



Energizing kitchens

Policy Recommendations for the Circular
Management of Brown Fats in Colombia

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List of acronyms

- ACODRES:** Colombian Association of Restaurants (Colombia)
- ACUACAR:** Aguas de Cartagena (Public Services Company, Colombia)
- ANDESCO:** National Association of Public Services Companies (Colombia)
- ANDI:** National Association of Industrialists (Colombia)
- ANGAT:** National Association of Sustainable Gastronomy and Tourism (Colombia)
- ARMCOL:** Colombian Shipowners Association (Colombia)
- ARnD:** Non-domestic Wastewater
- BOD :** Biochemical Oxygen Demand (5 days)
- CAR:** Regional Autonomous Corporations (Colombia)
- CIIU:** International Standard Industrial Classification of All Economic Activities
- COD:** Chemical Oxygen Demand
- CO eq:** Carbon Dioxide Equivalent
- CONPES:** National Council for Economic and Social Policy (Colombia)
- COTELCO:** Hotel and Tourism Association of Colombia
- DDU:** Directorate of Urban Development (Colombia)
- DNP:** National Planning Department (Colombia)
- D.C.:** Capital District (Colombia)
- D.C. y T.:** Capital and Tourism District (Colombia)
- EC :** Median Effective Concentration (50%)
- ESP:** Public Services Company (Colombia)
- Fedebiocombustibles:** National Federation of Biofuels (Colombia)
- FENALCO:** National Federation of Merchants and Entrepreneurs (Colombia)
- FONTUR:** National Tourism Fund (Colombia)
- HORECA:** Hotels, Restaurants, and Cafeterias (food service and accommodation sector)
- IATA:** International Air Transport Association
- ICA:** Industry and Commerce Tax (Colombia)
- IEA:** International Energy Agency
- MINAMBIENTE:** Ministry of Environment and Sustainable Development (Colombia)
- MinCIT:** Ministry of Commerce, Industry and Tourism (Colombia)
- MinHacienda:** Ministry of Finance and Public Credit (Colombia)
- MINMINAS:** Ministry of Mines and Energy (Colombia)
- O :** Oxygen
- P4G:** Partnering for Green Growth and the Global Goals 2030
- PEI:** Potential Environmental Impact
- PGN:** Office of the Attorney General of the Nation (Colombia)
- PRODES:** Watershed Pollution Control Program (Brazil)
- SDA:** District Secretariat of Environment (Bogotá D.C., Colombia)
- SDBS:** Sodium Dodecylbenzenesulfonate
- Superservicios:** Superintendence of Public Services (Colombia)

Executive Summary\

In Colombia, brown fats from industrial kitchens, mainly from the HORECA sector (hotels, restaurants, and cafes), represent waste with a high environmental impact and significant energy potential. Currently, these fats lack a clear regulatory framework that encourages their use for producing second-generation biofuels ¹, even though they could meet a substantial part of the national demand and contribute to the net-zero emissions goal by 2050. Technical evidence shows that these discharges can exceed legal limits for fats and oils by up to 380 times, causing blockages in sewer systems, water pollution, toxicity to wildlife, and public health issues. However, current regulations classify them as domestic wastewater, exempting many generators from control and treatment obligations. This regulatory ambiguity hampers investment in efficient recovery systems and stalls the development of a market for their valorization.

The project to scale a circular economy business that uses technology to recover greasy residues present in discharges (brown fats) from industrial kitchens and incorporate them into the biodiesel supply chain (hereafter, the project), supported by a donation managed by P4G (Partnering for Green Growth and the Global Goals 2030), has demonstrated that it is technically feasible to recover between 66% and 77% of these fats using specialized technologies like G-Trap, reducing the carbon footprint from 110 to 30 kg CO eq/m³ and generating raw material suitable for biodiesel. Additionally, local initiatives such as Fat-

¹ “second-generation biofuels can be manufactured from all sorts of bioresources other than food crops. It can include various biobased raw materials consisting of energy crops, crops and forest residues, construction, and municipal waste.” (Kumar et al., 2022)”



Free Zones ² and Green Business programs ³ have shown that it is possible to coordinate public, private, and community actors to improve waste management and turn these into economic opportunities.

Based on the technical and regulatory studies developed within the project and the dialogue spaces created with key private and public stakeholders, the following recommendations were identified:

1. Classify wastewater from industrial kitchens as non-domestic, including a practical definition of “industrial kitchens” in current regulations.
2. Use contaminant load as a criterion for classifying industrial kitchens in regulations, not solely by economic activity.
3. Incorporate a progressive and differentiated approach to the obligations set by regulations for industrial kitchens.

2 The ‘Fat-Free Zones’ pilot program targets key areas in Bogotá D.C. to prevent sewer blockages caused by improper disposal of fats and oils. It aims to coordinate large companies, public entities, authorized managers, and eco-friendly businesses to promote best practices, integrate technology, and reinforce institutional commitment. Additionally, it seeks to improve the engagement of waste generators with authorized managers for more effective waste management.

3 The Green Business Program serves as a support pathway for companies providing environmental products and services, helping them access a wider market. It stems from Colombia’s National Green Business Policy.

4. Develop local regulations following the principle of subsidiarity, allowing territorial entities to create a regulatory environment that promotes the circular management of industrial kitchen fats at the regional level.
5. Build capacity among local environmental authorities and relevant actors in the circular chain of brown fats in innovative treatment technologies and circular business models.
6. Strengthen the Fat-Free Zones program and link it to corporate environmental management programs like Green Business.
7. Create an environmental seal for sustainable establishments as a reputational incentive that recognizes the efforts and achievements of the HORECA sector in the circular management of brown fats.
8. Implement digital monitoring systems for discharges by water and sewer companies.
9. Design and implement financial instruments to leverage brown fats to produce alternative energies.
10. Encourage demand for fat waste for biodiesel production by adjusting existing regulations to increase biodiesel blending nationwide and including brown fats as waste subject to special management under MINAMBIENTE Resolution 0316 of 2018.

Utilizing this residual resource would reduce environmental impacts, strengthen energy security, promote the circular economy, and create new business opportunities. Coordination among regulators, the private sector, and technological innovation is crucial for Colombia to transform an environmental challenge into a strategic asset for its energy transition.

Introduction \

In Colombia, the amount of greasy waste generated by restaurants, hotels, and cafes (HORECA) can be up to 380 times higher than the limits established by current legislation (Zhana Solutions, 2025). Paradoxically, the same regulation that sets these limits does not require these generators to comply with them, as it classifies their wastewater as domestic. On the other hand, this greasy waste has significant potential for reuse in the production of biofuels such as biodiesel. Recent studies have identified that up to 77% of the brown grease currently sent to final disposal or directly dumped into the sewer could be used to produce second-generation biodiesel⁴ (Biotrade, 2024). However, given current technology and ambiguous regulatory signals, this recovery does not occur.

The scale of the challenge is proportional to the opportunity. The global net-zero emissions goal for 2050 opens a growing market for advanced biofuels. By 2028, demand for biofuels is projected to grow by 23% (IEA, 2024). This demand is driven, among other factors, by commitments from sectors such as aviation, which must replace 70% of its fuel consumption with Sustainable Aviation Fuel (SAF) to comply with European Union regulations (European Council of the European Union, 2023).

Regarding the utilization of waste fats and oils, the country has recognized their potential through regulations developed since 2008. In 2018, the Ministry of Environment and Sustainable Development issued Resolution 0316, establishing the necessary elements for the valorization of used cooking oil in Colombia. In 2019, through the National Circular Econo-

⁴ “second-generation biofuels can be manufactured from all sorts of bioresources other than food crops. It can include various biobased raw materials consisting of energy crops, crops and forest residues, construction, and municipal waste.” (Kumar et al., 2022)

my Strategy (Ministry of Environment and Sustainable Development, 2019), biomass was recognized as a priority flow for developing business models for its utilization, including energy valorization. Later, in 2022, the country established the Energy Transition Policy, which recognizes the potential of waste for biofuel generation from a circular economy perspective (CONPES, 2022). At the local level, Bogotá D.C. has a Circular Economy Policy (Mayor's Office of Bogotá, 2023) and a Public Services Policy, which sets strategies to promote circular business models across different sectors.

To address these challenges and within the framework of public policy, innovative alternatives are being developed in the country to prevent surface water contamination by oils and fats and to enable their recovery and utilization. For example, since 2018, ZhanaSolutions, a local startup, has created an innovative technological solution that removes over 99% of this waste, reduces the carbon footprint of discharges from this sector, and decreases the gray water footprint. This technology reduces wastewater emissions from industrial kitchens from 110 kg of CO₂ equivalent per cubic meter to 30 kg, as well as the water needed for one liter of wastewater to reach the maximum COD load set by regulations, decreasing water use from 1,606 liters to 358 liters in Bogotá (CarbonBox, 2025). However, for this solution or similar ones to grow, clear enabling conditions, regulatory adjustments, economic incentives, and intersectoral coordination are required.

To this end, in 2024, Fondo Acción and ZhanaSolutions, with support from the P4G platform through a grant, launched a project to expand a circular management model for brown fats, aiming to generate clean energy. The project included, among other activities, the development of technical and regulatory studies to identify barriers and opportunities for improvement. These analyses and recommendations are presented in this document as a roadmap to transform an environmental problem into a strategic opportunity for the country's energy transition.





Scale of the problem \

Discharges from industrial kitchens in the HORECA sector contribute a pollutant load of fats and oils that cause significant operational, environmental, and human health impacts; however, today they are classified as domestic wastewater.

- Studies conducted within the framework of the project have documented cases where restaurants in Colombia (classified under CIU code 5611 'Food service activities') exceed the maximum levels of fats and oils in their wastewater discharges by up to 380 times according to current regulations (Zhana Solutions, 2025).
- ACUACAR, the water and sewer company of Cartagena, D.C. and T., reported that in 2024, more than 30% of sewer blockages in the city were caused by fats combined with other materials. A significant number of these blockages occurred in the tourist area (Aguas de Cartagena, ESP, 2025).
- Meanwhile, the District Secretariat of Environment of Bogotá D.C. (SDA) indicated that 56% of establishments involved in food preparation activities and subject to regulation have had difficulty complying with current legal environmental requirements regarding the management of oils and fats (Secretaría Distrital de Ambiente - SDA, 2025).
- These non-compliances are caused by 1) technical limitations in restaurants, especially smaller ones, that prevent installing the necessary infrastructure for removing fats and oils, and 2) the use of inefficient technologies that demand maintenance not performed correctly.
- These limitations stem from restaurants lacking the financial resources to make these investments and their teams not being trained in proper waste management. Moreover, the limited capacity of environmental authorities to oversee compliance also contributes to violations of legal requirements concerning the discharge of fats and oils into wastewater.

Environmental impacts

The brown fats that reach city sewer systems through discharges from industrial kitchens have significant adverse environmental impacts. For example, they can drastically reduce the oxygen available in the water, affecting water quality, ecosystem health, and human health, creating anoxic environments and containing toxic components harmful to human health.

- The study from EAN University (Universidad EAN, 2025b) found that the brown fats present in the discharges of the analyzed sample ⁵ generate significant physical, chemical, ecotoxicological, and human health impacts. Wastewater from industrial kitchens can have COD levels up to 18 times higher (4,425 – 18,000 mg O₂/l) than those in domestic wastewater (500-1,000 mg O₂/l) (Universidad EAN, 2025a).
- The total potential environmental impact, assessed through the Potential Environmental Impact ⁶, for a flow of brown fat into the water of 100 kg/h was 136.9 PEI/h, dominated by human toxicity from ingestion (36.3%) and terrestrial toxicity (36.2%) ⁷.
- One of the components of the brown fat discharged into wastewater from restaurants, SDBS (dodecylbenzenesulfonate sodium), although only representing 1.5% of the residue, showed severe acute toxicity (EC = 0.75 ppm) ⁸. This compound, present in

5 This study was carried out in Bogotá D.C. and Cartagena D.T. y C. involving 23 restaurants and 92 effluent samples taken before the grease trap. Of these, 60% are classified as “tablecloth,” signifying luxury and high-end service. 35% are “frying” restaurants that serve foods cooked in oil or animal fat, such as chicken and burger outlets. Only one coffee shop was part of the study. All establishments used a G-Trap pretreatment system.

6 This indicator integrates mass flow data with environmental characterization factors that reflect the toxicity, persistence, and potential ecological damage of a compound, covering different impact categories.

7 Analysis conducted by EAN University for the representation of a universal sample based on the analyses performed.

8 Ibid.

brown fats, has a highly toxic profile for aquatic species such as crustaceans or algae (Universidad EAN, 2025b).

- The carbon footprint of wastewater treated through traditional pre-treatment systems like passive grease traps is 110 kg of CO₂eq/m³ (CarbonBox, 2025).
- The amount of water needed to ensure that one liter of wastewater from passive grease traps meets the maximum BOD load established by Resolution 0631 of 2015 from MI-NAMBIENTE (600 mg per liter) is 1,606 liters in Bogotá and 635 liters in Cartagena, D.T. and C. (CarbonBox, 2025).



Regulatory gaps \

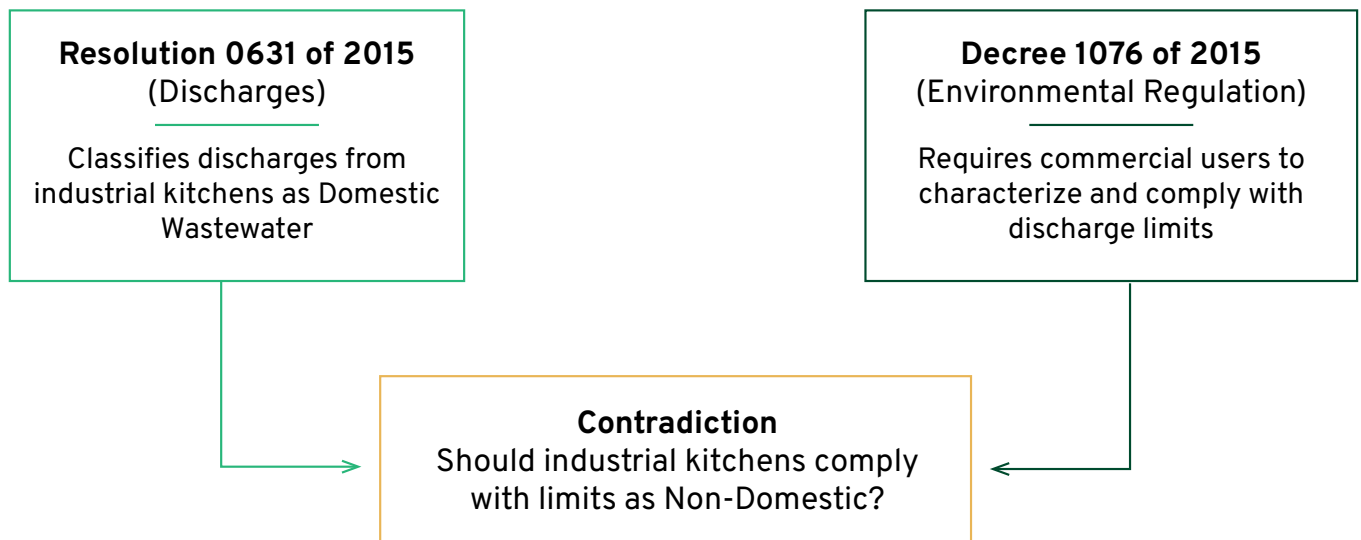
The leading producers of brown fat waste, the HORECA sector, receive confusing signals from current regulations regarding their obligations concerning the brown fat discharged into the wastewater they generate.

- Although there is a clear and robust regulatory framework for managing wastewater discharges into surface water resources and marine waters (Resolution 0631 of 2015 and Resolution 883 of 2018 from the Ministry of Environment and Sustainable Development), currently, this regulation classifies discharges from industrial kitchens as domestic wastewater (Article 2). Consequently, establishments are not subject to the obligations established in the regulation for responsible parties of non-domestic wastewater discharges, such as complying with the discharge limit for fats and oils, which is set at 20 mg/L (Universidad EAN, 2025c).
- On the other hand, Decree 1076 of 2015, in its articles 2.2.3.3.4.17 and 2.2.3.3.4.18, regulates the obligation for commercial, industrial, official, and special users to characterize their discharges according to protocols defined by the Ministry of Environment and Sustainable Development, comply with the current discharge standards, report to the service provider, and if there are violations, have the provider report them to the environmental authority. In this sense, it appears that the two regulations, particularly in the context of industrial kitchens, contradict each other, creating confusion regarding the obligations.
- The Ministry of Environment and Sustainable Development has confirmed that there are no ongoing efforts to modify Resolution 0631 of 2015, and discharges from industrial kitchens continue to be classified as domestic wastewater (Ministry of Envi-

ronment and Sustainable Development, 2025). Thus, ambiguity remains regarding the responsibilities of the HORECA sector in managing its discharges.

- The Ministry recognizes that local environmental authorities can impose stricter limits under the principle of subsidiarity. Still, it is unclear whether they can change the classification of waters generated by industrial kitchens from domestic to non-domestic wastewater (Ministry of Environment and Sustainable Development, 2025).

Figure 1: Relationship between Decree 1076 of 2015 and Resolution 0631 of 2015 regarding industrial kitchens.



Note: Own elaboration

On the other hand, the sector lacks clear incentives to recover the brown fats resulting from wastewater pre-treatment. Consequently, efficient systems that improve their quality are not invested in, and their potential as a feedstock for biodiesel production is wasted.

- Biodiesel has been a commitment of the Colombian government, supported by a regulatory framework that has encouraged investment since 2004, when Law 939 on biofuels was enacted, opening a market for its production. This law defines biodiesel in Article 6 as methyl/ethyl ester produced from vegetable or animal oil of a quality comparable to diesel.

- However, the law's emphasis was on biofuels derived from low-yield crops, promoting their expansion. Alternative sources, such as fatty waste, were not explicitly included. Due to the lack of a clear use, brown fat is considered by many generators to be special or hazardous waste, which is sent for final disposal rather than being transformed.
- In 2018, the Ministry of Environment and Sustainable Development (MADS) issued Resolution 0316, which regulates the management of Used Cooking Oil, recognizing it as a recoverable waste and promoting its reuse, among other uses, as an input for biodiesel production, marking a significant advance in the utilization of fatty waste, supporting the creation of a recovery system. However, this initiative overlooks waste from grease traps.
- In 2019, the country established the National Circular Economy Strategy, which included residual biomass as a priority flow for developing reuse models. This strategy set goals for the utilization of residual biomass and energy generation from these wastes, with an emphasis on the agroforestry sector.
- As a result, although progress has been made in promoting energy recovery from waste, there are no explicit incentives for the recovery of fatty waste despite an estimated recovery potential of up to 77.96% (Biotrade, 2024, 2025).
- Finally, although innovative solutions exist that enable the recovery of fatty waste from industrial kitchen discharges, there are barriers to their adoption related to a lack of awareness of their capacity to meet current technical pre-treatment standards.

Opportunities \

Although the regulations are not clear, the public and private sectors have made progress in identifying and realizing opportunities and have developed strategies to promote proper management of greasy waste by involving the HORECA sector.

- The country has a set of national and local policies focused on the energy transition (CONPES 4075 of 2022) and toward a circular economy (National Circular Economy Strategy, resolution 0316 of 2018 from MADS, Decree 233 of 2023 from the Mayor's Office of Bogotá, and CONPES Bogotá D.C. No.35 of 2023), which promotes innovative circular business models that enable the utilization of flows such as residual biomass and fatty waste as one of the government's priorities.
- Building on this policy framework, territorial entities like Bogotá are implementing initiatives such as Fat-Free Zones, urban areas with a significant number of fat generators interested in utilizing them through technological solutions for waste recovery and engaging in a utilization model for biodiesel production.
- Other opportunities offered by existing public policies include funding for innovation projects related to biofuel production (CONPES, 2022, p. 85), support for productive projects that incorporate circular models through local environmental management programs, strengthening circular productivity, supporting the creation of circular production chains, and promoting the circularity of biomass (Mayor's Office of Bogotá, 2023).
- Green businesses also offer the country an opportunity to strengthen and promote circular business models that contribute to the energy transition by utilizing fatty waste.

The 2020 National Green Business Plan aims to develop, promote, and encourage the supply and demand for businesses that meet the criteria established in the plan.

- Environmental seals are tools developed to highlight the management of companies or products concerning specific environmental criteria, such as green businesses. Currently, the country has the Colombian Environmental Seal awarded by the National Authority of Environmental Licenses. These instruments enable the holder to express their commitment to the relevant theme, thereby playing a crucial role in promoting and adopting models for waste energy recovery (ZhanaSolutions, 2025).



Policy recommendations

Based on the gaps identified in the previous section, and to strengthen the enabling environment for the prevention of brown grease discharges from the HORECA sector and its use as an alternative fuel, the following recommendations are made:

Regulation

Given the chemical and pollutant load characteristics of wastewater from industrial kitchens in the HORECA sector, which far exceed the current established limits and average quantities of domestic wastewater, it is recommended:

1. Modify Resolution 0631 of 2015 from the Ministry of Environment and Sustainable Development (MINAMBIENTE), national regulation, to classify industrial kitchens as sources of non-domestic wastewater (ARnD), including a clear and practical definition of industrial kitchens based on their function and size, not on the commercial use of the place.



2. Establish a technical classification based on the actual load of pollutants (fats and oils), regardless of the use or location of the establishment, and include it in the national regulation, the resolution 0631 of 2015. This allows for treatment obligations to be assigned proportionally to the environmental impact, promoting environmental justice and efficient regulation.
3. Implement a system of scaled environmental obligations, particularly regarding the treatment of discharges, according to the discharge load and the operational capacity of the establishment to meet maximum loads. This method recognizes the diversity of the sector and avoids unfair sanctions, facilitating the progressive adoption of good practices.
4. Develop local regulations, following the principle of subsidiarity, that enable territorial entities to create the regulatory environment that promotes the circular management of greasy waste from industrial kitchens at the local level.

Capacity development and incentives

Many of the challenges in complying with existing regulations are due to the limited capacities of those who exercise control in the territories and those who can be part of the management model, reflected in the lack of qualified personnel, lack of awareness of opportunities for the utilization of fatty residues, advanced technologies, tools to assess compliance, and limited resources. In this regard, it is recommended:

1. Create collaborations between the private sector, academia, and government to develop the capacities of local environmental authorities and relevant actors in the circular chain of brown fats using innovative treatment technologies and circular business models.
2. Strengthen the Free Fatty Acid Zones program by establishing circular management polygons where stakeholders monitor fat discharges, adopt technological solutions for fatty waste recovery, link to biodiesel production chains, monitor impact indicators, and connect participants to Green Business programs.
3. Develop a local or national environmental seal that recognizes HORECA sector companies that properly manage fats using approved technologies. A visible seal on tourism and gastronomic platforms recognizes those who adopt good practices, creating reputation incentives. Its implementation in collaboration with industry groups and local entities ensures legitimacy and growth. This seal can be linked to the Free Fatty Acid Zones and other existing corporate environmental management tools.

4. Encourage water utility companies to implement digital monitoring systems for discharges that allow measuring the impact of regulations and compliance with current obligations. These systems must measure the indicators established in Resolution 0631 of 2015 (BOD, COD, pH, fats, and oils), as well as include derived indicators such as CO2 equivalent emissions and water footprint.
5. Design and implement financial instruments in partnership with the financial sector to access the necessary technology for recovering brown fats from wastewater, facilitating system actors' access to recovery technologies. These instruments include green credits for restaurants to install efficient systems, local pay-for-results ⁹ programs for restaurants leveraged on savings in operating costs of water and sewer companies, and facilities created with donation resources to offer subsidized loans.

Biofuels regulation adjustments

Considering the energy recovery potential of the fat waste recovered during the pre-treatment process of wastewater from HORECA sector establishments, it is recommended:

1. Promote the use of fatty waste for biodiesel by assessing the necessary percentage adjustments to existing regulations to boost biodiesel blending levels nationwide. This includes reviewing Resolution 40266 of 2022 from the Ministry of Mines and Energy (MINMINAS) and the Ministry of Environment (MINAMBIENTE), as well as revising Resolution 0316 of 2018 from MINAMBIENTE to classify brown fats as waste requiring special management, as specified in Resolution 0316 of 2018 from MINAMBIENTE.

⁹ For example, in Brazil there is PRODES, a program aimed at water supply and sewerage companies to finance the construction of wastewater treatment plants, based on decontamination results ([learn more here](#)).

Action plan \

To further these recommendations, Table 1 in the annexes outlines an action plan with proposed activities, involved stakeholders, and timelines for execution. This section summarizes these proposals:

Reclassification of discharges from industrial kitchens.

Form an interagency technical committee to recommend revisions to Resolution 0631, clearly define what constitutes an ‘industrial kitchen,’ and conduct public consultations with the HORECA sector. The responsibility will rest with MINAMBIENTE, with support from Congress, SDA, and CAR.

Classification by pollutant load.

Based on technical discharge studies and detailed research, specific criteria will be incorporated into the regulations. These will be validated by authorities and industry groups, with MINAMBIENTE, universities, SDA, and trade associations taking responsibility.

Progressive and differentiated obligations.

Develop obligation scales based on the capacity of the establishments, conduct pilot projects, and gradually implement sanctions. The main stakeholders will include MINAMBIENTE, CAR, industry groups, and municipalities.



Adapted territorial regulation.

Local governments will develop ordinances or municipal agreements based on national standards, providing specific incentives for each region. The responsible entities include governorates, mayors' offices, SDA, and CAR.

Capacity building.

Develop training modules, regional workshops, and platforms for sharing experiences in innovative technologies and circular economy models. This initiative involves MINAMBIENTE, universities, SDA, CAR, international partners, and industry groups, with an immediate start and ongoing annual activities.

Consolidation of the Free Fatty Acids Zones program.

Identify circular management polygons in pilot cities, coordinate with the Green Business Route, and monitor environmental and business indicators. Responsible entities include MINAMBIENTE, MinCIT, mayors' offices, and HORECA industry associations.

Creation of an environmental seal.

Establish criteria and verification manuals, run pilots with restaurants and hotels, and promote their adoption on tourism and gastronomic platforms. This initiative will be led by MINAMBIENTE, MinCIT, industry associations, and mayors' offices.

Digital monitoring of discharges.

Create a real-time platform, train staff from water supply companies, and share data with environmental authorities. Responsible parties include water supply companies, Super-servicios, SDA, MINAMBIENTE, and technology providers.

Financial instruments for circularity.

Identify national and international funding sources, establish green credit lines and subsidies with banks focused on sustainability, and help companies access these resources. Led by the Ministry of Finance, in collaboration with MinMinas, MinCIT, development banks, and supported by industry associations.

Integration into the biofuels policy.

A legal proposal will be developed to include brown fats in Law 939 and Resolution 0316. Pilots for biodiesel blending will be coordinated, and progressive blending targets will be established at the national level. Responsible entities include Congress, MinMinas, MINAMBIENTE, and Fedebiocombustibles.

Path for regulatory adjustment \

The transition from the current regulations toward reclassifying discharges from industrial kitchens as non-domestic wastewater, along with creating conditions to promote the demand for biofuels derived from brown fats, requires a coordinated process across different institutional levels.

At the national level, MINAMBIENTE leads the regulatory review, with technical support from the National Planning Department (DNP) and coordination from ministries such as MINMINAS and MinCIT. This process involves updating Resolution 0631 of 2015 to include the new classification of discharges and modifying Resolution 0316 of 2018 to introduce brown fats as a subject of special management.

Additionally, MINMINAS is responsible for adjusting regulations on the minimum content of biofuels, ensuring a market space for biodiesel produced from residual fats. The technical procedure involves preparing a draft resolution based on scientific and technical evidence regarding the pollutant load of these discharges and the energy potential of brown fats. This draft must undergo public consultation, including dialogue tables with key stakeholders such as associations from the HORECA sector (e.g., ACODRES), gastronomy and sustainable tourism groups (ANGAT), universities and research institutes, water and sewerage service companies (ANDESCO), biofuel producers (Fedecombustibles), as well as transportation sectors like aviation and maritime, considered potential users of advanced biodiesel.

Regional and local environmental authorities can also enforce stricter standards within their jurisdictions by applying the principle of subsidiarity. For instance, the SDA might

issue a local resolution that designates industrial kitchen discharges as non-domestic, thereby enhancing the enforcement of national regulations and tailoring them to local circumstances.

This phased and coordinated strategy guarantees that regulatory updates are technically valid, institutionally practical, and socially accepted. Moreover, it helps ensure that regulation not only diminishes environmental impacts but also fosters new business opportunities for valorizing brown fats, thereby reinforcing the economic fabric amid energy transition and circular economy initiatives.



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Table 1: Action plan for the implementation of the recommendations

No.	Policy Recommendation	Strategy	Sub-activities	Responsible Parties	Suggested Timeline
1	Classify industrial kitchen wastewater as non-domestic, with a practical definition in the regulation	National regulatory adjustment	Establish an inter-institutional technical roundtable Draft a proposal to amend Resolution 0631 Define “industrial kitchen” based on pollutant load Conduct public consultation with HORECA associations	Ministry of Environment (MINAMBIENTE), Congress, Regional Autonomous Corporations (CAR), ACODRES, ANDESCO, ANGAT, universities	2025–2026
2	Use pollutant load as the classification criterion instead of economic activity	Impact-based regulation	Conduct technical studies of discharge loads Incorporate differentiated criteria into regulation Validate proposal with local authorities and associations	MINAMBIENTE, Congress, CAR, ACODRES, ANGAT, ANDESCO, environmental authorities, universities	2025
3	Integrate a progressive and differentiated approach in regulatory obligations	Regulatory scaling	Design obligation scales according to capacity and load Pilot model with different types of establishments Incorporate graduality in sanctions and requirements	MINAMBIENTE, CAR, ANDESCO, ACODRES, ANGAT, municipalities	2025–2026
4	Develop local regulation under the subsidiarity principle	Locally adapted regulation	Draft local regulations (e.g., ordinances or municipal agreements) Develop local norms exceeding national standards Create local incentive frameworks for circularity	Departments, municipalities, District Secretariat of Environment (SDA), CAR	2026
5	Build capacity in environmental authorities and value chain actors	Institutional and technical strengthening	Design training modules on technologies and the circular economy Conduct regional workshops and training sessions Promote experience-sharing among territories	MINAMBIENTE, universities, ACODRES, ANGAT, tech companies	Immediate start, annual

No.	Policy Recommendation	Strategy	Sub-activities	Responsible Parties	Suggested Timeline
6	Strengthen the “Grease-Free Zones” program and link it to Green Businesses	Pilot consolidation and scaling	Identify circular management areas Integrate with the Green Business Route Monitor environmental and business indicators	MINAMBIENTE, Ministry of Commerce, Industry and Tourism (MinCIT), municipalities, HORECA associations, ACODRES, ANGAT, green businesses	2025–2026
7	Create an environmental label for sustainable HORECA establishments	Reputational incentive	Design criteria and verification manual Pilot with restaurants and hotels Promote label on tourism and gastronomy platforms	MINAMBIENTE, MinCIT, associations (ACODRES, ANGAT), municipalities, universities, media	2026
8	Implement digital wastewater monitoring systems by water utilities	Technological innovation in monitoring	Develop real-time monitoring platform Train operators of public service companies Integrate data with local environmental authorities	Water utilities, Superintendence of Public Services (Superservicios), SDA, MINAMBIENTE, international cooperation, tech companies	2025–2026
9	Design and implement financial instruments for energy recovery	Financing for circularity	Identify public and private sources (IDB, CAF) Create green credit lines, technology subsidies, tax incentives for residual inputs Support companies in accessing financing	Ministry of Finance (MinHacienda), Ministry of Mines and Energy (MinMinas), MinCIT, development banks	2026
10	Promote demand for grease residues for biodiesel, adjusting regulations and national blending requirements	Integration into biofuel policy	Draft technical and legal proposal to amend Law 939 and Resolution 0316 Coordinate with Congress and Fedebiocombustibles Set progressive biodiesel blending targets using grease residues	Congress, MinMinas, MINAMBIENTE, Fedebiocombustibles, biofuel producers, fuel suppliers, IATA, ARMCOL	2026–2027

Table 2: Supporting studies for the identification of public policy recommendations

ID	Source type	Code	Institution or actor	Topic
1	Petition	DP-001	Office of the Attorney General of the Nation	Petition about resolution 0631 of 2015 revision
2	Petition letters	DP-002	Superintendencia de Servicios Públicos	Supervision responsibilities and impact on public funds
3	Petition letters	DP-003	Environment and Sustainable Development Ministry	Answer to the petition about the adjustment of the resolution 0631 of 2015 del.
4				Environment and Sustainable Development Ministry
5	Petition letters	DP-004	Office of the Attorney General of the Nation	Transfer of the inquiry regarding the adjustment to Resolution 0631 of 2015 to the Ministry of Environment and Sustainable Development (MADS)
6	Interviews	EN-001	Julio Galindo - P4G	Project supervision
7	Interviews	EN-002	Francisco Vivas - ZhanaSolutions	Project structure
8	Interviews	EN-003	Miguel Romero - CarbonBox	Carbon footprint and water footprint
9	Interviews	EN-004	Transforma Marketing - Gerardo Torres	Marketing
10	Interviews	EN-005	Sebastián Guerrero - Financial consultant	Financial model and processes
11	Interviews	EN-006	Tomás Correa - Sense IA	Sensor technology and telemetry
12	Interviews	EN-07	María Alejandra Urrutia	Stakeholder management
13	Interviews	EN-008	ZhanaSolutions Team	Project results
14	Interviews	EN-009	Katherine Ballestas	ACODRES Cartagena
15	Technical reports	ET-001	Universidad EAN	Ecotoxicological prospecting analysis
16	Technical reports	ET-002	Universidad EAN	Brown fat's chemical and physical analysis
17	Technical reports	ET-003	Zhana Solutions	Background on the management of oils and fats in wastewater
18	Technical reports	ET-004	Universidad EAN	Regulation analysis
19	Technical reports	ET-005	CarbonBox	Carbon footprint and water footprint of Gtrap

ID	Source type	Code	Institution or actor	Topic
20	Consultant reports	IC-001	Biotrade	Brown fat analysis for biodiesel production
21	Consultant reports	IC-002	Quarta	Legal advisory
22	Consultant reports	IC-003	Camila Cristancho	Project management
23	Consultant reports	IC-004	Carolina Varón	Project management
24	Consultant reports	IC-005	Transforma Marketing	Marketing strategy
25	Consultant reports	IC-006	Santiago Morales	Sales process
26	Consultant reports	IC-007	Mateo Chalarca	Sales process
27	Consultant reports	IC-008	Sebastián Guerrero	Sales process
28	Consultant reports	IC-009	Danilo Arenas	Sales process
29	Consultant reports	IC-010	Sense IoT	Sensor technology
30	Meeting record	ME-001	DNP - DDU	Meeting with the Urban Development Department (DNP)
31	Meeting record	ME-002	Stakeholders	First technical roundtable in Cartagena
32	Meeting record	ME-003	Office of the Attorney General of the Nation	Bilateral meeting
33	Meeting record	ME-004	Cartagena's mayor's office	Meeting with the Cartagena Mayor's Office (Department of Tourism and Environmental Affairs)
34	Meeting record	ME-005	DNP - DIE	Meeting with the DNP office for infrastructure and sustainable energy
35	Meeting record	ME-006	Stakeholders	Second Technical Meeting: Incentives for the Private Sector
36	Other	OT-001	Cristian Espejo	Operational management
37	Other	OT-002	ZhanaSolutions	Quarterly report to P4G Q2 2024
38	Other	OT-003	ZhanaSolutions	P4G Workplan
39	Other	OT-004	ZhanaSolutions	Project concept note
40	Other	OT-005	ZhanaSolutions	Change theory for the project
41	Other	OT-006	ZhanaSolutions	Performance report Q2 2025

Table 3. Participants in the technical tables and meetings with stakeholders

ID	Organization	Name	Category
1	Aguas De Cartagena S.A. E.S.P.	Víctor Pérez	Public sector
2	Alcaldía de Cartagena	Francisco Castillo	Public sector
3	Alcaldía de Cartagena	Mercedes Palomino Díaz	Public sector
4	Alcaldía de Cartagena	Valeri M. Hernández Pedroza	Public sector
5	Alcaldía de Cartagena	Cinzia Ciódaro	Public sector
6	Alcaldía de Cartagena	Estefanía Larios	Public sector
7	ANDI Bolívar	Gustavo Carballo	Industry association
8	BioD	Catalina	Business partner
9	BioTrade	Hernando Barón	Business partner
10	BioTrade	Juan Diego Vélez	Business partner
11	BioTrade	Roberto Terrios	Business partner
12	CarbonBox	Viviana Bohórquez	Technical consultant
13	COTELCO	Helen Ramos	Industry association
14	COTELCO	Paola Meléndez	Industry association
15	DNP Crédito Público	Natalia Varón	Public sector
16	DNP DDU	Christian Millán	Public sector
17	DNP DDU	Rafael Arias	Public sector
18	DNP DDU	Farid Rodríguez	Public sector
19	El Pasquín de Joaco	Camilo Briñez	Customer
20	Empresa de Acueducto y Alcantarillado de Bogotá	Octavio Reyes	Public sector
21	FENALCO	Andrés Manzano	Industry association
22	FENALCO Cartagena	Andrés Manzano	Industry association
23	Fondo Acción	Carlos Casallas	Business Partner

ID	Organization	Name	Category
24	Fondo Acción	Elizabeth Valenzuela	Business Partner
25	FONTUR	Andreina Morales	Industry association
26	Hotel Rosario de Mar	Clara Ibeth Ramírez González	Customer
27	Kiosko el Bony	Bonifacio Ávila	Customer
28	Mood Matuna	Juan Camilo Ossa	Customer
29	Osaka Cartagena	Yeimi Paramo	Customer
30	P4G	Julio Galindo	Donor
31	P4G	Adriana Castro	Donor
32	PGN	Olga Patín	Public sector
33	PGN	Carlos Echeverry	Public sector
34	Restaurante El Beso	Alexandra Betancourt	Customer
35	SDA	Francisco Erazo	Public sector
36	Secretaria de Ambiente Bogotá	Camilo Monroy	Public sector
37	Sion Gardens	Carlos Anaya	Customer
38	Triple A S.A.	Catherine Fren	Business partner
39	Universidad EAN	Luisa Carvajal	Technical consultant
40	ZhanaSolutions	Carolina Varón	Grantee
41	ZhanaSolutions	Cristina Sánchez	Grantee
42	ZhanaSolutions	Danilo Arenas	Grantee
43	ZhanaSolutions	Francisco Vivas	Grantee
44	ZhanaSolutions	Javier De Castro	Grantee
45	ZhanaSolutions	María Alejandra Urrutia	Grantee



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