

2018

THE ESSENTIAL

CNR

An aerial photograph of a river valley. A wide river flows through the center, with a dam and hydroelectric power plant visible. The surrounding landscape is lush green with rolling hills and vineyards. A small town with red-roofed buildings is situated near the river. In the background, more hills and a clear blue sky are visible.

DAY BY DAY INTO THE FUTURE

Involved in the development of the Rhone Valley since 1934, CNR has grown around the Rhone concession in the framework of three missions entrusted to it by the State: producing electricity, developing river navigation and irrigating the surrounding farmland.

Right from the beginning its knowhow emerged from harnessing the river to produce hydroelectricity and enhancing the territories that border it, thereby forming the basis around which it participates in building the energy landscape of tomorrow, at local scale and in the framework of European and national orientations.

An expert in energy generated from water, it has diversified in wind and solar power to become France's leading producer of 100% renewable electricity. The DNA of the Rhone Valley provides it not only with technical and financial resources, but also the operational methods it requires to invent a more sustainable world: balanced governance, an integrated industrial model, the rationale of redistribution, the spirit of innovation and participatory dynamism.

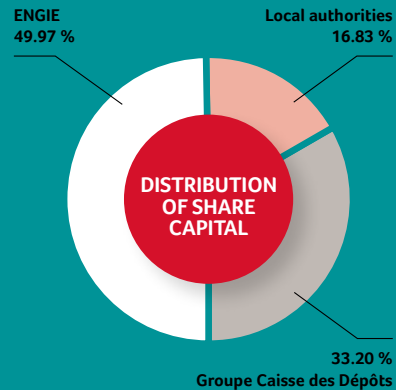
These are all advantages when taking into account the major societal challenges of our time, giving it a head start in energy transition and positioning it as a corporate laboratory for tomorrow's energies.

A balanced mode of governance

CNR is a joint stock company operating in the general interest, managed by a Management Board and administered by a Supervisory Board. A mainly publicly owned company with the Groupe Caisse des Dépôts and local authorities, ENGIE is CNR's leading private industrial shareholder.

THE MANAGEMENT BOARD

Elisabeth Ayrault: Chairwoman and Chief Executive Officer
Didier Lhuillier: Managing Director
Julien Français: Managing Director



THE SUPERVISORY BOARD

The supervisory body represents the shareholders, audits the accounts and ensures that CNR is managed efficiently.

THE SUPERVISORY BOARD IS CHAIRED BY MICHEL BLANC AND COMPRISES 18 MEMBERS:

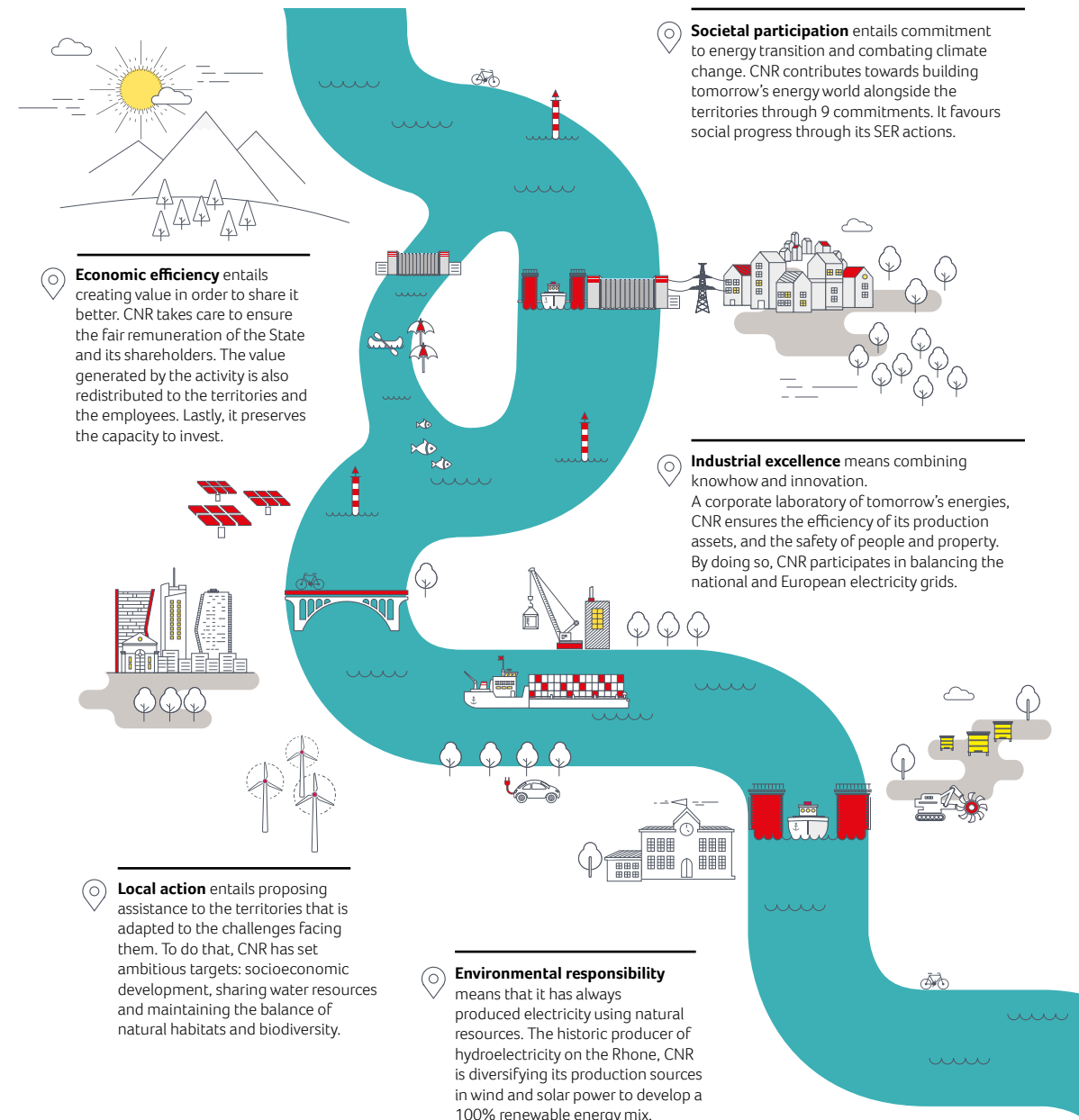
- 13 shareholders' representatives,
- 2 government representatives,
- 3 employees' representatives.

Gathered in the Supervisory Board, the energy company ENGIE and the Groupe Caisse des Dépôts provide their specific competences and knowhow alongside the local authority shareholders. A delicate balance between public and private interests, CNR cultivates a strong industrial identity and is greatly attached to the values of public service.



A model that places responsibility and solidarity to the fore

Sharing – with the redistribution of the wealth produced thanks to the river;
balance – by reconciling the uses of the river; and **sustainable development**
– with the global vision of a territorial developer: these are the values at the heart of the CNR model and its 9 commitments for energy transition.



2018

KEY FIGURES

RESULTS

GROSS
TURNOVER €1,380 M

NET INCOME €561 M

15.5 TWh OF PRODUCTION



1363

FULL-TIME EMPLOYEES
ON 31/12/2018



RIVER TRANSPORT AND TOURISM

14 wide gauge locks

4.52 million tonnes
transported (+2.3% VS 2017)

78,041 containers
transported
(-2.06% VS 2017)

84,552 lock passages
BETWEEN LYON AND THE
MEDITERRANEAN (-5.09% VS 2017)

5 locks for pleasure craft

12,289 pleasure craft
(-17% VS 2017)

198,356 passengers
on river cruisers
(+0.05% VS 2017)



INDUSTRIAL AND PORT SITES

8 enterprise zones

18 industrial
and port sites

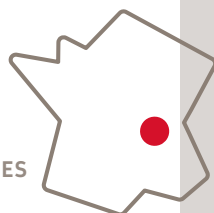
INCLUDING PORT DE LYON

REDISTRIBUTION

+ €30 M A YEAR IN
ASSISTANCE TO THE TERRITORIES
BY VIRTUE OF THE MISSIONS
IN THE GENERAL INTEREST

14,500 direct and indirect
jobs GENERATED IN THE RHONE VALLEY

€116 million
IN HYDRAULIC FEES



100% RENEWABLE PRODUCTION ASSETS

ON 30/04/2019

47 hydropower plants

48 wind farms

26 solar power
plants

3,789.4 MW of
installed capacity

OTHER ASSETS

27 charging points
FOR ELECTRIC VEHICLES

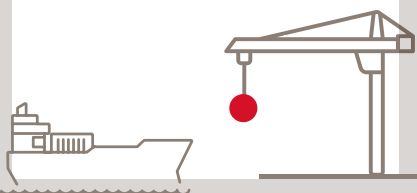
32 pumping stations
FOR IRRIGATION

27,000 ha of land and
river under concession

14,000 HA OF RIVER, 13,000 HA OF
LAND INCLUDING MORE THAN 800 HA
OF INDUSTRIAL AND PORT SITES,
AND ENTERPRISE ZONES

19 dams

39 fish passes



Safety and maintenance, the challenge of performance

CNR earns most of its income from harnessing hydroelectricity from the Rhone. Like any industrial company, it constantly seeks to improve its yields and lower its costs, while conforming to the imperatives linked to the safety of hydraulic structures and navigation. The probable lowering and greater variability of the Rhone's discharges caused by climate change makes this challenge more acute. The aim is to optimise every cubic meter of water that flows in the river, and the costs of monitoring and maintaining the development schemes. In order to improve its performance, CNR is strengthening its forecasting capacities, improving its reactivity to natural events and targeting its interventions with greater precision.

It relies on a quality management system for which it is certified ISO 9001 and it has started an approach to obtain ISO 55 000 certification

2018

A building dedicated to maintaining CNR's structures was inaugurated. It has its own training centre.

MONITORING THE RIVER AND THE INSTALLATIONS

CNR carries out two types of monitoring – that of its installations including dams, dikes, locks, hydropower plants, channels, etc. – and that of the riverbed to forestall any hydrological event liable to have an impact on safety, and to maintain the flow of the river, whatever the discharge. Technical teams observe the river and the installations throughout the year to verify water heights and detect possible traces of deposits and erosion. CNR also has a remote measurement transmission network (levels, discharge, rainfall, etc.) comprising more than 220 stations. The evolution of the riverbed is regularly monitored by a fleet of bathymetric survey boats, one of which is the "Frederic Mistral", a hydrographic boat packed with high technology equipment for carrying out measurement campaigns using 2 multibeam probes.



The "Frederic Mistral", CNR's hydrographic vessel.



Inauguration of a building dedicated to the maintenance of CNR's installations



Inspection and maintenance of 14 locks between Lyon and the Mediterranean during the annual shutdown of navigation.

MAINTAINING THE RIVERBED AND THE STRUCTURES

CNR regularly carries out preventive actions in the form of dredging and controlling vegetation, to guarantee that the river flows freely in the case of floods. This represents an average investment of €10 million a year. This is in addition to the maintenance of the installations which calls on the knowhow of CNR's multidisciplinary teams to ensure the safety and continuity of navigation, and to optimise production.

€80

is invested every year to maintain the industrial assets



1,000 EMPLOYEES

work along the Rhone to produce energy and maintain the installations.



A producer of 100% renewable energy

Thanks to its mix of hydro-, wind and solar power, CNR is France's leading producer of **100% renewable electricity** and an expert in **optimising intermittent energies**. It is now present throughout the energy value chain. An acknowledged actor in the hydroelectricity sector, with **25% of French production**, CNR operates 47 hydropower plants, 26 solar power plants and 48 wind farms, including 40 outside the Rhone Valley.

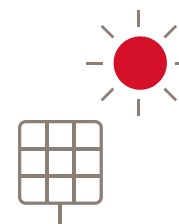


14.3 TWH
of CNR hydroelectricity
production in 2018

25 %
of French hydroelectricity
production

598.5 MW
wind power

87.9 MWc
solar power



AN INTEGRATED COMPANY RECOGNISED FOR ITS EXPERTISE

Its 80 years of experience on the Rhone have made CNR a pool of expertise present throughout the value chain: studies, design, operating installations, selling production, prospecting and developing assets. This integrated industrial model gives it control over all the skills required to ensure its performance and development.

Thus, CNR has unique expertise in managing intermittent energies, allowing it to enhance its production and propose tailor-made offers to other producers. At the end of 2018, it managed a hundred installations in France (350 MW) on behalf of third parties and sold their production on the market.

A DRIVING FORCE FOR ENERGY TRANSITION

To assist its growth and meet the challenges of French and European policies relating to renewable energy and combating climate change, CNR is pursuing its developments inside and outside the Rhone Valley in view to reaching "zero greenhouse gas emission". By 2020, CNR aims to **reach an installed capacity of 4,000 MW in France with its three renewable energies**. CNR is also experimenting with scientific partners (CEA, Ecole Centrale, Ecole des Mines, and other elite engineering schools) on breakthrough innovations, and is demonstrating its capacity to manage renewable energy installations



The wind farm of Oursel-Maison which benefitted from crowdfunding.



The solar power plant of Roche-de-Clun has been sown with the seeds of wild plants that attract pollinating insects and prevent the development of allergenic species like ragweed.

JOINT GOVERNANCE AND COMMUNITY SAVINGS

CNR gets the territories to participate in the development of new green electricity production installations. In 2018, it set up two companies to drive projects with the territorial authorities and launched three crowdfunding campaigns. This logic of joint construction involves each and all and gives impetus to energy transition which cannot be achieved without the backing of the community and its representatives.



Floating solar power plant on the lake of La Madone.

Continuous innovation in the service of energy transition

At CNR, innovation is a daily objective to optimise performance, done for example by exploring the as yet unexploited potentials of water, sun and wind. With its ambition to become a corporate laboratory for tomorrow's energies, it encourages its teams to be creative, develop processes in-house and it works with research institutes, industrial companies and start-ups to imagine the energy solutions of the future.


**57
INNOV' ACTIONS
FILES**
submitted in 2018

SUPPORT FOR INNOVATIVE PROJECTS

In 2018, it entered the capital of BeeBryte, a start-up specialised in artificial intelligence applied to energy consumption, allowing it to propose an original B to B offer of 100% green and smart electricity in France.

CNR is also developing innovative projects in the framework of joint collaborations with research institutes and supports the creation of a scientific research chair at INSA Lyon, an elite engineering school, focusing on methods for predicting the wear and fatigue of hydroelectric installations and analysing production data.

POWER TO GAS

CNR is experimenting with solutions to store excess renewable electricity, in view to keeping it available for use as a function of demand. A partner in the industrial demonstrator Jupiter 1000, supervised by GRTGaz, it is testing the technical-economic feasibility of power to gas. The objective is to produce hydrogen from renewable energy and water with the aim of injecting the hydrogen into the gas transport network, directly or after reaction with CO₂, to produce synthetic methane, 100% compatible with natural gas. In 2018, the 2 electrolyzers of Jupiter 1000 were installed in the industrial and port site of Fos-sur-Mer. Responsible for supplying them with electricity and controlling them remotely, CNR has developed an information and control system designed to operate them in relation to the forecast production of its wind farm at Fos-sur-Mer and the prices of the electricity market. The remote-control system will be started up in 2019.



Presentation of the Innov'actions awards.

PURCHASING GREEN AND LOCALLY

To respond to the desire of individuals and enterprises to become consum'actors and purchase green energy produced nearby, CNR is moving towards the provision of electricity at the territorial scale. To test the feasibility of this approach, it has joined up with ILEK, a supplier of green and local energy, so that consumers, especially those in the Rhone Valley, can purchase their electricity directly from its hydropower plants of Bollène, Avignon and Beaucaire, where it is produced.

By the end of 2018, more than 6,000 clients had chosen CNR as their electricity producer

IRRIGATION AND SOLAR ENERGY

CNR, Suez and SMHAR are testing a "smart" irrigation network to reduce water consumption and the cost of the energy consumed to convey the water. The aim is to supply water at the best moment as a function of crop requirements, the water content of the soil, the weather forecast and the evolution of electricity prices.

Furthermore, CNR has built a floating solar power plant on an irrigation basin managed by SMHAR* (lake of La Madone). The energy produced will supply the irrigation pumps in a self-consumption circuit. Since the lake is part of a leisure area, particular care has been taken to integrate the plant in the landscape and ensure its safety. Refuges for fish for spawning purposes and nurseries will be fixed to the submerged parts of the structures.

* Syndicat Mixte d'Hydraulique Agricole du Rhône

A promoter of river navigation

The development of river transport is one of CNR's three historic missions. It carries out a large number of actions to support the growth of traffic and improve the quality of the service provided to skippers

THE COORDINATION OF A LARGE NETWORK

CNR groups two major activities. It operates ports, with the development, management and promotion of port infrastructures on the Rhone: the Rhone Valley is meshed by 18 port and industrial sites, one every 20 kilometres from Lyon to the Mediterranean. Port de Lyon is the bridgehead from the south to the rest of Europe. And it is heavily involved in territorial development, by equipping sites and selling lots and warehouses for industrial and logistic purposes. A total of 880 ha of land hosts 230 enterprises operating in logistic and industrial sectors (construction, recycling, etc.) and which generate more than 5,500 jobs.



1 PUSH-TOW CONVOY OF 2 BARGES

(4,400 t) means

220 FEWER
trucks on the roads

A SUSTAINABLE ALTERNATIVE TO ROAD TRANSPORT

Safe, relatively clean and economic, river transport contributes in particular to reducing heavy goods traffic on the north/south road corridor. The industrial and port sites offer a full range of multimodal options – river, rail, river-maritime and road – and they provide direct access to the south and the Mediterranean via the ports of Fos-Marseille and Sète, and to the north via the wide-gauge waterway provided by the River Saone. Moreover, rail links with northern Europe make this network a strategic communication route between northern and southern Europe.

REMOTE CONTROLLED NAVIGATION

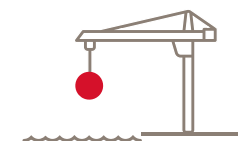
Since 2012, 24/7, CNR manages its 14 wide gauge locks from Lyon to the Mediterranean remotely from its Navigation Management Centre, installed at Châteauneuf-du-Rhône (Drôme). This system, the only one of its kind in France, satisfies three essential requirements: guaranteeing maximum safety on the river through constant monitoring of the installations (video, VHF, telephone), improving information for the users by providing them full information in real-time on traffic, and optimising lock passage time.



Port de Lyon Édouard Herriot

A PORT IN THE SERVICE OF ITS TERRITORY

Open to the Mediterranean Sea and the world, and linked to Fos-sur-Mer by an oil pipeline, Port de Lyon is linked to the rail network and to the major European highways. It handles 90% of the container traffic on the Rhone. 3 km from Place Bellecour and the centre of Lyon, it groups 70 enterprises and 1,300 jobs on 184 hectares. Manufactured products, heavy loads and oil and gasoline pass through it. Facilities for supplying new green energies to vehicles have been installed next to the oil depot. Begun with a roaming river waste collection service, other urban services are set to develop, with the removal via the river of the residues of the household waste incineration plant installed on the port, and the construction of a urban logistics hotel.



Port de Lyon covers

184 ha

**2 CONTAINER
TERMINALS**

equipped with efficient facilities

12 M TONNES

of manufactured goods
handled a year



Flood spillway for Boukhroufa dam (Algeria).

Engineering, excellence reaching out from local to international projects

As an agent of territorial development, CNR has its own engineering and consultancy office. Specialised in hydroelectric and river engineering, it benefits from double edged expertise: the design and operation of installations. Its strength resides in the synergy of its engineers' specialities and the support of the Hydraulic Structures Behaviour Analysis Centre (CACOH), endowed with precious competences in physical modelling, monitoring installations and metrology. It carries out studies all over the world.

CACOH, AN INTEGRATED HYDRAULICS LABORATORY

The purpose of the Hydraulic Structures Behaviour Analysis Centre (CACOH) is to control risks and optimise the operation of the installations. It uses physical scale models to reproduce flows, the evolutions of riverbeds, the behaviour of structures and more. It also couples physical and numerical models. Alone, it covers 40% of CNR's R&D activities. An irreplaceable decision aid, CACOH ensures that CNR reaches the highest levels of operational security. It also participates in maintaining the demand for CNR's engineering services in France and abroad.

80 YEARS'
expertise in designing
and operating installations



References in more than
40 COUNTRIES

MALI AND MAURITANIA

CNR carries out **missions of technical assistance and competency transfers** around the River Senegal, in the framework of a partnership with the River Senegal Development Organisation (OMVS) which is undertaking a huge programme of dredging and developing stopover ports in view to opening 900 km of a once flourishing navigable waterway. Agreements have been concluded with two companies operating hydropower plants in Mali and Mauritania.

LAOS

CNR has been present in the Mekong basin for 20 years, thanks to a cooperation agreement with the Laotian Ministry of Energy and Mines.

PARAGUAY

ITAIPU DAM

CNR and Itaipu Binacional, the company managing the Itaipu hydroelectric development scheme, the most productive in the world (100 TWh a year), signed a study agreement in November 2017 aimed at allowing boats to navigate the River Parana.

CNR carried out an initial currentology study to determine the risks to navigation. Itaipu Binacional then entrusted CNR with the mission of technical assistance to verify the feasibility of a bypass canal equipped with locks (a difference in level of 125 m) and calculating its cost.

SWITZERLAND

THE HYDROPOWER DEVELOPMENT SCHEME OF CHANCY-POUGNY

Built in 1924 and operated by the Société des Forces Motrices de Chancy-Pougny, this plant has been subject to a major overhaul since 2002 (replacement of turbine units and alternators). CNR oversaw all the construction and engineering activities that were continued anew in 2018 for 4 years, with the seismic reinforcement of the dam's lift gates.



3D numerical model of the locks envisaged for Itaipu dam



Signature of the partnership between CNR
and the Senegal River Development Organisation



ViaRhôna: from now to 2020 the cycle track will link Lake Geneva to the Mediterranean Sea.

An actor and sponsor for the general interest

Make the Rhone a powerful vector of economic development, that's the ambition of CNR which carries out its missions in the general interest in line with five-year plans and active sponsoring in favour of the territories.



**+ THAN 400 ACTIONS
AND PARTNERSHIPS**

forged along
the Rhone Valley

SHARED AMBITION

Its commitment has been transformed into reality since 2004 through its missions in the general interest (MGI), in the framework of five-year plans drawn up with the government and actors in the Rhone Valley. The 3rd MGI plan includes a large number of actions in the Rhone Valley concerning green energy, soft mobility, river navigation, agriculture, the environment, industrial tourism and enhancing the valley's heritage.

Most of the actions carry the Rhone Plan Label 2015-2020, the inter-regional Rhone-Saone Basin contract of which CNR is the leading contributor as it funds more than 15% of the budget.

LASTING PARTNERSHIPS

CNR works alongside the territories to generate local economic impacts, accelerate ecological transition and strengthen the link between the neighbouring population and the river. Examples of this are the laying of the ViaRhôna cycle track, the development of the electric corridor, the organisation of the Energy Circuits to support agro-ecology, and the revitalisation of the banks of the Rhone. The company has also endowed itself with an environmental management plan to ensure its activities are carried out in harmony with the principles of biodiversity.



Dedicated to rowing, the nautical centre of Virignin (Ain) is one of the projects that CNR has supported to dynamize the banks of the Rhone to give them life, and make them appealing places of discovery.



Supplied by CNR's electricity and easily accessible to all, the "electric corridor" comprises charging points every 30 km from Lake Geneva to the Mediterranean. CNR is promoting the changeover to electric vehicles by meshing the territories with rapid charging points. In 2018, 5,500 charges were performed, i.e. 15% more than in 2017.



By opening the hydropower plants of Génissiat and Bollène for guided tours, CNR is making the public and schoolchildren aware of sustainable development, encouraging the appropriation of the Rhone Valley's industrial heritage by the public and participating in making the territories attractive for tourism.

INITIATIVES FOR THE FUTURE OF GREAT RIVERS (IFGR)

Founded in 2014 by CNR and chaired by the economist and member of the French Academy, Erik Orsenna, Initiatives for the Future of Great Rivers (IFGR) is a high level international multidisciplinary forum in which experiences and good operating practices relating to river management confronted by the challenges of climate change and the environment are

exchanged. It is active in pointing out to decision-makers and the population the need to preserve the ecosystems of great rivers and the contribution they make to a more sustainable world. In 2018, the exchanges focused on navigation on the River Senegal and on the problems facing the Adour-Garonne basin.

A socially committed actor

In line with its 9 commitments for energy transition, CNR deploys a Social and Environmental Responsibility (SER) approach that helps it to improve its global performance. SER is the basis of CNR's industrial model in the general interest according to which all the activities generating value must act in favour of development that is socially fair, economically viable, and which is environmentally friendly and thus sustainable. It's a commitment by nature for people and the territories.



Convivial leisure spaces have been organised on the basis of employees' suggestions.

GLOBAL COMPACT

CNR is a high-level member of the Global Compact France. This membership satisfies 21 criteria corresponding to 17 sustainable development objectives of the UN. CNR therefore joined the club of French companies (70) that have achieved this level of excellence.

FOOD BANKS

A major sponsor of the National Federation of Food Banks, CNR provides its support to food banks in 14 departments, including Loire-Atlantique, Mayenne, Somme and Oise, as well as those of the Rhone Valley.

COMMUNITY GROCERY

CNR provides its support to EPIVAL which supplies quality low-cost basic foodstuffs to the inhabitants of Valence in need.

QUALITY OF WORKING LIFE

At its head office in Lyon, CNR organises actions and infrastructures such as a vegetable garden with the association Rendez-vous au potager (Let's meet in the vegetable garden), exterior spaces for relaxation, picnic tables and convivial interior spaces for the employees.

HOUSING

CNR concluded an agreement with Habitat & Humanisme, a network that manages 12,000 dwellings and which works in favour of housing and integrating people in difficulty.



An electric car financed by CNR in the framework of the partnership with the association Habitat et Humanisme.

THERAPEUTIC ASSISTANCE

CNR supports the Centre Ressource de Montélimar, dedicated to the well-being and therapeutic assistance of persons suffering from cancer who wish to return to work.



A combination of talents

The diversity of trades and specialities exercised at CNR is vast and ranges from operating and maintenance technicians to traders on the electricity market, electromechanical engineers specialised in strong currents, civil engineers, hydraulics engineers and mechanical maintenance technicians, estate managers, meteorologists and sales representatives of port sites. Some of these trades are rare but they all provide its employees with opportunities for professional advancement and lasting careers. Motivated by a long-term vision, CNR privileges internal mobility and the recruitment of young talent, while at the same time favouring the transmission of knowhow. It implements a solid training policy and 5% of its workforce includes young persons employed in the framework of work-study contracts.

More than
57,000 HOURS OF TRAINING
were dispensed in 2018



75 TRAINEES

welcomed in 2018. Nearly 39% of the candidates on average were employed afterwards on permanent contracts following their training



Disabled persons make up

7.2% OF CNR'S EMPLOYEES

of CNR's employees, a rate higher than the national average

2018

INFRASTRUCTURES

DIRECTION TERRITORIALE RHÔNE SAÔNE
DIRECTION TERRITORIALE RHÔNE ISÈRE
DIRECTION TERRITORIALE RHÔNE MÉDITERRANÉE



- 14 wide gauge locks
- 5 locks for pleasure craft
- 19 dams
- 20 hydropower plants
- 16 small hydropower plants (SHPP) (including 5 outside the Rhone Valley) and 9 mini-hydropower plants.
- 9 turbines for harnessing compensation water at dams
- 48 wind farms (including 35 out of Rhône Valley)
- 26 solar power plants
- Equipped canals

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