Société anonyme with a Management Board and a Supervisory Board and with share capital of €6,056,220

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Greenhouse Gas Emissions Balance

2019

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1. CONTEXT AND PURPOSE

This document is the CNIM Group's response to Article 75 of Law No 2010-788 of 12 July 2010 and its Implementing Decree No 2011-829 of 11 July 2011 concerning the greenhouse gas emissions balance:

- Article 75 of Law No 2010-788 of 12 July 2010 concerning the French national commitment to the environment (ENE) adds a new section to Book II, Title II, Chapter IX of the Environment Code, entitled 'Greenhouse gas emissions balance and regional climate-energy plan'.
- In compliance with Article 75, Implementing Decree No 2011-829 of 11 July 2011 concerning the greenhouse gas emissions balance and regional climate-energy plan introduces new regulatory provisions into Articles R229-45 to R229-56 of the Environment Code, defining the ways in which the new provision should be applied.

Since 2012, the CNIM Group has drawn up an annual greenhouse gas emissions balance each year.
These balances are available on the Group's website, http://www.cnim.com, from the Corporate Social Responsibility (CSR) page.

The main aims of the Greenhouse Gas Emissions Balance (BEGES) are to:

- estimate sources and quantities of greenhouse gas emissions associated with the Group's activities in order to assess the current situation and establish a carbon indicator;
- map the emissions associated with the Group's various activities so that effective, targeted action can be taken;
- measure activities' dependence on fossil fuels and anticipate the economic and social impact of a shortage of these fuels;
- raise awareness of good practice in the industry, and inform stakeholders about the Group's sustainable development strategy.

2. ORGANIZATIONAL SCOPE

The CNIM Group's greenhouse gas balance for 2019 covers emissions produced by the following companies (42 sites) :

- CNIM Group SA
- BERTIN GmBH
- BERTIN IT
- BERTIN TECHNOLOGIES
- CNIM Activ Emploi
- CNIM Air Space
- CNIM Azerbaïdjan
- CNIM Babcock Maroc
- CNIM Centre France
- CNIM China
- CNIM Insertion
- CNIM MARTIN Pvt. Ltd.
- CNIM Ouest Armor
- CNIM Paris Batignolles
- CNIM Singapour
- CNIM Terre Atlantique
- CNIM Thiverval Grignon
- LAB SA
- LAB WASHINGTON
- MES Environmental Ltd
- SUNCNIM
- Winlight

The chosen method of consolidation is the operational control approach, whereby the organization consolidates 100% of the emissions generated by plants over which it has operational control, i.e. which it runs and manages.

3. METHODOLOGY

- The Greenhouse Gas Emissions Balance (BEGES) is based on the Bilan Carbone© method.
- All greenhouse gas emissions covered by the Kyoto Protocol are converted into CO_2 equivalents (CO_2 e).
  - The Global Warming Potential (GWP) factor makes it possible to express and quantify greenhouse gas emissions in CO_2 equivalents:

$$GWP_{100\,years} = \frac{\int_0^{100\,years} RadiativeForcing_{gas}(t)dt}{\int_0^{100\,years} RadiativeForcing_{CO_2}(t)dt}$$

Table of gases regulated by the Kyoto Protocol (5th IPCC report):

Greenhouse gas	Formula	Source	GWP 100 years CO_2e
Carbon dioxide	CO_2	Combustion	1
Methane	CH_4	Decomposition	30
Nitrous oxide	N_2O	Fertilizer, industry	265
Sulfur hexafluoride	SF_6	Industry	26,100

Emissions to be included as a minimum in a compulsory greenhouse gas emissions balance are as follows:

Category	Number	Heading
SCOPE 1 Direct greenhouse gas emissions	1	Direct stationary combustion emissions
	2	Direct mobile thermal engine emissions
	3	Direct emissions from non-energy processes
	4	Direct fugitive emissions
	5	Biomass emissions (soils and forests)
SCOPE 2 Indirect emissions associated with energy	6	Indirect emissions associated with electricity consumption
	7	Indirect emissions associated with vapor, heat or cold energy consumption

Scope 3 covers, on an optional basis, the following items which may be included to obtain a more far-reaching assessment:

Category	Number	Heading
SCOPE 3 Other indirect greenhouse gas emissions	8	Energy-related emissions not included in items 1-7
	9	Purchased goods and services
	10	Capital property
	11	Waste
	12	Upstream goods transport
	13	Business travel
	14	Upstream franchising
	15	Upstream leasing assets
	16	Investments
	17	Visitor and customer transport
	18	Downstream goods transport
	19	Use of products sold
	20	End-of-life of products sold
	21	Downstream franchising
	22	Downstream leasing
	23	Commuting
	24	Other indirect emissions

To calculate emissions for each item, the Carbon Accounting (Bilan Carbone©) tool uses a regularly updated set of emissions factors (ADEME's Bilan Carbone database).

The table below shows the emission factors (EF) currently in the Bilan Carbone database that were used for the 2019 assessment:

	2019
Electricity mix, France ($kgCO_2$ / MWh)	57
Electricity mix, France, excluding transport ($kgCO_2$ / MWh)	40
Electricity mix, UK ($kgCO_2$ / MWh)	457
Electricity mix, AZ ($kgCO_2$ / MWh)	439

These factors are calculated analytically, measured or estimated, with a value of uncertainty associated with each emission factor.
The emission factors relating to the CNIM Group balance did not change between 2019 and 2018.

Specific features of the method used:

- The greenhouse gas emissions balance covers CNIM's consolidated activity for 2019 (see, in Chapter II, the list of companies included).
- The greenhouse gas emissions balance sheet 2019 covers scopes 1 and 2 (compulsory) but also takes account of emissions associated with the final waste of waste-treatment and waste-to-energy centers (optional scope 3).
- The fuel consumption of all of the Group's vehicles has been included.
- The tool used is the V8.1 spreadsheet program of the Association Bilan Carbone®.
- Acetylene is a gas used by some CNIM Group companies. It is not referenced in the Carbon Database. It has been added to the balance with the following characteristics:
  - density 1.1 kg / m^3
  - emission factor: 3.38 kg CO_2e/ kg (based on the stoichiometric reaction ratio).

4. GREENHOUSE GAS EMISSIONS

a) Emissions balance

In 2019, the consolidated greenhouse gas emissions were 515,333 tCO_2e, with a 42% uncertainty.

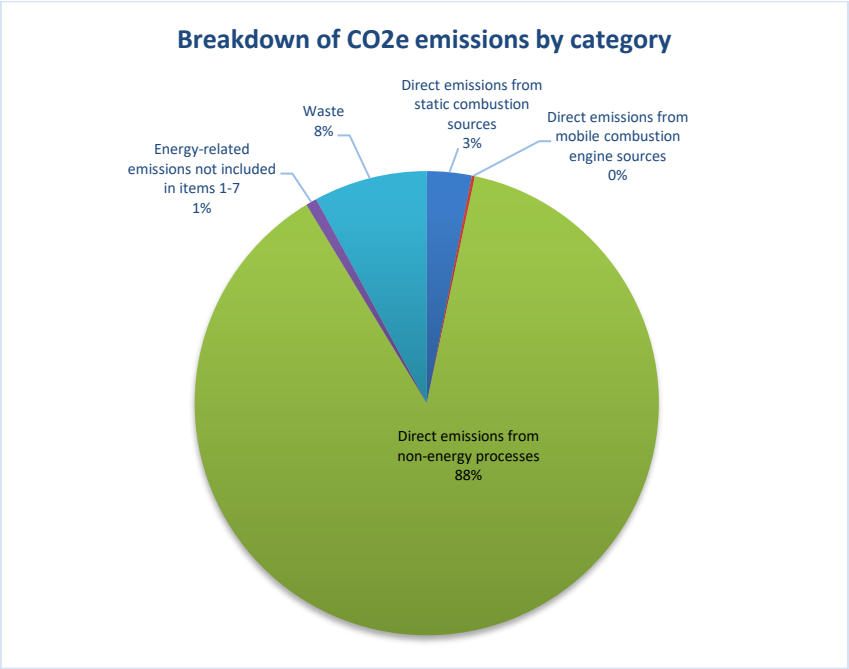
			Greenhouse gas emissions							Emissions avoided
Emissions categories	**Numbers**	**Emission items**	CO2 (t CO2e)	CH4 (t CO2e)	N2O (t CO2e)	Other gases (t CO2e)	**Total (t CO2e)**	CO2 b (t CO2e)	Uncertainty (t CO2e)	**Total (t CO2e)**
Direct greenhouse gas emissions	1	Stationary combustion emissions	15,744	35	161	0	15,940	31	516	0
	2	Mobile emissions	1,052	1	10	0	1,063	189	25	0
	3	Emissions from non-energy processes	412,207	46	0	580	449,444	0	207,928	174
	4	Fugitive emissions	1	0	0	0	1	0	0	0
	5	Biomass emissions (soils and forests)	0	0	0	0	0	0	0	0
	Sub-total		**429,004**	**82**	**170**	**580**	**466,448**	**220**	**208,469**	**174**
Indirect emissions associated with energy	6	Indirect emissions associated with electricity consumption	4,541	0	0	0	4,541	0	155	149,528
	7	Indirect emissions associated with steam, heat or cold energy consumption	36	0	0	0	36	0	6	27,622
	Sub-total		**4,577**	**0**	**0**	**0**	**4,577**	**0**	**161**	**177,151**
Other indirect greenhouse gas emissions	8	Energy-related emissions not included in items 1-7	2,999	883	43	0	3,926	-220	99	56,765
	9	Purchased goods and services	0	0	0	0	0	0	0	0
	10	Capital property	0	0	0	0	0	0	2	0
	11	Waste	34,799	3,754	1,829	0	40,382	20,632	9,995	67
	12	Upstream goods transport	0	0	0	0	0	0	0	0
	13	Business travel	0	0	0	0	0	0	0	0
	14	Upstream leasing	0	0	0	0	0	0	0	0
	15	Investments	0	0	0	0	0	0	0	0
	16	Visitor and customer transport	0	0	0	0	0	0	0	0
	17	Downstream goods transport	0	0	0	0	0	0	0	0
	18	Use of products sold	0	0	0	0	0	0	0	0
	19	End-of-life of products sold	0	0	0	0	0	0	0	0
	20	Downstream tax exemption	0	0	0	0	0	0	0	0
	21	Downstream leasing	0	0	0	0	0	0	0	0
	22	Commuting	0	0	0	0	0	0	0	0
	23	Other indirect emissions	0	0	0	0	0	0	0	0
	Sub-total		**37,799**	**4,637**	**1,872**	**0**	**44,308**	**20,411**	**10,097**	**56,832**
TOTAUX			**471,380**	**4,719**	**2,042**	**580**	**515,333**	**20,632**	**218,726**	**234,157**

Note CO2b: CO2 of organic origin (biomass and organic waste), chemically identical to fossil-origin CO2e but reported differently in the carbon account. It is classified as short-cycle carbon, unlike fossil-origin CO2.

Direct emissions from non-energy processes (waste processing) represent more than 87% of the Group greenhouse gas emissions.

The 42% uncertainty rating is largely attributable to the significant waste incineration business, as the incineration emission factor has an uncertainty of 50%.

b) Breakdown of CO_2e emissions by category



- The item 'Direct emissions from non-energy processes' represents 87% of the CNIM Group's CO_2 emissions. These emissions are related to waste-to-energy operations, which also make a very important contribution to avoided emissions.
- The item 'Waste', which accounts for 8% of the Group's CO_2 emissions, is also linked to the sorting and processing of waste.
- The other greenhouse gas emissions, amounting to approximately 5%, are due to energy consumption by vehicles and in industrial and tertiary buildings (gas, electricity and diesel, etc.) belonging to Group companies.

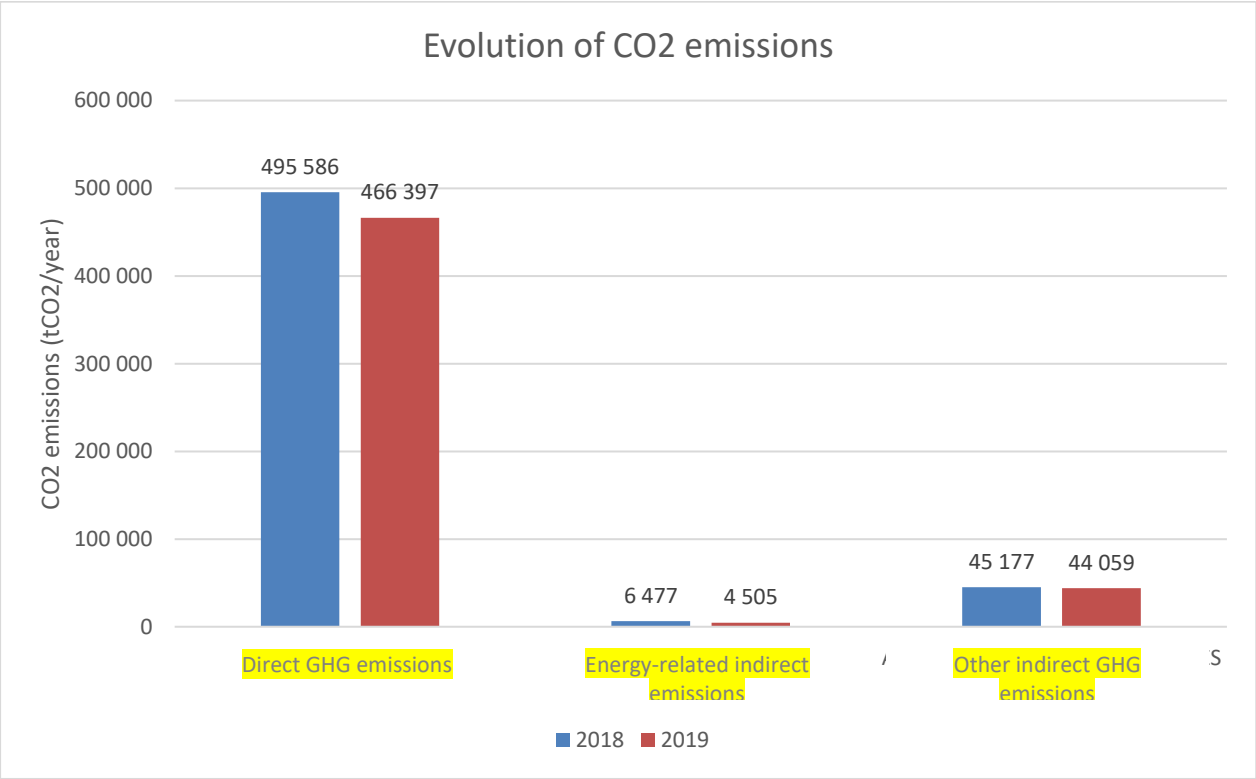
c) Evolution vs 2018

2019 emissions are down by 6% on 2018 with a constant scope.

Given the major role played by the waste treatment sites in the balance, it is useful to calculate the ($Tonnes$ of $CO2$ emitted)/($Tonnes$ of waste treated) ratio:

- 2018: 0.393 t CO2/t waste
- 2019: 0.358 t CO2/t waste

This reduction is the result of optimised site management, the effects of which include the ISO 50 001 certification process under way for all waste processing sites and waste-to-energy sites.



5. EMISSIONS AVOIDED

a) Emissions balance

The Bilan Carbone® method estimates the emissions avoided by a certain activity.

In the case of the CNIM Group, there are three sources of avoided emissions:

- Fresnel solar energy production (SUNCNIM),
- the sorting and processing of waste , thereby generating heat, electricity and recycled products.

Item	Emission factor	CTG CVD		CTG CDT		COA PLUZUNET		COA LANTIC		CCF		CTA		LAB Washington		MESE-Stoke-Dudley-Wolves		AZ		CNIM SA		SUNCNIM		CPB		Total	
Waste input		169813		30736		53683		45701		64850				154268		388922		512491						20514		1,440,978	
	kgCO$_2$e / MWh	MWh	t.CO$_2$e	MWh	t.CO$_2$e	MWh	t.CO$_2$e			MWh	t.CO$_2$e	MWh	t.CO$_2$e	MWh	t.CO$_2$e	MWh	t.CO2e	MWh	t.CO2e	MWh	t.CO2e	MWh	t.CO2e	MWh	t.CO2e	MWh	kt.CO$_2$e
France Electricity	40	63,483	2,508		0	10,601	419	219	9	6,711	265		0		0		0		0	72,415	2,860	4,560	180		0	157,989	6
UK Electricity	457		0		0		0		0		0		0		0	155,619	71,118		0		0		0		0	155,619	71
AZ Electricity	439		0		0		0		0		0		0		0		0	164,396	72,170		0		0		0	164,396	72
Heat networks France	279	49,186	13,723		0	17,147	4,784		0	32,672	9,115		0		0		0		0		0		0		0	99,005	28
	Total energy	112,669	16,230			27,748	5,203	219	9	39,383	9,381	0	0			155,619	71,118	164,396	72,170	72,415	2,860	4,560	180	0	0	577,009	177
	kgCO$_2$/T																									t	kt.CO$_2$e
Scrap iron	2090				0		0		0		0		0		0	6,052	12,649		0		0		0	300	627	6,352	13
Packaging	2380				0		0		0		0		0		0		0		0		0		0	160	381	160	0
HDPE	1718			504	866		0		0		0		0		0		0		0		0		0	410	704	914	2
Steel	2090			465	972		0		0		0		0	5,436	11,361		0	448	936		0		0		0	6,349	13
Aluminium	9317			30	280		0		0		0		0		0		0		0		0		0	48	447	78	1
Glass	514			11,222	5,768		0	2,809	1,444		0		0		0		0		0		0		0		0	14,031	7
Cardboard/ Tetra	1060			5,845	6,196		0		0		0		0		0		0		0		0		0	6,341	6,721	12,186	13
Paper	1			4,533	5		0		0		0		0		0		0		0		0		0	4,049	4	8,582	0
PET	3068			1,369	4,200		0		0		0		0		0		0		0		0		0	937	2,875	2,306	7
Compost	36		0		0		0	9,160	330		0		0		0		0		0		0		0		0	9,160	0
	Total recycling	0	0	23,968	18,286	0	0	11,969	1,774	0	0	0	0	5,436	11,361	6,052	12,649	448	936	0	0	0	0	12,245	11,760	60,118	57
	Total per site		**16,230**		**18,286**		**5,203**		**1782**		**9,381**		**0**		**11,361**		**83,767**		**73,105**		**2,860**		**180**		**11,760**	80,166	64
																										Total avoided emissions	**234 kt.CO$_2$e avoided**

Definition of avoided emissions: emissions that would have been generated in order to produce the same quantity of energy or raw material according to conventional production methods (national energy mix).

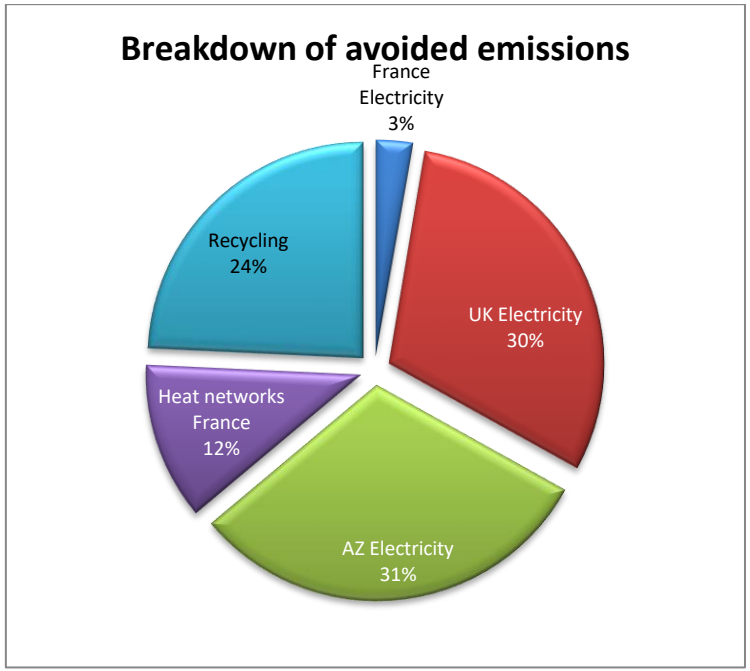
b) Emissions avoided balance

Thanks to its waste-to-energy and material recycling operations at its sites in:

- Thiverval-Grignon, Pluzunet, Launay lantic, Saint-Pantaléon de Larche and Llo (France),
- Wolverhampton, Stoke-on-Trent, Dudley and Beddington (UK),
- and Bakou (Azerbaidjan),

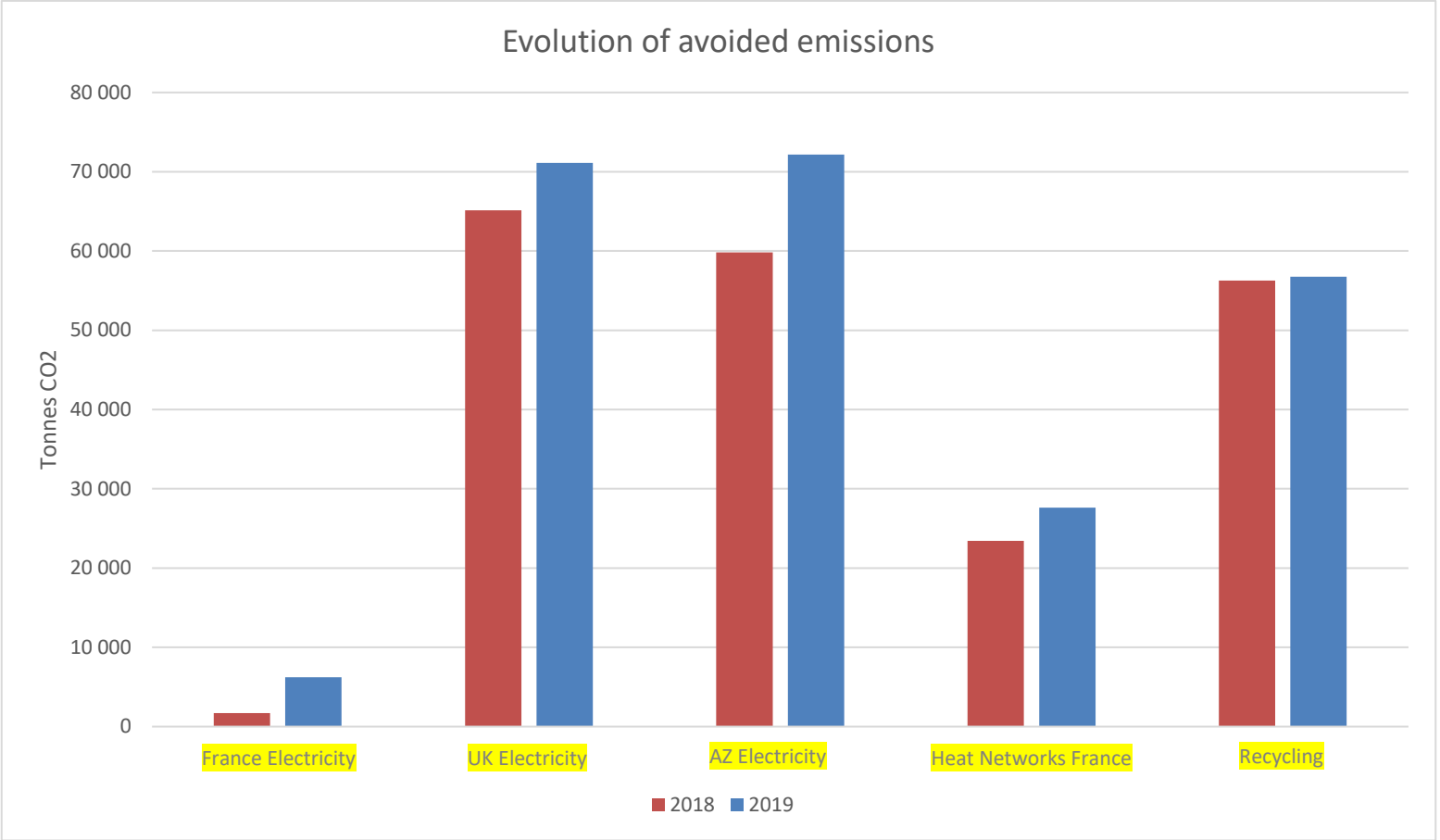
the CNIM Group has avoided 234,157 t CO2e in 2019.

This total has risen, mainly due to the Llo and Beddington sites entering operation.



- Waste sorting activities accounted for 30% of avoided emissions.
- Avoided emissions represented 45% of the CO2 emissions generated by the Group.
- Electricity sold in France has little effect on the Group's emissions both because of the part played by nuclear power in France's energy mix, which gives an emission factor per kWh that is ten times lower than in the UK or Azerbaijan, and because of the smaller capacity of French sites by comparison with those elsewhere.

c) Evolution vs 2018



- In each of the CNIM Group's waste-to-energy and material recycling activities, voided emissions have increased compared with 2018 with a constant scope.
- As waste processing is the main source of emissions, the ratio between tonnes of CO2 avoided and tonnes of waste processed is a useful metric showing that the energy efficiency and waste recycling of the sites operated by the CNIM Group has improved:
    - 2018: 0.15 t CO2/t waste
    - 2019: 0.16 t CO2 /t waste

6. EXAMPLES OF ACTION TAKEN TO REDUCE GREENHOUSE GAS EMISSIONS

a) Energy consumption reduction measures

- **Energy audits**

Where required, energy audits have been conducted in the various companies in the Group since 2015, in accordance with European Directive 2012/27/EU and the EN 16 247 standard. This measure is aimed at encouraging companies exceeding certain size or revenue thresholds to put an energy efficiency strategy in place for their businesses. Following this structured approach enables opportunities to improve energy efficiency to be identified, as well as the capital expenditure that would be required and the payback period for the investments. These audits confirmed that steps had already been under way for several years to control energy consumption at the main CNIM Group sites.

- **Construction and renovation of buildings at the La Seyne-sur-Mer plant**

At the Group's flagship plant located in La Seyne-sur-Mer, a major investment plan entailing the construction and renovation of industrial and commercial buildings is underway. As part of this programme, energy efficiency studies are conducted for each building.

b) Development of services helping to reduce our customers' greenhouse gases

- **ISO 50 001 certification of waste processing and waste-to-energy sites**

The CNIM Group has set a target of obtaining ISO 50001 certification for all waste processing and waste-to-energy facilities operated by the Group by 2025.

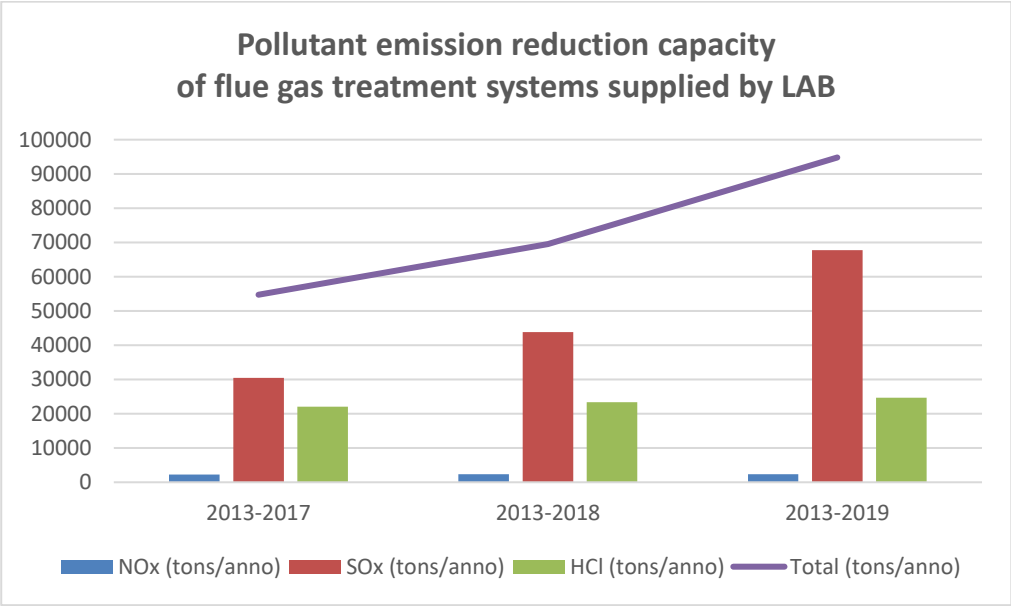
In 2019, the Paris Batignolles site, commissionned this year, obtained this certification.

In line with the objectives that the Group has set itself, all waste processing and waste-to-energy facilities operated by the Group in France are now certified.

- **LAB activities**

LAB strives to supply the most effective emissions reduction systems, featuring state-of-the-art technologies, in order to reduce the environmental impact of combustion systems. To achieve this goal, Lab designs and builds combustion gas scrubbing systems that incorporate the best available techniques (BAT), as specified by customers.

The chart below shows the combined pollutant emissions reduction capacity of the fume treatment systems delivered by Lab. Clearly, the efforts invested in terms of research and development, winning new business and in the areas of quality and environmental impacts have paid off, resulting in significantly increased reductions in our customers' atmospheric emissions. In this respect, Lab is a major contributor to improvements in our partners' environmental footprints and operating conditions.



The chart above measures the cumulative annual reduction since 2013 of NOx, SOx and HCl emissions achieved by the flue gas treatment systems delivered by LAB to its clients.

It should be noted that LAB's ability to reduce polluting emissions partly depends on the choices made by its clients, who may opt for:

- a solution that complies with their legal obligations; or
- a solution that goes beyond their legal obligations, and choose a solution that uses the best available techniques.

An illustration of LAB's work is its marine scrubber for the shipping industry. These systems help to significantly reduce sulphur dioxide (SOx) emissions into the atmosphere. LAB installed and commissioned a number of systems in 2019 for well-known shipping companies. After these systems were commissioned, the level of emissions measured by independent inspection bodies were lower than those required by its clients and to which LAB had committed.

- **SUNCNIM and Banque des Territoires inaugurate the world's first Fresnel type thermodynamic solar energy plant with energy storage in Llo, Occitania**

On 20 September 2019, SUNCNIM and Banque des Territoires, shareholders in the ELLO project company, inaugurated the Llo thermodynamic solar power plant with energy storage in Cerdagne (Pyrénées-Orientales). It is the first thermodynamic Fresnel solar energy concentrator with energy storage in the world. Built and operated by SUNCNIM, a subsidiary of the CNIM Group, it will contribute to the energy independence of Cerdan region and reduce the use of fossil fuels. With a power output of 9 MWe and thermal energy storage, i.e. the electricity consumption of more than 6,000 homes, the Llo power plant produces electricity both during the day and part of the night.

- **CNIM optimizes renewable heat production for Nantes' district heating network**

CNIM entered into an agreement concerning the energy efficiency optimization at the waste-to-energy plant serving the cities of Nantes and Saint Nazaire. Under the terms of this agreement, CNIM will install an absorption heat pump to boost the supply of hot water to Nantes. The new system has been designed to inject 3.1 MW of heat energy into Nantes' district heating system. This project consolidates CNIM's status as a major player in district heating system optimization using heat pumps connected to waste to energy plants.

- **CNIM and the French naval architects VPLP Design co-develop the Oceanwings® hybrid ship propulsion system**

Oceanwings® is a fully-automated, high-performance, furlable and reefable wingsail that can be used to create a hybrid ship propulsion system harnessing a combination of wind power and conventional propulsion. Based on a wind propulsion concept designed by VPLP Design, in November 2018 CNIM and VPLP Design jointly developed the design for a product suitable for industrial production. CNIM supplied its expertise to ensure that the Oceanwings® design satisfied the technical and industrial requirements for mass production. The first two units produced at CNIM's plant in La Seyne-sur-Mer will be mounted aboard Energy Observer, which is the world's first hydrogen-powered vessel designed to operate autonomously.

- **Bertin Energy & Environment looks for green energy supply solutions for the giant SKA radio telescope**

Bertin Energie Environnement has received a grant from the French private sector research and assistance fund (FASEP) to study possible energy supply solutions for the South African part of the SKA giant telescope. The company will thus offer SKAO (SKA Organization) and SARAO (South African Radio Astronomy Observatory) scenarios for an economical, reliable and environmentally friendly energy supply. This comparative study will allow it to design an energy supply solution that is based on renewable energies and that deals with the project's technical challenges.

- **The Ninh Thuan solar energy plant is now operational**

Developed in Vietnam, this 50MW solar energy plant is located in a region that enjoys plenty of sunshine and a favourable regulatory framework. The feasibility study, design and drafting of the technical specifications were entrusted to Bertin Energie Environnement with the support of SUNCNIM in the

exploratory phase. Based on these documents, the client, MSHLV, was then able to engage a contractor and build its power plant within the prescribed timeframe.

- **Enerbird equips France's largest solar power energy facility**

At the end of November 2019, Total Quadran inaugurated the Boulouparis 2 power plant in New Caledonia. It has 16Mwp of solar panels and a 10MW storage system. Bertin Energie Environnement supplied its ENERBIRD solution, which controls, optimizes and monitors hybrid power plants. It determines the plant's optimal production program based on meteorological forecasts. The objective is to maximize the producer's revenue while minimizing battery degradation.

- **An absorption heat pump for the world's leading brick manufacturer**

The world's largest brickmaker and Europe's leading supplier of tiles, the Austrian group Wienerberger sought to reduce gas consumption in its complex, energy-intensive product manufacturing processes. In its plant in the Linz region of Austria, CNIM has developed a complete heat recovery system consisting of an absorption heat pump, a scrubber and 14 air-to-water heat exchangers. Previously purely and simply wasted, the heat produced by the dryer is now recovered and re-injected into the process.