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THE ROLE OF ECOLOGICAL TAXES AND FEES IN SUPPORTING THE PRACTICE OF SUSTAINABLE ENVIRONMENTAL RESPONSIBILITY IN CEMENT COMPANIES IN ALGERIA - LAFARGEHOLCIM CEMENT COMPLEX AS A MODEL

Lehadi Aissa [1]
[1] Sfax University (Tunisie), aissa19783@gmail.com

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Abstract:
The research included studying the impact of ecological taxes and fees applied to the Lafarge Holcim cement complex in adopting the concept of social and environmental responsibility, and showing the extent of the contribution of the environmental management system followed in reducing negative environmental practices and compliance towards improving environmental performance. To achieve the study objective, we followed the descriptive approach with the use of the field study method with an analysis of the reality of ecological taxes and fees and their impact on environmental performance. Based on the above, the study reached the most important results: the role of ecological taxes and fees as a mechanism for adopting the concept of social and environmental responsibility for the cement complex, and the extent of the effectiveness of ecological fees applied to the company in reducing emissions, and optimal management by recycling waste and water of industrial origin, by adhering to the laws and legislation approved by Law 10/03, through the polluter pays principle.

Keywords: Environmental responsibility, Environmental management system, Ecological taxes, Lafarge Holcim complex.

1. INTRODUCTION

Business organizations in Algeria are facing future challenges and bets to carry out their economic activity, so they have turned to searching for the most effective ways to achieve balanced economic development with a sustainable environmental dimension, as they have been guided towards adopting quality and environmental management with the aim of achieving further development and improvement in the environmental protection system while working in balance with the needs of the environment. The cement sector in Algeria is one of the main sectors in the Algerian economy, as the cement industry is considered one of the developmental and strategic industries because it is directly related to construction and building works, as cement is used as a hydraulic binding material for building materials and concrete, and according to studies and research, the cement industry causes about 8% of carbon emissions around the world, as the giant chimneys of cement factories release clinker dust, cement dust, smoke, carbon and sulfur oxides and other toxic gases, which are the main component of environmental pollution, so the tax legislator has enacted a set of environmental laws and legislation by creating ecological taxes and fees, some of which are characterized by a deterrent

and preventive nature, and some of which are characterized by an incentive nature in response to environmental protection requirements.

1.1 .Problem of the study: Environmental responsibility is one of the most important contemporary issues, as a result of the expansion of industrial activity and the excessive exploitation of natural resources. Through the mandatory and obligatory imposition of green taxes on polluting institutions, the shift began from an economic model based on profit, towards a model known as the green economy based on reconsidering production methods. From this standpoint, this study came to answer the following problem:

What role do ecological taxes and fees play in supporting the practice of environmental responsibility at the Lafarge Holcim Hammam Dhalaa cement complex?

Where the problem and sub-questions arise, they are:

- The Algerian tax system imposes a set of ecological deterrent and incentive fees on environmental polluters?
- How can ecological taxes and fees support the practice of sustainable environmental responsibility by the LafargeHolcim cement group?
- Is the practice of social and environmental responsibility by the LafargeHolcim Hammam Dhalaa cement group mandatory or optional?

1.2 .Study hypotheses:

Environmental responsibility expresses the commitments adopted by modern business organizations towards the environment and the society in which they operate. Many studies have adopted the role and importance of environmental responsibility as a tool to support the environmental management system and achieve environmental sustainability in light of the new aspects of the global economy, which dictates conditions and data to modern business organizations in all environmental aspects. Therefore, the study is based on the following hypotheses:

• The role of ecological taxes and fees in supporting the practice of environmental responsibility of the Lafarge Holcim cement group

• The environmental tax system includes ecological fees of a deterrent and incentive nature for polluters of the environment

• Ecological taxes and fees contribute to encouraging the LafargeHolcim group to practice its environmental responsibilities

• The Lafarge Holcim cement group practices its environmental responsibilities by using cleaner production techniques, avoiding additional financial costs represented by the total ecological fees of a deterrent nature.

1.3 .Study methodology:

In the study methodology, we relied mainly on the deductive and inductive approaches, given the nature of the study topic, to clarify the role of green taxes and fees in pushing modern business organizations to adopt the concept of corporate environmental responsibility by extrapolating research and studies that dealt with the field of climate change. In order to be able to test the validity of the hypotheses and answer the questions, we relied on the descriptive analytical approach for this study, as well as the case study approach at the Lafarge Holcim Hammam Adh-Dhalaa cement complex.

1.4 .Importance of the study:

The importance of the study topic is highlighted by trying to link the relationship between the importance of ecological taxes and fees in pushing modern business organizations to adopt the concept of sustainable environmental responsibility towards the environmental challenges they face.

1.5 .Study objectives:

The study aims to show the role of ecological taxes and fees in directing and controlling environmental behavior to ensure environmental sustainability, by identifying the role played by ecological taxes and fees in urging modern business organizations to assume their environmental responsibilities by preserving the environment and its biodiversity. The study also aims to analyze and highlight the environmental sustainability achieved by the LafargeHolcim cement complex as a result of its adoption of the concept of environmental responsibility through production technology, avoiding additional financial costs represented by ecological fees of a deterrent nature.

1.6 .Previous studies:

During the past decades, there has been interest in studying the subject of corporate environmental responsibility. Various studies have been reviewed that have addressed the subject of the study related to the subject of our study, which shows us the difference between each study according to the vision and view of the researchers in terms of the results reached. Among the most important studies that have addressed the subject of our study, we find:

- A study by Bouftima Fouad, Bahchachi Rabah, University of Batna 1, 2020, entitled "**The Role of Ecological Taxes in Supporting the Practice of Environmental Responsibility in Algerian Business Organizations**" The study aimed to diagnose the content of the environmental tax system, and to determine the role that Algerian business organizations can play in exercising their societal and environmental responsibilities as a result of their polluting activity that harms the environment, its biological components and humans alike. The study also showed the role of business organizations in adopting social and environmental responsibility and trying to prove this in a systematic and scientific manner, which prompts these organizations to adopt this concept while carrying out their work and bear the payment of various taxes and fees with an environmental base. The results of the study showed that the practice of social and environmental responsibility in Algerian business organizations is done through an environmental tax system characterized by clarity and transparency, even if the tax bases differ, given that environmental pollution is one and environmental responsibility is one.
- The study by Gaoke Liao, Khaldoon Albitar, 2020 University, Guangzhou, China, titled "**Does Corporate Environmental Responsibility Engagement affect Firm Value? The Mediating Role of Corporate Innovation**" aims to build a comprehensive measure of emission reduction certificate engagement, by examining the relationship between emission reduction certificate engagement and firm value. The results show that when companies start adopting environmental regulations, emission reduction certificates will have a negative impact on firm value, but at a certain level, emission reductions will start to positively enhance firm value, in addition to that, corporate innovation will enhance the firm value of companies with emission reduction certificates more than companies without emission reductions. In general, the results of this paper are very relevant to government (tax authorities) and civil society, and can be used in making decisions related to environmental policies, encouraging companies to enhance their sense of environmental responsibility in order to enhance their competitive

advantages and enhance companies' ability to achieve environmental sustainability, and thus enhance corporate value.

▪ Study by Khair Eddine Jumaa, Dridi Ahlam, University of Mohamed Khider Biskra, 2018, entitled "**Environmental responsibility is an imperative necessity for moving towards a green economy in Algeria, the Black Treasure Factory - Maplak - as a model**" The study aimed to show that environmental responsibility and the transition towards a sustainable green economy is one of the challenges facing modern business organizations, due to their significant contribution to environmental pollution resulting from their activities and to know the reality of these organizations adopting environmental responsibility, by presenting the experience of the "Black Treasure Maplak Foundation" for recycling rubber tires, and the results of the study showed that environmental responsibility is an imperative necessity towards a sustainable environmental economy and proposing a set of recommendations represented in increasing the responsibility of environmental awareness of polluting institutions in order to use environmentally friendly technological techniques.

▪ Study by Tetiana Vasilyeva, Yaryna Samusevych, Sumy State University Sumy, UKRAINE, 2023, "**Environmental Taxation: Role in Promotion of the Pro-Environmental Behaviour**", The purpose of the article is to study the potential of environmental taxes in regulating environmental responsibility and ensuring pro-environmental behavior of economic entities, to study the theoretical basis of environmental taxes and environmentally responsible behavior, a bibliometric analysis of keywords in scientific articles published on this topic was conducted, the results of the bibliometric analysis show that aspects of environmentally responsible behavior are presented in the list of keywords that mediate the study of environmental taxes. Thus, pro-environmental behavior is defined by the need to avoid health risks, provide clean energy technologies, reduce waste generation, etc. The impact of environmental taxes on various aspects of environmentally responsible behavior was modeled on a sample of six European countries (Belgium, France, Austria, Finland, Denmark) for the period 1994-2019. The results show that environmental taxes have limited effectiveness in regulating various aspects of environmental responsibility.

2. Theoretical background of environmental and social responsibility of modern business organizations

Modern business organizations are increasingly exposed to pressure from public authorities and civil society, after becoming a dominant element in society with globalization and the emergence of the concept of sustainable development. Therefore, these organizations must take into account the societal and environmental impacts of their work and activities. In order to be able to talk about the sustainable environmental responsibility of business organizations, it is necessary to give a concept of social responsibility to these organizations.

2.1. The concept of social and environmental responsibility for business organizations:

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2.2. The concept of social responsibility according to the International Organization for Standardization (ISO 26000)

Corporate social responsibility is defined as "the responsibility of the organization with regard to the impact of its activities and decisions on the environment and society, which leads to ethical behavior that contributes to sustainable development, takes into account the

expectations of stakeholders, is consistent with applicable laws and legislations and is compatible with international standards, and is integrated into all departments of the organization as an integral part of its relationships during its implementation." (others, 2015).

2.3. Environmental Responsibility Concept

The concept of corporate environmental responsibility is inextricably linked to corporate social responsibility (CSR), and some scholars directly consider corporate environmental responsibility as a dimension of corporate social responsibility, defining it as part of socially responsible behavior related to pollution prevention and cleaner production (Liu, 2023).

As defined by GEMET, environmental liability is "the fine imposed on business organizations resulting from environmental damage caused by environmental pollution, or the recovery process resulting from the damage, whether the damage is the disposal of toxic or hazardous waste resulting from industry directed towards water bodies, or the disposal of this waste outside the facility's perimeter, or the intentional or unintentional emission of radiation that threatens humans and biodiversity." (Boufetima Foued, 2020).

3. Environmental Policies and Environmental Management System for Modern Business Organizations

The emergence of the concept of sustainable development through reviewing the environmental dimension, is done through commitment to all environmental legislation and laws, by following the ISO environmental management system, reviewing polluting emissions into the atmosphere, reviewing waste management, reviewing safety and health, where the environmental performance of business organizations is considered, especially the cement sector due to the specificity of the activity of this type of sector in the environmental field, and to achieve the integration of sustainable development and its dimensions, the environmental management system must be followed, which works to improve the environmental performance of business organizations according to a sustainable environmental policy, what is known as the ISO14001 standard specifications embodying the environmental dimension of sustainable development in the cement sector (others A. K., 2023).

3.1. Environmental policy for modern business organizations:

In a broad sense, policy can be defined as "the sum of measures taken and principles identified to solve a particular problem." Environmental policy, from a somewhat broader perspective, can be interpreted as "the determination of precautions that will ensure the protection of the environment or the determination of principles that will form the basis of human life." Environmental policy is subject to internal assessments of the organization's environmental impacts (including the identification of those impacts and how they have changed over time), the setting of measurable goals for reducing environmental impacts, the provision of resources and training of workers, and the verification of progress of implementation through systematic auditing to ensure that the goals are being met , Each country has different objectives for environmental policies, however, there are common objectives that apply to all countries. These include ensuring a healthy environment, maintaining and developing social environmental values and ensuring that implemented environmental policies comply with the principle of justice (Mehmet Turan PEKMEZCİ, 2016).

This policy is developed by business organizations in formulating their environmental responsibility in order to: (Hamza Dabar, 2016).

- Reducing environmental pollution and the extent of business organizations' commitment to taking into account the environmental dimension of sustainable development

- The extent to which these organizations comply with environmental laws and regulations
- Extent of commitment to review and examine environmental objectives
- Disseminate it to workers and civil society.

3.2. Environmental Management System for Modern Business Organizations:

Environmental Management Systems (EMS) is a comprehensive approach to managing environmental issues around the environment from every aspect of business management. The EMS ensures that environmental considerations are prioritized, along with other concerns such as costs, product quality, investments, and strategic planning, Overall, the EMS has a positive impact on the bottom line of business organizations, helping to improve both the financial and environmental performance of organizations by using the EMS to transform environmental problems into business opportunities that bring them into a stronger competitive position Under its environmental responsibility, modern business organizations adopt environmental management system to protect the environment. (Training, 2024) .

We mention among them:

3.2.1. Environmental Management System (EMS): An environmental management system gives business organizations of any size a global structure to ensure and manage their environmental issues. Standards such as ISO 9001 for quality management, ISO 45001 for occupational health and safety management, and ISO 50001 for energy management are easy to integrate into any existing ISO management system. ISO 14001 supports an organization in developing and integrating ISO 14001 which supports business organizations in developing and integrating environmental management practices (complete, 2024).

3.2.2. Environmental Management System ISO 14001: ISO 14001 is a series of written specifications and documents that provide business organizations with the important tools necessary to build an environmentally sustainable environmental management system, while giving the necessary guidelines for its use and implementation. The ISO 14001 series also provides a set of tools aimed at implementing and evaluating the environmental policies and objectives of business organizations, with the aim of addressing potential environmental problems (Dahimi, 2015).

4. Ecological taxes and fees as an entry point for adopting environmental responsibility towards environmental challenges

In light of its economic activity, business organizations carry out their activities, taking into account the environmental dimension of sustainable development, which makes environmental responsibility among its priorities and objectives by improving environmental performance. The Algerian tax system includes a group of green taxes and fees as an incentive or deterrent tool, which makes business organizations seek to improve environmental performance by exercising their environmental responsibilities in a sustainable manner towards the environment and society (Boufetima Foued, The Role of Eco-Taxes in Supporting the Exercise of Environmental and Social Responsibility in Algerian Business Organizations, 2020).

4.1. Theoretical foundation of ecological taxation

Ecological taxes and fees are considered one of the most important economic mechanisms adopted by Algeria towards environmental protection, which focus on incentive or deterrent measures through the polluter pays principle. The legislator came through Law 10/03 related to the environment and its protection within the framework of sustainable development, which charged polluters, whether a natural or legal person whose activity causes environmental

damage, by imposing environmental fees on owners of activities that pollute the environment.

4.1.1. The concept of ecological taxes and fees: Ecological fees and environmental fees or green tax, also known as the "Pigou tax", in the economics of welfare writings, impose a tax, the aim of which is to achieve equality between social costs and private costs, and it is an emerging form that clearly aims to protect the natural environment and its resources and reduce the aggravation of its problems (Dahimi, Economic tools to control the effects of environmental pollution, 2019).

4.1.2. Polluter-pays/polluter-user principle: Ecological taxes and fees are formed by transferring part of the tax burden towards activities that cause environmental damage (penalty), and supporting environmentally friendly activities (reward).

The principle of ecological taxation is based on: (Taxes, 2023)

- When the price of a product that pollutes the environment increases after imposing a tax, the consumption of this product decreases;
- When the price of a product that does not pollute the environment decreases after benefiting from a tax loan or subsidy, the consumption of this product increases

4.1.3. Ecological taxation and environmental performance of modern business organizations: Environmental responsibility of modern business organizations, according to Huckel, is concerned with the organization's relationship with the environment. It includes the commitment of decision-makers to bear responsibility for protecting the environment in line with their interests in order to create environmentally responsible business organizations (Princess Abdel Baqi, 2019).

Regarding the relationship between ecological taxation and the social and environmental performance of modern business organizations, from the point of view, ecological taxation can encourage business organizations to increase investment in environmental research and development, develop new environmentally friendly products, and consolidate the image of green business organizations, thus achieving the innovation compensation effect and the first-mover advantage effect, ecological taxation can positively affect the environment, so that ecological taxation helps reduce pollutant emissions, improve energy structure, and improve ambient air quality and environmental quality, however, the green paradox theory holds that unreasonable environmental regulation will accelerate the exploitation and utilization of natural resources and cause a large number of damages, such as greenhouse gas emissions. Based on neoclassical economics, ecological taxation is the external costs of using various natural resources, the current green tax and fee policy will make resource owners realize that the cost of exploiting natural resources will become higher and higher in the future, and energy exploitation will accelerate in order to reduce costs and improve benefits (Zhao, 2022)**.**

5. Field study of the research paper

The research sample is the Lafarge Holcim Hammam Dhalaa cement complex.

5.1. Lafarge Holcim Cement Complex Hammam Adh Dhalaa:

Lafarge Holcim Hammam Dhalaa Cement Complex, one of the member companies of the Holcim Lafarge Cement Algeria Group, which is affiliated with the Holcim Group headquartered in Switzerland, the factory is located northwest of M'Sila on a total area of 100 hectares. The company covers the market's needs for cement of all types by 25% at the national level (petroleum cement, comprehensive cement, durable cement, ecoplank environmentally friendly cement) in addition to clinker. LafargeHolcim Algeria has a total production capacity of more than 8 million tons at its two cement sites in Hammam Dhalaa. Cement exports to

Europe, North and South America are estimated at 4.6 million tons annually , The cement factory employs 1439, including 440 employees and the rest are workers across the factory's various workshops. In addition, the factory employs more than 1000 workers as handlers, in addition to trainees.

Table N° (01): Technical card for the Lafarge Holcim Hammam Al-Dhala'a cement plant (LCM)

Statement	Factory technical card
Lafarge Holcim Cement Complex (LCM)	Raw material quarries (Shouf Ammar, Al-Dabil, West Shouf Ammar, Qataya, Northwest Shouf Ammar).
	Number of workers: 999, including 440 employees, total: 1439
	02 production lines.
	Exports of cement of all types and semi-finished material clinker : • Semi-finished material clinker one million tons in 2022 • Production of petroleum cement, salt resistant, durable, comprehensive • Launching an environmentally friendly product in 2023 called Ecoplank Eco-Friendly Cement, certified cement that complies with European (EN197-5) and Algerian (NA170092) standards. • Exporting 17 thousand tons of gray cement to West Africa in 2023 .

Source : Prepared by researchers based on documents from the company's Environment and Quality Department 2024.

5.2. Environmental measures taken under the company's environmental responsibility

Lafarge Holcim Hammam Dhalaa Cement Complex, within the framework of its environmental responsibilities and following the recommendations of the Holcim Group, took the initiative to improve its competitiveness and its role in exporting cement products to the international market, considering that the ISO14001 mark is an international passport. The company, in cooperation with the Ministry of Environment, has worked to establish an environmental management system by investing in cleaner production technology.

5.2.1. Documentation of the company's environmental policy: Lafarge Holcim Cement Company, a member of the Holcim Group, a world leader in the production of cement of all kinds, has taken part in the policy within the framework of sustainable development as part of the 2030 vision. The company has adopted its own environmental management system according to the ISO 14001 standard. In this context, the company has pledged to:

- Protecting the environment, ecosystems and biodiversity in the region from pollution caused by emissions from the factory
- Commitment and compliance with environmental laws and regulations, including relevant important parties
- Continuous and permanent improvement of the environmental management system in light of its environmental responsibilities

The strategic axes that the group seeks to focus on are:

▪ We are committed to obtaining the latest version of ISO14001 certification.
▪ Activating and applying the SME environmental management system on the main axes, which are :
✓ Redirection of toxic and/or hazardous waste for sorting, resale and/or reuse
✓ Reducing gas emissions (sulfur oxide, nitrogen oxide, and carbon monoxide) and dust resulting from grinding the semi-finished clinker material.
✓ Proactively collaborate with the Ministry of Environment and civil society to support their environmental aspirations.

5.2.2. Environmental planning: The company's environmental planning process, in light of environmental responsibility, is carried out through sustainable urban embodiment by establishing foundations and rules with the aim of creating a system for environmental management. In this context, the institution has identified the manifestations of environmental impacts in the factory, which are:

A- **Diagnosis of environmental phenomena and their effects:** The process of diagnosing the environmental aspect is considered an essential process as it helps and determines the extent of the impact of cement on the environment. The aim is to deal with the pollution resulting from the manufacture of this material in an integrated manner with the aim of achieving environmental sustainability. In this context, the company has identified and diagnosed these aspects, which are:

▪ **Environmental impact related to gas emissions and cement dust:** During the process of grinding the clinker, toxic gases are generated from the factory kilns, such as (sulfur oxide, nitrogen oxide, carbon monoxide gas), which results in chemical reactions as a result of burning fuel in the factory kiln system, in addition to the emission of cement dust, where the amount of particles emitted into the atmosphere ranges between 10% and 20% of the kiln feed quantities.

▪ **Environmental impact related to waste and water pollution:** The waste generated by the factory is generated according to the degree of danger, whether harmful or toxic, represented by (special and hazardous waste, inert waste, household waste and the like, packaging waste), in addition to industrial water waste, drainage fluids are generated from the clinker cooling processes, as they contain suspended solids represented by calcium carbonate, and grease and oils pose a danger during discharge operations into water bodies.

5.3. Lafarge Holcim Cement Group's strategy towards its environmental responsibilities

Lafarge Holcim Hammam Dhalaa Cement Complex, within the framework of its environmental responsibilities, has taken into account environmental considerations within its strategic priorities through the accompanying environmental impacts through:

5.3.1. Ecosystem adoption strategy: Lafarge Holcim Group has taken a set of strategic measures and actions, which are:

• Suction of dust emitted from production lines using dust suction and collection techniques across the factory's various corridors
• Accurate measurement of dust and gases and various chemical and physical analyses
• Developing a monitoring system for production lines to monitor the various stages of the production process, relying on an automated information device
• Identify environmental risks by supporting environmental studies to adapt to applicable laws and regulations
• Using eight large sleeve filters and one hundred and forty small sleeve filters at the grinding level of the semi-finished clinker material, in addition to using five electrostatic filters.

5.3.2. Financial investments with an environmental dimension: Lafarge Holcim Hammam Adh-Dhalaa cement company, based on the recommendations of the Holcim parent group in Switzerland, has made significant efforts in light of its environmental responsibilities towards protecting the environment, investing in cleaner production technology worth 6 million euros, aiming to treat the dust flying around the factory and the area from the kiln area and grinding clinker. This type of environmental investment is characterized by a bag filter device that leads to passing dust and dirt through a cloth bag located in a box with small pores that allow gases to be emitted without the cement dust flying through collecting the dust inside it according to the filter model, then the bag filter is sucked using air pressure by blowing it at a pressure of 06 to 09 bar.

5.4. The effectiveness of ecological graphics in directing the behavior of the complex towards adopting environmental responsibility

LafargeHolcim Cement Group, like other Algerian and foreign companies, is subject to the provisions of Law 10-03, which includes environmental protection within the framework of sustainable development, by imposing ecological fees on activities and products that cause environmental damage, such as the emission of greenhouse gases into the atmosphere, waste of all kinds, or water pollution resulting from various industrial processes. Among the ecological fees to which the company is subject, we find supplementary fees on air pollution from industrial sources, supplementary fees on wastewater from industrial sources, and fees for not storing toxic and/or hazardous waste.

5.4.1. Drawing on non-storage of waste: Waste management at LafargeHolcim cement company is one of the environmental and social challenges that the group focuses on, by reducing waste and reusing, recycling or reselling it. The company's environmental and social responsibility can be seen as a strategic approach to managing its waste, so it has adopted a strategy centered on valorizing and monitoring its waste in accordance with Law 19-01, which includes the management, monitoring and removal of waste by creating a waste transit area and classifying it according to the degree of danger criterion, on an area of 10,000 square meters, supervised by the Waste Service (Environment and Quality Service).

Lafarge Holcim cement company is subject to the provisions of Article 03 of Executive Decree 315-05 which determines the methods of declaring waste, whether toxic and/or hazardous, where the value of the fee for not storing waste is determined by the text of Article 203 of Law 21-01, which was legislated to encourage not storing industrial waste, according to an annual report prepared by the environmental delegate at the factory within a maximum period of three months after the end of the fiscal year. This report includes the company’s situation, the company’s headquarters, the type of activity, and the nature of the waste produced by the company. The report is sent to the Environmental Collection Office (Environmental Directorate), through which the value of the fee for not storing industrial waste is determined.

Table N=° (02): The amount of waste in the company according to its classification (special or/special and hazardous)

Unity /ton

Statement	**2022**				**2023**			
	Total	Sold waste	temporary waste	permanent waste	Total	Sold waste	temporary waste	permanent waste
toxic waste	1372	1359	13,00	00	630	629,7	0,70	00

Toxic and/or hazardous waste	107	92,83	14,14	00	88	87,64	0,40	00

Source: Prepared by researchers based on documents from the company's Environment and Quality Department 2024.

Table (02) shows the amount of toxic waste (Déchets Spéciaux) generated from the factory during the year 2022, where the total waste is estimated at 1372.2 tons, the amount of recovered (sold) waste is 13.00 tons, and the amount of permanent waste is estimated at zero tons. In 2023, the total is estimated at 630.43 tons, the amount of recovered (sold) waste is 629.70 tons, and the amount of permanent waste is estimated at zero tons. As for toxic and hazardous waste (Déchets Spéciaux Dangereux), generated from the factory during the year 2022, where the total waste is estimated at 107.00 tons, the amount of recovered (sold) waste is 92.83 tons, and the amount of permanent waste is estimated at zero tons, this is due to the company adopting a strategy in light of its environmental responsibility, which avoids the deterrent fee represented by the fee for not storing industrial waste, estimated at 30,000 DZD per stored ton, on For example, among the hazardous toxic wastes we find used grease and oils, where the company has adopted a strategy to avoid the fee for not storing industrial waste by:

- **Waste storage:** Used grease and oils are stored in thick metal drums on plastic pallets in the waste transit area of the factory, with the provision of protective means, fire extinguisher with RIA network.
- **Waste Management:** Waste grease and used oils are sorted for temporary storage and then removed through an approved recovery device. Periodic inspection of the drums is carried out through an approved recovery device by the factory's environmental representative and a representative of the Environmental Collection Office of the Environment Directorate, approved agents and subcontractor supervisors, with the continuous presence and vigilance of the security agent in the transit area until they are sold and disposed of.

5.4.2. Supplementary tax on industrial air pollution: The LafargeHolcim cement group is subject to an air pollution tax, under the provisions of Article 205 of the 2002 Finance Law, where the tax determines the quantities emitted that exceed the specified values, stipulated by Executive Decree No. 138-2006 which regulates the emission of gases and dust into the atmosphere. The National Environmental Observatory ONEDD analyzes the emissions which allows it to determine the quantities of pollution released into the atmosphere. The multiplier factor, under the provisions of Article 03 of Executive Decree 299-07, determines the methods for applying the tax. The factor is set between 1 and 5 depending on the excess emissions into the atmosphere. The tax is determined based on the annual basic amount set by Article 117 of Law No. 91-25, and the table below shows:

Table N=° (03): Samples of cement dust and gas emission analyses in the factory

Unity : Mg/Nm^3

	Clinker baking oven (01)				**Clinker baking oven (02)**			
	Dust	**SO_X**	**NO_X**	**C_O**	**Dust**	**SO_X**	**NO_X**	**C_O**
2021/12	941,42	1854,7	375	682	564	1202	354,3	210,7
2022/12	15,90	491,94	435,6	502,8	7,78	488,16	350	476,3
2023/01	12,91	595,4	438,1	574,19	7,39	511,08	391,8	447,01

***138/2006**	30	500	1500	150	30	500	1500	150

***** Executive Decree No. 2006-138 on the emission of dust and gases into the atmosphere.

Source: Prepared by researchers based on documents from the company's Environment and Quality Department 2024.

Table (03) shows us the specific values for the emission of cement dust and gases (sulfur oxide, nitrogen oxide, carbon oxide) generated from the first and second kilns in the factory, where the analyses were conducted by the company using the GEMS device "Continuous Emissions Measurement Device" installed above the factory chimneys, the analyses were taken on the dates of December 2021, December 2022, January 2023, through the action plan and strategy adopted by the Lafarge Holcim Group within the framework of its responsibilities towards environmental protection, it was able to reduce the quantities of cement dust emissions. This is due to the adoption of a sustainable environmental policy by the Lafarge Holcim Cement Group, through investing in cleaner production technologies represented by the acquisition of a bag filter device, which led to a decrease in the cement dust flying from the production lines and benefiting from it by recovering it and reusing it as a raw material. As for the gases, there is an improvement in the emission rate despite exceeding the permissible limits stipulated in the executive decree. This is due to the nature of the region with the presence of sulfur and gases at a very high rate. As for the analyses The data taken by the company and shown in the table above are not taken into account in determining the air pollution fee despite the accuracy of the analyses taken by the company, as the one legally authorized to conduct the analyses is the National Observatory for the Environment and Sustainable Development (ONEDD). The table below shows us the analyses of the emission of cement dust flying into the atmosphere around the factory by the National Observatory for the Environment and Sustainable Development.

Table N=° (04): Cement dust emission measurement samples by the National Observatory ONEDD

	Sample result	**Executive Decree 2006/138**	**Dust sampling points**
Cement dust analysis samples dated 05/10/2023	13,17	30 =Mg/Nm^3	oven
	0,1	30= Mg/Nm^3	East of the quarry, see Ammar
	0,1	30= Mg/Nm^3	West of the quarry, see Ammar
	0,11	30= Mg/Nm^3	Factory Center
	0,14	30= Mg/Nm^3	Qataya quarry
	0,07	30 =Mg/Nm^3	Northwest of the quarry, see Ammar

Source: Prepared by researchers based on the National Environment Observatory Report 2024.

Table (04) shows the analyses of the cement dust flying in the atmosphere around the factory. Cement dust samples were taken by the National Environmental Observatory ONEDD in various areas of the factory. It is noted that the values did not exceed the permissible values and limits, according to the provisions of Executive Decree No. 2006/138 regulating the emission of dust and gases into the atmosphere, set at 30 Mg/Nm3. As for cement dust, through the results of the analyses shown in the table above, the company avoided the air pollution tax.

This is due to the environmentally friendly investment acquired by the complex, which enabled it to control and reduce the cement dust flying and limit negative environmental practices in light of the company's adoption of its environmental responsibilities.

5.4.3. Supplementary fee on industrial wastewater of industrial origin: The Lafarge Holcim cement complex is subject to a supplementary tax on industrial wastewater of industrial origin under the provisions of Article 94 of the Finance Law of 2003, according to the volume of polluted water discharged outside the factory perimeter, and the pollution burden resulting from the activity that exceeds the limits of the values determined by the regulations in force. The basic annual amount of the tax is determined under the provisions of Article 117 of Law 25-91. The multiplier factor ranges from 01 to 05 depending on the rate that exceeds the application of the tax. The tax relates to the quantities of pollution discharged into the landfills that exceed the values determined by the provisions of Executive Decree 06-141. The National Observatory ONEDD is responsible for analyzing the water discharged outside the factory perimeter. The analysis of industrial landfills includes a report as shown below:

- Company name: Holcim Lafarge Cement Hammam Al Dhalaa Joint Stock Company
  - Company headquarters: Hammam Al-Dhala'a, M'sila
  - Sample Specification: Industrial Fluid Drainage
  - Sampling by: Model T D S
  - Date of sample entry into the analysis laboratory: 02/16/2023
  - Agreement: N=° 001/2022 dated 02/16/2022.

Table N=° (05): Results of samples taken from the wastewater outside the factory perimeter from the ONEDD National Observatory

Industrial wastewater analysis samples				
Appointment	**Unity**	**Limit value****	**Sample result**	**Analysis standard**
Temperatures	C°	30	17	Multiple landmarks
Hydrogen potential (PH)	-	5,5-8,5	8,20	Multiple landmarks
Suspended Matter (MES)	mg/L	35	145	Instrument method
Chemical Oxygen Demand (DOC)		35	110	ISO 6060:1989
Biological oxygen demand (DBO_5)		35	< 3	Instrument method
Biodegradable materials		0,5	< 1	ISO 6060:1989
Industrial greases and oils		20	< 2	ISO 6060:1989
Cadmium		0,07	< 0,03	ISO 6060:1989
Chrome		0,1	< 0,2	ISO 6060:1989
copper		0,1	< 0,1	ISO 6060:1989
Cobalt		0,1	0,30	ISO 6060:1989
Nickel		0,1	< 0,2	ISO 6060:1989
iodine		0,5	< 0,2	ISO 6060:1989
Zinc		2	< 0,03	ISO 6060:1989

** Limit values for industrial wastewater discharges in accordance with Executive Decree No. 06-141 issued on 20 Rabi' al-Awwal corresponding to 19 April 2006 setting limit values for industrial wastewater discharges

Source: Prepared by researchers based on documents from the company's Environment and

Quality Department 2024.

Table (05) shows the results of the samples taken from the industrial wastewater discharge outlets outside the factory by the National Observatory ONEDD, The analysis results were positive for not exceeding the limit values for the discharge of industrial wastewater, according to Executive Decree No. 06-141. This is a result of the LafargeHolcim Cement Group adopting a sustainable environmental strategy to protect the environment, water bodies and biodiversity in the region in light of the environmental responsibility taken by the LafargeHolcim Cement Group, by carrying out the precise treatment of industrial wastewater which is carried out at the level of the treatment plant in the factory, and carrying out the chemical analysis by adding crystallized lime milk and carrying out the sedimentation process at the station level by converting iron impurities $Fe2^{+}$ to non-dissolved iron impurities $Fe3^{+}$ through the sedimentation process in the pressure filter. This strategy enabled the company to avoid the supplementary tax on industrial wastewater of industrial origin, by not exceeding the limit values stipulated in Executive Decree No. 141/06.

6. conclusion

Algeria has worked to adhere to the objectives of the United Nations Framework Convention on Climate Change, especially Articles 4 and 12 thereof, and demonstrates Algeria's determination to contribute to the efforts made to combat climate change to mitigate the severity of greenhouse gas emissions and adapt to the negative effects of climate change in all national and foreign institutions. Therefore, it has adopted a work strategy aimed at protecting the environment, the goal of which is to achieve compatibility between economic development and the sustainable use of resources by taking a set of preventive measures to address the problem of industrial pollution and achieve environmental sustainability, by adopting an ecological tax system that includes deterrent and incentive environmental fees, as Law No. 10/03 on environmental protection within the framework of sustainable development indicated the embodiment of the "polluter pays" principle, which holds industrial institutions that cause environmental damage accountable.

Therefore, in our study, we reached a number of results, which are:

- Lafarge Holcim Group follows a sustainable environmental policy in light of its adoption of environmental and social responsibility through its commitment to the environmental laws and legislation enacted by the Algerian tax legislator, and is also committed to participating in a zero-emission future.
- The concept of social and environmental responsibility is summarized in all the environmental activities and commitments that LafargeHolcim Group performs towards the environment to reduce the emission of cement dust and gases, and determining all this commitment from the financial aspect to deliver it to stakeholders for the purpose of taking appropriate measures and decisions.
- The ecological fees applied to the cement complex have contributed to directing its environmental behaviour towards environmental sustainability by investing in cleaner production technology by purchasing a bag filter device, to reduce the emission of cement dust and toxic gases into the atmosphere, within the framework of the recommendations of the parent cement group LafargeHolcim Switzerland.

Study recommendations:

- Developing policies and adopting the best methods of production to ensure environmental balance and resource sustainability, transparency and openness to society, and focusing on four

issues: energy and climate, development, the role of the business sector, and natural systems and resources.

- Working on long-term goals with different sustainable alternatives through studies, research and development to reduce these emissions, as the solution lies in reconsidering the various ecological fees, thus it can help in reaching a healthy and sustainable environment.
- Enhancing the competitiveness of the green cement industry in national and international markets, contributing to reducing carbon emissions, and applying sustainable development standards in the factory, as part of the roadmap towards climate neutrality, enhancing community awareness to preserve and protect the environment, and promoting the sustainable use of natural resources.

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