, or in more than 30% of half of the controlled parameters.			Idem in more than 30 % of all controlled parameters.		
	implementation rate	0	54	44	-	71	71	-	14	14	-	14	14
1g	Suitable maintenance of machinery operating on site.	2			Preventive maintenance -in addition to that required by law- in at least 30% of machinery operating on site.			Preventive maintenance -in addition to that required by law- in at least 60% of machinery operating on site.			Preventive maintenance -in addition to that required by law- in at least 90% of machinery operating on site.		
	implementation rate	88	92	90	47	29	36	33	40	37	20	31	27
1h	Environmentally-friendly night lighting.	1			Directional lighting instead of environmental lighting in at least 30% of areas or automatic on-off controls.			Directional lighting instead of environmental lighting in at least 60% of areas or automatic on-off controls.			Directional lighting instead of environmental lighting in at least 90% of areas or automatic on-off controls.		
	implementation rate	89	78	83	64	66	65	20	28	25	16	6	11
1i	Use of ducts for tipping rubble from heights and covering of containers with canvas.	1			In more than 30% of containers.			Idem, in more than 60%.			Idem, in more than 90%.		
	implementation rate	83	64	77	29	22	27	17	67	30	54	11	42
1j	Suitable control of vehicle speed on the site.	1			More than 30% of roads with speed limit signposting.			Idem in more than 60%.			Idem in more than 90%.		
	implementation rate	93	99	96	38	18	25	19	31	27	43	51	49

Building Civil engineering works Total

Good practice		I			Goal (degree of implementation) 1			2			3		
1k	Reduction of dust emission in auxiliary premises.	2			Shielding of some elements of the premises.			Individual enclosure of some dust producing equipment of the premises.			Enclosure of entire premise.		
	implementation rate	67	46	55	67	50	58	17	33	25	17	17	17
1l	Appropriate selection of the location for dust emitting machinery and activities.	1			There is written or graphic planning of work areas where dust emitting machinery and activities will be located.			In addition, the planning also takes into account the surrounding environment to locate these areas as far away as possible from potential receptors.			In addition, the planning is dynamic and includes the possibility of relocating these areas depending on project and environment conditions.		
	implementation rate	75	59	62	67	80	77	33	20	23	0	0	0
1m	Paving of the worksite's tracks to reduce dust generation.	2			Paving of entrances and exits.			Paving of entrances and exits and more than 10% of the site's tracks.			Paving of entrances and exits and more than 20% of the site's tracks.		
	implementation rate	100	64	71	67	57	60	0	14	10	33	29	30
1n	Reduction in the fuel gas emissions from vehicles and machinery.	2			Engines from vehicles and machinery are switched off when not in use.			In addition, minimisation of construction traffic on site.			In addition, use of fuel with low sulphur content.		
	implementation rate	86	68	73	50	54	53	50	31	37	0	15	11

Building Civil engineering works Total

Air Quality

Earthworks, manufacture and transport of building materials as well as other specific actions such as blasting are some of the activities that produce most dust emissions.

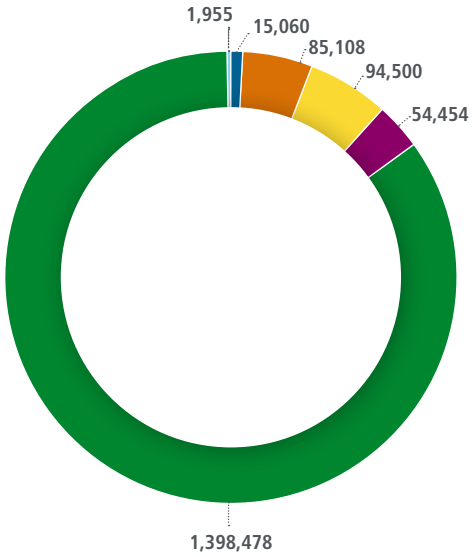
In 2014, most of the FCC Construction works implemented extensive measures to reduce dust emissions. Irrigation of roads and stockpiles took place in 98% of our projects, and in 96% of works the speed of vehicles in the vicinity of works was monitored. In terms of good practices applied to control dust emissions produced by other activities, in 83% of construction work screens were used to prevent the spread of dust generated by specific actions, and in 74% of projects, machinery with humidifier systems to reduce dust emissions during drilling were used.

Easy and simple actions such as the watering of trucks or adequate speed control of works vehicles significantly reduce dust emissions.

Emissions of pollutants not associated with the Greenhouse Effect

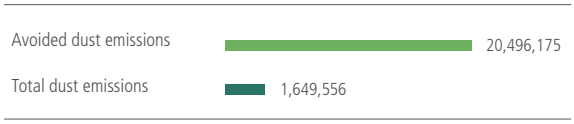
Emissions of contaminants (kg)	Construction Division	FCC Construcción
Total NOx emissions	338,149	337,377
Total SOx emissions	4,030	3,886
Total particulate matter emissions	1,649,685	1,649,556
Total emissions	1,991,864	1,990,819

Dust emissions (kg)



- Due to manufacture of asphalt agglomerate
- Due to manufacture of concrete
- Due to aggregate crushing
- Due to stockpiling of materials
- Due to earth movement
- Due to transport of consumed materials and earth and rubble wastes

The data in the following graphs refers to all FCC works executed in 2014, excluding FCC Industrial.



Good practices applied in relation to dust generation are selected depending on the causes of the emission, aiming to reduce this at the point of origin. As a result of the good practices implemented in construction products throughout 2014, we were able to reduce almost 20.500 tonnes of emissions.

Other emissions from construction work include combustion gases produced by transport and the use of machinery. During 2014 various measures were implemented to reduce these emissions, such as limiting the speed of works vehicles, thereby reducing fuel consumption. Another measure widely implemented is the preventive maintenance of machinery used in works (90% of projects). This measure ensures their correct functioning and

Enclosure of conveyor belts reduces not only noise, but more importantly stops material from falling and dust emission, resulting in cleaner and more environmentally friendly facilities.

therefore efficient use of fuel, achieving greenhouse gas emissions within the permitted limits. Thanks to these and other measures we have achieved a reduction in gas emissions from vehicles and machinery in 73% of works executed by FCC Construcción in 2014.

Climate Change

Greenhouse gas emissions (GHG) from construction works are not our largest emission, however, they do still contribute to aggravating the global environmental problem: climate change.

As a sign of our strong commitment to combatting this global problem, FCC Construcción has prepared (since 2010) an annual inventory of our greenhouse gas emissions. This inventory is verified externally, and we are proud to acknowledge that we were the first company to achieve this verification. This process serves to calculate the organisation´s carbon footprint as well as to detect activities that produce most emissions. Identifying these activities allows us to establish measures to reduce or avoid GHG emissions.

The main sources of Scope 1 and 2 emissions of our carbon footprint, that is to say, emissions from sources for which FCC Construcción is directly responsible, as a consequence of our activities and controlled by us, are emissions from combustion in boilers, generators, auxiliary material manufacturing plants or vehicles using fuel purchased by FCC Construcción (Scope 1) and emissions from electricity purchased by FCC for use in construction work and fixed centres such as offices, warehouses or machinery depots (scope 2).

Direct and indirect Greenhouse Gas Emissions

Emissions classified by scopes (t CO_2e)	Construction Division	FCC Construcción in Spain**
Scope 1: Direct GHG emissions	**51,468**	**17,779**
Associated with fuel used at projects	ND	17,372
Associated with fuel used at premises	ND	407
Scope 2: Indirect GHG emissions	**7,905**	**5,012**
Associated with electricity used at projects	4,673	4,358
Associated with electricity used at premises	3,232	652
Associated with electricity used as vehicle fuel	0	2
Scope 3: Other indirect emissions	**422,030**	**202,698**
Associated with the production and transport of purchased materials	362,324	166,047
Associated with the subcontracted work units	23,889	13,379
Associated with the transport and management of surplus wastes and materials	23,096	10,847
Associated with employee business travel	11,998	11,998
Derived from losses due to electricity transport and distribution	723	427
TOTAL EMISSIONS	**481,403**	**225,489**

* Emissions reported by the various organisations and centres; not verified by third party
** Emissions verified by AENOR. Scope: worksites and centres located in Spain

FCC Construcción has published its greenhouse gas emissions report each year since 2010.

However, these emissions are much lower than the scope 3 emissions, which are produced as a result of the company´s activities, but which we do not have operational control, and which occur in sources that are not owned, nor controlled by us.

Included within scope 3 emissions are those resulting from the production and transport of the main building materials consumed (concrete, asphalt agglomerate, steel, non-ferrous metals, bricks, glass, land and aggregates). These constitute 75% the organisation´s carbon footprint, although FCC Construcción also quantifies the emissions from works at subcontracted units, from the transport and management of waste and leftover materials, from losses during the transport and distribution of electricity and those generated from employee business trips.

Despite the crisis facing the construction sector in recent years, FCC Construcción considers that the Climate Change Strategy is a necessary differentiating factor, especially in an international context in which the company´s capacity to monitor, reduce and communicate their carbon footprint makes us more competitive and improves our reputation. This is evidenced by the fact that we were the first construction company to list its carbon footprint for 2013 in the registry of carbon footprint and CO_2 compensation and absorption projects, created by the Ministry of Agriculture, Livestock and Environment in 2014.

Included in this Environmental Report is our fifth GHG emissions report, providing data for 2014. This data is also available on the FCC Construcción website and is yet more proof of our efforts to measure and communicate our environmental footprint.

To try to reduce GHG emissions and contribute to mitigating the effects of climate change, we must adopt an approach based on a life cycle analysis, so that the result obtained shows, with the greatest possible precision, the environmental footprint for that activity. To reduce this footprint, certain actions or good practices were implemented in works carried out in 2014, to try and avoid some GHG emissions that would have otherwise occurred. The action that most contributed to this reduction in emissions was the reuse of materials in the work itself (as opposed to taking them to landfills), followed by the preventive maintenance of machinery and vehicles used.

Light pollution

Light pollution is a relatively recent concept, but one which has a strong impact on the population and animal and plant species in the area. An excess of night-time lighting affects the body's circadian rhythms, causing disturbance and even health problems. Because of this, there is increasingly more emphasis on the design and choice of a night lighting system that respects the natural life cycles.

In 83% of the works executed by FCC Construcción in 2014 a system of environmentally friendly night lighting was used. The type of lighting chosen varies depending on the type of project, its lighting needs and the characteristics of the environment in which it is located. One of the concrete measures undertaken to minimise energy consumption is the installation of timers to avoid lights being on for longer than necessary; presence sensors, which light up for the time needed; or directional lighting, which can illuminate only the required area therefore not affecting the environment so directly.

Certifying stamp awarded to FCC Construcción by the government. This stamp is awarded to those companies that voluntarily join the Ministry of Agriculture, Livestock and Environment initiative, in recognition of their efforts to fight against climate change.

Avoided emissions

Avoided emissions by the implementation of Good Practices (t CO_2e)	Construction Division	FCC Construcción in Spain**
By reusing surplus material on site and not taking it to landfill	21,734	14,076
By pH neutralisation with CO_2	0	0
By suitable maintenance of the machinery operating on site	1,362	368
Due to vehicle speed control on site	120	79
Due to the use of electric vehicles	3	3
TOTAL EMISSIONS	23,219	14,526

* Emissions reported by the various organisations and centres; not verified by third party
** Emissions verified by AENOR, Scope: worksites and centres located in Spain,

Noise and vibrations

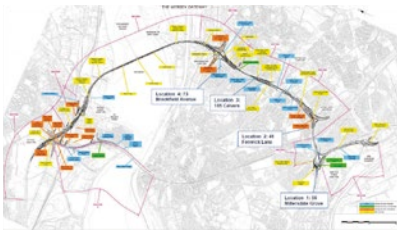
Mersey Bridge

Case study

Client: **Merseylink limited** • Completion deadline: **47 months**

Problem detected:

Construction of the new bridge across the Mersey estuary and work on the next step of the existing road network, aim to provide a road connection linking the area of the city of Liverpool to Cheshire.
As in all similar projects, and even more so if they are in an urban area, the acoustic impact of construction work is one of the most troublesome for inhabitants as it can alter their daily routines, cause stress, headaches and other side effects. Also, it is worth noting that this impact continues throughout the life cycle of these civil engineering works.



Location of baseline noise measurement points

Noise measuring in one of the selected areas

Solutions adopted:

Due to the noise from the project execution and operations, a Plan to Manage Noise and Vibrations was designed prior to initiating the works, in order to minimise the impact caused to residents in the area.

With the implementation of the first phase of the plan, effects of noise and vibration for each of the construction and use phases were identified, and also the approximate duration of each phase. Noise measurement was also performed before starting construction work to determine the baseline noise levels and identify the most vulnerable areas.

As part of aforementioned management plan, activities that produce noise and vibrations were identified, and each case studied in order to design preventive and/or mitigation measures aimed at reducing the impact of the noise on both neighbours and local fauna.

The measures selected were quite diverse, depending on the nature of the noise. In general, it was agreed that works staff would be informed of the need to minimise noise affecting residents and limit the working hours of certain noisier activities, located in areas that the receptors detected as more sensitive. Another of the measures planned for the construction phase is to form a pile of building materials to create a protective screen, both for noise and dust. Regarding the transport of materials, this will take place, whenever possible, within working hours.

For the use phase, once construction is finished, the plan is to install sound barriers on both sides of the road to keep the impact for residents in the surrounding areas to a minimum.

Results:

As a result of the implementation of the first phase of the Plan to Manage Noise and Vibrations, baseline noise levels have been established and the most vulnerable areas where the largest impact may occur have been identified.

Project activities that generate noise have also been identified and the correct preventive and mitigation measures have been selected to address each problem as it occurs. Because the project is still in the very early stages, we have not been able to verify the effectiveness of these chosen noise reduction measures. We do anticipate however, that these measures will result in a reduction of the inconvenience to the surrounding population and consequently fewer complaints and greater acceptance of the project.

Risks	Actions-Opportunities						
	Noise and vibration reduction devices	Consideration of the environmental conditions	Reduction of the impact of blasting	Creation of value due to improvement of levels demanded	Use of modern machinery	Speed restrictions	Rational use of machinery
Sound pollution	•			•	•	•	•
Discomfort to the neighbouring population	•	•	•	•	•	•	•
Impacts on the fauna reproductive cycles	•	•	•	•	•	•	•

Noise and vibrations are also significant environmental aspects that are inherent in construction activities and even in some types of works such as roads, during the operational phase. The impact generated by noise not only affects construction workers, but also the inhabitants of nearby villages and fauna present in the area.

As well as being a nuisance, prolonged exposure to noise and vibrations can cause potentially harmful effects people´s health, including insomnia or stress, and can affect the life cycles of the animal species nearby. This is why this impact should not be underestimated and consideration is necessary during all phases of the project life cycle, from design through to implementation and even the operational stage.

The table of next page reflects the Good Practices, implemented in projects carried out in 2014, to reduce noise and vibrations.

Different measures exist within FCC Construcción Good Practices System, designed to prevent or mitigate the adverse effects caused by noise and vibration caused by our projects. These measures are implemented at the earliest stages, taking into account the environmental conditions. During construction work, measures are taken to ensure that the most modern and noiseless machinery is used, with devices to reduce noise and vibrations incorporated.

Before initiating construction works, baseline noise levels are measured to determine the most vulnerable areas and to design appropriate preventive/mitigation measures.

Construction work often has a high acoustic impact. This means that the use of more modern EC marked machinery and incorporated noise reduction devices whenever possible, is of major importance.

Good practice		I			Goal (degree of implementation) 1			2			3		
2a	Use of devices to reduce noise and vibration in installations or machinery on site, with silencers, noise reduction barriers, shock absorbers, etc.	3			Presence of these devices in some machinery regarded as critical.			Idem in 50% of critical machinery and in 50% of those used at night.			Idem in 100% both critical and used at night.		
	implementation rate	73	73	73	82	54	63	9	29	23	9	17	14
2b	Rubber lining in hoppers, mills, sieves, containers, buckets, etc.	2			Presence of rubber lined elements.			More than 30% of these elements are protected against noise.			Idem, more than 60%.		
	implementation rate	60	33	45	67	100	80	17	0	10	17	0	10
2c	Consideration of environmental conditions in the works programme.	2			Limitation of noisy activities to less disturbing hours.			Limitation of noisy activities to less disturbing times of year.			Frequent temporary interruptions of works, depending on external factors.		
	implementation rate	93	93	93	77	69	73	15	17	16	8	13	11
2d	Reduction of the effects of blasting.	2			Protection of the area affected by the use of rubber blankets, placement of barriers between the affected area and blasting origin, or tarpaulins, nets or any other devices to protect areas with sensitive elements.			In addition, use of low density explosives.			In addition, reduction of explosive charge through timed blasts or charge decoupling or spacing.		
	implementation rate	0	76	76	-	38	38	-	31	31	-	31	31
2e	Improvement of the levels required by law for controlled noise levels.	3			Systematic improving of noise levels better than those required by more than 5%.			Idem, more than 15%.			Idem, more than 30%.		
	implementation rate	50	52	52	67	62	63	33	31	31	0	8	6
2f	Use of modern machinery.	2			Percentage of machinery with CE mark (own and that of subcontractors) > 50%.			Idem more than 70%.			Idem more than 90%.		
	implementation rate	94	92	93	23	12	17	20	25	23	56	64	60

Building Civil engineering works Total

In 93% of FCC Construcción works during 2014 a previous study of the environmental conditions was carried out, so that the loudest activities were limited schedules or times of the year that caused fewer disturbances. Furthermore, in 73% of projects devices to reduce noise and vibration, such as mufflers, shock absorbers or noise barriers were incorporated; and 76% of civil engineering works impacts from blasting were reduced. With regards to machinery used in construction work, in 93% of cases, quieter and more modern and environmentally friendly machinery was used. Through these and other measures, we were able to better the noise levels required by law in more than half of our works.

Good practices aimed at reducing noise and vibrations are key when operating in sensitive areas, as possible impacts on the wildlife that inhabit them are reduced.

Effluent discharges

New Control Tower of the International Airport El Dorado

Case study

Client: **UNIDAD ADMINISTRATIVA ESPECIAL DE AERONÁUTICA CIVIL - UAEAC** • Execution time: **32 months**

Desander of the waters coming from the rain and runoff

Incorporation of the dumping in the sewerage system

Detected problem:

In the drainage of the rain and filtered waters, directed to the inspection boxes, the presence of a high content in ash was noticed, which was conducted directly to the sewage system of the Airport without previous treatment, and this would generate a direct pollution of the water resource. In the construction process of the project, the ash is used to fill and, in suspension in the draining water, affects the quality of the water, which generates a direct pollution of the sewage system, which additionally supposes contractual non-observances with the Civil Aviation, apart from possible fines and sanctions by the Secretariat of Environment, which established the prohibition of pouring industrial waters directly to the sewage system.

Adopted solutions:

In order to mitigate this environmental impact generated by the development of the project, as well as observing the applicable regulation, it is necessary to adopt corrective measure, and the discharge of waters in the conflict point is immediately suspended. Additionally, the need to build a desander of rain and runoff waters, located close to the Resting building (conflict point) is established. As a last resort, it is decided to carry out, additionally, a protection of the drain, which is the final point to which the project's waste waters arrive, to the sewage system of the El Dorado Airport.

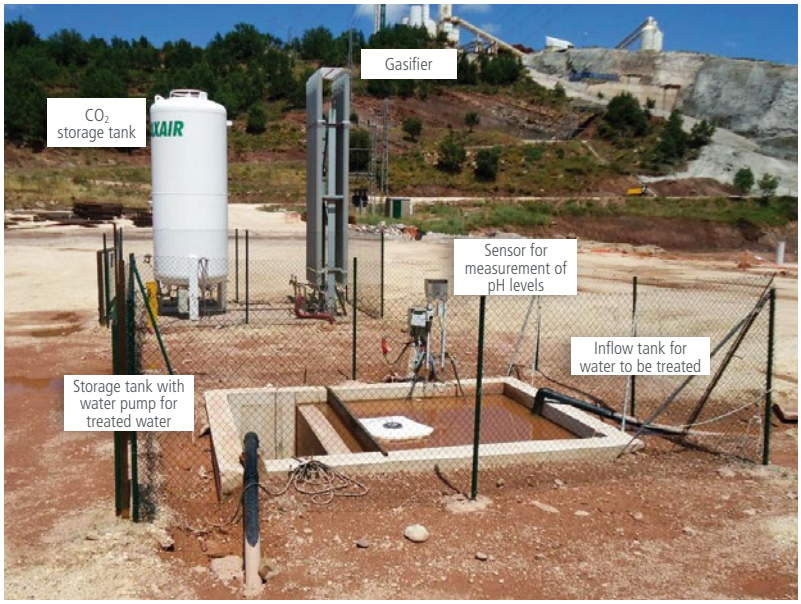
Results:

As a result of the implementation of these measures, and to check that the construction of the desander observed the needs for which it had been built, a Monitoring and Follow-up Programme was carried out of the waste and domestic waters derived from the project, where the waste water quality that would be discharged in that point was tested. The obtained results were compared with parameters established by regulation, and it was checked that the project observes the requirements requested in the environmental subject and the desander complied with its function correctly. With all this, the observance of the applicable regulation has been achieved, as well as an important decrease of the pollution levels of the discharged waters.

Castrovido Dam

Case study

Client: **Environment Ministry** • Completion deadline: **96 months**



Elements of the water treatment system with CO_2 as a neutralising agent.

Control unit for monitoring pH, regulating influx of CO_2 and catchment pool for subsequent treatment with CO_2.

Problem detected:

During an analysis of water from the River Arlanza, where the Castrovido dam is located, 200 meters downstream from the discharge point pH levels of 10.59 were detected. These limits are higher than the established pH limits between 6 and 9.

The presence of these high pH levels presents a risk to the riverbed flora and fauna, and therefore the discharge must be pre-treated. These pH levels in the water discharge are mainly due to the use of concrete for construction, especially for stripping and cleaning works.

Solutions adopted:

To neutralise the effluent discharge, a concrete tank was set up with two compartments separated by a wall. In the first compartment, the pH of the water from the decanting tanks was neutralised by means of CO_2 diffusion through a gridiron (CO_2 is fed from a cryogenic tank of liquid carbon dioxide adjacent to the tank of concrete). Once the pH of the water is neutralised, this then overflows to the second compartment where the neutralised discharge is pumped to the river. These water quality parameters are within the limits set by law.

The decision to opt for the use of CO_2 as a neutralising agent has advantages over the use of other reagents such as hydrochloric acid, sulphuric acid or acetic acid (used more frequently), since the use of these acids involves greater storage and handling difficulty due to their high corrosive nature.

Results:

The implementation of this process meant that the effluent discharge maintained a constant pH within the limits set by law. After periodic inspections conducted both by an accredited independent laboratory and quality control personnel from the works, it was determined that the discharge did not affect the fish fauna, with trout, crayfish and other species typical of this type of environment present downstream from the discharge area of treated water.

Risks	Actions-Opportunities: Treatment of waste water	Effluent decanting pools	pH treatment	Aeration prior to discharge	Added value due to improvement of levels demanded	Re-use of process waters	Choice of suitable cleaning systems
Generation of large volumes of effluent discharges		●	●			●	●
Water pollution	●	●	●	●	●		●
Acidification and subsequent impact on aquatic flora and fauna	●	●	●		●		
Loss of scarce resource						●	●
Increase in temperature and subsequent impact on aquatic flora and fauna		●		●	●		
Eutrophication	●	●	●	●	●		●

Water is an essential element in construction since it is required for most activities, including the preparation and washing of materials. But this water can affect adjacent aquatic environments, either because the work alters the hydrological cycle or morphology of rivers, or because of the quality of water discharged into the environment.

The main problem regarding discharges corresponds to the increase of suspended solids carried by run-off water during construction. These solids increase water turbidity, affecting aquatic fauna and flora, and preventing light reaching the deeper areas. Another process that affects water quality is eutrophication. This process, less common in our industry, is caused by an increase in nutrients in the water, especially nitrates and phosphates, which cause excessive growth of phytoplankton. The use of concrete and other building materials can cause a change in water quality causing acidification, as all wash water in contact with concrete has a very high pH.

Good Practices implemented in FCC Construcción are designed to avoid and minimise the impacts of works water and its disposal. Therefore most of the practices introduced are based on treatment of effluent prior to its discharge into the water, using for example, portable purifiers or neutralising the pH of water. Measures are also taken to decrease water consumption, in particular by reusing some wash water, provided that it is apt for other uses.

The silt barriers impede dispersion of fine emulsion and other substances such as oils or hydrocarbons. Thus the surrounding waters are protected from pollution.

Below are the percentages of Good Practices implemented in relation to water management in works executed by FCC Construcción during 2014.

It is important to remember that FCC Construcción works and production centres request administrative authorisation to carry out direct or indirect discharges of effluent or residual products that could contaminate fresh water or any other element of public water or shoreline.

In the majority of our works wastewater volumes are small, although an initial characterisation analysis is always performed. If the established quality parameters are not met, this water is treated before being discharged into the environment, be it in septic tanks

During construction work, the water is used in many diverse activities that can modify its physicochemical and biological characteristics. It is therefore necessary to establish appropriate areas for washing vats and gutters, and neutralise the pH of this wash water before discharge.

					Goal (degree of implementation)								
Good practice		I			1			2			3		
3a	Use of portable wastewater treatment plants or recoverable prefabricated septic tanks for treating sewerage water.	3			Installed in at least in at least the outlet with the greatest volume of effluent.			Installed in at least 50% of the discharge points.			Idem with elements recovered from other sites.		
	implementation rate	92	88	89	64	59	60	36	32	33	0	8	6
3b	Effluent decanting pools with or without use of additives, in effluent discharge and process waters.	2			Controlling greases and suspended solids.			In addition, pH.			In addition, the effluent is colourless.		
	implementation rate	0	88	81	-	62	62	-	38	38	-	0	0
3c	Neutralisation of the pH of basic effluents using acid.	2			Neutralisation with HCl or H2SO4 in at least one discharge point.			Idem in 50% or in at least two different discharge points.			Idem in 100% or in at least three different discharge points.		
	implementation rate	0	42	36	-	80	80	-	0	0	-	20	20
3d	Improvement of the levels required by law or by the discharge licence in controlled parameters.	3			Systematically obtaining of pollution levels better than those required, by more than 5% in all parameters.			Idem by more than 15%, or by more than 30% in half of the controlled parameters.			Idem by more than 30% of all controlled parameters.		
	implementation rate	0	50	45	-	100	100	-	0	0	-	0	0
3e	Re-use of concrete mixer wash water.	3			Re-use for track irrigation on site.			Re-use for later washing of mixers.			Re-use in the concrete plant.		
	implementation rate	95	78	85	17	29	23	11	0	5	72	71	72
3f	Neutralisation of the pH of basic effluents using CO_2.	3			Neutralisation of at least one discharge point with CO_2.			Idem in 50% or at least two discharge points.			Idem in 100% or at least three discharge points.		
	implementation rate	0	17	17	-	100	100	-	0	0	-	0	0
3g	Concrete washout areas for chutes.	1			Definition of some points (distant from water table and watercourses) for washing out the chutes of concrete mixers.			In addition, these points are waterproofed.			In addition, these points will be covered and restored at the end of the project.		
	implementation rate	100	96	97	50	45	46	23	19	20	27	36	33

Building Civil engineering works Total

Before discharging water used during construction into the natural environment or the sewerage system, it is treated to control parameters such as oils and fats, colouring, pH and suspended solids. Therefore the necessary standards of quality are reached and possible impacts on the environment are avoided.

Accidental discharges into the surrounding environment can lead to environmental problems. To avoid this at FCC Construction we put the necessary means into place, such as decanting pools or concrete gutter cleaning areas.

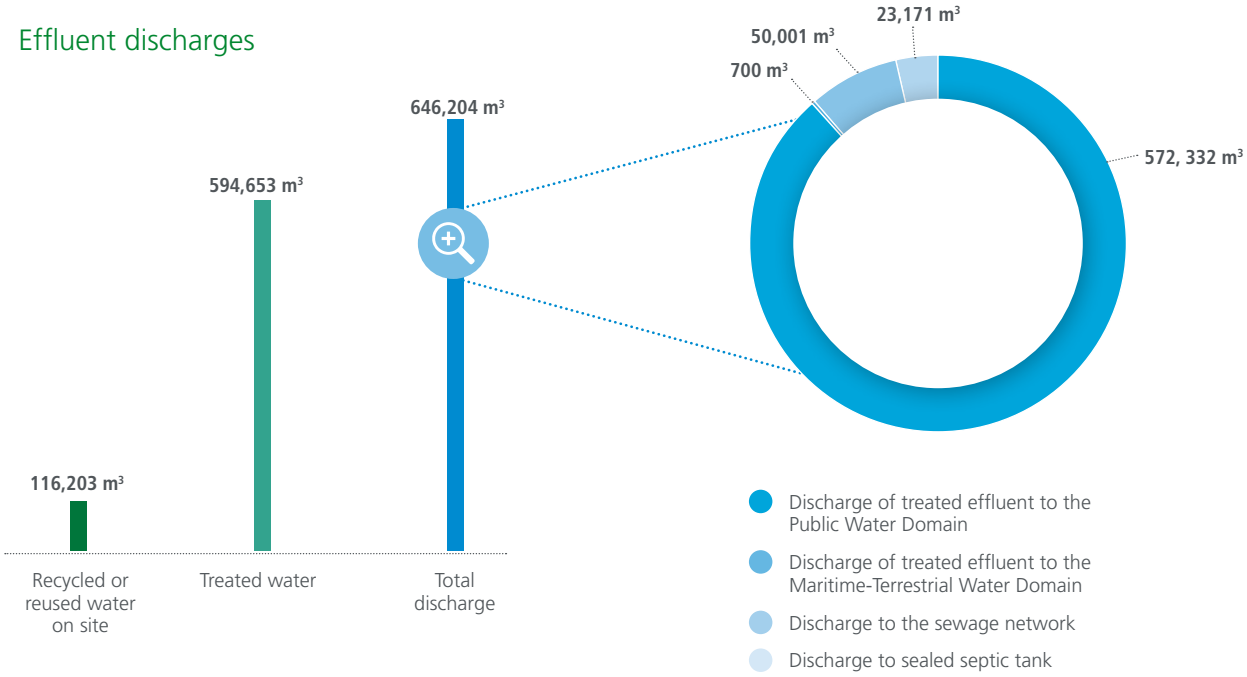
or treatment plants for small amounts of effluent, or installing more complex treatment facilities for tunnel effluents, which are usually quite large. Therefore, in almost 100% of live works in 2014 gutter washing areas were established, avoiding the discharge of untreated process effluent directly into natural streams. Moreover, in 81% of works, decanting pools were installed so that effluent discharge reached the natural environment with the least amount suspended solids possible. Other Good Practices used to prevent these solids reaching the water, without reducing erosion in areas close to streams or channels, is the installation of containment instruments such as straw barriers or geotextiles.

In order to minimise water consumption, in 85% of FCC Construcción works the wash water from concrete tanks was recycled, therefore reducing the amount of discharge water. Provided these wash waters meet the appropriate physical and chemical characteristics, they are used for washing other tanks, for watering works roads or for new batches in the concrete plant.

Although at FCC Construcción we do not perform a calculation of our water footprint as such, we do conduct an inventory of the flow of water collected, consumed and discharged. This way we check the effectiveness of best practices and track water consumption and discharge. This enables us to identify opportunities for improvement, from which can develop new practices to minimise the environmental footprint caused by the work.

During 2014 discharge effluents were measured and classified according to their destination. As shown in the graph below, the main destination for almost all discharge was the Public Water Domain, but always after a treatment process to prevent alteration to the environment. 8% of our waste water is poured directly into the sewage system, while another 4% was discharged into watertight septic tanks. The volume of discharge into the Maritime-terrestrial Public Domain is insignificant in relation to the total discharge volume for 2014. However, it must be noted that, as in the case of discharges into the Public Water Domain, a pre-treatment process is carried out to ensure the quality of the water is maintained.

Effluent discharges



In addition to quantifying discharges, our Management System also records spills that occur on our sites. There have been a total of 68 accidental spills in 2014 with a total volume of about 17 m³, although none were significant.

Most significant accidental spills

Type of spill	Nº of spills	Volume (m³)
Total uncontrolled or accidental spills	68	17

We can therefore identify which of our works have had significant spills and which of them are located near receiving environments with substantial value, either because they are in natural protected areas with high biodiversity or important to the livelihood of the local communities. From a combination of these two factors, we can determine which works should be especially monitored in terms of effluent treatment.

Water resources affected by significant discharges

Type of affection	Nº of works
Significant discharges in natural protected areas	1
Significant discharges in areas with high value for biodiversity	2
Significant discharges in water sources that are relevant to local communities and indigenous peoples	1
Significant discharges in natural coastal line	14
Total	14

The data in these tables refer to all works executed by FCC Construcción in 2014, not including FCC Industrial.

Occupation, contamination or loss of soils

Bajo Frío Hydroelectric Dam

Case study

Client: **Fountain Intertrade Corp** • Completion deadline: **37 months**

Products for developing vermicomposting, application of product to seedlings immunization of seeds for planting.

Problem detected:

For the construction of works of large dimensions, as is the case with the Bajo Frio Hydroelectric Generation Centre in Panama, earthwork has to be carried out using heavy machinery. This, together with other construction activities, affected soil compaction and the vegetation that grew over it, converting it into degraded soil, with no permeability or microbial activity and few nutrients, particularly in areas reserved for infrastructure installation which required more extensive earthworks.

Solutions adopted:

In order to promote soil regeneration, we opted for vermicomposting; a clean technique that transforms organic waste into a material high in nitrogen, potassium, phosphorus, magnesium, minerals and micronutrients with a better uptake and water retention capacity. If the optimal conditions for the worms to develop are created, they can produce excellent quality compost without having to form stacks and transfer them to palates.
Two species of red worm were used for the composting process: Eisenia fetida and Lumbricus rubellus. These are very appropriate and effective due to their growth and reproduction rates.

Results:

The use of earthworms is a clear sustainable alternative for soil regeneration.
The application of this vermicomposting process helped the regeneration of the compacted soil caused by construction activities, restoring its physical and biological properties. This technique improved soil permeability, both for air and water, increased water retention and the capacity to store and release nutrients required by plants. In addition, as a result of its biological activity, the soil began show a high microbial load, key for stimulating the vegetation growth.
Had it not recovered, this soil would have had to be treated as a waste, and managed and transported to the authorised landfill. This was avoided with the vermicomposting.

Risks	Actions-Opportunities						
	Restoration of areas affected	Restriction of occupied areas and access areas	Prevent occupation of environmentally valuable zones	Concentration of auxiliary installations	Prevention of accidental discharges	Correct execution of loading and unloading operations	Suitable maintenance of the machinery
Occupation of land	●	●	●	●			
Visual impact on countryside	●	●	●	●			
Soil pollution		●	●		●	●	●
Destruction of the regenerative capacity of the vegetation		●	●		●	●	●
Loss of potential uses	●	●	●	●	●		

The land is the basis for vegetation development and therefore for other trophic levels. In addition, the land is the base for human activities, a fact that increases its value but also the pressure placed on it. Land is a finite, non-renewable resource, and vulnerable in the face of human activities. This is why we must evaluate the pressure we put on it, and make an effort to make our business as sustainable as possible, and to avoid causing damage to the land.

Construction operations have a direct effect on this resource both due to the intrinsic needs of projects to occupy the land and the space needed for ancillary installations, areas for stockpiling and access roads. In addition, other activities associated with the works such as soil compaction and accidental discharges can alter the microbiological activity of the soil, increasing the risk of erosion and affecting the regenerative capacity of vegetation.

At FCC Construcción we are aware of the land´s importance as a natural resource and the close relationship with it, given our activity. This is why Good Practices relating to this area are implemented in practically all the company´s works, as can be seen in the following table.

Storage vats of substances and/or hazardous waste are placed on waterproofed ground, with roofing and the corresponding labelling, in order to avoid accidental discharge of pollutants.

All works need to occupy an area of land to carry out their corresponding activities. In order to ensure that only absolutely necessary land is used, access to these areas is limited.

Good practice		I	Goal (degree of implementation) 1			2			3		
4a	Restoration of the areas affected by site installations.	2	Cleaning and removal of elements foreign to the environment, or with no further use, written and/ or graphic planning of the proceedings.			In addition, de-compacting of the soil and landscaping to match the surroundings			Same, but adding plantations and ornamental elements integrated into the resulting or pre-existing environment.		
	implementation rate	95 98 97	66	48	56	21	35	29	13	16	15
4b	Limitation of the access areas.	2	There is a written and/or graphic planning of access roads that is respected throughout the site.			Same, but includes physical signs to mark out these areas "in situ".			Same, but limiting access roads to those already in existence.		
	implementation rate	97 94 95	26	19	22	49	49	49	26	32	29
4c	Limitation of occupied areas.	1	There is written/graphic documentation of the areas that may be occupied by machinery and personnel.			The same, but including a physical delimitation or signposting of said areas.			In addition, these areas are limited to the area occupied by the worksite.		
	implementation rate	96 99 97	22	23	23	41	38	39	38	38	38
4d	Prevention of accidental discharges	2	Physical barriers and/or dissuasive signposting in area of storage tanks containing dangerous substances or hazardous wastes or substances, aiming to prevent unwanted access and avoid collisions.			Additional protection in access areas of storage tanks containing dangerous substances or hazardous wastes			Additional platforms or protected areas for handling or maintenance operations which must take place on the site or centre.		
	implementation rate	98 93 95	51	34	40	49	49	49	0	18	11
4e	Adequate planning of the construction of access roads.	2	Use of existing roads or tracks.			Search for definitive use of the temporary access roads.			Both previous options.		
	implementation rate	90 90 90	56	65	63	22	4	9	22	31	29

Building Civil engineering works Total

The restoration of areas affected by works is a key Good Practice and its implementation is obligatory where possible to prevent conditions such as long-term impacts on the landscape in the works area, loss of soil by erosion or loss of the potential uses of the land on which the project is developed. During the financial year 2014, 97% of works restored the affected areas by carrying out activities such as the cleaning and removal of elements foreign to the environment or of no subsequent use, the reconditioning of compacted land, adapting it to the morphology of the surrounding environment or the revegetation of the restored area.

In order to improve ground conditions and integrate the work into surroundings, a restoration of the areas affected by the project is carried out to avoid possible impacts. Installation of 3D geogrids covered in topsoil and application of hydroseeding technique allow for erosion control and the regeneration of slopes, while minimising the impact on the landscape.

Limiting physical access to areas adjacent to the work is essential to prevent impacts on animal and plant species, as some works can be located in the vicinity of sensitive areas of high environmental value. If the work is located in an urban area, this measure is useful to minimise direct disturbance to the neighbouring population.

Through advanced planning, access was restricted in 95% of work areas, while occupied areas were demarcated in 97% of works in 2014. Including signage or physical barriers reinforces these actions, avoiding the occupation and alteration of areas of higher environmental value. These limitations on the one hand minimise the potential impacts of occupation, soil compaction and contamination, and on the other, safeguard an appropriate structure for vegetative cover.

Work was carried out to prevent accidental pollutant spills in 95% of works. Special attention was paid to the correct implementation of both loading and unloading operations, including lubrication, cleaning, maintenance operations and refuelling machinery. In addition, vats are provided for storage of hazardous substances or waste as well as physical deterrents or dissuasive posters to prevent unwanted access and avoid collisions. Emergency plans are also drawn up before starting works, to define a systematic approach and establish the necessary measures for soil protection in the event of accidental spills or ruptures of containers or tanks containing hazardous substances.

Proper road planning is not only positive for reducing the impact of the works on the ground in terms of occupation or pollution, but also has a positive effect on society and the economy. Depending on the size of the project, these effects can be measured in cost or time savings for road users once the works are complete. During 2014, 90% of works access roads were correctly planned making the most of existing roads or looking for a definite use for temporary access roads.

We must be aware of the soil's high vulnerability, so that we are able to combine the infrastructures construction with the conservation of the soil characteristics in a given territory.

Use of natural resources

Restoration of Madrid Viaduct in Redondela

Case study

Client: **Treasury Department and Public Administration Directorate General of State Patrimony**

• Completion deadline: **21.5 months**

Problem detected:

The viaduct structure, which supports the Vigo-Ourense railway line, is made up of two types of materials: granite and steel masonry. The steel area has a more marked deterioration due to tensions between the layers of primer from constant maintenance and different types of products applied at each stage; also the constructive typology of the viaduct favours crevice corrosion and the accumulation of water in different areas. This has resulted in a loss of certain sections, and significant distortion, thereby necessitating the integral rehabilitation of the viaduct. In relation to the rehabilitation of the metal structure, the use of a new primer was discouraged, so that a general cleaning of the metallic elements was performed, loosening the existing cracked primers, through hydrojetting, consisting of projecting a jet of high pressure water. The environmental problem of this cleaning method was the large amount of water used, as it required an average flow of about 20l/min per nozzle.

Washing the viaduct´s steel structure.

Water collection using inclined platforms.

Solutions adopted:

Once the cleaning procedure was selected, a water collection and recirculation system was designed in order to reduce the excessive consumption of water resources. This system consisted of a collection area where the water was channelled into a deposit (catch chamber) where it was filtered through a sieve located in the discharge pipe. The water was pumped from the pit up to the top of the trolley from where the clean-up was performed to gain height and using gravity, it was taken to the closest bracket, where it was discharged into tanks. The rest of the water was channelled into the municipal sewage works.

Results:

This collection and recirculation system allowed for the recuperation of 30% of the total water consumption intended for this use. Water that couldn´t be reused for subsequent washing (due to suspended particles which obstructed the water jet nozzle) was used to water the work camp area which was also used for all the material to access the viaduct.

Risks	Actions-Opportunities: Re-use of inerts	Re-use of topsoil removed	Compensation of mass diagram	Use of elements recovered from other works	Exchange of surpluses with other works	Re-use of effluents and process waste waters	Reduction of water and power consumption
Over-exploitation of natural resources	●	●	●	●	●	●	●
Drought						●	●
Climate change	●		●				●
Difficulty when opening borrow pits	●	●	●		●		

By the very nature of its work, the construction sector is particularly demanding in its consumption of natural resources, taking into account both the land where works are located as well as the materials used for works execution; principally water and energy. In recent years, since the European Union has been promoting the concept of "efficient use of resources", we have pursued a more effective use of materials and resources to develop an economic activity, and enhance practices such as reuse and recycling.

This is achieved by applying management systems, best practices and procedures that act on all stages of the life cycle of materials. Also, advances in research of materials enable the use of new more environmentally friendly alternatives that contribute to this decrease in consumption.

Due to FCC Construcción commitment to a more responsible use of natural resources, our system of good practices incorporates those aimed at the re-use and recycling of construction materials, among others.

The table of page 59 shows the percentage of FCC Construcción works that applied Good Practices in 2014 relating to optimising the consumption of natural resources, as well as their different degrees of implementation.

One of the main challenges we face in our projects is the reduction of resources used and waste taken to landfills. One way of reducing this is reusing construction waste as filling material, thereby reducing the amount of loaned soil.

The natural resource most consumed in construction, especially in civil engineering, is soil. For the implementation of any construction project, we need not only the land where the work is to take place and neighbouring areas, but also large amounts of soil and inert materials. Virgin materials borrowed from external sources may be used, or cuttings and embankments from the works can be recuperated and uncontaminated stone materials may be used as fillings in the works, provided they contain the appropriate mechanical and physicochemical characteristics.

Good practice		I			Goal (degree of implementation) 1			2			3		
5a	Re-use of inerts from other sites.	3			More than 1% of all inerts (fillings).			More than 5%.			More than 15%.		
	implementation rate	74	82	77	36	22	30	21	0	13	43	78	57
5b	Use of recoverable elements in site processes such as removable walls (traditionally made of concrete for later demolition) in aggregates crushing installations, etc.	2			Use of some system in at least 50% of possible cases in development of an activity.			Idem, in 2 or more activities.			Idem, in 5 or more activities.		
	implementation rate	71	38	48	80	50	64	20	17	18	0	33	18
5c	Reduction of borrow-pits compared to the volume forecast in the project.	3			Reduction greater than 5%.			More than 15%.			More than 30%.		
	implementation rate	86	90	88	70	57	63	20	31	27	9	11	10
5d	Re-use of effluents wastewaters from processes.	2			More than 15%.			More than 30%.			More than 60%.		
	implementation rate	60	40	45	100	67	78	0	17	11	0	17	11
5e	Re-use of removed topsoil.	2			Separation of topsoil in horizontal layers less than 2.5 metres in height.			In addition, overturning of topsoil stockpiled for longer than 6 months.			In addition, seeding and fertilisation of stockpiled topsoil.		
	implementation rate	53	96	88	100	63	67	0	19	17	0	19	17
5f	Usage of elements recovered from other projects, like portable water treatment plants, containers, etc.	2			Use of 1 element.			Use of up to 3 elements.			Use of more than 3 elements.		
	implementation rate	91	79	85	45	58	51	20	16	18	35	26	31
5g	Use of recycled water for watering, if it complies with the necessary quality requirements.	2			More than 30% of water used for watering is recycled water, from the worksite itself.			More than 80% of water used for watering is recycled water, from the worksite itself.			Recycled water from an external supplier or other external sources is used.		
	implementation rate	75	56	60	33	67	58	33	33	33	33	0	8
5h	Use of renewable energies.	3			Some source of renewable energy is used (photovoltaic solar panels, thermal solar panels, biomass boilers, etc.) to achieve self-supply of the worksite offices.			Some source of renewable energy is used (photovoltaic solar panels, thermal solar panels, biomass boilers, etc.) for some construction process activities.			Both previous options.		
	implementation rate	50	25	29	100	33	50	0	67	50	0	0	0
5i	Use of recycled aggregates instead of filler material from borrow pits.	2			More than 5% of total needed aggregates are recycled aggregates.			More than 15% of total needed aggregates are recycled aggregates.			More than 30% of total needed aggregates are recycled aggregates.		
	implementation rate	67	71	71	50	60	58	0	10	8	50	30	33

Building Civil engineering works Total

The use of resources provided by the land itself allows for a reduction in the volume of borrowed material in relation to the amount projected within the initial project. Almost 90% of sites in 2014 employed implemented this practice this as well as reusing topsoil from initial waste stripping works. More than 70% of projects also reused inert materials from other sites, contributing to their useful life, and recycled aggregates instead of borrowed materials.

All these measures, in addition to reducing consumption and the risk of overexploitation of natural resources, reduce waste generated on site and provide suitable materials for subsequent environmental restoration and landscaping of the area.

The table of this page quantifies the consumption of key resources throughout the year 2014, specifying waste that has been reintegrated into the production cycle.

During execution of works, certain auxiliary elements are used, such as portable purifiers, vats or site huts that can be reused in other works, maximising their useful life. 91% of building works recuperated and re-used auxiliary elements, this percentage reducing to 85% of live works in 2014.

Consumption of resources

Resource used	Spain	Rest of Europe	Latin America	Middle East and North Africa	TOTAL
Raw materials and materials* (t)	15,766,260	876,740	11,659,713	4,299,378	32,602,091
Asphalt agglomerate	544,133	22,806	11,789	26,367	605,095
Concrete	2,352,178	21,808	599,546	755,071	3,728,603
Steel	119,294	825	92,949	33,898	246,966
Bricks	7,223	22	317	498	8,060
Glass and metals	1,031	7	17	256	1,311
Aggregates, soil and rubble	11,803,527	813,866	9,969,517	3,091,208	25,678,118
Vegetal soil	854,198	12,015	983,313	391,209	2,240,735
Paint, solvents, stripping substances, concrete curing liquids, accelerators, fluidifiers, antifreeze and epoxy resins	80,449	5,302	1,881	864	88,496
Other harmful and hazardous substances	4,227	89	384	7	4,707
Resources from valuation of inert waste** (m^3)	6,151,413	ND	ND	ND	6,151,413
Surplus earth or rocks	6,115,356	ND	ND	ND	6,115,356
Surplus clean rubble	36,057	ND	ND	ND	36,057

* Construction Division
** FCC Construcción in Spain

In order to keep water consumption to a minimum we carry out different actions. One of these is the reuse of water for lorries and stockpiles. This good practice also reduces dust emissions.

As for water, although construction is not an activity with intensive water consumption, it is essential for preparing materials or cleaning machinery and tools. In our works, we opt for responsible water consumption, prioritising recirculation and reuse as long as the quality levels required for different activities, allow us to. 45% of projects in 2014 reused effluent and process wastewater, whilst in 60% of works; the water used for irrigation was recycled water.

Energy use is also a necessity in construction projects and the type of energy used varies, depending on the project location and the machinery used. At FCC Construcción we track energy consumption which is in turn used to calculate the organisation´s carbon footprint. Our goal is to prioritise the use of renewable energy whenever possible and encourage responsible use of the elements that require energy, in order to reduce consumption and therefore reduce GHG emissions.

To minimise consumption, the first step is to take the correct measurement. Improving our IT applications allows us to record consumption in all production centres and extract this information at different levels and for different time periods, making it easy to track progress. The following tables show FCC Construcción water and energy consumption differentiating by geographical area.

Energy consumption

	Consumption (GJ)					
Type of energy	**Spain**	**Rest of Europe**	**Latin America**	**Middle East and North Africa**	**TOTAL**	**%**
Direct energy consumption	336,463	12,001	347,328	22,454	718,246	90.3%
Fuel-oil consumption	72,569	0	257,504	0	330,073	41.5%
Natural gas consumption	1,158	206	0	0	1,364	0.2%
Diesel oil consumption	245,720	11,073	80,794	22,454	360,041	45.2%
Petrol consumption	1,957	722	9,030	0	11,709	1.5%
Propane and butane consumption	15,059	0	0	0	15,059	1.9%
Indirect energy consumption	59,214	771	15,968	1,264	77,217	9.7%
Electricity consumption	59,214	771	15,968	1,264	77,217	9.7%
TOTAL	**395,677**	**12,772**	**363,296**	**23,718**	**795,463**	**100%**

Consumption of water by source

Origin of consumed water	Consumption (m^3)					
	Spain	Rest of Europe	Latin America	Middle East and North Africa	TOTAL	%
Surface water	977,919	1,127	14,309	0	993,355	56.1%
Underground water	33,193	15,216	164,125	0	212,534	12.0%
Water from the supply network	200,178	1,213	60,793	131,526	393,710	22.2%
Recycled or reused water from the worksite	114,551	0	1,652	0	116,203	6.6%
Water from other sources	0	0	54,500	0	54,500	3.1%
TOTAL	**1,325,841**	**17,556**	**295,379**	**131,526**	**1,770,302**	**100%**

Being aware of water scarceness, especially in regions such as Almeria where the Sorbas tunnel was constructed, our projects try to reuse effluent and wastewater in their processes. In this case, following a depuration process which essentially decants solids and neutralises the pH of the tunnel effluent, we managed to reuse 100% of the water for the excavation process of the tunnels.

Generation of wastes

Açu Port

Case study

Client: **Anglo American** • Completion deadline: **34 months**

Problem detected:

The Açu Port works, located on the northern coast of Rio de Janeiro in Brazil, had a specific area designated for construction and demolition debris known as "bota fora". Since the beginning of the port construction works, all of the construction debris, especially concrete and aggregates, were stored in this area that reached a volume in excess of 80,0300 m^3. During the construction of the riprap jetty made up of a vertical dam with 47 shelves and a 600m sloping breakwater, the volume of waste materials increased becoming a major environmental liability for the Client, directly responsible for the disposal of these materials.

Preparation of waste material with hammer head excavator.

Solutions adopted:

The amount of accumulated waste material motivated FCC Construction and the Client to analyse the possibility of using waste material to construct the breakwater. Initially much of the waste material was used to prepare the foundations of the sloping breakwater; excavators with hammer breakers were used to prepare the filling material. This processed material was deposited in the foundations of the sloping breakwater using boats and dump trucks. At a later stage we continued to use waste accumulated during 2014 and 2015, to fill the anchored shelves.

Results:

This action of reusing material waste shows that often the most environmentally favourable measures are also the most economic. The measures adopted in this project allowed us to:

- Reuse a volume of material that was considered as an environmental liability and avoid its disposal in another site where it would undoubtedly have had a greater environmental impact.
- Reduce costs by avoiding the production and purchase of the equivalent volume of rock necessary to build the sloping breakwater.
- Reduce costs associated with the disposal of waste material, such as transport costs and final waste disposal.
- Reduce costs associated with shelves, by using waste material instead of dredged sand.

Waste material collected for works.

Riyadh metro project

Case study

Client: **Arriyadh Development Authority** • Completion deadline: **60 months**

Collection of material extracted from tunnel boring machines in line 5.

Material excavated by the first TBM in the Al-Sulayl landfill.

Problem detected:

FCC headed the execution of the Riyadh Metro project and was in charge of the construction of three lines (4, 5 y 6). During the excavation of line 5, two TBMs were used, producing more than 2 million tonnes of excavated material that had to be managed. These materials were in slurry form, and therefore needed pre-treatment to transform them into mud before removal from the tunnel; However, the city did not have the necessary sites to carry out this treatment, which made the management of these materials a challenge.
The only option available for managing these materials was their disposal in solid waste landfills, even if this meant significantly increasing the volume of waste sent to the landfill and significantly decreasing its capacity.

Solutions adopted:

The must sustainable option was to treat the excavated material as reusable soil to reduce the volume of waste and maximise the level of reuse as much as possible. Therefore it was suggested that the material extracted from the tunnel be reused in municipal landfills as a daily or final covering layer. We collaborated with the Riyadh council and agreed to take the waste to the Al-Sulay landfill where it would be used as an earth covering for the landfill.
The process was controlled using a system of tickets managed by the council and heads of the trucks and tunnel boring equipment.

Results:

The benefits from the adopted measures were twofold: On the one hand 100% of materials excavated by TBMs were reused, implying a significant reduction in management costs and there was also a significant improvement in waste management. The reuse of the material excavated by the TBM improved the covering on landfills, preventing water infiltration and moisture. Furthermore blocking holes and pores in the top covering meant that the level of gas leakages was reduce, therefore minimising the amount of leachate and odours and increasing the level of recovered gas.

The nature of our activity produces a large volume of waste from either construction or demolition. This construction and demolition waste (CDW) is mostly non-hazardous and has the potential to be reused or recycled. However, when generated in large volumes, the management of this waste can be a challenge.

As a responsible company, FCC Construcción´s priority is to achieve a true reduction in waste, prioritising sustainability and bearing in mind our commitment to the environment. As a result of our demands, this reduction of waste constitutes an opportunity for improvement not only at environmental level, but also economically and socially. The measures adopted are designed at minimising impacts such as harmful effects on human health, the depletion of resources and their associated costs.

The Waste Disposal Act includes specific targets for reuse, recycling and recovery of waste from construction and demolition. In particular, the target fixed for 2020 is that the amount of non-hazardous waste from demolition and construction intended for reuse, recycling, and revaluation must be at least 70% of the total weight produced.

Risks	Actions-Opportunities: Improvements in the design and construction process	Reduction of packaging waste	Purchase of material in suitable quantity and container	Correct identification and storage of waste and containers	Classification and individual management of the C&D Wastes	Compen-sation of mass diagram	Management of excavation surplus	Assessment "in situ"
Generation of large volumes of C&DW	●			●	●	●	●	●
Increased quantity and diversity of containers and packaging	●	●	●	●	●			●
Production of HW and associated risk	●		●	●				
Increased quantity of earth and other excess excavation materials	●					●	●	●
Increase in production of waste due to inadequate storage		●	●	●	●			
Increase in production of waste due to inadequate transport		●			●	●		●

To achieve this goal we have established a comprehensive waste and resources management strategy in line with the EU hierarchy: prevention, reuse, recycling, revaluation and disposal in authorised landfills, always as a last option.

FCC Construcción calculates the waste produced in the course of each works project. During the financial year 2014, a total of 4,889,686 tonnes of waste was produced, of which just 0.04% was hazardous waste.

Waste Produced

Hazardous waste	1,889 t
Non-hazardous waste	4,887,797 t
TOTAL	4,889,686 t

The waste generated in the work must be stored in properly equipped areas that are clearly marked and indicated. In the case of temporary storage of hazardous waste, the contents must be identified in accordance with current regulations; this includes labelling with the danger pictogram, identification of the waste producer and the date it was placed in storage.

Below is a more comprehensive list of waste generated exclusively by FCC Construcción (excluding FCC Industrial), grouped according hazard levels.

Waste produced

Hazardous waste		
Empty hazardous waste containers (kg)		**45,879**
15 01 10	Empty packaging containing residues of DS or contaminated by DS	8,411
15 01 10	Empty plastic packaging containing residues of DS or contaminated by DS	8,355
15 01 10	Empty metal packaging containing residues of DS or contaminated by DS	29,113
Solid hazardous waste (kg)		**351,283**
15 02 02	Absorbents and wiping cloths contaminated by DS	22,876
16 01 07	Oil filters	5,689
16 01 09	Components containing PCBs	100
16 02 13	Discarded electrical and electronic equipment containing hazardous components	669
16 05 04	Gases in pressure containers containing DS	3,603
16 06 01	Lead batteries	2,938
16 06 02	Ni-Cd batteries	342
16 06 03	Mercury- containing batteries	178
17 01 06	Mixtures of, or separate fractions of concrete, bricks, tiles and ceramics containing DS	1,409
17 02 04	Glass, plastic and wood containing or contaminated by DS	15,657
17 05 03	Soil and stones containing DS	176,502
17 06 05	Insulation materials containing asbestos	104,199
17 09 03	Construction material containing asbestos DS	16,845
20 01 21	Other construction and demolition wastes (including mixed wastes) containing DS	276
Used oil (kg)		**59,392**
12 01 12	Spent waxes and fats	1,409
13 01 13	Hydraulic oils	16,222
13 02 05	Mineral-based chlorinated engine, gear and lubricating oil	23,696
13 03 08	Motor, synthetic insulating and heat transmission oils	18,065
Hazardous liquid waste (kg)		**293,911**
08 01 11	Waste paint and varnish waste containing organic solvents or other DS	2,609
08 04 09	Waste adhesives and sealant containing organic solvents or other DS	897
12 03 01	Aqueous washing liquids	387
13 07 03	Liquid fuels	120,985
14 06 03	Solvents and solvent mixtures	1,529
16 01 13	Brake fluids	198
16 01 14	Antifreeze fluids containing DS	143
16 01 21	Release agents, curing liquids, plasticizers, liquidisers	60,621
16 05 06	Laboratory chemicals consisting of or containing DS	252
16 07 08	Wastes containing oil	106,290
TOTAL		**750,465**

Waste produced

Non-hazardous waste (kg)		
Inerts (m^3)		**4,835,825**
17 01 01	Concrete	21,923
17 01 02	Brick	340
17 01 03	Tiles and ceramics	33
17 01 07	Mixtures of concrete, bricks, tiles and ceramics not containing DS	350,454
17 05 04	Soil and stones not containing DS	4,463,075
Urban waste (kg)		**1,320,073**
20 02 01	Compostable waste	69,465
20 03 01	Mixed municipal waste	1,250,608
Other non-hazardous waste (kg)		**46,605,174**
01 05 04	Fresh-water drilling muds and wastes	36,600
08 03 18	Waste printing toner	3,430
10 11 03	Waste glass-based fibrous materials	22,803
12 01 13	Welding wastes	10,165
15 01 06	Non-hazardous mixed packaging	4,893
16 01 03	End of life tyres	4,804
16 06 04	Alkaline batteries (except mercury-containing batteries)	1,700
17 02 01	Wood	1,559,793
17 02 02	Glass	13,195
17 02 03	Plastic	293,169
17 03 02	Bituminous mixtures not containing coal tar	747,218
17 04 07	Mixed metals	1,670,692
17 08 02	Gypsum-based construction materials other than those mentioned in 17 08 01	420,184
17 09 04	Mixed non-hazardous construction and demolition wastes	40,967,252
19 08 05	Sludges from treatment of urban waste water	727,138
20 01 01	Paper and cardboard	122,077
20 01 32	Expired medicines other than cytotoxic and cytostatic	61
TOTAL		**4,883,750,247**

* FCC Construcción Data, excluding FCC Industrial

The projects of FCC Construcción do prioritise the valuation of demolition waste. In this way, they become useful resources for the works as they reduce both the volume of inerts intended to be disposed of in landfills, as well as the volume of virgin aggregates consumed.

In order to improve the way we manage our waste, a forecast is made of the type and amount of such materials that are likely to be generated. This forecast allows us to study the various alternatives for managing the waste, as well as plan how best to handle, separate and stockpile the waste.

The table below shows the amount of forecast and actual recycled materials for financial year 2014.

Recycled / used materials*

	Quantity Forecast (m^3)	Actual Quantity (m^3)
Surplus soil and stones		
Temporary waste (prior to final use)	100,709	340,601
Obtained from borrow pits	2,025,444	2,092,409
Used from other projects	54,482	29,186
Used in the same project (compensation/excavation/fill)	3,259,530	6,086,170
Disposed in landfill	3,558,790	2,880,064
Used in other projects	209,357	393,445
Total excavation	8,468,670	12,140,791
Total fill	6,508,415	8,382,111
Clean rubble (concrete, mortar, brick, prefabricated elements, others)		
Disposed in landfill	154,451	61,910
Used in the same project	19,450	36,046
Used from other projects	0	11
Used in other projects	1,463	15
Delivered to a recovery installation	15,390	69,511

* Data from FCC Construcción in Spain

It is worth highlighting that the forecast amount of surplus land or rocks for landfill has been reduced by 678,726 m^3. Also noteworthy is the reduction of clean rubble (92,541 m^3 of concrete, mortar, bricks, prefabricated elements and others) for landfill disposal, resulting in 60% less than initially predicted. This data clearly shows that successful waste management allows recycled materials to become raw materials, instead of being considered waste materials.

Good Practices designed for this area aim to achieve an effective management of waste generated by reducing both the amount of inert waste disposed of in landfills and the consumption of natural resources. In the table shown below, the percentage of implementation and the achievements in the year 2014 can be seen.

The first step for proper treatment of waste involves a classification of the materials. At the worksite, different areas are prepared for the collection and storage of waste, be it hazardous waste or construction and demolition waste. Depending on how this segregation is performed, different valuation and recovery options are possible.

Good practice		I			Goal (degree of implementation) 1			2			3		
6a	Reduction of inerts taken to landfill compared to the volume forecast in project.	3			More than 5% reduction.			More than 15% reduction.			More than 30% reduction.		
	implementation rate	93	88	90	62	69	65	21	16	19	17	15	16
6b	Classification/segregation of construction and demolition wastes for its individual management.	2			Construction and demolition wastes are segregated into one more category than those requested by law.			Construction and demolition wastes are segregated into two more categories than those requested by law.			All construction and demolition wastes are segregated and recycled/reused.		
	implementation rate	83	91	88	53	41	46	24	33	29	22	27	25
6c	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			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.			Idem in three or more activities.			Idem five or more activities.		
	implementation rate	60	38	46	100	67	83	0	33	17	0	0	0
6d	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			Applied to two or more materials.			Idem, to five or more.			Idem, to ten or more.		
	implementation rate	83	69	75	89	77	83	11	9	10	0	14	7
6e	Management of excavation wastes.	2			More than 1% on other site for restoration of degraded area.			More than 30%.			More than 50%.		
	implementation rate	90	79	83	42	55	51	32	24	26	26	21	23
6f	Valuation of rubble.	2			Reuse or recycling on another worksite or external plant.			Reuse on the same worksite.			Recycling of stones setting up a plant on the same worksite .		
	implementation rate	87	70	77	67	33	49	30	47	39	4	20	12
6g	Use of devices to reduce waste volume (paper, cardboard, metal, etc.).	1			Applied to one type of waste.			Applied to two different types of waste.			Applied to three or more different types of waste.		
	implementation rate	96	74	83	60	40	50	20	44	32	20	16	18

Building Civil engineering works Total

The first step to effective waste minimisation is prevention. By changing the design or construction system in relation to the use of hazardous waste materials, 46% of wastes generated in live works in 2014 were of less or no danger. Through simple practices, such as requesting materials in returnable packaging from the supplier, reusing contaminated containers, avoiding the purchase of elements in containers but rather in bulk, we have managed to reduce the volume of packaging waste in 75% of works.

Although site offices generate less waste, this is still separated in order to manage it correctly. Accustoming workers to separate all waste, irrespective of its volume serves to raise awareness of correct waste management, both on and off site.

Furthermore, in 83% of works, we have taken measures to reduce the volume of waste generated such as paper, cardboard, metals, thereby reducing both the space needed to store this as well as the volume to be transported.

Individual management of construction and demolition waste (CDW) classified into at least one or more of the categories required by law were carried out in 88% of the works. In 25% of these works, all construction and demolition waste was classified and valued.

A reduction of inert waste for landfill in relation to project forecasts was achieved in 90% of works carried out in the year 2014. This good practice is obligatory in all works where its implementation is viable. In order to reduce the estimated inert waste for landfill, 83% of works managed surplus excavation materials, using them in other works or the restoration tasks of degraded areas; whilst in 77% of works, a valuation of rubble was carried out for reuse in the works or in an external revaluation plant.

Although FCC Construcción does not generate significant volumes of hazardous waste, in 2014 a total of 0.04% of waste was treated specially, as in addition to requiring a different system of handling and treatment, it could have harmful effects on the environment.

Therefore, all hazardous waste is identified in order to comply with current legislation in this respect, and to make decisions regarding its management. Regardless of who assumes ownership of waste, be it the sub-contractor or FCC Construcción, all our works have specific storage areas to house hazardous waste in a correct and safe manner.

In works, hazardous waste is stored in covered fixed or mobile vats, during a maximum of six months. In this way, the risk of spills, discharges and mixtures of waste is reduced.

Land planning

Secondary network of the Segarra-Garrigues irrigation system

Case study

Client: **Aigües del Segarra-Garrigues** • Completion deadline: **19 months**

Problem detected:

The area where the irrigation network was constructed bordered with Secans Belianes Preixana, an area that forms part of the Natura 2000 network, considered a Special Protection Area (SPA) and Community Interest Area (CIA). Among the bird species present in the area, a number of steppe birds are subject to special protection: the little bustard *(Terax tetrax)*, the European Roller *(Coracias garrulus)*, the Lesser Kestrel *(Falco naumanni)* and the Calandra Lark *(Melanocorypha calender)*.
According to the Environmental Impact Statement (EIS), the irrigation project planned for this area would affect these species, which meant that conservation measures would have to be implemented.

Male Little Bustard with breeding plumage in works area.

A lesser kestrel hovering over his prey.

Male Little Bustard in flight with breeding plumage.

European Roller posing on an almond tree.

Solutions adopted:

To prevent these works affecting the avifauna present in the area, certain areas originally included in the plans were excluded from the irrigation project and allocations previously assigned in other areas, were reduced.
In the initial planning work, it was established that an ornithologist would carry out an inspection was prior to the execution of any clearing work, in order to identify the presence of protected birds in these areas. These inspections were carried out in coordination with the works and were carried out at least one week prior to machinery entering the site in order to ensure the validity of the observations. Furthermore, the works planning was adapted to take into account results obtained in previous ornithological inspections.

The works plan was also affected by the phenology of the agricultural vegetation that had to be taken into account, prioritising entry into cereal fields once the harvest was completed. These actions meant that we managed to reduce alterations to the steppe bird's habitat and damage to the landowner´s property.
On the other hand, indirect causes that could affect the birds also had to be taken into account, and the appropriate measures taken to limit them. These measures led to the reduction, where possible, of noise and dust emissions, speed limits within the works area, and ensuring machinery was in good condition by carrying out the necessary checks.

Results:

Before clearing work took place, the sampling plan was carried out as planned. In most routes no species were identified which would affect the pace of the work, as these birds did not have a permanent base there, and would therefore not be directly affected by the works. On only one occasion a female sisón was identified who could possibly nest in the area to be cleared. As a result of the ornithologist's observation, the clearing plan was modified, resulting in a week´s delay to the works. A subsequent inspection discarded the presence of any nests belonging to this species, and therefore work could be continued as normal.

Improvement of Las Chilcas Mountain Road

Case study

Client: **Aconcagua Motorway** • Completion deadline: **24 months**

Problem detected:

As a result of the widening of the roads on the Aconcagua Motorway, native Chilean flora was affected when vegetation on the Chilcas Hill stretch was scraped and cut. The significance of this problem was that this area comprised a native or conservation forest, inhabited by endangered plant species or species in some kind of conservation category, corresponding to unique environments or representative of the biodiversity of the country.

Solutions adopted:

One of the objectives of the Environmental Management Plan was to offset environmental impacts on affected native flora. This therefore meant that the project had to include the development and implementation of a Forest Management Plan.

Before the start of work, six native species that were expected to be later affected were be collected: Soapbark *(Quillaja saponaria)*, Hawthorn *(Acacia caven)*, Guayacan *(Porlieria chilensis)*, Carob tree *(Prosopis chilensis)*, Litre *(Lithrea caustica)* and Huingán *(Schinus polygamus)*. The collection of seeds and fruits was carried out within the official perimeter and the project´s surrounding areas with more vigorous species. Subsequently, these seeds were delivered to Antumapu Nursery at the University of Chile, where during two years they germinated and grew to 30 cm.

In the final stages of the project a perimeter fence was established surrounding the reforestation site, which had a surface area of almost 18 hectares, to prevent grazing animals entering.

Currently the planting, watering and plant maintenance phases are still pending, and must be carried out after the distribution of existing vegetation, to ensure that there is enough water for irrigation, so that at least 85% of the planted specimens develop.

Results:

Four seed collection campaigns have been carried out during the works execution. Due to consecutive droughts, there have been no Quillay fruits, so we could only collect seeds from the other 5 species. Moreover, as the number of specimens developed was not sufficient, we decided to buy specimens of each species, taking into account proximity to the project, to maintain genetic diversity.

A total of 6,616 plants are ready for reforestation, planned for late 2015, taking into account those germinated in the nursery and those purchased.

Reforestation site.

Collection of Hawthorn seeds.

Collection of Litre seeds.

Nursery inspection.

Mariña-Lucense Gas Pipeline

Case study

Client: **Gas Natural Fenosa** • Completion deadline: **6 months**

Problem detected:

During the execution of the Mariña-Lucense Pipeline, Iberian "Common Frog" tadpoles were detected. This is a protected species, which figures in the Galician Catalogue of Endangered Species in Galicia, where it is classified as species in danger of extinction.

Solutions adopted:

In order to avoid affecting the Iberian frog specimens we developed a protection plan, taking into account the main stakeholders; in this case the local community, regional and local environmental protection services and the Client. The feasibility of alternatives to protect the Iberian frog tadpole were analysed when developing this plan.

In the area affected by the stretch of Mariña-Lucense pipeline, flood areas were identified and where Iberian "Common Frog" tadpoles appeared, samples were taken. We then proceeded to conduct an inventory of species in order to then remove them from the flood area, so as to avoid being affected by the passage of machinery. Subsequently, the species were moved to protected areas with a plastic protection that acted as a barrier preventing the amphibians returning to the affected by the execution of works. Lastly, the affected land was restored to its original state is.

Works managers supervised the implementation of the planned solutions, and subsequently reported the results obtained to the local community and environmental protection services.

Results:

During the period in which the environmental project was carried out, there were no signs of loss of specimens due to execution of the pipeline works, which can be considered a positive result, which clearly contributes to the protection of Iberian "Common Frog" tadpole specimens.

Removal of Iberian amphibian frog tadpoles.

Barrier between flood areas and stretch of pipeline.

Risks	Actions-Opportunities: Protection of examples of flora	Replanting	Use of indigenous species in the restoration	Planning of the works (life cycles, critical stages…)	Transfer of habitats or individuals	Use of means to prevent dirt	Use of signposting, protection and signalling for reduced occupation of pavements and roads
Removal of vegetation	●	●	●	●		●	
Erosion, desertification	●	●	●	●			●
Impact on the fauna	●			●	●		
Loss of biodiversity	●	●	●	●	●		
Visual impact on countryside	●	●	●	●		●	●
Dirt in the environment						●	●
Interference with traffic or external installations						●	●

Given their size, construction projects have an impact on the area where they are located and surrounding areas. These impacts refer not only to the use of land and changes to the terrain, as discussed in previous sections, but also to the lives of animal and plant species in the area. Another factor to bear in mind when conducting our business is the interaction with urban areas and disturbances caused to the nearby population.

The challenge for FCC Construction is to minimise the negative effects of our works on the biodiversity of the area, carrying out the preservation and recovery actions outlined in our Good Practices system. The selection of measures to be implemented depends on the type of works and characteristics of the area, which means it is important to analyse the characteristics of the physical environment and landscape included in the environmental impact study or work project, to know the area´s biodiversity and how it may be affected. In addition to these measures, actions are also taken to avoid the negative impacts that construction works can have on neighbouring towns. All these considerations are taken into account at are made for all life cycle stages of the works, from planning through to construction and functioning of the building or infrastructure, to its end life.

The following table highlights the Good Practices implemented, designed at minimising the effects on the biodiversity and urban surroundings.

The different construction activities generate a series of changes in the land; therefore we have to be especially careful when designing measures that favour the co-existence of the most sensitive animal and vegetable species with the Works carried on.

Good practice		I			Goal (degree of implementation) 1			2			3		
7a	Physical protection of individual items.	1			All rare species affected by the works are protected.			Idem for all species.			In addition, maintenance and care work is carried out.		
	implementation rate	94	83	86	47	54	52	35	31	32	18	15	15
7b	Transplants.	1			Rare species affected by works are relocated.			Idem for all rare species.			In addition, transplants are successful in 80% of cases.		
	implementation rate	100	76	80	14	50	42	57	38	42	29	12	15
7c	Adaptation of the project planning to the life cycles of the most valuable species.	2			Project forecasts are bettered.			Not taken into account in project but carried out.			In addition, a follow up on individuals affected during more than six months.		
	implementation rate	80	71	73	75	45	50	25	25	25	0	30	25
7d	Relocation of nests or individuals.	1			Some relocation is carried out.			A general relocation is carried out.			In addition, the individuals affected are tracked for more than six months.		
	implementation rate	75	65	67	67	53	56	33	20	22	0	27	22
7e	Use of measures to avoid dirt at the site entrance and exit.	2			Entrances and exits are swept systematically.			The wheels of all trucks are cleaned before they join the public road.			A fixed device is used for the above (water troughs at the exits, sprays, etc.).		
	implementation rate	99	96	97	87	76	81	10	19	15	3	5	4
7f	Occupation of pavements and roads.	2			Protection measures are adopted (fencing, signing, separation of pavement/road, etc.).			In addition, alternative access roads are provided.			In addition, the authorised time or maximum space of occupation is reduced.		
	implementation rate	100	95	97	58	39	49	25	46	35	17	15	16
7g	Prevention of rubble falling on public roads or neighbouring buildings.	1			Protective shelf on the 'façade's front (overhang scaffold which sticks out from facade with vertical fender).			Mesh covering surrounding the building structure.			In addition to placing of "protective shell" or mesh covering, signposting of the installed protection measures.		
	implementation rate	83	73	76	0	9	6	80	73	75	20	18	19
7h	Use of means to minimise barrier effect and avoid animals' accidents.	2			Setting-up of specific wildlife crossings to help the crossing of animals.			Setting up of cynegetic fence or dissuasive signposting to avoid the crossing of animals.			Both previous options.		
	implementation rate	100	78	80	0	71	63	100	29	38	0	0	0
7i	Setting-up of fauna shelters (refuges) with artificial structures.	1			Setting-up of temporary shelters for, at least, one animal species.			Setting-up of temporary shelters for, at least, two animal species.			Setting-up of temporary shelters, which become permanent at the end of the project.		
	implementation rate	0	80	80	-	50	50	-	25	25	-	25	25
7j	Biodiversity plan.	1			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.			The initial inventory is used to define and implement measures aimed at reducing or compensating the biodiversity loss.			In addition, the implemented measures are monitored for longer than six months.		
	implementation rate	0	100	100	-	75	75	-	0	0	-	25	25

Building Civil engineering works Total

Biodiversity

During 2014 Good Practices designed to conserve the biodiversity have been implemented in the majority of FCC Construcción works. A Biodiversity Plan was implemented for civil engineering works to understand the characteristics of the area and draw up the most appropriate conservation measures.

With regards to plant species, 86% of works undertook some kind of physical protection of species present on site. Where, due to project constraints, this was not possible 80% of works carried out transplants so that the plant species could continue to grow in an alternative location.

With regards to wildlife, steps have been taken to reduce the potential inconveniences caused by projects. To do this, prior identification of the main animal species present in the area is required, especially if they are protected species.

Landscape restoration takes place once a project has been finished, with representative species of vegetation from the area. This can be carried out by hydroseeding or planting tree species.

One of FCC Construcción priorities is the protection and conservation of flora and fauna species located in the project area. This is carried out by setting limits in protection zones and where this is not possible, by transferring nests and animal species or transplanting tree species to safer areas.

More specifically, in 73% of works the planning process was adapted to the life cycles of the species present, with maximum respect for their most vulnerable stages, such as reproduction. On the other hand, in 80% of projects, devices were designed to minimise the barrier effect of infrastructure and construction work, allowing animals to be mobile and reducing the number of collisions. Another measure taken to protect wildlife was the establishment of artificial shelters in 80% of works.

When we undertake projects in areas of high value in relation to fauna, as is the case with Panama Hospital City, we establish plans to rescue and relocate wildlife. Potentially affected species are transferred to other danger free zones for their physical well-being.

The tables below provide data on the size and number of works in 2014, which were located near to or within a natural area of high biological diversity or relevant for the nearby local communities, as well as the surface area affected by the works, which has been protected and restored.

Land adjacent to or located in natural protected areas or in non-protected areas of high biodiversity

Alteration type	Nº of Sites	Surface (mil. m²)
Location in natural or protected areas or in areas with high value for biodiversity	5	1,000
Location in areas with landscape classified as relevant	15	1,022
Impact on protected natural riverbed or on riverbed located in areas with high biodiversity value	2	8.3
Impact on very high value riverbeds or on riverbeds that are relevant for local communities and indigenous populations	5	8.4
Impact on catalogued or protected vegetation	23	21.4
Impact on catalogued or protected animal species	11	22.8

Restauration and protection of spaces

Protection measures	Surface area (ha)
Restoration of affected areas	61.26
Protection of sensitive areas	74.31

One of the main objectives of any of our works is to minimise the inconvenience that may be caused to the surrounding population. One of the many activities we perform is the use of tanks and sweepers to clean the pavements and driveways which can become contaminated with dirt or material when carrying out works.

Urban environment

The FCC Construcción Good Practices System also includes procedures aimed at protecting the urban population close to works. These measures minimise the project's potential annoying and harmful effects on the population.

Our most widespread actions include those designed to avoid dirt at the entrance and exit of our works, by watering roads or cleaning machinery wheels; as well as limiting and fencing off occupied pavements and roads which, carried out in 97% of works. In addition, 76% projects installed elements and took measures to prevent debris falling onto the street or adjacent buildings.

At a glance:
Outstanding Good Practices in 2014

Our main environmental indicators

Atmospheric emissions

Generated emissions

GHGs	2013	439,288 t
	2014	481,403 t
Dust	2013	2,029 t
	2014	1,650 t

Avoided emissions

GHGs	2013	21,377 t
	2014	23,219 t
Dust	2013	11,899 t
	2014	20,496 t

Effluent discharges

Discharged water

	2013	890,797 m³
	2014	646,204 m³

Recycled water

	2013	68,316 m³
	2014	116,203 m³

- **Restoration of Redondela viaduct**
- **Castrovido Dam**
- **Mariña-Lucense gas pipeline**
- **Segarra-Garrigues irrigation system**
- **Accesses to Sagrera Station**
- **Riyadh metro project**

Our projects apply an average of **23** Good Practices

Environmental signposting is used in **99 %** of our sites

The volume of inerts disposed of in landfill compared to the volume forecasts has been reduced in **90 %** of our projects.

Natural resources

Energy	2013	629,499 GJ
	2014	795,463 GJ
Water	2013	2,054,239 m³
	2014	1,770,302 m³

Wastes

Hazardous wastes	2013	3,043 t
	2014	1,889 t
Non-hazardous wastes	2013	4,223,123 t
	2014	4,887,797 t

Environmental **Report 2015**

With a firm step towards the future

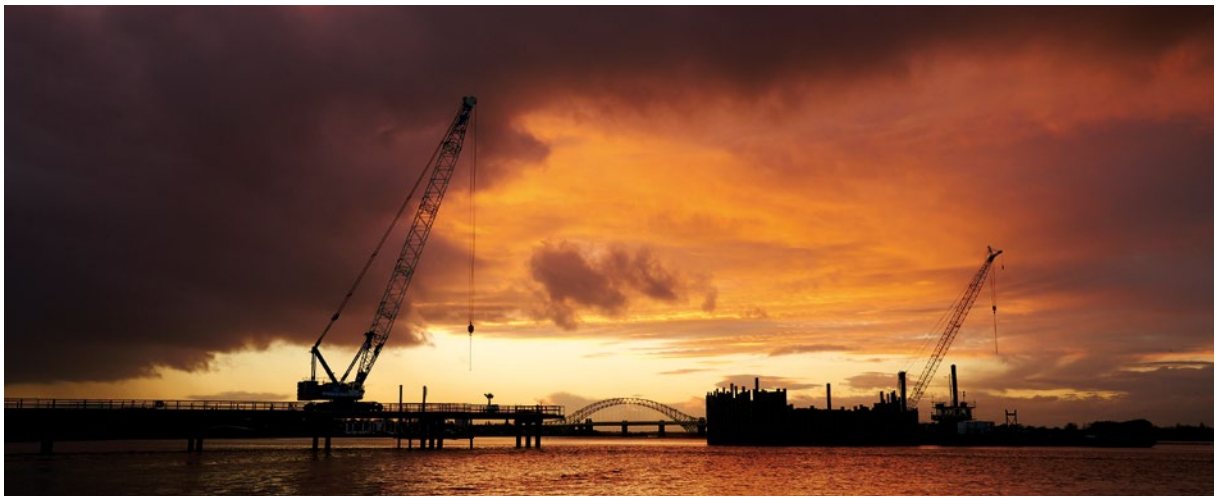
Nobody knows exactly what the future holds for us in the field of construction. However, one thing we can be sure of at FCC Construcción is that this future depends on our commitment to the environment and to people.

As a responsible company, we know that our duty is to share our experience and knowledge acquired over the years, in order to achieve the sustainability of our actions at an environmental, social and economic level. We know that the path won't be easy, and that we will face numerous challenges to make sure our activity always represents an improvement in people´s quality of life, whilst minimising our footprint and not irreversibly harming the environment.

After all these years dedicated to construction we still dream of creating, always taking into account the surrounding environment and the needs of citizens. This is why our analysis tools, although essential to evaluate our management, are not enough to complete this journey. We also need input from interested parties to assess our performance. Communication is a key aspect if we want to walk hand in hand, with a firm step, towards sustainable development in construction.

To reach this sustainable future, we must be aware of the adaptation effort necessary; facing up to ever-changing conditions day by day. We must leave behind old habits and change them for new methods, betting on technological innovation in order to become more efficient, optimise resources and make the least possible impact. This is why our IT application DISCON-CACUMEN, which is used for elaborating work management plans, is working since 2014 in its on-line version that is also adapted for its use at international projects.

Good Practices are a fundamental tool to guide each project towards a more sustainable performance; however an analysis of the information provided is necessary to gain knowledge about our projects and to be able to identify areas for improvement. With this in mind, we have developed and implemented a metrics to assess the social and environmental sustainability in new bidding projects carried out from 2014, and we have developed a methodology to assess the sustainability of civil engineering works, which will be refined and tested in "pilot works" of international infrastructures.



Building the future is not only performing the projects that will make up the scenery of tomorrow, but building confidence and ensuring that future.

As a responsible company, we build bridges to pave the way towards a sustainable future.

Our involvement in fulfilling our commitment to the environment is reflected in tangible results, such as being the first construction company to list its carbon footprint in the MAGRAMA´s National Register of Carbon footprint, Carbon offsetting and Carbon dioxide absorption projects or having certified the energy management system at our corporate headquarters.

This year we have strengthened our relationship with society, broadening our expectations in social and ethical behaviour matters in works, and positively evaluating those projects that implement a communication plan for environmental, social or cultural heritage topics. We have also incorporated new environmental and social criteria to policies, procedures, guidelines and IT applications of our Management System, and have developed basic guidelines that provide guidance on how to act on site with regard to the conservation and management of biodiversity, interaction with local communities and cultural heritage management. Convinced that the road to sustainable construction is more effective when we work with other organisations that have the same goal, we have participated in 43 working groups related to sustainability and the environment in construction and we have joined the IISIS project to assist in the research on the development of elements, materials, technologies and systems necessary for the achievement of sustainable construction.

The best way to stay on safe ground is to do nothing, however we want to carry on setting objectives and facing risks, we want to carry on our journey, although we may sometimes stumble. This is why we carry on with our firm commitment to minimise and, where possible, avoid the negative impacts that our activities may cause during all stages of the life cycle. We are working to minimise our environmental footprint, seeking to reduce the waste sent to landfill by reusing it in our works; making an inventory of GHG emissions; monitoring both our effluents discharged and resources consumed, and carrying out fundamental training of employees and subcontractors to fulfil the company's commitment to sustainability.

Step by step we move towards a more sustainable future. We hope to find you along the way.

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