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# BELGIAN CONSUMPTION OF SUGARCANE ETHANOL FROM BRAZIL AND PERU

Shared  
responsibilities  
of human rights  
violations



Funded by  
the European Union



**OXFAM**  
België | Belgique

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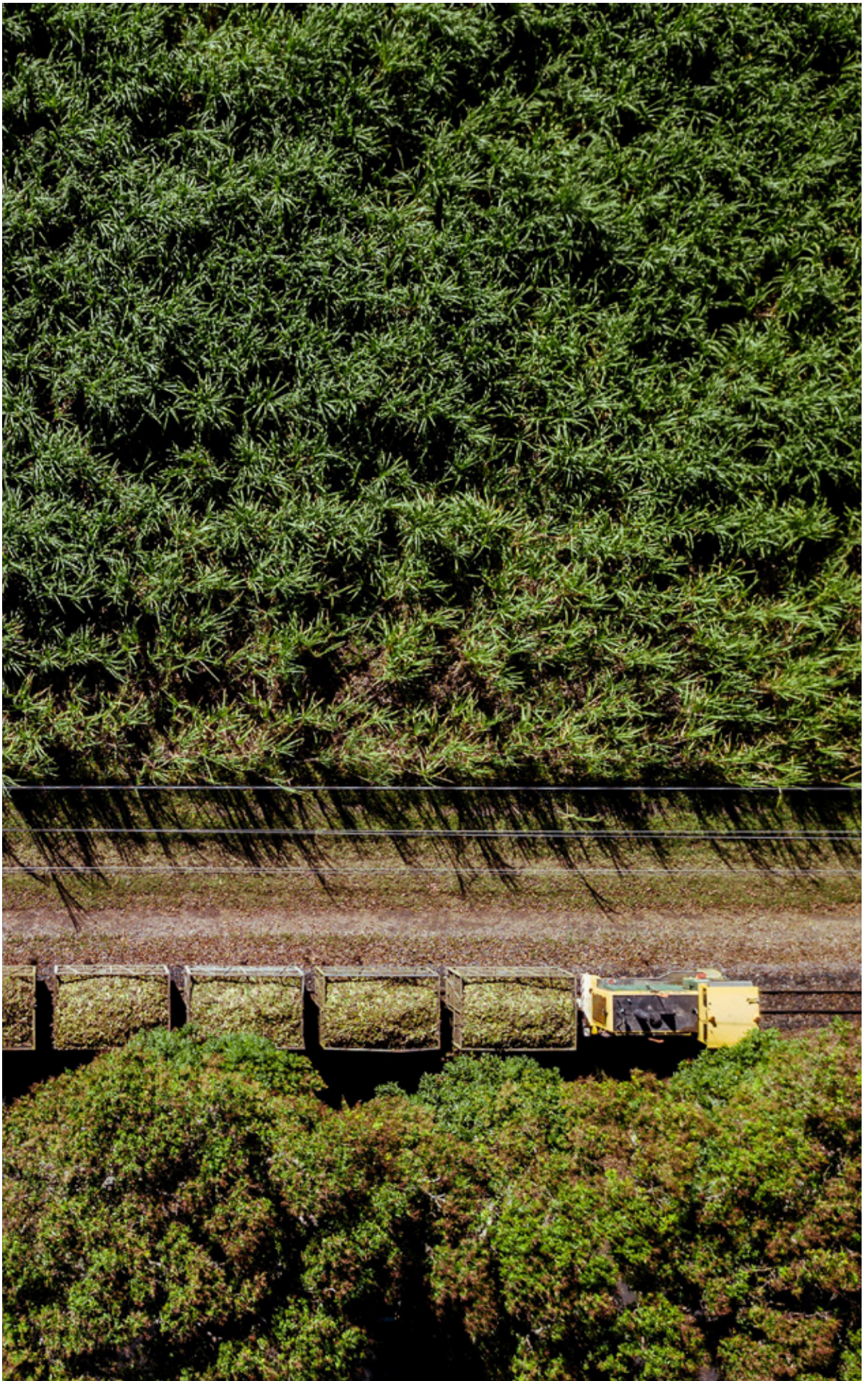
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# Main highlights

- In 2021 all gasoline consumed in Belgium included bioethanol to different levels, as mandated by law (79% (1.66 million tonnes) of the gasoline consumed was E10 (Euro 95), while 21% (450,000 tonnes) was Euro 98 with 0% to a maximum of 5% bioethanol).
- **Transparency** in ethanol value chains remains very low. The obligation for companies to disclose this type of information publicly is very limited, and there is a lack of harmonized trade data with more than 16 trading codes identified by the EU commission as pertinent.
- Belgium **has imported biofuels<sup>a</sup> from 75 different producer** countries between 2018 and 2022, including Brazil and Peru. In addition to these, countries identified in the sugarcane ethanol value chain from producer to consumer include, among others: Norway, Brazil, China, France, Germany, Kuwait, Netherlands, Peru, Russia, Saudi Arabia, Singapore, Switzerland, United Kingdom, United States.
- Brazil has 8.6 million hectares of sugarcane plantations, **more than twice the area of Belgium**. 54% of the production is used for ethanol.
- The study identified more than 330 sugarcane-based production facilities, and analysed more than 60 private actors.
- Severe human right violations identified in producing areas include harming the rights of women, children and indigenous communities, worker's rights, civil and political rights, health rights, the right to education, food, adequate housing, to physical integrity and to live. While the research uses Brazil and Peru as examples, the findings are applicable for the broader context of first-generation biofuels.
- The increasing demand for biofuels is one important factor influencing **the price of cane sugar and its derivatives**. Sugarcane ethanol imports in Belgium have multiplied from 4,193,739 Liters in 2018 to 42,503,323 Liters in 2020. The FAO Sugar Price Index was 117.2 points for December 2022, compared to 68.6 points in August 2018. The number of people affected by hunger globally rose to as many as **828 million** in 2021, an increase of about **46 million** since 2020.
- The lax environmental and human rights safeguards of EU policies promoting "clean" energies have done little to prevent the negative human-rights impacts of land-based biofuels destined for the EU market. **Belgium needs to stop counting the contribution of all land-based biofuels, including from sugarcane, towards the EU's Renewable Energy Directive (RED) targets by 2025 at the latest.**

## Executive Summary

The use of biofuels in road transport as a sustainable source of energy is one of the key strategies used by the European Union (EU) to tackle the climate crisis and cut dependency on fossil fuels produced by controversial regimes like Russia. This strategy is enshrined in the Clean Energy for All Europeans package, and the various iterations of the Renewable Energy Directive (RED I, II, III and IV).

In implementing these policies, Belgian imports of bioethanol made from sugarcane have increased dramatically. But while the Belgian Government promotes the consumption of gasoline-bioethanol blends as a low carbon-footprint solution, the local impacts of sugarcane-based ethanol prove that this energy source is anything but sustainable.

Belgium has increased its mandatory blending targets for bioethanol and biodiesel into conventional fuels during the last years. Following the 2019's National Climate and Energy Plan (NECP), Belgium intended to increase the share of biofuels in transport from an average of 5.5% in 2017 to 13.9% in 2030, with first-generation biofuels accounting for up to 7%.

The Belgian consumption of biofuels is still overwhelmingly based on so-called first-generation biofuels derived from food and feed crops, like grains and oilseeds. A significant share of the first-generation biofuels are imported. Despite the 2022 Government agreement to reduce their share, the legal text is still undergoing revision in 2023.

This consumption causes serious negative social and environmental impacts around the world. Belgium imported biofuels from 75 different countries between 2018 and 2022<sup>b</sup>, including Brazil and Peru. Brazil was the key origin for sugarcane feedstock, accounting for 73% of the sugarcane-based bioethanol consumed on the Belgian market in 2021. However, the negative social and environmental impacts of bioethanol imports from Brazil, Peru, and other Latin American countries remain unknown, underreported, and not sufficiently addressed in European and Belgian legislation.

Oxfam demands that Belgium prohibits the use of biofuels produced from food or energy crops and food by-products to meet the EU's 2030 greenhouse gas reduction and renewable energy targets. We push the EU to phase out land-based biofuels in the targets of their Renewable Energy Directive and only allow advanced biofuels after a robust human rights and environmental impact assessment. Below, we propose ways forward that would allow Belgium and Europe to meet the challenge of sustainable development in the context of climate change without the use of biofuels.

## Methodology

**This study draws from fieldwork done in Peru between June and July 2022, interviewing different stakeholders. This fieldwork was complemented by a controversy scan investigating Brazilian sugarcane ethanol producers. The study has analysed more than 60 companies while reconstructing the sugarcane-based bioethanol supply chain from Peru and Brazil to Belgium.** It builds on the evidence from a previous Oxfam report on a Peruvian plantation set up with the support of Belgium which also found linkages to several European countries acting as transshipment hubs. Brazil was added to the research given it is the main provider of sugarcane ethanol to Belgium.

## Findings

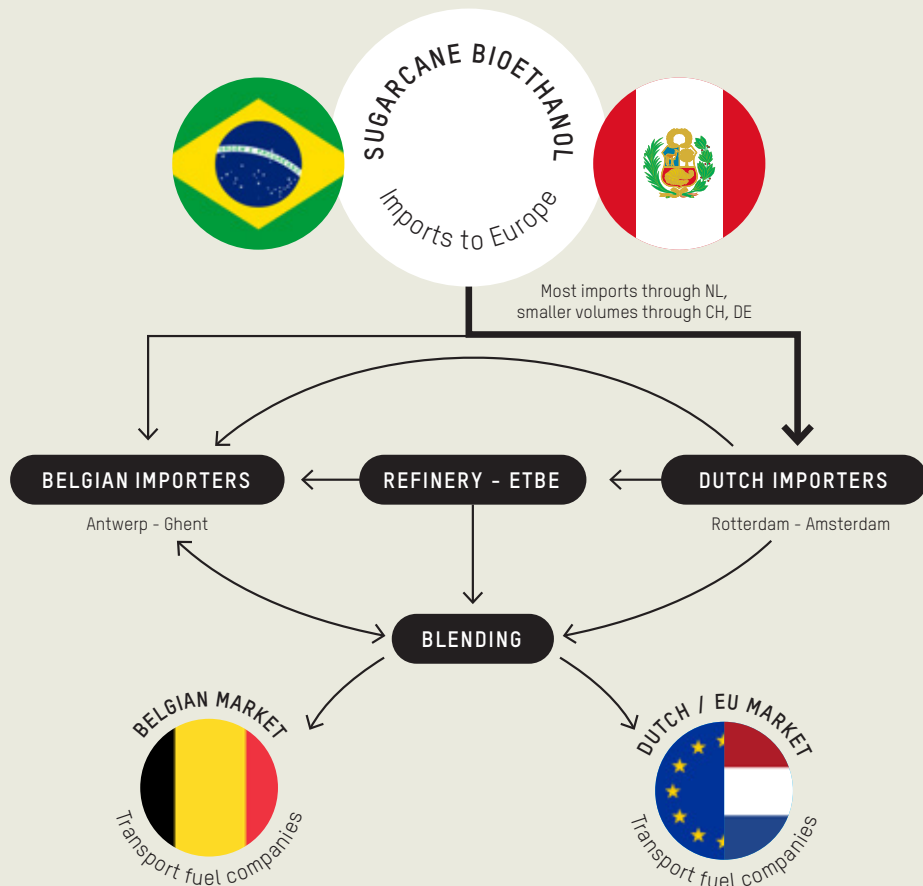
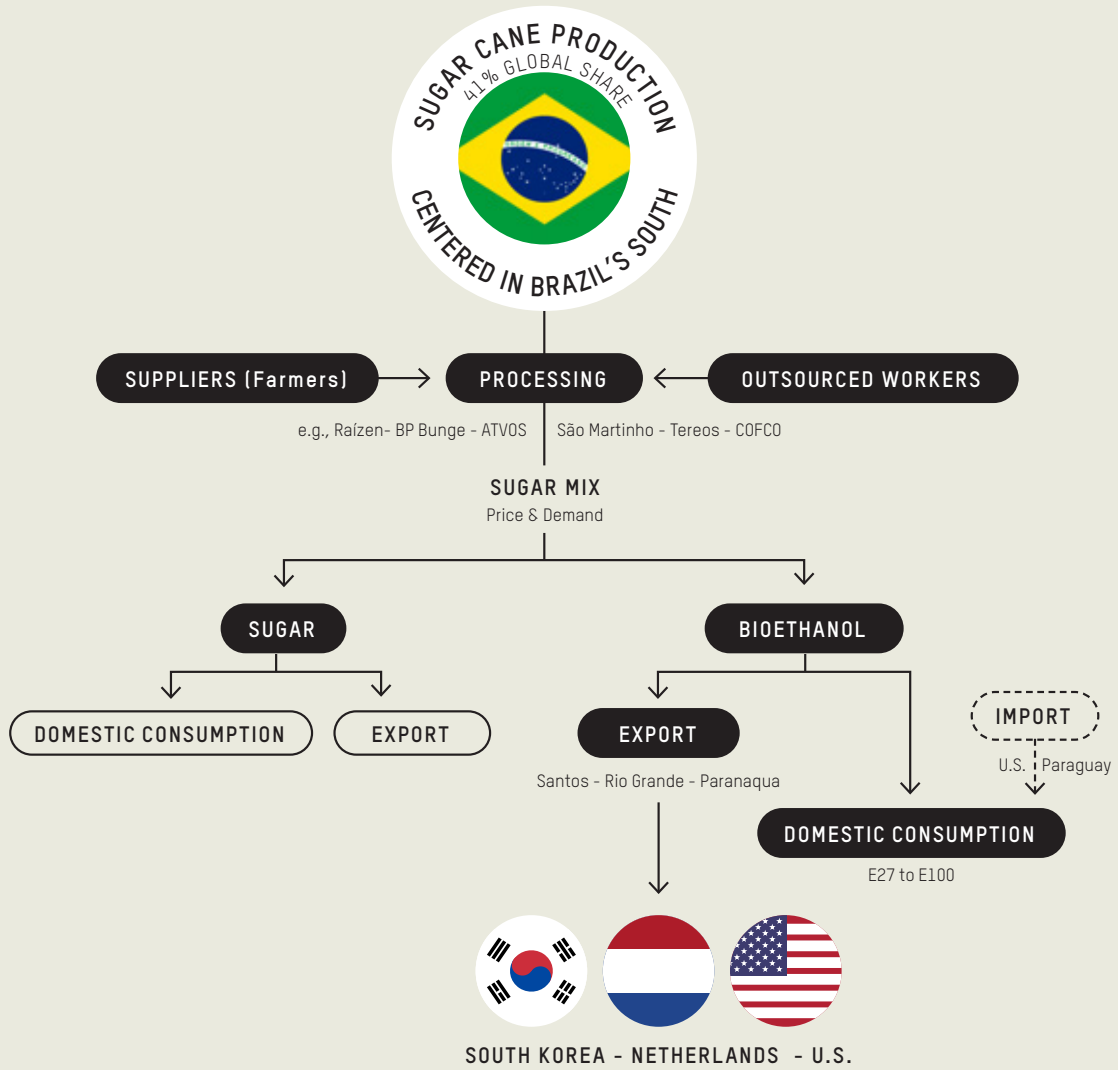
### Supply chain mapping

In Belgium, gasoline consumption increases at an annual compound growth rate of 7% from 2017 to 2021. In 2021, 79% (1.66 million tonnes) of the gasoline consumed in Belgium was E10 (Euro 95), containing 10% of bioethanol, while 21% (450,000 tonnes) was Euro 98 with 0-5% of bioethanol. Latin American sugarcane-based ethanol accounts for 13% of all ethanol-based biofuels consumed in Belgium in 2020.

Sugarcane-based bioethanol is among the biofuel flows to Belgium that have increased in importance in recent years, with Brazil and Peru among the suppliers. Brazil is the largest sugar producer in the world, with 8.6 million hectares of sugarcane and 337 sugarcane-based ethanol plants. While Peru has a much smaller output in comparison, a considerable part of its output is exported. Sugarcane ethanol is processed in ethanol plants in producer countries, and transferred to the ports of Santos, Rio Grande, Paranagua in Brazil, and the port of Paita in Peru mainly by pipeline, where it is then shipped to the EU by boat. The Rotterdam and Amsterdam ports in the Netherlands are the key entry point to the EU and important transshipment hubs to neighbouring countries like Belgium. Once in the EU, it is then blended with gasoline in the Netherlands or in Belgium and distributed to the consumers via European transport networks, including inland waterways, railways, and roads.

The value chain includes sugarcane producers, ethanol plants and blending units, shipment and logistic companies, transshipment facilities, ports, storing units, chemical companies, transport fuel companies, petroleum processors and wholesale traders, and investors like public and private banks and pension funds. These actors included among others, companies like Raízen (in which British group Shell and Brazilian group Cosan each hold 44% stakes), French group Tereos or TotalEnergies Marketing Belgium (TEMB), and investors like Belgian KBC Bank, and Dutch ING Bank. FMO, who invested in the plantation in Northern Peru now excludes projects that compete with food production, unlike ING and Rabo bank. Raízen considers involvement in bioethanol as their contribution to lowering GHG emissions.





## Insufficient transparency

There is no doubt that market actors at various chain levels are involved in enabling the placing of sugarcane ethanol on the Belgian market from Brazil and Peru. However, the lack of transparency in these supply chains hampers a mapping of the physical flows and involved stakeholders.

The obligation for companies to disclose this type of information publicly is very limited, and in some cases companies can legally request for information to be treated as confidential and business-sensitive. Furthermore, there is a lack of harmonized trade data with more than 16 trading codes identified by the EU commission as pertinent. Finally, the bioethanol market's volatility stimulates shifting in sourcing countries which furthers complexifies the traceability.

Nevertheless, the role of the Netherlands as a distribution hub for bioethanol from Latin America is clear from the country's central position in ethanol supplies to Belgium. But due to a lack of transparency in supply chain relations, it is difficult to trace ethanol supplies from Brazil and Peru to storage, blending or transshipment facilities in the Netherlands and pinpoint the responsible actors. Neither is it easy to make clear connections with customers in Belgium. Companies do not release information on their up- and downstream relationships; authorities only report on feedstock flows on a generic level.

## Human rights impacts of sugarcane ethanol production

Severe human right violations identified in producing areas include harming the rights of women, children and indigenous communities, worker's rights, civil and political rights, health rights, the right to education, food, adequate housing, physical integrity and the right to live. While the research uses Brazil and Peru as example, the findings may be applicable for the broader context of first-generation biofuels producer countries.

The social impacts of sugarcane ethanol production in the Chira Valley, Piura, Northern Peru have been widely documented by local media, human rights organisations, community-based organisations, and NGOs, including a report by Oxfam België/Belgique in 2021. Several thousand hectares were bought at prices representing as low as 4% of the market value and without proper consultation of local populations. This led to the legal dispossession of common lands and enclosure of human settlements and public spaces, affecting up to 40,404 inhabitants. The sugarcane ethanol industry in the region has also led to water grabbing, air pollution, and weak governance, and has failed to provide quality employment.

The industry has also severely affected the rights of women in the Chira valley. For example, women who are partners of sugarcane workers see their workload increase due to their partners' long work shifts and insufficient salaries. But also, the water contamination by the runoff of pollutants from the agrochemicals used to grow the sugar cane, further adds to women's unpaid care and domestic work as women are often in charge of fetching and administering household water.

In Brazil, the Guarani tribe is an example of a community who has been severely impacted by ethanol production on their lands. According to the Guarani, the sugarcane production on their lands has had detrimental impacts on their indigenous community, including health issues related to the use of chemicals on the plantation, deforestation, a loss of access to natural medicine, environmental degradation and death of fish and plants due to water pollution.

There have also been widely documented labour rights violations in the sugarcane ethanol industry in Brazil. This includes discrimination against workers for being absent from work or having low productivity, and those who filed labour complaints against the company. Gendered labour rights violations have occurred through abuses of female workers' rights by discriminating based on their gender, health, and productivity.

Finally, increasing demand for sugarcane ethanol leads to an increase in sugarcane ethanol prices, reducing the availability of sugar in the market, which affects the price of associated food products. The increased demand for sugarcane ethanol can happen when gasoline prices surpass sufficiently ethanol prices in Brazil, given the lower energy efficiency of bioethanol, or by increased international demand, such as stimulation of bioethanol by the EU Renewable Energy Directive. There is thus a link between bioethanol policies and the price of food products, which in turn affects equitable access to food.

## Policy recommendations

The lax environmental and human rights safeguards within EU policies promoting “clean” energies have done little to prevent the negative impacts of land-based biofuels destined for the EU market. For member states like Belgium, where the growth of ethanol consumption is strongly driven by the legal obligation and incentives to incorporate biofuels into the fuel blend during the past 15 years, the legal framework has triggered human and environmental rights abuses in the sugarcane ethanol supply chain.

In response to societal pressure for the EU to address these impacts, policymakers have stated their commitments to making biofuels and the transport sector more sustainable. In spite of this, it has become clear that policies – either voluntary private sector initiatives or binding legislation – are falling short of the stated intentions. The latest government agreement in Belgium foresees to phase down first-generation biofuels from 2023 to 2030 and strengthens social considerations. Meanwhile, maintaining the fuel blend obligation and the poor social sustainability criteria keep constituting a driver of human right violations as documented in this report.

Belgian and EU policy makers should, under their respective mandates, address the gaps in the following policy fields.

- **On climate targets:**

- Stop counting the contribution of all land-based biofuels, including from sugarcane, towards the EU’s Renewable Energy Directive (RED) targets by 2025 the latest.
- Advanced biofuels in transport should only be considered as counting towards renewable energy targets after conducting a robust, independent and thorough human rights impact assessment that supports these claims.

- **On human rights assessments and defenders:**

- Enable the adoption of additional sustainability criteria at Member State level in the context of the transposition of RED III. In the context of Belgium’s transposition of RED II, first generation biofuels should be fully excluded immediately.
- Improve and enforce the monitoring mechanism as required by RED and CSDD. This result can be achieved by including more frequent independent audits and include impacts in third countries in the reporting obligations of Member States. As part of human rights due diligence procedures, require gender-sensitive auditing and monitoring that collect and use disaggregated data and that include gender-responsive stakeholder engagement.
- Formulate comprehensive and legally-binding social and environmental sustainability criteria for land-based fuels, advanced fuels and fossil fuels, especially when produced in third countries; to cover land and water grabbing; land, water and air pollution and degradation; impacts on ecosystem services; impacts on governance; respect human rights through the whole value chain, including food security and food sovereignty, health, decent work, child work, women’s rights and Indigenous people’s rights, in future iterations of RED and CSDD and their national implementation.
- Support social movements and peasants in producer countries fighting for their basic human rights, and ensure the protection of environmental defenders and local activists, taking into consideration gendered risks and vulnerabilities.

- Include an accountability and remedy mechanism to compensate for the damaging impacts of biofuel production outside Europe during and after imports are stopped.
  - Include all production, trade and transformation of land-based biofuel feedstock in the risk-sectors that fall in the scope of the EU Deforestation Regulation and the CSDD.
- **On trade and transparency:**
    - Harmonize the 16 trading codes including a single code for sugarcane ethanol for the transport sector.
    - Strengthen companies' obligation to disclose information related to sugarcane bioethanol trade.
    - Implement a standardised set of reporting obligations under the EU regulations for both Member State authorities as well as companies to increase transparency towards the public. This reporting should include, at a minimum, data on national production, import and use of biofuels by type, traded volumes, direct and indirect origins of biofuel imports, and of the used feedstock. Downstream companies should be obliged to provide transparency on their feedstock supply chains to also allow civil society to identify social and environmental issues in these supply chains.
    - Refrain from adopting free trade agreements which are increasing transcontinental exchange of agricultural products, unsustainable production models in rural areas and who are further supporting rural migration to urban precarious jobs.
    - With regard to the negative impact of biofuels, the new EU-Mercosur Association Agreement should only be considered to be adopted if its provisions are in line with the EU Green Deal's principle of considering the implications of imports and establishing trade regulations that may mitigate the risks related to the imports of biofuel, and if its sustainability provisions do not take the social and economic impact on small farmers and agricultural workers into account. To keep democratic control over the process, the European Commission should not split the Association Agreement into a political and commercial part, to avoid ratification by the national parliaments.
  - **On food and transport:**
    - In moving away from fossil fuel-based energy sources, strong safeguards should be put in place in relevant policy instruments, including RED and CSDD, to identify, prevent, address, and remedy any negative human rights and environmental impacts that alternative sources may entail.
    - Aim to significantly reduce the carbon footprint of transport by designing policies that prioritise the efficient use of public mass transportation and that discourage the use of individual private transport.
    - In reducing the emissions linked to freight transport, EU and Member State governments should design policies that prioritise lowest emitting transport modes, shorten supply chains, increase transport efficiency, including on global transport routes, encourage local agroecological food<sup>6</sup> and non-food production and consumption, reduce volumes and types of packaging and food waste, disincentivize (over)consumption, and encourage repairing and recycling.
    - Governments must rebalance the power in food supply chains, and ensure that the rights of the farmers and workers producing our food are respected. Therefore, more support should be directed to farmers and agricultural workers to expand sustainable domestic and local food production.
    - Taking these measures would reduce dependence on international markets, which exposes countries to supply disruptions and price fluctuations. It is essential that small-scale farmers in low-income countries are supported in having more access to funding, infrastructure, inputs and markets, and that their land rights are protected.



## Abbreviations

CBA	Collective Bargaining Agreement
EISA 2007	U.S. Energy Act of 2007
EPS	Institutional Health Service Providers insurance system
ETBE	Ethyl tert-butyl ether
EU	European Union
FNT-CGTP-ABA	National Federation of Workers in the Food, Beverage, and Related Sectors
FQD	European Fuel Quality Directive
FTA	Free Trade Agreement
HREDD	Human Rights and Environmental Due Diligence
HS	Harmonized System of trade codes
ILO	International Labour Organization
IPO	Initial Public Offering
NECP	National Energy and Climate and Plan
NDC	Nationally Determined Commitment for emission reductions
OSH	Occupational Safety and Health
PPE	Protective Personal Equipment
RED	European Renewable Energy Directive
UNGP	United Nations Guiding Principles on Business and Human Rights
USDA	U.S. Department of Agriculture

# Introduction

There is no doubt that the dependence on fossil fuels needs to be urgently cut if the world wants to avert catastrophic climate change. The urgency is further exacerbated by the global events of the past year, which have shed light on the risky dependence of the European economy on Russian oil and gas. Building on the European Union (EU) Renewable Energy Directive (RED) that was introduced in 2011, and its further amendments, the EU Member States have increasingly relied on biofuels, mostly produced from agricultural crops, as an instrument to supposedly achieve CO<sub>2</sub>-emission reductions from transport. Belgium is no exception, with consumption of biodiesel and bioethanol continuously increasing in line with mandated EU transport targets under the RED and Fuel Quality Directives (FQD).

The Russian war in Ukraine has exacerbated the discussion around energy and food security and affordability in the light of rapidly increasing prices. Biofuels may still be seen as a solution to reduce the dependence on fossil fuels and be marketed as a solution for reducing emissions. This ignores the fact that the dominant first-generation biofuels cause higher CO<sub>2</sub>-emissions than the fossil fuels that they replace when considering full lifecycle emissions including direct and indirect land-use change.<sup>1</sup> Moreover, the predominantly food crop-based first-generation fuels contribute to rising food prices as well as severe social and environmental violations in countries from where feedstock is sourced.<sup>2</sup>

Research has so far mostly focussed on the negative implications associated with biodiesel feedstock like palm oil or soybean oil, such as land grabbing, deforestation, biodiversity loss, and land-use change (LUC) leading to higher CO<sub>2</sub>-emissions than fossil fuels. Meanwhile, a significant increase in the global use of conventional bioethanol from crops like sugarcane or maize is expected until 2030,<sup>3</sup> yet the negative social and environmental impacts of bioethanol remain underreported. Imports of sugarcane-based bioethanol from Brazil, Peru, and other Latin American countries have increasingly gained in importance in recent years and are forecasted to continue growing.

In its effort to increase its use of 'sustainable' energies, Belgium is importing increasingly more bioethanol made from, amongst other sources, sugarcane to partially fuel car engines. But while the Belgian Government promotes the consumption of gasoline-bioethanol blends as a low carbon-footprint solution<sup>4</sup>, the local impacts of ethanol production prove that this energy source is anything but sustainable. Despite this knowledge, the Belgian government intended to increase the share of biofuels in transport from an average of 5.5% in 2017 to 13.9% in 2030, as approved in the NECP for 2021 - 2030, with first-generation biofuels accounting for up to 7%.<sup>5</sup> Despite 2022's Government agreement<sup>6</sup> to start reducing the total share, the legal text is still undergoing revision in 2023 and not yet in force.

In 2021, Oxfam Belgium published a first study on the severe human rights impacts of sugarcane-based ethanol production in a plantation in Peru established with the support of Belgian funding.<sup>7</sup> Building on these findings, the study at hand is taking a closer look at the complete supply chains, from origin to destination, of sugarcane-based bioethanol from Brazil and Peru as important non-European suppliers on the Belgian and Dutch markets. It aims to create a better understanding of the prevalent sustainability issues and to map the roles and responsibilities of value chain stakeholders in respecting social responsibility. While the research uses Brazil and Peru as examples, the findings are likely applicable for the broader context of first-generation biofuels from food and feed crops.

Chapter 1 explains the objective and scope of the research. Moreover, it explains the applied methodologies in conducting the research and describes the encountered data gaps. Chapter 2 looks at the downstream end of the chain, with a focus on Belgium as a consuming country and on the Netherlands as an important trade hub. The upstream Brazilian and Peruvian bioethanol value chains are described in Chapter 3, including brief policy overviews and profiles of key actors and trade flows. The human rights impacts of sugarcane ethanol production in Brazil and Peru are discussed in Chapter 4. Lastly, Chapter 5 draws recommendations from the findings.

# 1

## Research scope and methodology

This chapter briefly outlines the chosen approaches for the mapping of the ethanol value chains in Brazil and Peru and their links to the Belgian market, as well as the stakeholder consultation and controversy scan.

### 1.1 Research objective

Sugarcane production in Latin America is known to be linked to a range of harmful social impacts. Meanwhile, imports of sugarcane-based ethanol from Brazil and Peru play an increasingly important role on the Belgian market. Against this background, this research report aims to shed light on the impacts on livelihoods, human rights, and the environment in producing countries driven by the increasing hunger for biofuels. It seeks to map the sugarcane ethanol value chain from Brazil and Peru into Belgium, and to identify its key stakeholders and their roles and responsibilities in respecting social sustainability.

Peru has been chosen for this research given the severe social impacts found in the previous research<sup>8</sup>, its increasing role as an ethanol provider to the Belgian market, the climate change vulnerability of the region and the financial support its sugarcane industry has received from the Belgian and Dutch Governments through their international development banks, BIO and FMO. Brazil is of interest due to its role as a global producer of sugarcane ethanol, its important role for the Belgian market, accounting for more than two thirds of sugarcane-based bioethanol in Belgium, and the potential impacts the EU-Mercosur Agreement will have on European imports from this country.

#### Definitions

**First-generation biofuels:** based on starch-, sugar- or oil-containing food and feed crops, such as grains or sugarcane for bioethanol, and oilseeds for biodiesel.

**Second-generation biofuels:** based on waste and residual, non-food or inedible materials from agriculture, forestry, and industrial process, such as wood, crop residues, energy crops and paper, as well as used cooking oil (UCO), animal fats, or organic waste.

**Third-generation biofuels:** algae-based biodiesel and synthetic fuels.

**ETBE (Ethyl Tertiary Butyl Ether):** produced from bioethanol and isobutylene (from fossil sources).

**Anhydrous ethanol:** alcohol that is used in gasoline blends.

**Hydrous ethanol:** used as fuel in its pure form in adapted vehicles, containing around 5% water.

**Biomethanol:** produced from industrial waste biomass and straw, among other feedstock.

## 1.2 What is bioethanol?

Ethanol is an ethyl alcohol with high energy content that is mostly produced from agricultural products (bioethanol), or to a lesser extent from petrochemical feedstock (synthetic ethanol).<sup>4</sup> The feedstock for bioethanol differs per region, but currently includes commonly food grains like maize and wheat as well as sugarcane and sugar beet.<sup>5</sup> Waste products still only account for a small share. The ethanol is obtained through several stages. For first-generation biofuels, also known as food-based fuels or agofuels, sugars are extracted from plant material. These sugars are fermented and distilled, to obtain an ethanol-water mix (Figure 1). To obtain ethanol-based biofuels, the water is removed during a dehydration process and the ethanol is blended with gasoline. Blending refers to the mixing of alternative fuels like bioethanol with conventional fossil fuel to replace petroleum products. For gasoline, typical blends include E5 (5% ethanol / 95% gasoline) or E10 (10% ethanol / 90% gasoline). Ethyl tert-butyl ether (ETBE) is produced industrially in a catalytic reaction between ethanol and isobutylene. It typically contains 45% ethanol. Using ETBE in blending improves the combustion qualities of petrol and creates higher compatibility with pipelines and engines than ethanol.<sup>9</sup>

Many countries, including Belgium, have biofuel blending mandates<sup>7</sup>, requiring transportation fuel refiners and retailers to offer biofuel-blended fuel.

Typically, a distinction is made between denatured ethanol, which is poisonous due to a high content of additives and denaturants, and undenatured ethanol, which is the pure form of ethanol that contains no or fewer additives and denaturants. Ethanol has a range of different uses with different levels of purity, including fuel for transportation, solvent, bioplastic production and food and-beverage.<sup>10</sup>

## 1.3 Value chain mapping

To understand the impacts of Belgian and EU biofuel policies on workers, local communities, and the environment in producing countries, we must chart the sugarcane-based ethanol value chain. However, connecting actors along the value chain is difficult due to the lack of data transparency.

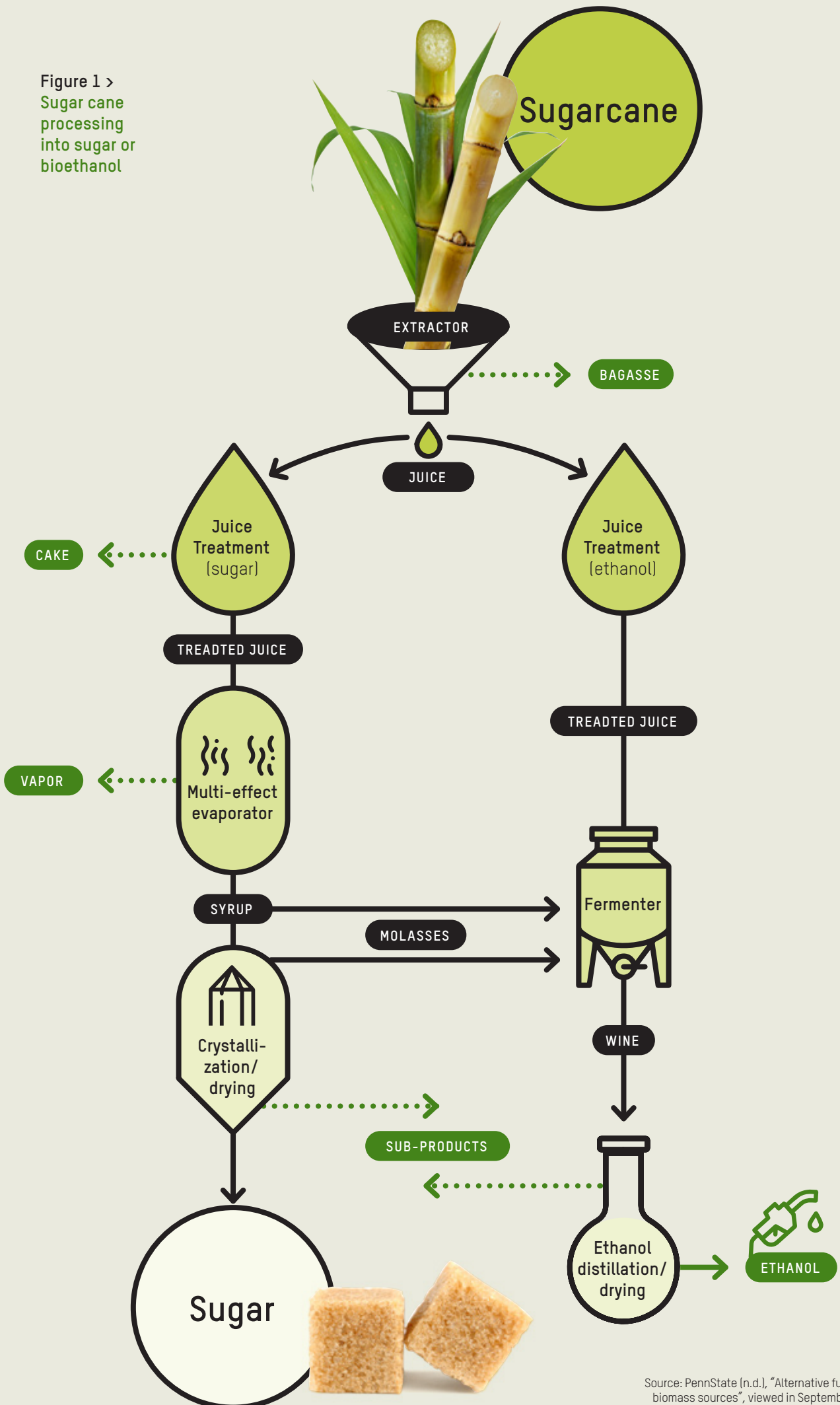
We consulted a range of different sources to map the bioethanol value chain linking Brazil and Peru as suppliers to Belgium as a recipient and the Netherlands as a transshipment hub. We analysed the information on upstream ethanol production as well as flows to the European market from Brazil and Peru using trade statistics, shipment data, market research publications and official data from the Belgian administration. Information on investors of the value chain was also included.

In 2011, the European Commission mandated reporting on country of origin and consumption by type of biofuel to facilitate the monitoring of GHG emissions.<sup>11</sup> However, since the mandate was given to EU Member States, the quality and ease of access to data varies between countries as there is no standardised database at EU level. In Belgium, the EU directive entered into force in November 2011.<sup>12</sup> As a result, official data on Belgian biofuel feedstock and direct as well as indirect suppliers can be obtained from the Federal Public Service for Health, Food Chain Safety, and Environment (FOD Health). Data on indirect suppliers is particularly relevant for Belgium due to the significant role of the Netherlands as the main entry point and transshipment hub for ethanol from non-European origins.

Information on intermediate steps in the value chain, production volumes of sugarcane-based ethanol, breakdowns by use and details on feedstock is provided as far as data availability allows. Tracing ethanol trade flows is hampered by the fact that ethanol for fuel use as the key product has no dedicated trade code (Harmonized System or HS) but falls under many different trade categorisations. EU ethanol imports are monitored using up to 16 different HS codes that have been identified by the EU Commission as falling within the scope of renewable ethanol for fuel use (i.e., focussing on ethanol from agricultural products and not including other uses like beverages or industrial applications).<sup>13</sup> This economic surveillance data has been published since the end of 2020. However, it provides no breakdown per destination country but only reports on the EU level, and neither does it allow to identify feedstock.



Figure 1 >  
Sugar cane  
processing  
into sugar or  
bioethanol



Source: PennState (n.d.), "Alternative fuels from biomass sources", viewed in September 2022.

For the purpose of this research, we focus on the trade under HS Codes 2207.10 (undenatured ethanol), 2207.20 (denatured ethanol), and HS 2909.1910 (ETBE).<sup>14</sup> For other HS codes and on the individual Member State level, the role of sugarcane ethanol cannot be reliably estimated from generic trade statistics. Moreover, a breakdown of ethanol use by application can only be provided on a high level, as no such data is systematically documented and reported.

Finally, there are common discrepancies between certain sets of trade data. For example, shipment data based on export information often differs from trade statistics based on import data. This can, for example, be due to the differing application of HS codes, an incorrect destination country noted upon export or the specific country where customs clear goods in transit. The latter is commonly referred to in trade economics as the ‘Rotterdam-Antwerp effect’, highlighting the influence of the large flows of goods re-exported through ports to their final destination.

When moving from overall trade flows to the specific actors, it becomes increasingly difficult to trace the data. Company-specific information is not available in shipment records, nor in the data provided from official sources. Relevant shipment records only include partial information on shippers and consignees and can therefore only provide indications of the level of involvement. Where companies do acknowledge being involved in the handling of bioethanol or ETBE, no information on its origin or feedstock is given.

## 1.4 Stakeholder consultation

Between June and July 2022, the study team conducted fieldwork in Peru. The study team spent a week in Piura, interviewing local government officials, civil society and community-based organisations, employees of sugarcane ethanol companies, researchers, and the local press to triangulate and expand the information obtained through a previous document review (Table 1). For this purpose, Focus Groups Discussions (FGDs) ranging between 5-6 participants were conducted in La Huaca, Sullana, Viviate, Paita, and Piura. At their request, the names of the organisations represented by our informants are not published as part of this report. The organisation names are known to the authors and to Oxfam Belgium.

**Table 1 > Characteristics of informants**

Informant category	Number of FGD participants (M/F)
Government officials and civil servants	2 (2M)
Local NGOs	4 (2M/2F)
Community-based organisations	7 (4M/3F)
Sugarcane employees	8 (7M/1F)
Researchers	2 (1M/1F)
Local press	2 (2F)
<b>Total</b>	<b>25 (16M/9F)</b>

## **1.5 Controversy scan**

We consulted CSO publications, articles by news outlets, and company publications, to collect and amplify the voices of human and environmental defenders in Brazil sugarcane ethanol sector, with particular attention to high-profile instances that have attracted media and NGO attention. Moreover, two telephone interviews of 60 minutes each were conducted with investigative journalists in Brazil that specialise in human rights violations in different supply chains, including the sugarcane ethanol supply chain.

## **1.6 European policy instruments on corporate social responsibility**

We looked at energy policies at the Belgian and EU-level, as well as voluntary corporate social responsibility initiatives, identifying social safeguards that are already included, and those that could be improved or are missing. Using policy documents and civil society reports, we assessed the loopholes in each of those policies.

# 2

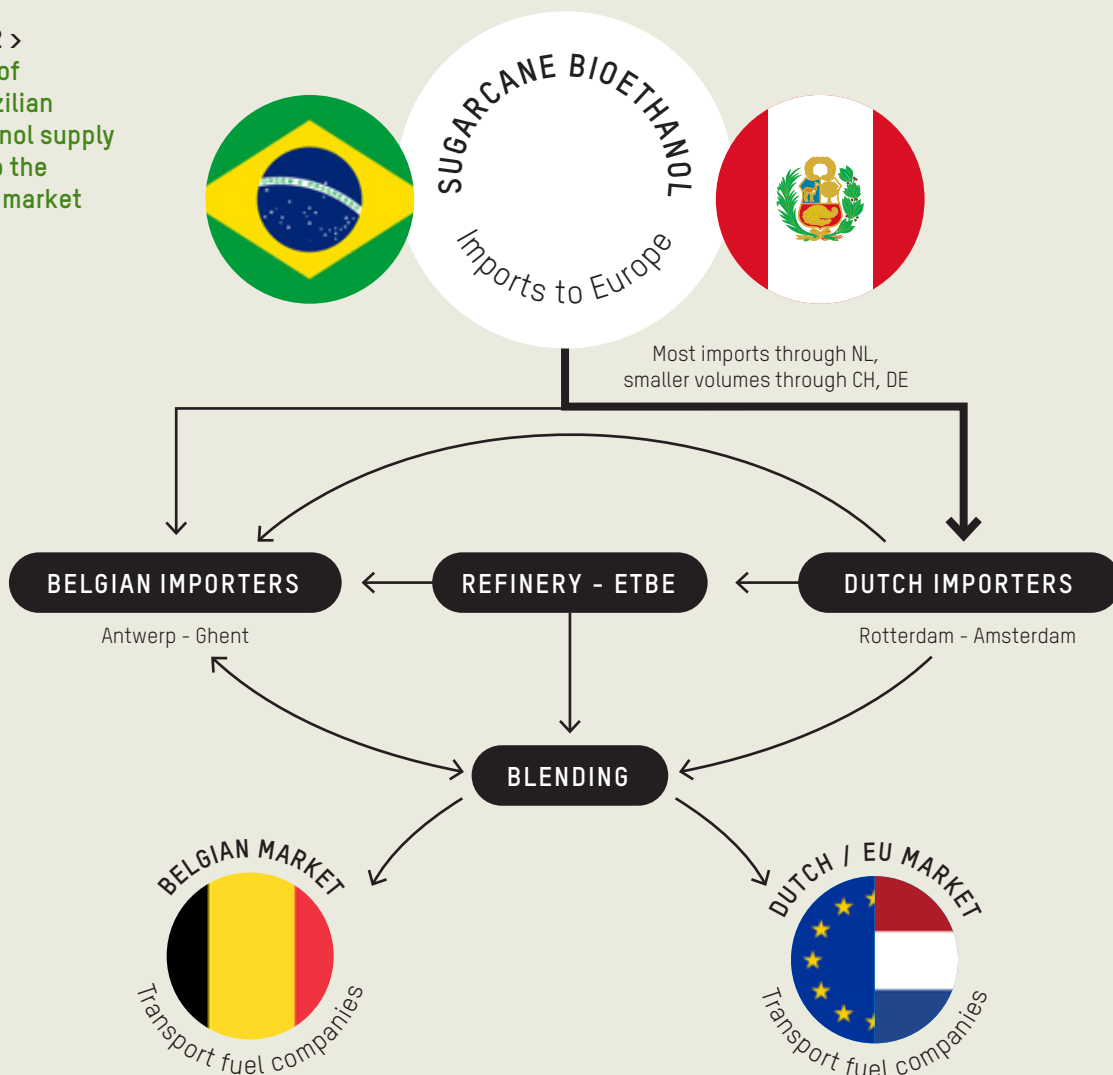
## The Belgian bioethanol value chain

The Belgian biofuel ethanol market is composed of domestic production as well as trade. Important stakeholders include producers, distributors, and government entities. The Netherlands plays a key role as a transshipment country of bioethanol from Brazil and Peru. Weak supply chain transparency hampers a mapping of the commodity flows from upstream producers to downstream costumers.

### 2.1 Bioethanol on the Belgian market

Once the sugarcane-based ethanol leaves Brazil and Peru, various supply chain steps may precede the placing on the market in Belgium (Figure 2).

Figure 2 >  
Sketch of  
the Brazilian  
bioethanol supply  
chain to the  
Belgian market



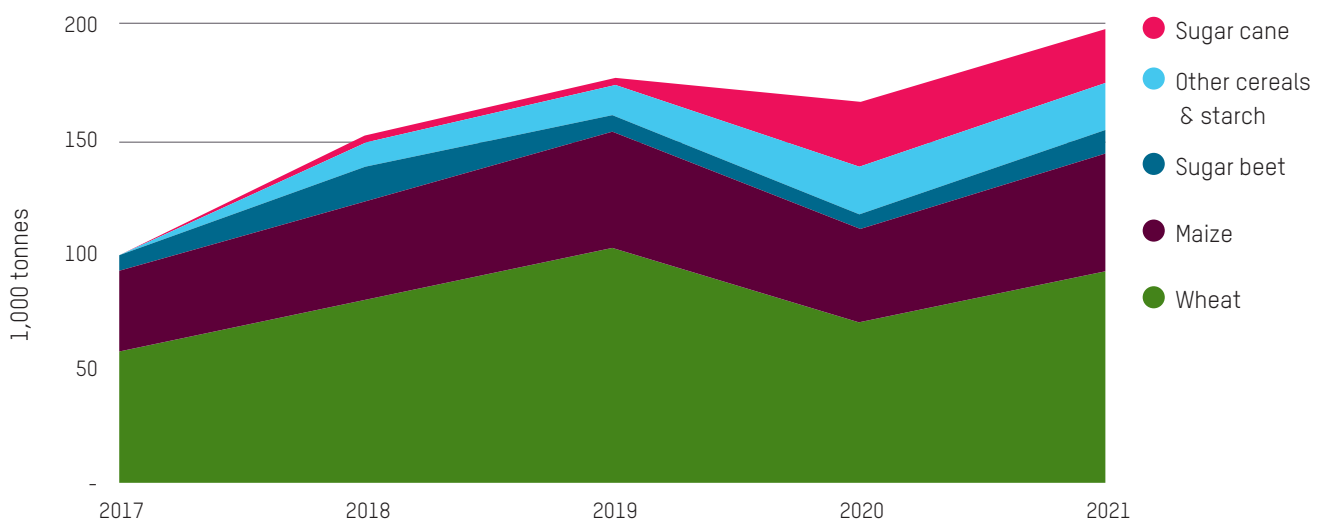
Transport energy companies active in Belgium are required by law to incorporate biofuels into the product that they put on the market. In 2009, E5 with a maximum of 5% bioethanol was introduced for gasoline 95 and 98. While conventional gasoline 98 remains available for older cars incompatible with E10, this blend containing up to 10% bioethanol was launched as the standard for gasoline in 2017 and likely also contributed to increasing imports of ethanol to meet demand.<sup>9,15</sup> At the same time, overall Belgian gasoline consumption increased at an annual compound growth rate of 7% in the five years from 2017 to 2021. In 2021, 79% (1.66 million tonnes) of the gasoline consumed in Belgium was E10 (Euro 95), while 21% (450,000 tonnes) was Euro 98 with 0% to a maximum of 5% bioethanol.<sup>h,16</sup>

Public reporting on biofuel production and consumption at the EU and national level is mandatory but very limited. As part of the EU's 2020 renewable energy goals, EU countries reported bi-annually between 2001 and 2018 on their progress towards renewable energy targets.<sup>i</sup> However, these reports provided no transparency on questions like member states' feedstock use and origin. Under the revised renewable energy targets until 2030, reporting for individual member states is moved under the Directive EU 2018/1999 regulating the governance of the energy union and climate action, to streamline energy and climate reporting obligations. This includes disclosure on biofuel use, changes in internal commodity prices and sustainability criteria.<sup>17</sup> Since the mandate was given to member states, there is no standardised database disclosing feedstock volumes and origins. Data quality and ease of access differ. The Belgian administration provides feedstock and origin data upon request.

For the Belgian market, a distinction can be made between the volume of bioethanol products that is placed on the market, and the volume that is actually consumed. The total volume of bioethanol and ETBE that is placed on the Belgian market (i.e., domestic production plus imports, but before deducting exports), reached 407,000 tonnes in 2021, an increase by almost 10% compared to 2020 (371,000 tonnes). In this total, the share of sugarcane-based bioethanol and ETBE was 6% (24,300 tonnes) in 2021, down from 9% (33,500 tonnes) in 2020. Out of the total volume placed on the market, 51% was (re-)exported in 2021, while 49% was eventually consumed in Belgium. In 2020, 20,000 tonnes were consumed in the Belgian markets, in comparison to 33,000 initially placed in the market

Focussing on the Belgian consumption, data from the year 2017 onwards - when E10 was introduced - shows a doubling in the consumption of bioethanol on the Belgian market in the period to 2021, with a small, COVID-19-related dip in 2020. Most of this ethanol volume is derived from feedstock sourced in the EU, especially wheat and maize. However, the role of ethanol from Latin American sugarcane has been growing significantly since 2020 (Figure 3).<sup>18</sup> Sugarcane imports have multiplied from 2,004,557 Liters in 2014 to 42,503,323 Liters in 2020.<sup>19</sup>

**Figure 3 > Feedstock of bioethanol consumed in Belgium, 2017-2021 (1,000 tonnes)**

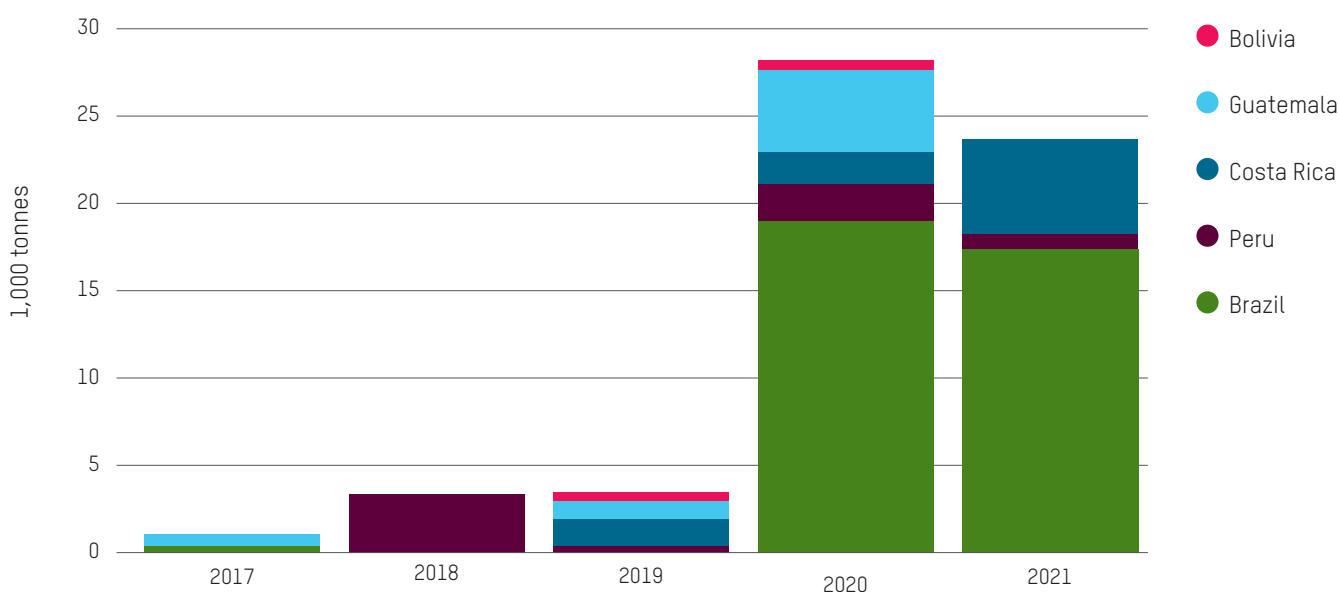


Note: Not including biomethanol. Source: FOD Health (2022); Greenpeace België et al. (2022, March), Evaluatie van het Belgische biobrandstoffenbeleid, p. 11.

Looking at 2021, Belgium fuel consumption included a total of 183,000 tonnes of bioethanol.<sup>1</sup> Belgian feedstock was used for around 34% of this total volume, mostly in the form of wheat. Accounting for 13% (20,000 tonnes), sugarcane from Brazil, Peru, Costa Rica, Bolivia and Guatemala was the third-most important feedstock after wheat and maize in 2020.

Most of the sugarcane-based ethanol products arrive in Belgium as indirect imports via third countries. In 2021, at least 83% of the total sugarcane-based ethanol from Brazil and Peru that was consumed in Belgium arrived via the Netherlands, while some of the ETBE reportedly came via Switzerland and Germany. However, the biofuel data by the Belgian administration allows to trace these indirect imports to their actual origins. Brazil was the key origin for sugarcane feedstock, accounting for 73% (17,300 tonnes) of the sugarcane-based bioethanol consumed on the Belgium market in 2021.<sup>20</sup> Its role as a supplier of sugarcane-based feedstock has increased significantly in recent years (Figure 4).

**Figure 4 > Origin of sugarcane ethanol consumed in Belgium, 2017-2021 (1,000 tonnes)**



Note: including bioethanol and ETBE. Source: FOD Health (2022).

## 2.2 Market actors

Market actors at various value chain levels are involved in enabling the flow of bioethanol from Brazil and Peru on the Belgian market. However, the lack of transparency in these supply chains hampers a mapping of the physical flows to storage, blending or transshipment facilities in Europe and to pinpoint the involved companies. There is no obligation for businesses to disclose this type of information publicly and authorities only report feedstock flows on a generic level. Consequently, it is generally treated as confidential and business-sensitive information. Authorities only report on feedstock flows on a generic level.

The Netherlands-part of the supply chain plays a particularly important role, as most of the bioethanol from Latin America first arrives in Dutch ports from where redistribution is taking place. Therefore, the following sections first sketch the Dutch market, before looking at potential links with the Belgian market. The naming of individual market actors does not constitute a proof of actual exposure to bioethanol flows from Brazil and Peru.

## 2.2.1 Importers and distributors in the Netherlands

Various companies are engaged in importing, storing, and blending biofuels in the ports of Rotterdam and Amsterdam. According to shipment data, Rotterdam is the main entry point for bioethanol from Latin America, while Amsterdam receives less shipments. Both ports have important liquid bulk facilities that are well connected to European transport networks, including inland waterways, railways, and roads.

Companies involved in biofuel logistics and storage in Dutch ports include Dekker Europe and its subsidiaries operating tank storage facilities in Rotterdam. The company handles biofuels, oleochemicals, and vegetable oils and offers related logistical services.<sup>21</sup> Dekker has a loan agreement with Rabobank and ING Bank over € 73.1 million maturing in 2024.<sup>22</sup> Koole Terminals in Rotterdam is specialised in the storage, blending, and logistics of biofuels. It is connected to train facilities and other infrastructure.<sup>23</sup> Koole is actively engaged in the scaling up of bioethanol distribution. It distributes large volumes of blended fuels to filling stations with the help of service providers. While closely following the development of more advanced biofuels, the company currently focuses on biodiesel and bioethanol.<sup>24</sup> Rabobank is issuing guarantees for Koole.<sup>25</sup> HES Botlek operates a terminal in the port of Rotterdam that is accessible by vessel, barge, rail, and truck. Services include handling, storage, heating, mixing, and blending, including ship-to-ship discharge of ethanol and other liquid bulk.<sup>26</sup>

GPS Amsterdam (GPSA) operates a storage and blending facility for bioethanol, biodiesel and 'clean petroleum products' across 17 flexible storage tanks at a terminal in the Port of Amsterdam. Its ethanol blending facility has a capacity of 150 m<sup>3</sup> per hour.<sup>27</sup> VARO Energy – owned by asset manager Carlyle Group (U.S.) and Dutch energy company and commodity trader Vitol – sells and distributes transport fuels, heavy fuel oils, heating oils and biofuels across Europe, including Belgium. Vitol, in turn, is an active player in the marketing and distribution of bioethanol and biodiesel.<sup>28</sup>

In a strategic partnership with GPSA, VARO has constructed a new railway line as an alternative to river freight along the Rhine and converted storage tanks for hydrocarbons in the port of Amsterdam to store ethanol for biofuel production. VARO sources biofuel feedstock for blending from trading companies and directly from producers. The company states in its CSR report that 84% of its bio-gasoline feedstock is ethanol from "[...] *sustainable or waste sources that do not compete with the food chain*", while about 16% is ETBE. Another part of the report explains that "*VARO Energy will gradually minimise the use of food and feed crop-based biofuels in the future.*"<sup>29</sup> The origin of feedstock is not disclosed. . In recent years, the limited available shipment data from Brazil links VARO Energy Marketing to a total of 10,200 tonnes of ETBE shipped to France in 2019, and a 2020 ETBE consignment of 4,200 tonnes to Amsterdam, all supplied by Brazilian chemical company Braskem.<sup>30</sup>

Among Dutch recipients of Brazilian sugarcane-based ethanol in recent years, it appears that Shell can be linked to a total of 12,000 tonnes received in 2020 from Usina Alta Mogiana and São Martinho, and 7,000 tonnes in the first half of 2022 from Tereos Sugar & Energy and Usina Alto Alegre.<sup>31</sup> Shell is a joint venture partner in Raízen, holding a 44% stake (see section 2.2.3).

Chemical companies in the Netherlands are involved in the production of ETBE, for which demand has been rising in recent years.<sup>32</sup> For example, LyondellBasell produces at its Botlek facility in Rotterdam (Lyondell Chemie Nederland) with a production capacity of 0.4 million tonnes<sup>33</sup>, while Sabic operates a factory in Limburg in the South of the Netherlands that converts bioethanol and isobutylene into ETBE.<sup>34</sup> In 2020, shipment data shows 6,000 tonnes of bioethanol shipped by Raízen to Lyondell Chemie Nederland.<sup>35</sup>

## 2.2.2 Belgian ethanol industry and its links to Latin America

The ethanol industry is represented by its association, the Belgian Bioethanol Association<sup>k</sup> (BBA), which in turn is a member of the European Bioethanol Association, ePURE. BBA has three members, jointly representing 100% of the Belgian production capacity of bioethanol. These members are Tereos Syral and Alco Bio Fuel (ABF), both based in East Flanders, and Biowanze, based in Liège. They produce bioethanol from European maize, wheat, and sugar beet.<sup>l, 36, 37</sup> There are no indications that sugarcane-based bioethanol is part of their supply chains. However, Tereos Syral and ABF have business links with the Brazilian sugarcane sector.

Tereos Syral and Tereos Sugar & Energy Brazil (TSEB) are both part of the French cooperative group Tereos. Sugarcane processing constitutes the third-largest source of revenue for Tereos. The group has been active in the sector since 2000 in Brazil, where it is one of the top sugarcane processors (see Table 2). Seven of its eleven sugarcane factories are based in Brazil, as well as seven ethanol production sites.<sup>38</sup> For Tereos' partnership with Brazilian logistics company VLI (see section 3.1.3.) Tereos does not show up as a Brazilian exporter to Europe in shipment records; however, due to the limited data coverage such a link cannot be excluded either.

Belgian ethanol producer ABF and the commodity trader Alcotra, based in Geneva (Switzerland), are both part of the Alco Group.<sup>39</sup> Alcotra's Brazilian subsidiary, Alcotra do Brasil, is a company sourcing from Brazilian producers, suggesting sugarcane as feedstock. Alcotra do Brasil has global ethanol sales for biofuel, food, cosmetic and industrial use serving markets in the US, Europe, Asia, Africa and Latin and Central America.<sup>40</sup> According to the company, *"Alcotra do Brasil is one of the world's leading ethanol trading companies."* The company states further that *"[w]e are focused sourcing ethanol from Brazilian producers to our distributions and clients worldwide, being especially focused on Industrial Ethanol, and we also work with the importation of Fuel Ethanol to supply Brazil's short of the molecule."*<sup>41</sup> While ABF and Alcotra share a common owner, no shipments of bioethanol by Alcotra to ABF, nor to other destinations in Europe, could be traced with the available data.

At the time when the Maple Energy assets in Peru were up for sale in 2014, Alco Group was one of the interested parties.<sup>42</sup>

### 2.2.3 Gasoline distributors and marketers

Belgium has a large number of transport fuel companies, which are organised in the industry association Energia. Energia's 16 members are active in the refining, distribution, and storage of energy products for transport, heating, and industry, and feedstock production for the petrochemical sector.<sup>43</sup> As is the case for bioethanol in the Netherlands, the general lack of data disclosure means that it is impossible to trace the flow of ethanol from Brazil and Peru to the gas stations in Belgium, or even the entry into the country.

Petroleum processors and wholesale traders active in Belgium include, for example, Chevron Belgium, Gunvor Belgium, Lukoil Belgium, and VARO Energy (see section 2.2.1).<sup>44</sup> VARO Energy (see section 2.2.1) states that it supplied 23.6% of the 'biogasoline' on the Belgian market in 2021. Gasoline retail companies on the Belgian market include, among others, Shell, ExxonMobil, Maes, Q8, and TotalEnergies.<sup>45</sup> These are all companies which could possibly trade (wholesale) and distribute (to consumers) sugarcane-based ethanol in Belgium. However, neither their role in the bioethanol supply chain on the Belgian market could be quantified with the available data, nor could concrete connections with sugarcane-based ethanol from Brazil and Peru be made. The entity TotalEnergies Marketing Belgium (TEMB) is in charge of the incorporation of bioethanol in accordance with the mandates required by Belgian national and European legislation. The analysis of the sustainability certificates ("Proof of Sustainability" or "POS") submitted by their suppliers in 2022 indicates that 7.4% comes from outside Europe. The share of sugarcane originating from Brazil and Peru represented respectively 0.97% and 0% of the biomass involved in TEMB's supplies of bioethanol in 2022.<sup>46</sup> Shell generally promotes its participation in the Raízen joint venture as a contribution to lowering carbon emissions but Oxfam has been unable to find a reference to a geographic breakdown of sales.<sup>47</sup> As reported by Shell in its 2021 Sustainability Report *"[i]n 2021, around 9.1 billion litres of biofuels went into Shell's petrol and diesel worldwide, which included 3.2 billion litres through our joint venture Raízen on an equity basis. In 2020, around 9.5 billion litres of biofuels went into Shell's petrol and diesel worldwide (page 36)"* (see also section 3.1.2). On top of the purchases from Raízen, an additional 1% of all other global biocomponent purchases by Shell were based on sugarcane as feedstock from undisclosed sources.<sup>48</sup>



## 2.2.4 Belgian and Dutch financiers of bioethanol production in Brazil and Peru

As described in Oxfam's 2021 report, the Belgian Investment Company for Developing Countries (BIO) and the Dutch development bank FMO were among the co-investors in the controversial Maple Ethanol greenfield project in Peru. In 2010, Maple Ethanol received a US\$ 9 million loan from BIO to implement the ethanol production project in the Chira Valley. The Dutch Business Development Bank (FMO) contributed US\$ 25 million at the time.<sup>49</sup> The project went into default in 2014 and was taken over by Grupo Gloria.<sup>50</sup>

According to BIO, Maple Ethanol prematurely reimbursed BIO in 2013 and left the bank's portfolio. The bank states further that "[...] since 2014, BIO's Investment Strategy formally excludes investments in biofuels in developing countries."<sup>51</sup> The former Belgian Minister for Development Cooperation, Meryame Kitir, confirmed in her policy note for 2022 that BIO will no longer invest in first generation biofuels.<sup>52</sup> FMO still invests in biofuel projects including bio-ethanol facilities, but states to exclude projects that rely on "[...] sources that deplete carbon pools or compete with food sources."<sup>53</sup>

Other Belgian and Dutch financial institutions are financing ethanol producers in Brazil.

- **Raízen:** Several Dutch pension funds invest in Raízen, including PFZW (€ 0.4 million), ABP (€ 16.0 million), and BpfBOUW (€ 1.6 million), and Pensioenfondsvoor de Woningcorporaties (SPW) (€ 0.5 million).<sup>54</sup>
- **Bunge:** Commodity trader and bioethanol producer Bunge also received funding from several Belgian and Dutch banks during recent years. Belgian KBC Bank participated in July 2021 in a syndicated revolving credit facility of US\$ 1.35 billion to Bunge with an amount of US\$ 30 million.<sup>55</sup> Moreover, as of September 2022, it holds shares and bonds in the company with a value of US\$ 2.07 million. Bank Degroof Petercam also holds shares with a value of US\$ 2.56 million.<sup>56</sup> Dutch banks have participated in several loans for general corporate purposes and refinancing to Bunge during the last two years: ING Group with a total of US\$ 206.3 million and Rabobank with a total of US\$ 419.7 million.<sup>57</sup> Dutch investors in the company include Achmea (US\$ 2.2 million), Aegon (US\$ 5.3 million) as well as several pension funds.<sup>58</sup>
- **TSEB:** TSEB received a US\$ 105 million (€ 97 million) loan from a consortium of banks in 2020, with ING as one of the lead arrangers and involving Rabobank as part of the syndicate of banks. The proceeds were destined to finance TSEB's sugar exports from Brazil and refinance a large part of TSEB's existing lines maturing in 2020.<sup>59</sup>



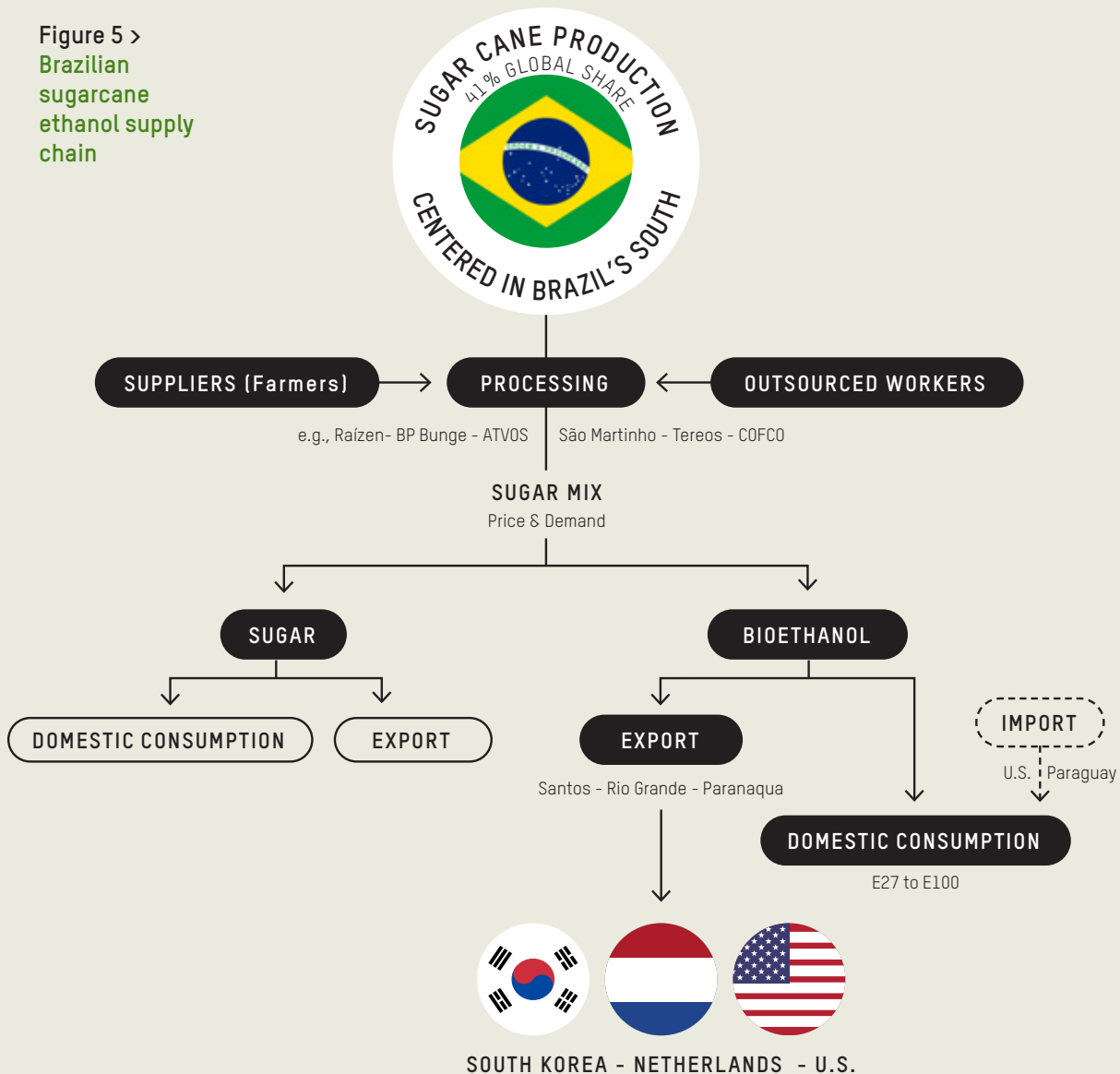
# 3

## The Brazilian and Peruvian bioethanol value chains

Sugarcane-based ethanol from Brazil and Peru has been imported to the Belgian market in increasing volumes in recent years. The size of operations in both countries differs significantly. Brazil is a leading global producer with high domestic consumption, while Peru's production remains small in comparison but is for a considerable part exported. The following sections profile the two markets and their key stakeholders.

### 3.1 The Brazilian bioethanol market and actors

Figure 5 >  
Brazilian  
sugarcane  
ethanol supply  
chain



### 3.1.1 Policy environment

The Brazilian production of sugarcane-based ethanol is predominantly driven by the domestic transportation market and the objective to lower the dependency on oil imports. While exports are increasing, including to EU markets like Belgium, trade so far has not been a prime mover for the expansion of the industry.

An important part of the Brazilian renewable energy policy framework is the Nationally Determined Contribution (NDC) towards achieving the United Nations Framework Convention on Climate Change (UNFCCC) objective. First announced at the COP21 in 2015 and updated in 2020, it sets economy-wide targets for emission reductions (37% by 2025, 43% by 2030). Key policy instruments for implementation of the NDC are the National Policy on Climate Change (Law 12,187/2009), the Brazilian Forest Code (Law 12,651/2012), the Law on the National System of Conservation Units (Law 9,985/2000), as well as associated legislation and instruments.

Biofuels are seen as one of the main instruments to achieve the country's emission reduction targets. The latest policy addition was the Brazilian Policy for Biofuels (RENOVABIO) in 2018, which provided the regulatory framework to revive the national biofuels sector and aims to reduce transport emissions. Starting in 2020, it implemented a system of Decarbonisation Credits (CBIO) that are traded on the Brazilian stock exchange.<sup>60</sup>

Policy instruments driving the increasing volume of sugarcane-based ethanol in transport fuels in recent years is the blending mandate of 27% anhydrous ethanol in automotive gasoline (E27), in place since 2015, and the large fleet of with flexible-fuel vehicles (FFV). The flex-fuel technology, introduced in 2003, allows any mix of gasoline and ethanol, up to 100% hydrous ethanol fuel (E100).<sup>61</sup> Moreover, the industry profited from federal and state tax differentiation between renewables and fossils, as well as investments in the sugarcane industry by the Brazilian development bank, BNDES.<sup>m, 62</sup>

In its 2021–2030 Energy Plan, the Brazilian government under President Bolsonaro anticipated an expansion in the supply of ethanol during the forecast period. Most of the expected demand increase for fuel ethanol is linked to the domestic market, due to the greater competitiveness of hydrous ethanol compared to gasoline. For exports, only a marginal growth is anticipated, mainly due to the maintenance of protectionist measures of the markets and the adoption of more efficient technologies.

Industry growth potential is seen in the use of idle milling capacity and expansion of existing production units as well as the addition of new units. Overall, it is anticipated that in the ten-year period, the total Brazilian sugarcane harvest area will increase by 15% or 1.3 million hectares (ha)<sup>n</sup> from 2020 to 2030, along with a 10% productivity growth. It is further forecasted that the average share of this growing sugarcane harvest that will be used for ethanol production will increase from 56% in 2021 to 59% in 2030.<sup>63</sup>

Expansion could also take place in forested areas, as then President Bolsonaro in 2019 in an unexpected move revoked a decree from 2009 that had banned the cultivation of the crop in the Amazon and other areas of primary forest.<sup>64</sup> It remains to be seen how the new presidency under Lula da Silva will influence the sector and related policies. If ratified, the EU-Mercosur trade deal is expected to drive up exports to the EU market. It foresees a duty-free quota of 450,000 tonnes of ethanol for the EU chemical industry, as well as a 200,000 tonnes quota with a reduced in-quota duty<sup>o</sup> for all other uses, namely fuel as the largest EU ethanol market segment.<sup>65</sup>

The booming Brazilian sugarcane industry is connected with serious human and labour rights breaches which have been repeatedly documented (see also section 4.2).<sup>66</sup> Human rights and labour laws with relevance to the industry include the 'Consolidation of Labour Laws' (Consolidação das Leis do Trabalho), a collection of labour standards which forms the main instrument for regulating labour relations and protecting fundamental workers' rights.<sup>p, 67</sup> Moreover, since 2003, after a campaign led by the Pastoral Land Commission, Article 149 of the Brazilian Penal Code defines what labour analogous to slavery means.<sup>68</sup> Since 2004, the so-called "dirty list" is compiled on which companies and individuals are placed who have been found by labour inspectors to have engaged in slave labour. It is widely used, for example by banks and international buyers to evaluate credit or supply chain risk.<sup>69</sup> However, it remains vulnerable as exposed industry sectors as well as the Bolsonaro administration repeatedly tried to weaken it.<sup>70</sup>

### 3.1.2 Bioethanol production and use

Brazil is by far the largest producer of sugarcane in the world, accounting for a global production share of 41% in 2020.<sup>71</sup> Sugarcane production is concentrated in the Central-South region of Brazil (92%), with the main production hub in São Paulo state (54% of total Brazilian production in 2020/21).<sup>72</sup> A total of 8.6 million hectares were cultivated in 2020/21.<sup>73</sup>

During the 2021/22 harvest, Brazil used its sugarcane harvest to produce 35 million tonnes of cane sugar and around 20.7 million tonnes of ethanol, making it the main feedstock of Brazilian bioethanol. The share of Brazilian sugarcane going into ethanol production (versus sugar) currently stands at around 54%. The so-called sugar mix fluctuates as it is influenced by market prices and demand for sugar and fuels.<sup>74</sup>

As of September 2022, Brazil has 357 ethanol plants. Out of this total, 337 are sugarcane-based, while another twelve are maize-based plants, and six are flex-plants that can flexibly use sugarcane and/or maize as feedstock.<sup>75</sup> Most of the plants are concentrated along the coast, especially in the country's southern part (Figure 6). At around 89%, capacity use is comparatively high.<sup>76</sup>

Figure 6 > Location of ethanol plants in Brazil



Source: ANP, in: Barros, S. (2021, August 30), Brazil Biofuels Annual, USDA GAIN Report BR2021-0030

### Box 1 > Sugar market volatility influences prices and sugar-ethanol production ratio

Brazil, the world's largest sugarcane producer, has closely interlocked markets for sugar and ethanol. The hundreds of sugarcane mills are impacted by a mix of variables that affect sugar and ethanol production levels differently.<sup>77</sup> In general, the price of both products is decisive for the production ratio. Most mills can simultaneously produce sugar and ethanol, and each of these mills has some flexibility on how much capacity to allocate to sugar or ethanol.

The global sugar market is highly volatile as it is impacted by a multitude of factors, including supporting and restricting policies (e.g., subsidies, tariffs), geopolitical influences, and weather conditions. Sugarcane is a very water-intensive and water-sensitive crop distressed by slight temperature changes and other climatic conditions. Droughts can significantly reduce the yields by reducing the crop's sugar content.<sup>78</sup> Meanwhile, sugar is a highly politicised sector in many countries, with more common government interventions than on other commodity markets. The harvest of the multi-year crop is difficult to store. Therefore, sugar surplus is regularly dumped on the world market at prices below the cost of production during low-price periods, leading to further decreases of the world sugar price.<sup>79</sup> It is expected that trade distortions on international sugar markets will also persist in the coming years. Despite initiatives in some countries to liberalise the sugar market, others continue to use trade policy instruments to protect their domestic sugar markets.<sup>80</sup> The ethanol price in turn is closely linked to the price of domestic gasoline, as 80% of the country's fleet is composed of flex-fuel vehicles.<sup>81</sup> Given the lower energy efficiency of ethanol in comparison to gasoline, ethanol prices need to be 70% or lower than those of gasoline to incentivise demand for the biofuel on the Brazilian market.<sup>82</sup>

In early 2022, it was expected that high crude oil and gasoline prices would trigger Brazilian sugar mills to shift a greater percentage of the crop to domestic ethanol production, leading to rising sugar prices.<sup>83</sup> However, after sizeable tax cuts on fuel, and especially gasoline, Brazilian mills shifted towards sugar production as domestic prices for the biofuel plunged.<sup>84</sup> As a result of lower domestic prices and rising demand for the cheaper EU10 fuel in various European countries, Brazil was set to export a record volume of ethanol to Europe in 2022.<sup>85</sup> As shown in section 2.1, imports to Belgium and the Netherlands have also increased significantly in recent years. The FAO Sugar Price Index\* was 117.2 points for December 2022, compared to 68.6 points in August 2018.<sup>86</sup>

2022 saw increasing European imports of cheaper Brazilian ethanol and Analysts are expecting further growth potential as some European ethanol producers have considered shutting down plants due to the high prices for oil and gas.<sup>87</sup>

Fossil fuel prices are also indirectly influencing the ethanol market. Surging fertiliser prices and supply shortages are caused by high energy prices as well as supply disruptions and may influence the coming planting decisions and harvests. Intensive sugarcane production systems rely on large volumes of fertiliser, with Russia and Ukraine as key suppliers of potassium and nitrogen.<sup>88</sup>

It is difficult to rank the Brazilian ethanol producers based on ethanol production due to the mentioned flexibility to switch between ethanol or sugar production, depending on market conditions. Therefore, Table 2 is based on sugarcane grinding. These large processors at the same time operate largescale sugarcane plantations. Their combined sugarcane area of around 2.9 million ha equals around a third of the total cultivated area of almost 10 million ha of sugarcane.<sup>89</sup> Moreover, it is likely that the companies also source sugarcane from third party suppliers (see Chapter 4).<sup>9</sup>

**Table 2 > Top bioethanol producers Brazil, 2020/21**

Ethanol producer	Parent Group	Sugarcane area (ha) <sup>b</sup>	Grinding (million tonnes)	% Brazilian sugar cane market
Raízen <sup>a</sup>	Shell (UK) & Cosan (BR)	1,300,000	87.2	14.4%
BP Bunge	BP (UK) & Bunge (U.S.)	450,000	27.3	4.5%
ATVOS	Novonor (BR) (former Odebrecht)	485,000	26.7	4.4%
São Martinho	Ljn Participações (BR)	350,000	22.5	3.7%
Tereos Sugar & Energy	Tereos Group (FR)	134,000	20.9	3.5%
COFCO	COFCO International (CN)	180,000	17.2	2.8%

Note: **a.** Including Biosev, which was acquired from Louis Dreyfus Company (Netherlands) in 2021; after Raízen's stock exchange listing in 2021, Shell and Cosan hold 44% each, but both continue to hold 50% of the ordinary voting stock; **b.** owned, managed or leased.

Source: *Revista RPA News* (2022, June 6), "Veja 10 maiores grupos do setor sucroenergético na safra 2020/21", viewed in July 2022; ASR Group (2022, August 3), "Raízen and ASR Group Partner to Create World's First Sustainable and Fully Traceable Supply Chain, with Non-GM Raw Cane Sugar Backed by Independent Certification", viewed in August 2022; BP Bunge (2021), *Sustainability Report 2020/21 Crop Year*, p. 8; ATVOS (2021), *Annual Report Crop Year 2020/2021*, p. 5; São Martinho (n.d.), "Nossos números", viewed in August 2022; Tereos (2021), *Consolidated Financial Statements for the Year Ended 31 March 2021*, p. 34; COFCO International (2022), *Sustainability Report 2021*, p. 7.

### Box 2 > Market leader Raízen is set to further grow its market share after IPO

Raízen was listed on the stock exchange through an initial public offering (IPO) in August 2021, raising around US\$ 1.15 billion (€ 1 billion) from the listing of 12% of its shares. Cosan and Shell kept their controlling stakes of 44% each and a joint 100% of voting rights. The move was seen as a strategic step for Raízen to finance its further growth, and specifically to increase its investments in second generation biofuels and biogas.<sup>90</sup>

Raízen produced around 2 million tonnes of ethanol from sugarcane and around 4 million tonnes of sugar in 2021.<sup>91</sup> Already the largest ethanol, sugar, and bioenergy producer in Brazil, Raízen had further increased its market share through the August 2021 acquisition of the assets of Biosev, a Brazilian subsidiary of Louis Dreyfus Company (Netherlands).<sup>92</sup> Moreover, as of August 2022, Raízen is one of two top contenders for the acquisition of the joint venture between Bunge and BP.<sup>93</sup> Should Raízen reach an agreement, the distance to its competitors would grow even bigger.

Raízen operates one of the two second-generation ethanol (E2G) plants in Brazil, using sugarcane biomass. Its Piracicaba facility has a capacity of around 33,000 tonnes per year. In 2021, production stood at 15,000 tonnes.<sup>94</sup> In June 2021, Raízen announced plans to invest in a new plant with a production capacity of 64,000 tonnes of which 91% would be delivered to an unnamed global energy player under a long-term contract.<sup>95</sup> In November 2022, Shell was named as the partner in the agreement to buy around 2.6 million tonnes (3.25 billion litres) of Raízen's E2G from sugarcane biomass until 2037.<sup>96</sup> Investments including five new E2G plants are expected to reach US\$ 1.19 billion.<sup>97</sup>

Brazil's ethanol balance for 2021 consisted of 23.6 million tonnes ethanol production and net exports of 1.2 million tonnes. Domestic consumption totalled 23.3 million tonnes.<sup>97</sup> Sugarcane accounted for a feedstock share of around 97%, while maize made up the remaining 3%. There is no official registration of the split of the consumed volume between different uses. However, according to the U.S. Department of Agriculture (USDA), fuel use accounted for more than 93% of total ethanol consumed on the Brazilian market in 2021. According to USDA estimates, only around 13% of the exported volume consisted of fuel exports, while 87% went into other applications.<sup>98</sup> For 2022, an increase in total Brazilian ethanol production by 6% to 25.0 million tonnes is forecasted, driven by a larger 2022/2023 sugarcane crop and a somewhat higher volume of maize-based ethanol. Domestic fuel use is estimated to increase by 1.7 million tonnes to 22.3 million tonnes.<sup>99</sup>

### 3.1.3 Ethanol logistics

The primary ethanol-producing regions in the Center-South of Brazil are connected with major fuel consumer centres like the metropolitan regions of São Paulo and Rio de Janeiro through an ethanol pipeline. Operated by Logum - a joint venture by Copersucar (30%), Raízen (30%), Petrobras (30%) and logistics company Uniduto Logística (10%) - and financed by Brazil's development bank, BNDES, the pipeline extends over 1,400 km. It can transport 3.1 million tonnes of ethanol per year.<sup>100</sup> In 2020, it transported 1.7 million tonnes, a year-on-year decrease by around 16% caused by the impacts of the COVID-19 pandemic. It is expected that the capacity and length of the pipeline will be further expanded in the coming years.<sup>101</sup> Transporting by pipeline is cheaper than transport by truck.

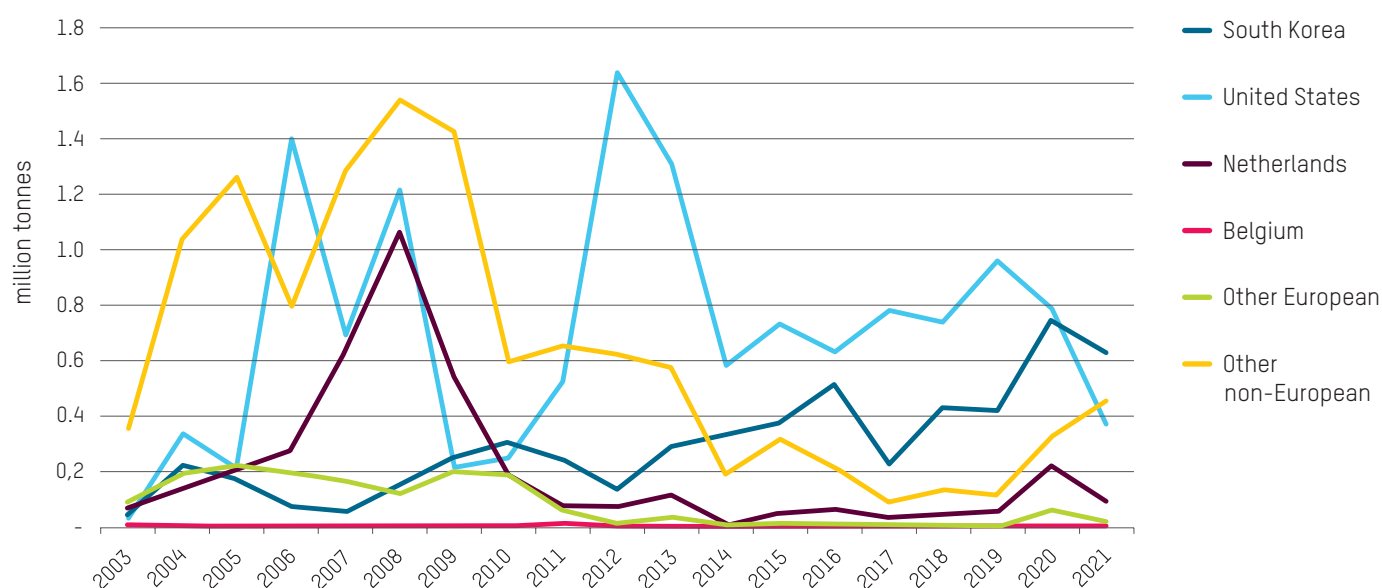
French cooperative Tereos (see also section 2.2.2) signed a partnership with VLI, a Brazilian logistics company, in 2018. VLI integrates railways, intermodal terminals, and ports to facilitate the annual transport of 1 million tonnes of sugar. As part of the agreement, the delivery of two sugar warehouses at the Guar and Tiplam terminals at the Port of Santos was planned in 2020.<sup>102</sup> This agreement seems to be limited to sugar.

The main ethanol export hubs to European destinations are the ports of Santos, Rio Grande, and Paranagu in the south of Brazil, accounting for 80% of European exports between 2019 and the first half of 2022. The remaining 20% were shipped via Aratu (Salvador) and Suape in the northeast.<sup>103</sup> Port logistical and shipment companies play a crucial part in realising commodity exports from Brazil. However, logistics companies that appear in shipment records to the Netherlands, like for example Hoyer Global or Stolt Nielsen Transport Group, can only be linked to comparatively small volumes. Shipment records from Brazil to Europe and the U.S. suggest that wholesalers or other intermediary companies do not have an important role in ethanol export.

### 3.1.4 Ethanol trade

Key destinations for the 1.54 million tonnes of ethanol exported by Brazil in 2021 were South Korea (40%), the U.S. (24%) and the Netherlands (6%). These three countries have been the key direct recipients over several years already (Figure 7).<sup>104</sup>

Figure 7 > Brazilian ethanol exports to country of first arrival, 2003 to 2021



Note: Based on HS codes 2207.10 and 220720 for ethanol. Source: ComexStat (n.d.), "General imports and exports", viewed in August 2022.

Direct exports to Belgium are reported on a very low level at an average of 0.1% of total Brazilian ethanol exports during the analysed period. As the Netherlands is a key transshipment country in Europe, Brazilian ethanol enters Belgium via the Netherlands and to a lesser degree via Germany and Switzerland.<sup>105</sup> In the first half of 2022, a shipment of 9,000 tonnes of ethanol from Brazil to Belgium is recorded. However, no information on the shipper or consignee is available. The trade relationships with Belgium are discussed in more detail in section 2.2.

Similarly, only very limited conclusions can be drawn on the main Brazilian ethanol suppliers to the Netherlands, as shipment information rarely provides information on the involved actors. Looking at data for the period January 2020 to July 2022, key ethanol producers Raízen (12,000 tonnes in 2020) and São Martinho (8,700 tonnes in 2020) show up among the larger suppliers. In 2022, Companhia Mineira de Açúcar e Alcool (CMAA) reportedly exported around 15,000 tonnes to the Netherlands, while supplies of 15,500 tonnes are recorded for Alta Mogiana in 2020. Other suppliers are reported with smaller volumes.<sup>106</sup> Due to the large share of undisclosed suppliers, no conclusions on the relative positions of the different Brazilian ethanol producers in exports to the Netherlands can be drawn.

## 3.2 The Peruvian bioethanol market and actors

### 3.2.1 Policy environment

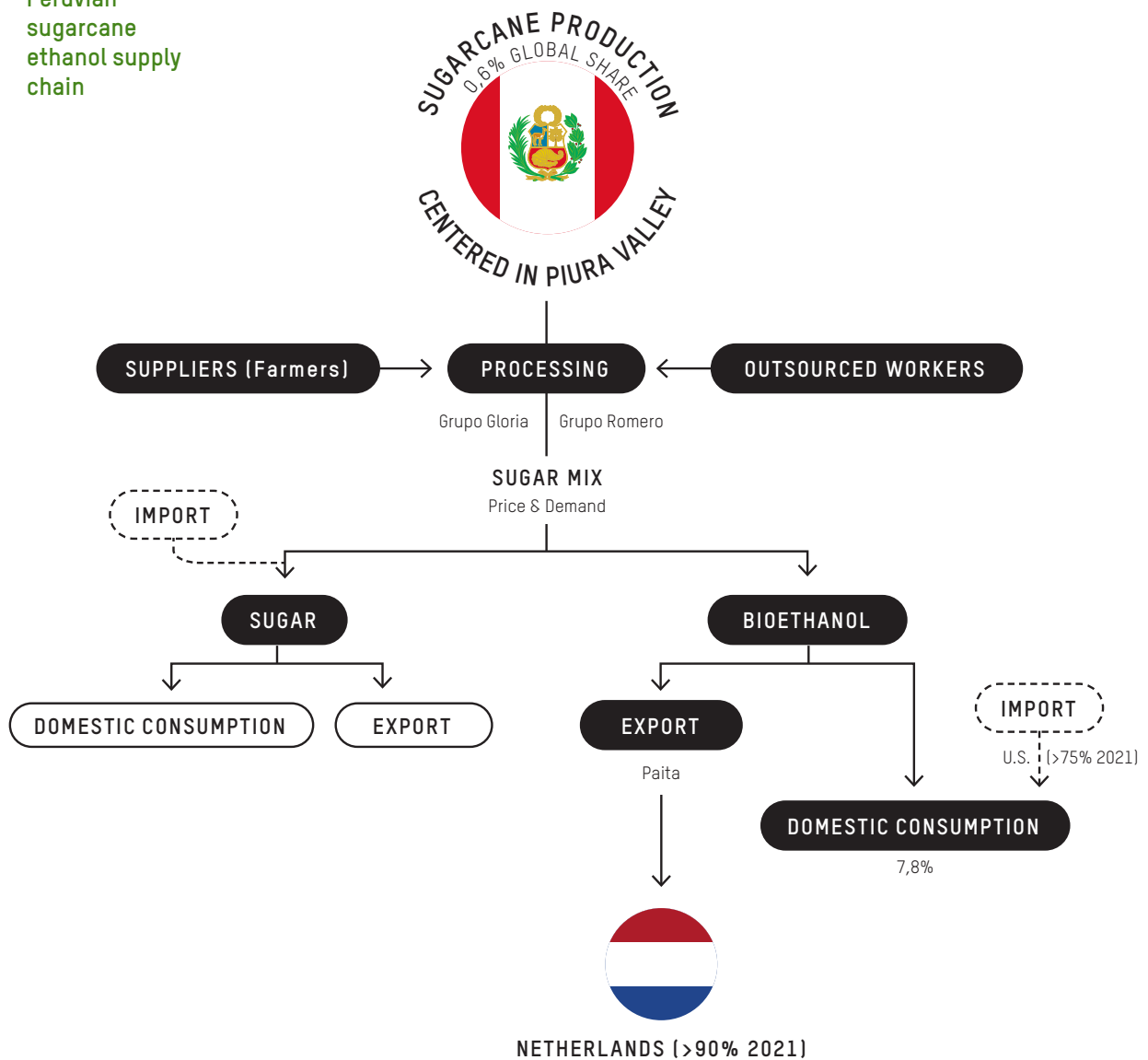
Different than Brazil, the development of the Peruvian biofuel market during the last 20 years is closely intertwined with EU and Belgian policies. Peru commenced fuel ethanol production in 2008, with sugarcane as the sole feedstock. However, preparation started already as early as 2003, when Peru's government, under the advice of the Inter-American Development Bank (IDB), set the legal and technical conditions for future biofuel production projects in the country. In addition to enabling laws for large-scale agricultural investments and the mandatory use of bioethanol and biodiesel in Peru's internal energy market, a series of incentives for biofuel promotion and commercialization enabled the introduction of biofuel production (see section 4.1 for the policy impacts).<sup>107</sup>



These decisions coincided with growing EU demand created by the introduction of the first EU directive promoting biofuels (2003/30/EC), which set voluntary biofuel targets of 2% by the end of 2005 and 5.75% by the end of 2010.<sup>108</sup> In 2010, investments by the Belgian and Dutch development financing institutions supported the Maple Ethanol greenfield project (see section 2.2.4). In the following years, blending targets for transport fuels on the Belgian market were further increased, creating a growing demand for bioethanol (see section 2.1). In recent years, attractive ethanol prices in the EU are considered a driver of ethanol production in Peru. Moreover, exports of Peruvian ethanol to the EU market benefit from duty-free access under the EU-Colombia-Ecuador-Peru Trade Agreement which took effect in 2013, in addition to price premiums for some growers who can implement certain environmental measures, including among others green harvesting (without cane field burning) and biological pest control.<sup>109</sup>

Among the Peruvian regulatory instruments related to biofuels is Law 28,054/2007 for the Biofuels Market Promotion, which established the PROBIOCOM programme to attract investments in the local biofuel sector. However, no new investments were made after the initial years. Supreme Decree 021-2007 EM regulates the commercialization of biofuels and sets biofuel blending minimums. For gasoline this stands at 7.8% since 2013. The country has no tax incentives or other direct support mechanisms for biofuel.

Figure 8 >  
 Peruvian  
 sugarcane  
 ethanol supply  
 chain



### 3.2.2 Bioethanol production and use

The Peruvian ethanol sector relies on sugarcane as feedstock. Peru is a small sugarcane producer on the global scale, accounting for a share of 0.6% of global production in 2020. Production is concentrated in Piura. The comparatively high yields in an arid region were enabled by the expansion of irrigation infrastructure. This expansion transformed not only the land ownership conditions and impacted local livelihoods, but also the water management. The creation of productive sugarcane plantations required connections to the Chira Valley water system and created additional pressure on the water supply in a water-scarce environment.<sup>110</sup>

Total ethanol production for fuel and other uses was 170,000 tonnes in 2021.

Grupo Gloria, Peru's largest dairy processor, owns Coazucar, the country's largest sugar and ethanol producer with its Aurora refinery (Agroaurora). Aurora previously operated under the name Maple Ethanol and was acquired by Grupo Gloria in 2015.<sup>111</sup> Agroaurora has 14,669 ha of land, of which 7,167 ha are under sugarcane cultivation. Other operations of Coazucar producing sugarcane include Casa Grande, Agrolmos, Cartavio, and San Jacinto.<sup>111</sup> Agroaurora has an annual production capacity of around 100,000 tonnes of sugarcane ethanol.<sup>112</sup>

Caña Brava is owned by Grupo Romero. Both ethanol refineries are in Piura state.<sup>113</sup> It has a cultivated area of more than 9,500 ha of sugarcane, and its daily production capacity amounts to 290 tonnes of ethanol or an estimated 100,000 tonnes per year. Caña Brava consists of the plantation company Agrícola De Chira; the milling and ethanol producing company Sucoalcolera Del Chira; and Bioenergía Del Chira, which generates electricity.<sup>114</sup> Moreover, informants confirmed that these companies are likely to also source from small- and medium-sized third-party suppliers. There have been rumours recently that Grupo Gloria may acquire Caña Brava (see section 4.1).

Agroaurora and Caña Brava have a combined annual production capacity of at least 200,000 tonnes of ethanol (see table 3).

**Table 3 > Top sugarcane bioethanol producers in Peru**

Ethanol producer	Parent Group	Sugarcane area (hectares)	Grinding (tonnes/years)
Agroaurora	Grupo Gloria	7,167	100,000
Caña Brava	Grupo Romero	9,500	100,000

Like in Brazil, there is no official registration of the split of ethanol production between different uses. However, the USDA provides estimates based on end-users that give an indication of the share of fuel use and other industrial chemical use, showing that with 80%, most of the ethanol available in Peru is used as fuel. Imports of 143,000 tonnes mostly came from the US, where maize forms the predominant feedstock in ethanol production. Meanwhile, Peru exported 110,000 tonnes of sugarcane-based ethanol, mostly to Europe. Therefore, the consumption in Peru itself is only partly based on sugarcane as feedstock. Other industrial chemical uses made up the remainder.<sup>115</sup>

### 3.2.3 Ethanol logistics

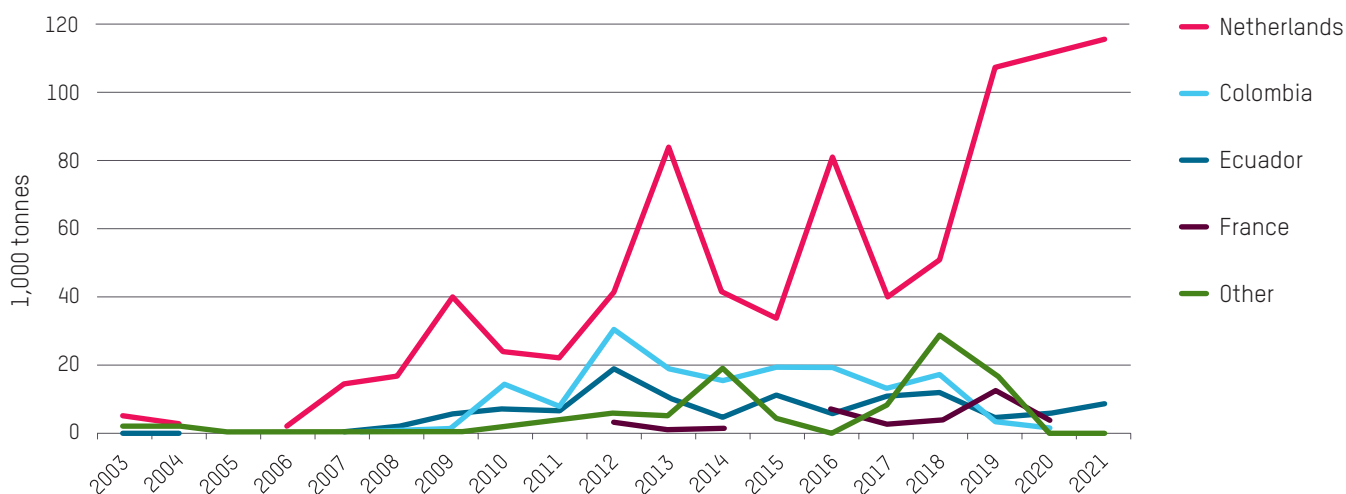
Based on shipment data, it seems that wholesalers or other intermediaries are not playing an important role in ethanol export to Europe. Shipments are linked to subsidiaries of Grupo Gloria and Grupo Romero.<sup>116</sup> Logistical companies involved in the trade include port logistical providers and shipping companies. An important ethanol export hub is the port of Paita in the North of the country.<sup>117</sup> As of 2014, terminal operator Penta Tanks Terminals had a 20-year export contract with the former Maple Energy refinery,<sup>118</sup> however, it reportedly lost this agreement after Grupo Gloria acquired the refinery in 2015.<sup>119</sup>

### 3.2.4 Ethanol trade

Through 2014, domestic demand in Peru could be met by local production; however, a supply chain gap emerged from the temporary closure of the Maple Energy refinery. As the country continued to export high-value, sugarcane-based ethanol to Europe, cheaper U.S. imports have since then been used to fill the supply gap. Peru is one of the top 10 export markets for U.S. ethanol. In 2020, the U.S. ethanol industry exported approximately 116,000 tonnes to Peru, representing an 80 percent market share.<sup>120</sup> Smaller volumes are imported from Bolivia. In 2014, the European Renewable Ethanol association, ePURE, complained that imports from Peru surged since the free trade agreement with the EU entered into force in August 2013. According to the association, Peru took advantage of the lifting import duties on ethanol by driving up its exports to the EU and substituting with cheap imports from the US.<sup>121</sup> Peru's ethanol does not fulfil biofuel land use change requirements under the U.S. Energy Act of 2007 (EISA 2007).<sup>†</sup> It therefore does not count toward fulfilling mandates under the Renewable Fuel Standard (RFS). Moreover, Peruvian ethanol is more expensive than U.S. maize ethanol.<sup>122</sup>

As illustrated by Figure 9, the Netherlands has been the key trading destination for ethanol from Peru since it started exports. Another considerable increase can be observed since 2019.

Figure 9 > Peruvian ethanol exports to country of first arrival, 2003 to 2021



Note: Based on HS codes 2207.10 and 220720 for ethanol.

Source: Trademap (n.d.), "List of importing markets for a product exported by Peru", viewed in August 2022.

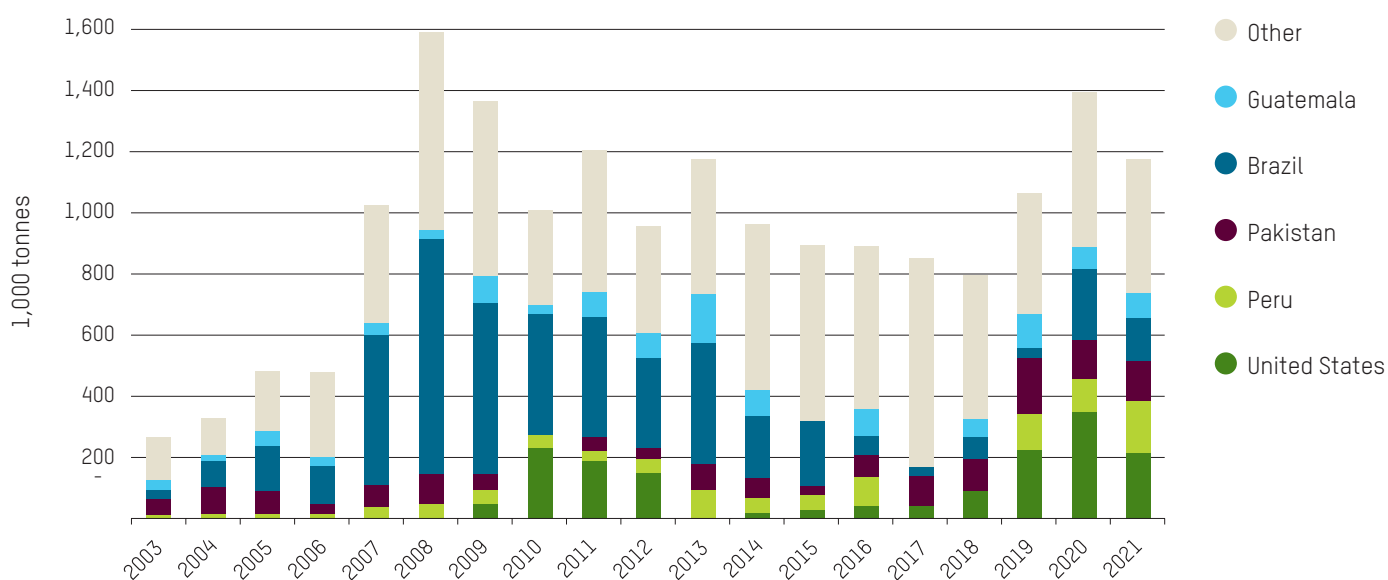
Shipment records available for Peruvian exports cover only a share of the volumes exported to the Netherlands as reported by Eurostat (116,000 tonnes in 2021 versus 165,000 tonnes reported by Eurostat). Looking across the full available dataset since March 2011 to July 2022, the dominant actors are subsidiaries of Grupo Gloria (Agroaurora, Agrojibito, Casa Grande, Cartavio, Agrolmos) and Grupo Romero (Sucroalcolera del Chira) with similar shares of the volumes exported to the Netherlands.<sup>123</sup>

### 3.3 European bioethanol imports and production

In addition to domestic production, from crops like maize, wheat and sugar beet, the EU imports bioethanol from various non-EU countries. Among the important suppliers are Brazil, Peru, and Guatemala, all with sugarcane as the dominant feedstock. During the last 20 years, important yet fluctuating shares are accounted for by these countries. Peru increased its supplies to the EU market since 2019 (Figure 10). Meanwhile, overall EU imports from Brazil were considerably higher in the period from 2007 to 2013 than in recent years, due to increasing domestic consumption in Brazil as well as higher prices achieved in the U.S. market. However, since 2020 a significant increase in Brazilian exports of bioethanol to the EU and Belgian markets (see Figure 10) can be observed again, driven by attractive market conditions (see section 3.1.2). Other important suppliers of bioethanol are the U.S. and Pakistan. Dominant feedstock for U.S. ethanol is maize, while Pakistan uses sugarcane molasses.<sup>124</sup>

In addition to ethanol and ETBE imports of almost 1.4 million tonnes in 2021, EU production from domestic crops totalled around 5 million tonnes.<sup>u</sup>

Figure 10 > Ethanol imports to the European Union, 2013 to 2021



Note: considering HS 2207.10, 2207.20 and 2909.19.10. Source: Eurostat (2022)

# 4

## Human rights impact of sugarcane ethanol production in Peru and Brazil

This section presents the human rights impacts of sugarcane ethanol production in the Piura Province (Northern Peru) and in the main sugarcane-producing regions of Brazil (namely, the states of São Paulo, Goiás, Minas Gerais, Mato Grosso do Sul, Paraná, and Mato Grosso). Information on Peru builds on the investigative work of Oxfam Belgium, published in 2021, and extends especially on the gendered impacts of sugarcane ethanol production and its violation of labour rights. Information on Brazil is presented for each of the leading producers with potential trade links to the Netherlands and Belgium.

### 4.1 Peru

The environmental and social impacts of sugarcane ethanol production in the Chira Valley, Piura, Northern Peru have been widely documented by local media, human rights organisations, community-based organisations, and NGOs, including Oxfam. Oxfam's study of human rights violations by the sugarcane ethanol industry in the Chira Valley describes a dire situation (Table 4). The diverse negative impacts show that sugarcane bioethanol production in this region has failed to unlock the economic benefits that motivated the Peruvian Law 28054, on the Promotion of the Biofuel Market (see section 3.2.1.).<sup>125</sup> In fact, the Peruvian sugarcane ethanol industry has failed to provide quality employment and impacts related to land and water grabbing, air pollution, and weak governance affect women much more than any other group. The following sections present those labour and gendered impacts.



**Table 4 > Socio-environmental impacts of sugarcane ethanol production in the Chira Valley, Piura Province, Peru**

Impact	Description	Status (2022)
Air pollution	The regular burning of fields before the sugarcane harvest has increased respiratory diseases in the Chira Valley. It has also increased damage to local infrastructure and caused several car accidents due to poor visibility by smoke.	The latest documented incidences of burning sugarcane fields date from late 2021. However, the local sources consulted for this research denounced fires that the sugarcane companies claim were caused by third parties.
Land grabbing	The extensive land ownership of ethanol producing companies in the Chira Valley encroaches human settlements and public spaces. Moreover, there are instances of legal dispossession of communal lands by one of the ethanol producing companies. <sup>v. 126</sup>	While there were no registered cases of land grabbing by sugarcane producers in the Chira Valley in 2022, there are reports of Grupo Gloria's intention to acquire Caña Brava (Grupo Romero), including its 9,500 hectares of land. <sup>127</sup>
Water grabbing	Ethanol production, which relies on the intensive irrigation of sugarcane fields, has strained hydric resources, affecting the access to water of smallholder producers and inhabitants of the Chira Valley, especially during the drier months of the year.	Throughout 2022, several communities along the Chira River, in the Chira Valley region, have denounced the installation retention walls on the left bank of the river, allegedly by ethanol producers (Caña Brava <sup>w</sup> and Agro Aurora) to divert the water to their fields. <sup>128</sup>
Weak governance	The presence of Caña Brava and Agroaurora in the Chira Valley and the impunity with which they compromise people's livelihoods through land and water grabbing has caused widespread distrust in local and national politics. Moreover, the power imbalance between government-backed corporations and local communities has eroded local authority in land negotiations.	While some civil servants in Sullana have stated their willingness to take measures to prevent sugarcane fields burning and river water retention, their leverage is limited as, according to them, ethanol production and its impacts is the jurisdiction of the national government. Moreover, as of 2022, citizens did not appear to be included in the ongoing institutional dialogue around the socio-environmental impacts of sugarcane burning. <sup>129</sup>

Source: Oxfam Belgium (2021), *Fuelling Human Rights Violations – Consequences of EU and Belgian Biofuel Policies in Northern Peru*.

#### 4.1.1 Labour rights violations

As stated earlier, within Piura, sugarcane ethanol production is concentrated in the Chira Valley. Production, which includes sugarcane cultivation and processing into ethanol, is done by two large-scale producers: Grupo Romero's Caña Brava and Agroaurora, a company of Grupo Gloria.

##### Workforce and freedom of association

Caña Brava is a group of three companies: Agrícola del Chira, in charge of cultivating the sugarcane; Sucroalcolera del Chira, in charge of milling and processing sugarcane into ethanol and sugar; and Bioenergy del Chira, in charge of electricity generation from bagasse.<sup>130</sup> According to the sugarcane workers that informed this study, as of May 2022, Caña Brava employed 1,447 workers, including 240 female employees. Most workers are employed at Caña Brava work in Agrícola del Chira. Of the total number of employees, 255 workers (including one woman, only) are members of SINTRAGRACHI (the workers union of Agrícola del Chira) or SINTRA CHIRA (Sucroalcolera del Chira). According to Caña Brava SINTRAGRACHI AND SINTRA CHIRA are currently made up of 19,3% and 10,3% workers, respectively.<sup>x</sup> Both unions were formed in 2019.

At Agroaurora, the workers interviewed for this research estimate around 1,000 employees work in the sugarcane fields and the mill. Of these, 42 workers (including two women) are members of SITRAAGROA, Agroaurora's workers union formed in 2019.

SINTRAGRICHI was formed by a group of workers seeking advice from the regional office of FNT-CGTP-ABA (National Federation of Workers in the Food, Beverage, and Related Sectors) to address what the workers referred as Caña Brava's reluctance to provide its workers with enough water, food, and rest.<sup>y</sup> FNT-CGTP-ABA advised them to unionise, but they initially did not manage to gather the minimum of 21 workers to form a union, as the law requires.<sup>131</sup> Both the lack of awareness of their rights and fears of reprisals kept (and continue to keep) workers from unionising. While the union was eventually formed with 27 workers in 2019, they faced a limitation on the number of delegates, as the Peruvian Labour Law requires that the number of delegates in a union be proportional to the total number of workers employed by the company.

Through their advocacy work, the union founders managed to get Caña Brava to provide them with meals again. In the end, the company argued that it had stopped providing employees with meals in line with Peru's single-use plastic law that came into force in December 2018.<sup>132</sup> According to the company, the containers used to pack the workers' meals did not comply with the law. The workers also denounced the deductions on their salaries of PEN 6 (€ 1.50) per meal up to a maximum of PEN 40-46 (€ 10.50 – 12) per month to cover their meals, which they considered too high a deduction given the fact that the quality of food was not good enough to make it safe to eat. Moreover, the company allegedly did not provide its workers with a proper place to sit down and eat.

### Salaries and working hours

While the quality of their meals has improved since (but the lack of proper dining facilities remains a problem<sup>z</sup>), the deductions weigh heavily on their workers' salaries. According to the workers that informed this study, Caña Brava pays the statutory minimum wage (PEN 1,025, or € 269), but this amount is not enough to cover the workers' (and their families') living expenses.<sup>aa</sup> If well, salary increases are adopted, these increases are done on yearly basis and therefore do not keep up with inflation. For that reason, many employees work overtime frequently. Workers employed by Agrícola del Chira and Sucroalolera del Chira work four days in a row with a 12-hour shift a day and rest three days a week (also known as 4x3 workweek)<sup>bb</sup>. Working overtime at night pays 35% extra, while daytime overtime pays 25% more. Workers at Caña Brava are free to choose whether they want to do overtime, while there are reports that workers at Agroaurora are coerced into overtime.

At Caña Brava, there are two types of repair technicians: workers employed at the repair shop and those that do maintenance work in the field. Repair shop workers have reported wage discrimination because there is no wage harmonisation across work functions. The company has claimed that wage differences amongst workers of the same class are based on the individual worker's experience. Unlike their counterparts working in the field, workers stationed at the repair shop do not have the opportunity to work overtime, and they see it as a punishment to be sent to the company's repair shop since most of them rely on overtime to make ends meet.

### Collective bargaining

Since the formation of the unions at Caña Brava in 2019, collective bargaining agreement (CBA) negotiations take place every year. In 2020, CBA negotiations took ten months to be finalised. Caña Brava allegedly blamed the COVID pandemic for the delays. In 2022, after five months of CBA negotiations, tension raised when the union brought up the issue of profit sharing, which according to interviewees had not taken place for at least 14 years. The company justified this situation by claiming that it had not made any profits during this period (although, some workers employed at Agrícola del Chira claim to have received profit shares in 2021 as a result of the new Law of the Agrarian Sector 31110 of 2021, which introduced profit sharing with agricultural workers).<sup>cc</sup>

As a result of the union's demands regarding profit sharing, Caña Brava refused to transfer its contribution to pay for the facilities used by the union to hold its meetings and conduct its work. While this situation constitutes a union-busting practice, the unionised workers do not perceive the company as a threat for their lives. This suggests a complex company-union relation, where although labour rights are allegedly not guaranteed, unionised workers can fight for their rights in safety.<sup>dd</sup>

By contrast, despite the formation of the union at Agroaurora, there are no CBA negotiations and workers have not received a salary increase since Agroaurora took over from Maple Energy. The union was formed in response to several labour abuses they were subject to, including forced overtime and unfair dismissal. These abuses continue even after the formation of SITRAAGROA. In fact, two unionised workers have been unfairly dismissed recently. Moreover, during the first two years of the COVID pandemic, Agroaurora has allegedly not allowed its workers to hold in-person meetings on the excuse that meeting carried a high COVID outbreak risk. These practices constitute union busting. Not surprisingly, a few workers have suggested that they left the union for fear of losing their jobs or suffering other types of reprisals.

### **Social dialogue**

In terms of social dialogue, both Caña Brava and Agroaurora engagement with the unions occurs in the presence of lawyers hired by the companies. According to the workers that informed this research, the lawyers are very uncompromising. The Peruvian state does not participate in social dialogue. According to our informants, Caña Brava used to consult its workers before taking important decisions, however, they no longer conduct this practice.<sup>ee</sup> Agroaurora has reportedly never involved its workers in decision-making.

### **Occupational Safety and Health**

Regarding the Occupational Safety and Health (OSH) practices by Caña Brava, workers are given Protective Personal Equipment (PPE) every year, but it deteriorates very quickly. While the company replaces damaged or worn-down equipment, workers claim that they often must work with faulty equipment as the company does not replace damaged equipment immediately.<sup>ff</sup> Collective agreements require the issuance of PPE, but the rule is not binding and workers often end up tearing or damaging their clothes while working, which adds to their already high living expenses.

Although our sources were not able to provide exact figures about workplace accidents, they confirmed that accidents at work happen often, especially amongst workers doing night shifts in the field. According to our sources, the light is dim at night, and they cannot see well. This, combined with the unevenness of the terrain, makes workers lose their footing and slide. In this context, aged workers who slip usually hurt themselves badly. To tend to injured employees, every sector has a first aid kit. The kit contains paracetamol, alcohol, and band-aids. During the day, there is an infirmary with a nurse. The infirmary is not accessible to employees who work by the river (those workers must make do with the first aid kit).

According to the workers who informed this research, the canteens at both companies are unhygienic. The unions have been fighting for mobile dining rooms but have not succeeded. The companies have provided dining infrastructure that includes wooden benches, but according to the workers, these are unhygienic. Workers also claim that the company does not supply enough resting places in the shade, and workers must look for a shadow wherever they can. Both companies provide medical services to their workers through the Institutional Health Service Providers insurance system (EPS).

The sugarcane employees interviewed for this research were satisfied with the Occupational Safety Hazards (OSH) trainings they received and stated that the companies provided periodic toolbox talks.<sup>gg</sup> Also, the workers confirmed that both companies have gender and sexual harassment policies and gender committees. However, these policies are not adequately socialised, most workers are unaware of their existence, and the committees have not been introduced to them.



## Ethical hiring and outsourcing

Concerning the companies' hiring practices, according to our sources, all workers receive a written contract, except outsourced workers, who presumably sign a contract with the subcontracting agency. A manager reads the contract out loud to workers who cannot read and write. The workers of Caña Brava and Agroaurora receive their salary slips monthly by email, and workers who do not have an email address receive their salary slips by post.

According to the workers interviewed for this research, over 30% of the mill employees at Caña Brava are workers whose labour is outsourced through a subcontracting agency called Representaciones Agromaster S.A.C. Outsourced workers are not unionised. Although the number of outsourced workers at Agroaurora is unknown, the company relies on outsourcing to avoid offering its workers permanent employment. In this context, Agroaurora routinely gives its workers fixed-term contracts for three years. At the end of these three years, employees are subcontracted for six months to conduct the same function they do when in direct employment with the company. After six months of work as outsourced labour, they are hired again directly by Agroaurora for three years.

During the stakeholder consultations in Piura, the research team learned that small- and medium-sized farmers are also supplying sugarcane to Caña Brava. None of the identified farmers was willing to inform this research, but data from 2017 points to unfavourable contractual conditions that may push Caña Brava's suppliers to hire temporary workers under precarious labour conditions. For example, the purchase agreement between Caña Brava and its sugarcane suppliers stipulates that the supplier must bear the costs of hiring labour to plant, maintain and harvest the crop. Furthermore, the sugarcane is sold at an agreed price 15 days after the harvest. This price, which in 2017 was PEN 270 (€ 72,27) per tonne, is set by Caña Brava based on the price of ethanol FOB Rotterdam T2, published by Platts, discounting export costs, so that the company can sell ethanol in the European market with the preferential tariff set in the context of the EU-Colombia-Peru-Ecuador Trade Agreement.<sup>133</sup>

Purchase agreements notwithstanding, it is not uncommon for Caña Brava to announce the purchase price after the harvest and during the weighing (or even after it), in a context that gives suppliers very little room for negotiation. Most of the farmers do not know nor have a way to compare the prices offered by the company to other suppliers, as is the case with conventional crops such as coffee or banana. On top of the unequal footing in which suppliers sell their sugarcane harvest to Caña Brava, sugarcane farmers are expected to reach productivity levels similar to the ones reached by the company itself. This implies substantial investments in inputs and machinery (that Caña Brava may supply, but at a cost for farmers that is deducted from the purchase of sugarcane). For many suppliers, the profit margin is not sufficient under these circumstances.<sup>134</sup>

### 4.1.2 Gendered impacts of sugarcane ethanol production in the Chira Valley

The labour rights of sugarcane workers in Piura are part of a system installed in the country on the large farms on the Peruvian coast. In this context, the already precarious conditions of male workers weigh heavily on women – whether or not they are employed as sugarcane workers. Women who are partners of sugarcane workers see their workload increase due to their partners' long work shifts and insufficient salaries. Civil society groups interviewed for this research agreed that these women get up earlier than their husbands to prepare meals and feed them before leaving for work.

Oxfam's study on the environmental and human rights impact of sugarcane production in Piura documented that land- and water-grabbing by sugarcane ethanol producers has compromised smallholders' productivity and capacity to supply local markets.<sup>135</sup> The smallholder producers consulted for this research confirmed Oxfam's assertion, adding that the sugarcane has brought a host of plant pathogens that did not exist in the region before and that affect their rice crops - a regional staple and main source of income for these farmers. This threat to food security in the region weighs heavier on women who are in charge of preparing meals and feeding their families and who engage in petty trade in addition to stretching their already limited budgets to provide for their families. This situation is compounded by the increasing costs of food caused by inflation and the prevalence of incomes that do not keep up with the rising prices.

As stated earlier, local communities in the Chira Valley have not accessed the economic benefits of the sugarcane ethanol industry, and women's participation in it has been limited. In this context, less than 17% of the total workforce at Caña Brava are female employees. These women are employed in the laboratories as technicians or conduct administrative tasks. In fact, 50% of administration employees at Caña Brava are women. Cooking and cleaning, two jobs that are traditionally given to women, are done both by women and men. Only five of 200 employees working in the field (where sugarcane is cultivated) are women. According to the company, Caña Brava works actively to incorporate women into its workforce in different positions and are the first business group in northern Piura to certify women as heavy machinery operators to whom they provide professional opportunities and a safe work environment. Likewise, Agroaurora employs very few women. Although the exact number is unknown, the workers interviewed for this project estimate that less than 100 women are employed in the different segments of the company (including 20 women at the mill and another 20 in the sugarcane fields).

As part of its support for the development of the ethanol industry in Piura, the Peruvian government has endorsed the intensification of irrigation sugarcane cultivation. In this context, Agroaurora and Caña Brava have been granted year-round access to the different water reservoirs along the Chira River, leaving other water users in the Chira Valley to face water scarcity during the dry months of the year.<sup>136</sup> Adding insult to injury, during the dry months, both companies put up retaining walls on the banks of the Chira River to divert water to their fields. This illegal practice comes at the expense of smallholders who also need the water to grow their crops.<sup>137</sup>

The situation described above, together with the water contamination by the runoff of pollutants from the agrochemicals used to grow the sugarcane, further adds to women's unpaid care and domestic work. When water becomes scarce and faucets at home run dry, the municipal authorities distribute drinking water with water tank trucks. Women are in charge of fetching and administering the water distributed by the municipality, which, according to the sources consulted for this research, is limited to 300 litres per household per week. Collecting water not only costs significant effort but also time.

Moreover, to cope with water scarcity, many women collect rainwater in large containers, which, according to the local sources consulted for this research, increase the incidence of water-related vector-borne diseases such as dengue, malaria, and chikungunya. Those diseases also increase women's workload caring for sick family members. In this context, our sources stated that dengue has become endemic in Piura and that women are especially exposed to it as they spend much more time at home than any other household member. In 2022, there were over 14,800 cases of dengue in Piura, an increase of 267% from the previous year.<sup>138</sup> Our sources stated that 19 of the 25 dengue-related deaths in the Chira Valley in 2022 were women.

Figure 11 > **Women queue to collect drinkable water distributed by the district municipality of La Huaca**



Photograph courtesy of Radio Culturalú.

Likewise, the air pollution from the burning of the sugarcane fields (a routine step in the sugarcane production cycle that both Agroaurora and Caña Brava assure to no longer rely on since the mechanisation of their operations<sup>138</sup>, but that allegedly continues to happen every year), also adds to women's unpaid care work. The contamination of the air has led to the prevalence of chronic respiratory diseases, especially amongst children and the elderly.<sup>139</sup> The increasing incidence of asthma amongst children affects women more severely because caring for ill family members is a task relegated exclusively to them. While the latest reports of burning sugarcane fields date November 2021, Peru's Environmental Assessment and Enforcement Agency (OEFA) installed air quality monitoring stations in February 2022. This was done in acknowledgement of the air quality problem caused by sugarcane cultivation, which OEFA detected during a routine assessment.<sup>140</sup>

## 4.2 Brazil

In November 2019, the Brazilian government issued a decree that liberated the sugarcane plantations in the Pantanal and the Amazon regions. The new law allowed planting sugarcane on approximately 60 million hectares (around 20 times the size of Belgium) outside forest areas, in degraded or pasture areas, without having to expand into other biomes with primary forest. Even restricted, the permissible land bank was six times greater than Brazil's total planted sugarcane area at the time the decree was issued.<sup>141</sup>

The impacts of sugarcane ethanol production on food security in Brazil are highly contested, with several scientific studies and claims by politicians pointing to positive outcomes, and a number of smallholder farmer organisations and other social movements claiming the contrary.<sup>142</sup> What is undeniable, however, is that Bolsonaro's lifting of restrictions from this crop has become a driving force of deforestation in biomes with primary forest. Direct conversion of forests not only raises land values, and increases the danger of spreading forest fires and carbon emissions from burning sugarcane during harvesting, but also breaches the human rights of Indigenous communities in those territories and exacerbates labour rights abuses.<sup>143</sup>

Bolsonaro's decision to open the Amazon to sugarcane expansion spurred EU concerns regarding the sustainability of Brazil's sugar sector, hindering the ratification of the EU-Mercosur trade agreement. However, this did not stop deforestation or land grabs. It is widely expected that the 2023-2026 presidency of Luiz Inacio Lula da Silva will reverse the detrimental policies that characterised Bolsonaro's tenure. To date, however, Lula has only issued a decree that exempts fossil fuels from federal taxes, which limits previous expectations that more expensive fuels would make sugarcane ethanol more competitive domestically.<sup>144</sup> Whether high bioethanol prices will be enough to curb demand and prevent further loss of forest land to sugar plantations will likely not depend only on the profitability (or lack thereof) of sugarcane ethanol exports, but on stricter safeguards to protect the Amazon Forest. This section provides an overview of the impacts of the Brazilian sugarcane industry on people and the environment.

#### 4.2.1 Environmental impacts of sugarcane ethanol production

In November 2018, the Public Prosecution Office in Mato Grosso do Sul state filed a civil action lawsuit against Atvos' Usina Santa Luzia for the inappropriate release of vinasse<sup>ii</sup>,<sup>145</sup> into the environment. According to inspection reports of 2018, by the Special Department of Support for Execution Activities of the State Public Ministry (DAEX) and by researchers from the Federal University of Grande Dourados (UFGD), the plant's activity has contributed to the proliferation of stable flies, that harm livestock farmers and their animals. Moreover, the excess vinasse released into the soil generated contamination of water courses.<sup>146</sup> The Public Prosecution Office and Atvos reached an agreement in 2020 in which the Santa Luzia plant agreed to adapt to the procedures and observe the normative criteria for the storage, distribution and application of vinasse in agricultural soil and wastewater generated from the processing of sugarcane, as well as for paying the amount of R\$ 1,600,000 (€ 285,716).<sup>147</sup> There have been no new reports of non-compliance by Atvos since.

In addition to the vinasse pollution case, in August 2018, the same plant was fined R\$ 495,000 (over € 96,700) for setting fire to sugarcane plantations without authorisation. The value was calculated based on the affected area (495,000 hectares), which included areas of native vegetation. The company claimed not to be responsible for the fires, as their harvest is mechanised (allegedly not needing to burn the crop prior to harvesting, as is the case when manual harvesting methods are used).<sup>148</sup> There is no public information available to confirm whether Atvos paid this fine. The year prior, more than 500 hectares of sugarcane fields had been burned too. The company claimed that the fire had been initiated by former employees who lit it using candles at different points throughout the plantation. The said employees had lost their job to redundancy.<sup>149</sup> Likewise, as a result of the sugarcane plantation fires in Usina Santa Luzia in November 2021, two workers died from asphyxia while trying to contain the flames.<sup>150</sup>

Between 2018 and 2021, Raízen sourced sugar from Usina Trapiche, a mill in Pernambuco accused of invasion of conservation areas, expulsion of traditional communities, pollution of mangroves, gender violence, threats, private imprisonment, and torture.<sup>151</sup>

Lastly, between 2018 and 2020, Bunge appears to have purchased sugar from Biosev's Unidade Santa Elisa, a mill in São Paulo with proven environmental pollution cases including leaks of vinasse, residual water, cleaning water and chemical products into water streams.<sup>152</sup> Likewise, between 2018 and 2021, Bunge's Unidade Frutale caused damage to permanent conservation areas caused by leased farms on the border between São Paulo and Minas Gerais. There are at least three lawsuits involving four properties linked to the plant. The main violation is the suppression of vegetation, without the authorisation of the environmental agencies for the planting of sugarcane.<sup>153</sup> Also, Bunge's Unidade Uoreste (in São Paulo state) was sued in 2021 for field fire that reached a permanent conservation area. After having its appeals denied, the company signed a Term of Commitment for Recovery (TCRA) to restore the damage and implement fire prevention measures.<sup>154</sup> In this context, two workers were severely burnt.<sup>155</sup>



#### 4.2.2 Human rights violations

Violations to the rights of indigenous communities by the Brazilian sugar sector are plentiful. Despite some victories and reversals, many of the crimes committed against rights defenders, and the breach of their labour rights remain unaddressed as of 2022. This section presents an overview of the most salient human rights violations.

In 2011, the Guarani tribe in Brazil campaigned against ethanol production on their lands by Raízen. According to the Guarani, the sugarcane production on their lands has had detrimental impacts on the indigenous community, including health issues related to the use of chemicals on the plantation, deforestation, a loss of access to natural medicine, environmental degradation and death of fish and plants due to water pollution. In addition, the Guarani had not been consulted on the use of their lands due to the government of Brazil's failure to protect the land rights of the Indigenous community.<sup>156</sup> In this context, at least 2,300 hectares leased by one of Raízen's suppliers, NovAmérica were Guarani lands.<sup>157</sup>

The land grabbing associated with Raízen's sugarcane production did not occur in isolation but fit into a wider trend of severe abuses of the human and Indigenous rights of the Guarani tribe associated with the rapid growth of agro-industrial production in Brazil. The indigenous communities belonging to the Guarani have been forced off their lands into roadside camps with severely poor living conditions. In retaliation to the communities' attempts to reoccupy their land taken over by soya farms, cattle ranches and sugarcane plantations have been met with severe violence. In 2010 alone, 56 Guarani were reported to have been assassinated.<sup>158</sup> In 2013, Guarani leader Ambrósio Vilhalva, a prominent advocate against the practices of the cane sugar industry, was murdered in his own community in Mato Grosso do Sul.<sup>159</sup> The police have denied that his murder was connected to the local land dispute, and as of 2022 the crime remains unsolved.<sup>160</sup>

In 2012, Raízen agreed to stop buying sugarcane from land declared as indigenous by the Ministry of Justice following pressure from a campaign by Survival International.<sup>161</sup> Raízen has an Indigenous Peoples Relationship Policy which fosters procedures to consult and provide prior free and informed consent from indigenous peoples and has committed to use georeferenced mapping.<sup>162</sup> But according to members of the Guarani community, there is still a lot of sugarcane planted in Indigenous lands. Of the more than 11 thousand hectares declared as ancestral Guarani land, only 55 are occupied by the Guarani people, the rest of the area is dominated by sugarcane plantations.<sup>163</sup>

Nevertheless, the struggle for Guarani land rights in the face of agro-industrial production of commodities like sugarcane continues. In 2021, the Guyra Roka community, part of the Guarani tribe, finally had a small victory after Brazil's Supreme Court ruled that a 2014 judicial decision cancelling the return of some of their ancestral territories to the Guarani community of Guyra Roka must be revisited because of a lack of consultation of the Guarani themselves in the process. However, according to Solidarity International, it is not likely that this will lead to a recovery of the Guarani lands anytime soon, as in the meantime the lands have been occupied by powerful agro-industrialists and other trends in Brazil's policies on Indigenous land rights continue to severely oppose any justice for the Guarani.<sup>164</sup>

According to non-profit news platform Mongabay, the Guarani tribes are continuing to experience conflict over their lands, which have heightened under the Bolsonaro administration.<sup>ii</sup> Because of the increasing hostility towards Indigenous rights, the Guarani people have experienced intimidation and assault by gunmen from large-scale farms on their lands.<sup>165</sup> In 2022, the local military police illegally evicted around 150 Guarani people from their own territory in a brutal operation that killed one person and injured at least two people.<sup>166</sup> While the land grabbing of late has not been perpetrated by Raízen, there is consensus amongst human rights organisations that the present threats to Indigenous territories by large scale farmers are ramifications of Raízen's model of land grabbing.<sup>167</sup> After years of rampant violence against Indigenous people under Bolsonaro's regime, the tide begins to turn. One of the first actions of Lula's presidency was the reinstatement of FUNAI, Brazil's National Foundation of Indigenous Peoples in charge of safeguarding Indigenous people's rights, including land rights.<sup>168</sup>

Likewise, Bunge has been regularly associated with social conflicts, including land grabbing, human rights abuses, and adverse environmental impacts, including in relation to its cane sugar and agri-food production in Brazil. In 2013, Oxfam published a report that outlined Bunge's involvement in land grabbing in the Brazilian state of Mato Grosso do Sul, home of the Guarani-Kaiowá tribe. One can conclude from the sources cited above that the Guarani people have faced severe violence in retaliation to their attempts to reclaim their lands. Bunge was found to be purchasing from sugarcane plantations located in the grabbed Indigenous land.<sup>169</sup> In response to the report, Guarani Indians launched a campaign asking companies to stop sourcing sugar through Bunge. Bunge replied to the report stating it follows Brazilian law, although the company pledged not to renew the contracts with the five farms on Indigenous land after the contracts' expiry in 2014.<sup>170</sup> Bunge also adopted in 2015 a commitment to respect communities' and indigenous peoples' land rights. While these are positive steps, the community was still unable to return to their land and has not received remedy for harms. Bunge has continued responsibilities to communities.<sup>171</sup> As of 2022, there is no evidence that Bunge is still buying from suppliers illegally operating in Indigenous territories.

While no further landgrabs have been documented in Bunge's sugarcane supply chains, a 2017 report by Global Witness found that Bunge continues to trade directly and indirectly with soybean producers associated with human rights abuses and land conflicts in Brazil, which raises questions about the company's due diligence practices in other supply chains.<sup>kk</sup>

### 4.2.3 Gendered impacts of the Brazilian sugarcane supply chain

These accusations above fit into a wider context of criticism that Bunge contributes to social conflict and human rights abuses through its sourcing practices. In 2020, a report by ActionAid found that Bunge was linked to sourcing palm oil from plantations in Guatemala that were associated with women's rights abuses such as the right to food, water, economic opportunities, and land rights.<sup>171</sup> The company's due diligence system failed to flag due to a lack of gender-sensitive assessments of human rights risks.<sup>172</sup>

Likewise, Raízen operations also have been related to abuses of female workers' rights.<sup>173</sup> In September 2015, Raízen Energia's Unidade Diamante was sentenced for discriminating against female workers who sued the company or had health problems or low productivity in previous harvests. The decision was made by the Labour Court of Jaú (in Sao Paulo state) and responded to the complaint by the Public Ministry of Labour. The ruling also prohibited the company from discriminating against women and people over 45 years at the time of hiring. The company was prohibited from outsourcing sugarcane "planting, harvesting, loading and transport" activities at any of its establishments in the region.<sup>173</sup>

In 2020, workers from Usina Trapiche (in Pernambuco state) were involved in a case of gender violence against fisher woman and activist Maria Nasareth. Nasareth is an advocate for the rights of traditional communities who had been intimidated and beaten by local police, allegedly in complicity with Usina Trapiche's employees.<sup>174</sup> A 2022 investigation found that Usina Trapiche had been one of Raízen suppliers from 2018 to 2021.<sup>175</sup>

### 4.2.4 Labour rights violations

In 2022, it was reported that Bunge's Moema Mill in Sao Paulo state was an accumulation of labour infractions between 2016 and 2019 that resulted in the filing of a lawsuit against the plant: safety failures due to negligence, with incidence of accidents, including fatal ones; non-payment of commuting hours; and coercion of workers to write down fewer service hours than hours they had actually worked.<sup>176</sup>

In November 2017, following the introduction of a reform of Brazil's labour law, Raízen faced significant backlash for using the reform to repress workers' rights. Raízen stopped paying workers for the hours they spent commuting to sugarcane plantations in company-provided transport, which in some cases added up to over two hours. As a result, workers lost up to 30% of their incomes. In 2018, Brazil's Labour Court ruled that Raízen is responsible for paying the hours and needs to reinstate those paid hours. Although Raízen also paid back the lost wages to workers covering the months the policy was not in place, workers lost various benefits over those hours that were not reinstated.<sup>177</sup>

In addition, Raízen also laid off 250 workers at its Usina Tamoio plant (in São Paulo state) without any negotiation or consultation with workers and unions, nor any attempts to retain employment. Raízen claimed the closure of the plant was linked to the lower availability of sugarcane in the region, but clearly used the labour reforms to dismiss workers more easily, as the plant closure was announced exactly one day after the entry into force. Raízen claims that the company offered a package of benefits and additional compensation to these workers and helped them in their quest for new jobs.<sup>178</sup> In 2018, a regional labour court ruled that Raízen needed to reinstate all contracts of all dismissed employees and negotiate with the trade union on the severance package. Despite this small victory, workers will still lose their jobs eventually.<sup>179</sup>



Raízen established in 2014 the “Elos Raízen” program to promote and nurture environmental protection and respect for human and labor rights among growers.<sup>180</sup> Yet in 2018, Repórter Brasil reported on violations of labour rights and human rights on plantations that sell sugarcane to Raízen. In the region of Piracicaba, auditors from the Ministry of Labour found about 80 sugarcane cutters who did not have a formal contract and who worked excessive hours due to the quota-based payment structure. According to the inspection, workers were also found to be living in poor and unclean accommodation facilities, unsafe transportation from and to the plantations, and meals provided by the plantation that were insufficient to nourish the workers adequately. Workers also reported on severe health issues, including physical exhaustion, caused by excessive working days without breaks for meals or rest. The workers were found to be harvesting over 22 tonnes of cane daily, even though anything over 10 tonnes per day is already generally considered excessive within the industry. As a result of the inspection, three plantations that sell to Raízen were fined for various abuses: Consórcio de Produtores Rurais, Renato Massena Quixabeira and Luis Antônio Neves. However, Raízen did not commit to acting or suspending the suppliers.<sup>181</sup>

During the Covid-19 crisis, Repórter Brasil highlighted how agribusinesses exposed the Guarani workers and communities to the deadly virus, however, there are no official figures regarding the number of infections and casualties in this context. According to indigenous leaders and experts, Raízen and other companies delayed action after the first cases were confirmed and took ineffective measures to prevent the spread of Covid-19.<sup>182</sup> In response, Raízen claimed it took necessary steps to protect workers, including the provision of PPE and enforcement of social distancing and claimed it only temporarily dismissed workers with the maintenance of their pay before any cases were detected.<sup>183</sup>

Lastly, as of 2022, it is reported that Raízen has several labour lawsuits and administrative procedures, related to situations such as overtime, granting of intra-day break, irregular outsourcing, moral and material damages, work accidents, accidents at work, compliance with health and safety standards, among others. By March 2019, the company’s lawyers predicted costs of about R\$272.9 million in relation to labour lawsuits.<sup>184</sup>



With regards to Atvos, in 2019, there were allegations that the company had failed to pay for the commuting times of its workers, through transportation the company provided for them. This would have happened after the entry into force of Law 13467/17, thus causing an effective salary reduction for workers. The Public Ministry of Labour (MPT) ruled the company's duty to pay the hours of commuting in the workday of its employees, "who would have to travel up to 200 km per day to attend the workplace, demanding around 2 hours of commuting", which is why the transport could not be considered as a benefit or advantage, in addition to being a necessary element for the economic activity carried out by the company. The ruling was overturned after the company submitted arguments proving that there was no breach of the rule, including greater benefits for workers (meals allowance, food aid, shopping card, life insurance, free transportation, and day-care assistance, as well as medical and dental assistance).<sup>185</sup>

Likewise, a 2022 investigation found that between 2021 and 2018, Atvos' Conquista do Pontal unit in Sao Paulo state operated in breach of labour rights, including omission of employment contracts, illegal outsourcing, poor working conditions and lack of safety at work, inadequate sanitary conditions, and remuneration below the statutory minimum.<sup>186</sup>

#### 4.2.5 Corruption, tax avoidance and impacts on governance

In 2018, Repórter Brasil revealed that Marcos Marinho Lutz, CEO of Cosan and member of the Board of Directors of Raízen, was the second biggest campaign donor to Brazilian federal deputy Tereza Cristina, who was president of the special commission of the Chamber of Deputies that approved a bill that facilitates the release of pesticides. According to Repórter Brasil, Cristina was fundamental in advancing this bill after years of resistance from environmentalists and health experts. The bill has been nicknamed the "poison package" for loosening the approval of new pesticides and allowing products previously prohibited by environmental and safety legislation.<sup>187</sup>

Also in 2018, Lutz donated R\$ 100,000 to Tereza Cristina's campaign, though Lutz claims the donation was unrelated to the pesticide legislation. In addition to Lutz, other executives of Raízen's parent company Cosan, have also been linked to the funding of Cristina. Rubens Ometto Silveira Mello, disbursed R\$ 6.63 million for 57 political campaigns and was one of the largest individual donors to political campaigns in Brazil, with R\$ 50,000 being donated to Cristina's candidacy.<sup>188</sup>

As of 2020, Raízen's active debt with the Federal Government of Brazil exceeded R\$ 580 million (over € 103 million). Raízen recognised that the "Company and/or its Controlled Companies were involved in several judicial and administrative tax lawsuits". Among those cases is the proceeding at the Administrative Council for Tax Appeals Board (CARF) resulting from a notice of tax assessment for lack of payment of Corporate Income Tax (IRPJ) and Social Contribution on Net Profit (CSLL). In addition, there are other million-dollar lawsuits filed by the tax office for the same reasons. Raízen also indicates possible losses in disputes over PIS/Cofins, ICMS, IPI and social security contributions. After exhausting the administrative process, the company can still appeal to the courts.<sup>189</sup>

### 4.3 Sugarcane sector initiatives

As part of sectoral efforts to improve sustainability and social standards in global agricultural value chains, companies, industry associations and civil society have introduced certification schemes and standards specific to certain commodities to promote better environmental practices, human rights, and labour rights in the sector. Table 5 presents the sector standards covering the sugarcane ethanol sector.

**Table 5 > Sector standards on sugarcane ethanol production**

Initiative	Issues covered	Certification scheme	Members in Peru and Brazil
Bonsucro <sup>190</sup>	Legal compliance, human rights, workers' rights, efficiency, biodiversity	Bonsucro	<ul style="list-style-type: none"> <li>• BP Bunge Bioenergia</li> <li>• São Martinho</li> <li>• Tereos Açúcar e Energia Brasil</li> <li>• Agrolmos (Grupo Gloria)</li> <li>• Casa Grande (Grupo Gloria)</li> </ul>
International Sustainability & Carbon Certification (ISCC) <sup>191</sup>	Supply chain traceability, carbon footprint, biodiversity, health and safety, human rights, labour rights, land rights, legal compliance, governance.	ISCC Certification	<ul style="list-style-type: none"> <li>• Braskem</li> <li>• Raízen</li> <li>• Sucroalcolera del Chira (Grupo Romero)</li> </ul>
Roundtable of Sustainable Biomaterials (RSB) <sup>192</sup>	Feedstock production, supply chain traceability, fuel, biomass, recycled carbon, fossil waste, governance, legal compliance	RSB Standard	<ul style="list-style-type: none"> <li>• Associação de Fornecedores de Cana de Guariba (Socicana)*</li> <li>• Braskem</li> </ul>

Note: \* associate member

Voluntary initiatives have emerged to address the damage that the sugarcane industry causes to the environment and the rights of people given the lack of strong policies and legislative frameworks to regulate the sector. Voluntary guidelines such as Bonsucro, ISCC and RSB bring together groups of stakeholders in the industry: producers, processors, traders, fast moving consumer goods companies, retailers, banks/investors and environmental and social non-governmental organisations, and the government. A key component of these voluntary initiatives is the certification system, which assesses compliance against the sustainability and human rights standards laid out as part of the certification scheme criteria.

### Voluntary initiative shortcomings

Though certification is used worldwide, there are several significant weaknesses in their performance that limit their credibility. A body of evidence exists about the repeated failure of these schemes to stop corporate environmental and human rights impacts. While the reasons for these failures vary between schemes, a common thread is the inadequate environmental and human rights standards, ineffective and insufficiently independent auditing and assurance processes, weak or no accountability mechanisms. Other flaws are related to the way the rules apply to corporate groups, or the ability of corporations to avoid accountability by leaving a scheme when a complaint is made, as well as the voluntary, non-comprehensive nature of these schemes.<sup>193</sup>

# 5

## Policy recommendations

It is clear from the available data that the consumption of sugarcane-based bioethanol from Brazil and Peru in Belgium has considerably increased in recent years, driven by the EU's policies to replace fossil fuels with supposedly more environmentally friendly fuels. These policies do not take into account and have even been a driver of the environmental and social impacts of bioethanol production in origin countries.

However, the lack of data disclosure in relation to the supply chain of bioethanol from countries like Brazil and Peru to the European and Belgian market hampers a reliable mapping of the specific commodity chain. Transparency in relation to the flows of a product like sugarcane-based ethanol would benefit from introducing clearly defined trade codes under which imports and exports of dedicated products are reported, and from mandatory disclosure of trade data by companies involved in the value chain.

Brazil and Peru have been used in this study as examples of the wider concerns around human and environmental issues in the production of sugarcane that feeds into the growing European bioethanol consumption. However, breaches of human and labour rights and environmental issues linked to the production of crop-based biofuels are also rife in other producing countries and thus the issue transcends the specific value chain of sugarcane-based bioethanol from Brazil/Peru to Belgium and below recommendations are relevant to all first-generation biofuels consumed in Europe.<sup>194</sup> Belgian and EU policy makers should, under their respective mandates:

- **On climate targets:**

- Stop counting the contribution of all land-based biofuels, including from sugarcane, towards the EU's Renewable Energy Directive (RED) targets by 2025 the latest.
- Advanced biofuels in transport should only be considered as counting towards renewable energy targets after conducting a robust, independent and thorough human rights impact assessment that supports these claims.

- **On human rights assessments and defenders:**

- Enable the adoption of additional sustainability criteria at Member State level in the context of the transposition of RED III. In the context of Belgium's transposition of RED II, first generation biofuels should be fully excluded immediately.
- Improve and enforce the monitoring mechanism as required by RED and CSDD. This result can be achieved by including more frequent independent audits and include impacts in third countries in the reporting obligations of Member States. As part of human rights due diligence procedures, require gender-sensitive auditing and monitoring that collect and use disaggregated data and that include gender-responsive stakeholder engagement.
- Formulate comprehensive and legally-binding social and environmental sustainability criteria for land-based fuels, advanced fuels and fossil fuels, especially when produced in third countries; to cover land and water grabbing; land, water and air pollution and degradation; impacts on ecosystem services; impacts on governance; respect human rights through the whole value chain, including food security and food sovereignty, health, decent work, child work, women's rights and Indigenous people's rights, in future iterations of RED and CSDD and their national implementation.

- Support social movements and peasants in producer countries fighting for their basic human rights, and ensure the protection of environmental defenders and local activists, taking into consideration gendered risks and vulnerabilities.<sup>195</sup>

- Include an accountability and remedy mechanism to compensate for the damaging impacts of biofuel production outside Europe during and after imports are stopped.

- Include all production, trade and transformation of land-based biofuel feedstock in the risk-sectors that fall in the scope of the EU Deforestation Regulation and the CSDD.

- **On trade and transparency:**

- Harmonize the 16 trading codes including a single code for sugarcane ethanol for the transport sector.

- Strengthen companies' obligation to disclose information related to sugarcane bioethanol trade.

- Implement a standardised set of reporting obligations under the EU regulations for both Member State authorities as well as companies to increase transparency towards the public. This reporting should include, at a minimum, data on national production, import and use of biofuels by type, traded volumes, direct and indirect origins of biofuel imports, and of the used feedstock. Downstream companies should be obliged to provide transparency on their feedstock supply chains to also allow civil society to identify social and environmental issues in these supply chains.

- Refrain from adopting free trade agreements which are increasing transcontinental exchange of agricultural products, unsustainable production models in rural areas and who are further supporting rural migration to urban precarious jobs.

- With regard to the negative impact of biofuels, the new EU-Mercosur Association Agreement should only be considered to be adopted if its provisions are in line with the EU Green Deal's principle of considering the implications of imports and establishing trade regulations that may mitigate the risks related to the imports of biofuel, and if its sustainability provisions do not take the social and economic impact on small farmers and agricultural workers into account. To keep democratic control over the process, the European Commission should not split the Association Agreement into a political and commercial part, to avoid ratification by the national parliaments.

- **On food and transport**

- In moving away from fossil fuel-based energy sources, strong safeguards should be put in place in relevant policy instruments, including RED and CSDD, to identify, prevent, address, and remedy any negative human rights and environmental impacts that alternative sources may entail.

- Aim to significantly reduce the carbon footprint of transport by designing policies that prioritise the efficient use of public mass transportation and that discourage the use of individual private transport.

- In reducing the emissions linked to freight transport, EU and Member State governments should design policies that prioritise lowest emitting transport modes, shorten supply chains, increase transport efficiency, including on global transport routes, encourage local agroecological food<sup>mn</sup> and non-food production and consumption, reduce volumes and types of packaging and food waste, disincentivize (over)consumption, and encourage repairing and recycling.

- Governments must rebalance the power in food supply chains, and ensure that the rights of the farmers and workers producing our food are respected. Therefore, more support should be directed to farmers and agricultural workers to expand sustainable domestic and local food production.

- Taking these measures would reduce dependence on international markets, which exposes countries to supply disruptions and price fluctuations. It is essential that small-scale farmers in low-income countries are supported in having more access to funding, infrastructure, inputs and markets, and that their land rights are protected.<sup>196</sup>

# Notes

- a. Including Biodiesel, Bio-ETBE, Bioethanol, Biomethanol, Bio-MTBE. Bionaphta and Hydrotreated vegetable oil HVO.
- b. Considering all countries of import for the combined 5-year period, irrespective of the year.
- c. Depending on the food type, tackling transport at-related carbon footprints can reduce the total carbon footprint associated with food production, distribution, and storage by a few percent to more than half. To reduce their carbon footprint, suppliers can consolidate their operations, increase their use of rail and water transit, and increase transport efficiency by filling trucks and considering backhaul opportunities, and reduce the use of air transport.
- d. Depending on the source, ethanol production, trade and use is reported by volume (litre, m<sup>3</sup>) or weight (metric tonnes). For comparability reasons, it was chosen in this research to standardise to weight, with a conversion factor of 0.789.
- e. Contrary to ethanol from agricultural products, synthetic ethanol is made from petroleum fuels; its market is much smaller than that of bioethanol.
- f. A complete overview of biofuel mandates for Belgium is available in Oxfam Belgium's report "FUELING HUMAN RIGHTS VIOLATIONS", published in 2021.
- g. European standards set the maximum percentage of bioethanol that can be mixed with gasoline at 10% to ensure compatibility with vehicle engines.
- h. Euro 95 and 98 are two types of fuel set by EU norms. They both consist of a mixture of octane and heptane. Euro 95 contains 95% octane and 5% heptane, hence its name. For Euro 98, the ratio is 98% octane and 2% heptane. They can have varying amounts of biofuels. E5 and E10 refer to fuels with 5% and 10% of bioethanol, respectively, 10% being the maximum proportion of bioethanol that can be mixed with gasoline at 10% according to European standards. Beyond 10%, vehicle engines are no longer suitable. Since 2017 E10 gasoline replaces gasoline 95 E10 in Belgium, with 10% of bioethanol. Euro 98 can have varying amounts of bioethanol. Some Euro 98 fuels, like Shell V-power, contain 0% bioethanol.
- i. In 2022, the European Commission published a report evaluating the achievement of the 2020 renewable energy targets, building on these country reports.
- j. Including bioethanol, bio-ETBE, bio-MTBE and biomethanol.
- k. ABF and BBA communicated in a letter to Oxfam that BBA and its members, as well as Alcogroup and all its subsidiaries, condemn any form of human right and social right violations.
- l. ArcelorMittal Belgium is currently in the process of constructing its Steelanol project. The bioreactors will convert industrial gases that are captured during the steelmaking process and convert them into ethanol. The plant is projected to produce 62,600 tonnes of ethanol per year. First production is expected still in 2022; ABF switched from wheat to corn as a raw material for its bioethanol.
- m. Financing of the sugarcane sector by BNDES dropped significantly though in recent years due to the high indebtedness of the industry, with funds provided in 2019 only corresponded to about 27% of what was observed in 2013, the year with the highest disbursement.
- n. Roughly the surface area of the Flanders region.
- o. One third of the current high duty (up to €19/hectolitre). No new sugar quota for Brazil is foreseen.
- p. It applies to workers hired through an employment relationship as well as those without a formal contract but fulfilling the requirements of such a relationship. Not included are, for example, to self-employed and occasional workers or interns.
- q. Information on links to Belgian and Dutch financiers is included in section 3.2.4.
- r. Differences due to changes in stocks.
- s. Information on links to Belgian and Dutch financiers is included in section 3.2.4.
- t. Biofuels imported to the United States can fulfil U.S. Renewable Fuel Standard (RFS) obligations if the biofuel plant was "grandfathered" by supplying the U.S. market prior to entry into force of the EISA in 2007, or by certifying that the feedstock was grown on lands that were cultivated prior to 2007; is covered by a feedstock tracking and certification scheme that excludes ineligible crops; and meets a minimum environmental sustainability standard of GHG savings.
- u. The industry's association, ePURE, which represents 85% of EU installed capacity, reported ethanol production from domestic crops of 4.4 million tonnes in 2021.
- v. Grupo Caña Brava indicated in a letter to Oxfam that land was acquired in processes in accordance with the law and the company have titles that accredit the legitimate ownership or possession. The company estates that there is no boundary conflict with any community or person and rejects any assumption that involves the Caña Brava Group in a land or water grab that could affect neighboring communities.
- w. Caña Brava stated in a letter to Oxfam that the use of water resources is regulated and controlled by the National Water Authority, and that consumption is allocated in accordance with the current regulatory framework and that it is applicable to all users located in the Chira River basin. In fact, since the beginning of its agricultural operations, Caña Brava claims to have an innovative drip irrigation and green harvesting system that optimizes and regulates the efficient consumption of water resources, care for the soil and the environment, and promotes the circular economy, and the

eradication of the burning of sugar cane in its harvest processes. According to the company, this system is unique in the sector and is a globally recognized sustainable practice.

**x.** Written communication by Caña Brava

**y.** Caña Brava stated in a letter to Oxfam that the collective agreements approved between Caña Brava and the SIN-TRAGRACHI and SINTRA CHIRA Unions are public and are registered with the authority, and that none of the negotiation processes that resulted in the aforementioned agreements have commitments associated with food been included free, breaches of wages and working hours.

**z.** Caña Brava stated in a letter to Oxfam that workers from Agrícola del Chira are provided with transport in order to have meals at home, and that Sucroalcolera del Chira, has a dining room with adequate infrastructure to guarantee food safety and security in the elaboration/preparation of worker's food.

**aa.** Caña Brava stated in a letter to Oxfam that 73% of the employees of the Caña Brava Group perceive a remuneration higher than the minimum vital remuneration established by law.

**bb.** Caña Brava stated in a letter to Oxfam that they company with current labor regulations.

**cc.** Caña Brava stated in a letter to Oxfam that profit sharing is an obligatory non-negotiable legal mandate established by article 29 of the Constitution in Peru. According to the letter when profits are generated the corresponding percentage is distributed to all their workers, as will happen with companies Agrícola del Chira S.A. and Sucroalcolera del Chira S.A. for the period 2022. According to the company their financial information is public and the syndicates have access to it.

**dd.** Caña Brava stated in a letter to Oxfam the company respects and complies with current national and international labor regulations.

**ee.** Caña Brava stated in a letter to Oxfam that as part of the company's open door and dialogue policy; they have implemented processes and procedures to establish free access communication channels for employees and communities, such as: Suggestion and claim boxes, Ethics Line (access via telephone/web/via email), Communication booths within the facilities, monthly meetings with union associations and monthly meetings with authorities and community leaders. These channels allow the company to be close to their collaborators and other interest groups and are a good source of continuous improvement.

**ff.** Caña Brava claims that equipment is replaced immediately.

**gg.** Toolbox talks or toolbox meetings are short and routine consultations designed to create awareness of safety measures and hazards at the workplace.

**hh.** Caña Brava stated in a letter to Oxfam that the company has implemented an innovative project for burying cane brush for the last 7 years, and affirms that in none of the company's plantations they carry out any type of burning, considering it a harmful practice for the populations and the environment. Additionally, Caña Brava is regularly inspected by the Specialized Environmental Enforcement Agency -OEFA, Peru's highest environmental agency, which guarantees the company's good environmental practices and sustainability in our processes and in none of its audits has any burning practice been reported or identified in the company's plantations.

**ii.** During the distillation process that follows the fermentation, vinasse is generated as a liquid by-product. The sulphur-rich, low-pH, and odorous effluent is produced at volumes as high as 20-fold of ethanol. While research is ongoing to find useful applications of vinasse in irrigation, energy production, or animal feed, concerns around negative effects on soil and groundwater remain.

**jj.** During his administration, Bolsonaro not only failed to approve new designations of Indigenous reserves, but in 2020, Brazil's Justice Ministry issued a decree allowing the registration of real estate and land ownership in Indigenous territories whose designation had not yet been fully completed.

**kk.** In this context, Global Witness found that Bunge sources soy from farms belonging to producers with 'legal reserves' that overlap with the traditional community lands of fundo e fecho de pasto, agropastoralists in Correntina municipality of Brazil's Bahia state. The agropastoral communities have reported being subjected to violent human rights abuses and intimidations, including death threats and beatings, for defending their legitimate customary land rights and livelihoods against an alleged green land grab involving a group of powerful soy producers. According to Global Witness, Bunge not only continues to source from these farms, but also is taking insufficient due diligence efforts to identify, mitigate, or remediate the harms their purchases directly link them to. As a result, Global Witness concludes Bunge fails to meet its responsibilities under international standards, such as the UN Guiding Principles on Business and Human Rights (UNGPR) and the OECD Guidelines. As of 2022, these allegations were sustained by Indigenous rights organisation Amazon Watch.

**ll.** Bunge responded in a letter to Oxfam that the company has stopped sourcing from Chiquibul mill in 2018, and lifted restrictions to Repsa's mill in 2020 after successful reports.

**mm.** Raízen mentioned in a communication to Oxfam they they have established a Diversity and Inclusion Policy to foster culture change and increase women in leadership positions. The company has signed the Women's Empowerment Principles (WEPs) of UN Women, and since 2021 two out of eight members of their Board of Directors are women.

**nn.** Depending on the food type, tackling transportation-related carbon footprints can reduce the total carbon footprint associated with food production, distribution, and storage by a few percent to more than half. To reduce carbon footprints, suppliers can consolidate their operations, increase their use of rail and water transit, and increase transport efficiency by filling trucks and considering backhaul opportunities, and reduce the use of air transport.

# References

1. Jeswani, H.K., Chilvers, A. and A. Azapagic (2020, November), "Environmental sustainability of biofuels: A review", The Royal Society – Proceedings A, Vol. 476(2243): 20200351.
2. Malins, C. (2017, September), Thought for Food – A Review of the Interaction Between Biofuel Consumption and Food Markets, London, United Kingdom: Cerology, p. 51.
3. IEA (2022, September), "Biofuels", online: <https://www.iea.org/reports/biofuels>, viewed in December 2022.
4. Federale Overheidsdienst Financiën (n.d.), "Vragen en antwoorden over E10", online: <https://economie.fgov.be/nl/themas/energie/energiebronnen/brandstoffen/biobrandstoffen/benzine-e10/vragen-en-antwoorden-over-e10>, viewed in August 2022.
5. Government of Belgium (2019), Belgian Integrated National Energy and Climate Plan 2021-2030, Section A: National Plan, p. 17.
6. SPF Chancellerie du Premier Ministre - Direction générale Communication externe (2022, July 20), « Normes européennes pour l'énergie renouvelable dans les carburants fossiles », online <https://news.belgium.be/fr/normes-europeennes-pour-lenergie-renouvelable-dans-les-carburants-fossiles>; viewed in March 2023.
7. Oxfam Belgium (2021), Fueling Human Rights Violations – Consequences of EU and Belgian Biofuel Policies in Northern Peru.
8. Oxfam Belgium (2021), Fueling Human Rights Violations – Consequences of EU and Belgian Biofuel Policies in Northern Peru.
9. Flach, B., Lieberz, S. and S. Bolla (2022, July), European Union Biofuels Annual, USDA GAIN Report E42022-0048; ETIP Bioenergy (n.d.), "ETBE", online: <https://www.etipbioenergy.eu/value-chains/products-end-use/products/etbe>, viewed in August 2022.
10. Buckley, J. (2022, August 16), "Drink the best And sell the rest", Ethanol Producer Magazine, online: <https://ethanolproducer.com/articles/19490/drink-the-best-and-sell-the-rest>, viewed in August 2022.
11. European Commission (2009, April), "Directive 2009/30/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC Article 7a.
12. Belgisch Staatsblad (2011, November), "Koninklijk besluthoudende bepaling van productnormen voor biobrandstoffen".
13. European Commission (2020, November), Commission Implementing Regulation (EU) 2020/1628 Introducing Retrospective Union Surveillance of Imports of Renewable Ethanol for Fuel, Document 02020R1628-20201224.
14. Flach, B., Lieberz, S. and S. Bolla (2022, July), European Union Biofuels Annual, USDA GAIN Report E42022-0048; ETIP Bioenergy (n.d.), "ETBE", online: <https://www.etipbioenergy.eu/value-chains/products-end-use/products/etbe>, viewed in August 2022.
15. FOD Economy (n.d.), "Vragen en antwoorden over E10", online: <https://economie.fgov.be/nl/themas/energie/energiebronnen/brandstoffen/biobrandstoffen/benzine-e10/vragen-en-antwoorden-over-e10>, viewed in September 2022.
16. Federal Public Service for Economy (FOD Economy) (2022), "Maandelijkse consumptie van de voornaamste aardolieproducten", online: <https://economie.fgov.be/nl/themas/energie/energie-cijfers/maandelijkse-consumptie-van-de>, viewed in December 2022.
17. European Commission (n.d.), "Renewable energy targets", online: [https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-targets\\_en](https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-targets_en), viewed in September 2022; European Commission (n.d.), "National energy and climate plans", online: [https://commission.europa.eu/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-energy-and-climate-plans\\_en](https://commission.europa.eu/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-energy-and-climate-plans_en), viewed in December 2022.
18. Federal Public Service for Health, Food Chain Safety, and Environment (FOD Health) (2022).
19. Oxfam Belgium (2021), Fueling Human Rights Violations – Consequences of EU and Belgian Biofuel Policies in Northern Peru.
20. Federal Public Service for Health, Food Chain Safety, and Environment (FOD Health) (2022).

21. Dekker Groep (n.d.), "Transport", online: <https://www.dekkergroep.com/transport/>, viewed in September 2022;  
Port of Rotterdam (2020, May 20), "Dekker Group breidt uit in Rotterdam", online: <https://www.portofrotterdam.com/nl/nieuws-en-persberichten/dekker-group-breidt-uit-rotterdam#:~:text=Dekker%20Group%20gaat%20uitbreiden%20in,verwief%20ook%20de%20aanpalende%20percelen.>, viewed in September 2022.
22. Dekker Europe Holding (2022), Rapport Inzake Jaarstukken 2021, p. 31.
23. Koole Terminals (n.d.), "Rotterdam Botlek", online: <https://koole.com/asset/rotterdam-botlek/>, viewed in September 2022.
24. Kijk op Noord Holland (2021, June 30), "Wij zetten volop in op transitiebrandstoffen", online: <https://www.kijkopnoord-holland.nl/wij-zetten-volop-in-op-transitie-brandstoffen/>, viewed in September 2022.
25. Koole Terminals (2022), Annual Report 31 December 2021, p. 18.
26. HES International (n.d.), "HES Botlek tank terminal", online: <https://www.hesinternational.eu/en/terminals/hes-botlek>, viewed in September 2022.
27. GPS Amsterdam (n.d.), "GPS Amsterdam Terminal", online: <https://www.gpsgroup.com/assets/gps-amsterdam-terminal>, viewed in September 2022.
28. Vitol (2019), Corporate Brochure, p. 12.
29. VARO Energy (2022), ESG Report 2021, pp. 11, 17, 28, 29.
30. Panjiva (n.d.) "Brazilian shipment data", online: <https://panjiva.com/>, viewed in January 2023.
31. Panjiva (n.d.) "Brazilian shipment data", online: <https://panjiva.com/>, viewed in January 2023.
32. SPGlobal (2021, June 30), "Rising European biofuels uptake supports demand and price of gasoline additive ETBE", viewed in September 2022.
33. Yong. C. And A. Keys (2021, January), Decarbonisation Options for Large Volume Organic Chemicals Production, LyondellBasell Rotterdam, The Hague, Netherlands: TNO and PBL;  
Port of Rotterdam (n.d.), Rotterdam Bioport.
34. Sabic (n.d.), "Benzene, butadiene and ETBE factory", online: <https://sabic-limburg.nl/nl/sabic-limburg/fabrieken-en-productieprocessen/benzeen-butadieen-en-etbe-fabriek>, viewed in September 2022.
35. Panjiva (n.d.) "Brazilian shipment data", online: <https://panjiva.com/>, viewed in January 2023.
36. HLN (2016, August 19), "Tereos maakt brandstof van toekomst", online: <https://www.hln.be/aalst/tereos-maakt-brandstof-van-toekomst>, viewed in August 2022;  
Landbouwleven (2020, February 24), "Alco Bio Fuel op zoek naar extra Belgische mais", online: <https://www.landbouwleven.be/7259/article/2020-02-24/alco-bio-fuel-op-zoek-naar-extra-belgische-mais>, viewed in August 2022;  
Biowanze (n.d.), "Grondstoffen", online: <https://www.biowanze.be/nl/Grondstoffen/>, viewed in August 2022.
37. ABF (2020), "Alco Bio Fuel Looking for further greening and diversification", online: <https://www.alcobiofuel.com/wp-content/uploads/2020/12/Alco-Bio-Fuel-LR-1.pdf>, viewed in March 2023.
38. Tereos (n.d.), "Raw material. Sugarcane", online: <https://tereos.com/en/activities-and-products/raw-materials/sugar-canne/>, viewed in July 2022
39. ABF (n.d.), "About us", online: <https://www.alcobiofuel.com/en/about-us/>, viewed March 2023.
40. Alcotra do Brasil (n.d.), "Sobre nós", online: <https://www.alcotra.com.br/>, viewed in August 2022.
41. Alcotra (n.d.), "Alcotra do Brasil", online: <https://alcotra.com/alcotra-do-brasil/> <https://alcotra.com/alcotra-do-brasil>, viewed in August 2022.
42. Oxfam Belgium (2021), Fuelling Human Rights Violations – Consequences of EU and Belgian Biofuel Policies in Northern Peru, p. 17.
43. Energia (n.d.), "Wie zijn we", online: <https://www.energiafed.be/nl/wie-zijn-we>, viewed in December 2022.
44. Energia (n.d.), "Wie zijn we", online: <https://www.energiafed.be/nl/wie-zijn-we>, viewed in August 2022.
45. Energia (n.d.), "Wie zijn we", online: <https://www.energiafed.be/nl/wie-zijn-we>, viewed in August 2022.
46. TotalEnergies (2023), Response to Oxfam's report. February 7, 2023. Courbevoie, France.
47. Shell (n.d.), "Low carbon fuels", online: <https://www.shell.com/energy-and-innovation/new-energies/low-carbon-fuels.html#iframe=L2ZvcmlzL2xvd19jYXJib25fZnVlbHM>, viewed in September 2022.



48. Shell (m.d.), "Biofuels", online: <https://reports.shell.com/sustainability-report/2021/achieving-net-zero-emissions/fuelling-mobility/biofuels.html>, viewed in September 2022.
49. Development Bank of Latin America (2010, January 7), "US\$65 million loan for Maple Etanol to develop biofuel in Peru", online: <https://www.caf.com/en/currently/news/2010/01/us-65-million-loan-for-maple-etanol-to-develop-biofuel-in-peru/>, viewed in September 2022.
50. Oxfam Belgium (2021), Fuelling Human Rights Violations – Consequences of EU and Belgian Biofuel Policies in Northern Peru.
51. BIO-Invest (2021), "BIO's investment in Maple Etanol SRL", online: <https://www.bio-invest.be/en/news/bios-investing-in-maple-ethanol-srl>, viewed in September 2022.
52. Kitir, M. (2021, October 29), Beleidsnota Internationale Solidariteit, p. 9.
53. FMO (2020), Sustainability Bonds Framework.
54. ABP (2021), Beursgenoteerde Beleggingen van ABP per 31 December 2021; bpfBouw (2021), Aandelenportefeuille bpfBOUW per 31 December 2021; SPW (2021), Aandelenportefeuille SPW per 30 September 2021.
55. Bloomberg, "BBID: BL369171 Corp", viewed in April 2022.
56. Refinitiv, "Share ownership: Bunge Ltd - 30 June 2022", viewed in September 2022; Refinitiv eMAXX, "Bondholdings: BUNGELTDFINANCECORP - US120568BC39, 30-04-2022", viewed in September 2022.
57. Thomson Reuters Eikon, Tearsheet 4149856116; Thomson Reuters Eikon, Tearsheet 4379202116; Thomson Reuters Eikon, Tearsheet 4379202116; Refinitiv, Tearsheet 4497922116; Refinitiv, Tearsheet 4497922116; Bloomberg, BBID: BL369171 Corp; Bloomberg, BBID: BL369192 Corp.
58. Bloomberg and Refinitiv, viewed in September 2022.
59. Tereos (2020, June 16), Tereos takes out the first sustainability-linked loan in the Brazilian sugar and ethanol sector with a new US\$ 105 mi longterm financing
60. IAE Bioenergy (2021), Implementation of Bioenergy in Brazil – 2021 Update; OECD-FAO (2022), Agricultural Outlook 2022-2031 - Biofuels, p. 7.
61. IAE Bioenergy (2021), Implementation of Bioenergy in Brazil – 2021 Update, pp. 12-13.
62. IAE Bioenergy (2021), Implementation of Bioenergy in Brazil – 2021 Update, pp. 12-13; Ministry for Mining and Energy (2021), PDE 2030 – Plano Decenal de Expansão de Energia, p. 247.
63. Ministry for Mining and Energy (2021), PDE 2030 – Plano Decenal de Expansão de Energia, pp. 9, 35, 249, 250.
64. Presidency of the Republic (2019, November), "Decree No. 10.084", online: [http://www.planalto.gov.br/ccivil\\_03/\\_Ato2019-2022/2019/Decreto/D10084.htm](http://www.planalto.gov.br/ccivil_03/_Ato2019-2022/2019/Decreto/D10084.htm), viewed in December 2022.
65. European Commission (2019), EU-Mercosur Trade Agreement – Better Export Opportunities for European Farmers and Food Producers, p. 4.
66. See, for example:  
Bouissou, J. and K.S. El Sayed (2022, December 31), "Brazilian plantations accused of forced labor supply Europe with sugar", Le Monde, online: [https://www.lemonde.fr/en/economy/article/2022/12/31/brazilian-plantations-accused-of-forced-labor-supply-europe-with-sugar\\_6009821\\_19.html](https://www.lemonde.fr/en/economy/article/2022/12/31/brazilian-plantations-accused-of-forced-labor-supply-europe-with-sugar_6009821_19.html), viewed in December 2022;  
Teixera, F. and D. Sherfinski (2021, November 16), "Ethanol: Brazil's sugar-based biofuel built on labor abuses", Context, online: <https://www.context.news/money-power-people/long-read/ethanol-brazils-sugar-based-biofuel-built-on-labor-abuse>, viewed in December 2022.
67. President of the Republic (2022 (last update), "Decreto Lei Nº 5.452, de 1º de Maio de 1943 – Consolidação das leis do trabalho", online: [https://www.planalto.gov.br/ccivil\\_03/decreto-lei/De15452compilado.htm](https://www.planalto.gov.br/ccivil_03/decreto-lei/De15452compilado.htm), viewed in December 2022; De Moraes, V. (2020), "Guia completo da CLT – Consolidação das Leis do Trabalho, Aurum, online: <https://www.aurum.com.br/blog/clt/>, viewed in December 2022.
68. Conectas (2019, August 5), "How Brazilian law defines labour analogous to slavery", online: <https://www.conectas.org/en/noticias/how-brazilian-law-defines-labour-analogous-to-slavery/#:~:text=Article%20149%20of%20the%20Penal,incurred%20with%20employees%20or%20owners.>, viewed in December 2022.
69. Teixeira, F. (2020, September 14), "Brazil court rules in favor of anti-slavery 'dirty list'", Reuters, online: <https://www.reuters.com/article/uk-brazil-trafficking-dirtylist-idUKKBN2653AF>, viewed in December 2022.

70. Corporate Justice Coalition (2019, April 23), "Why Brazil needs a new law on supply chain reporting and mandatory human rights due diligence", online: <https://corporatejusticecoalition.org/uncategorised/brazil-needs-new-law-supply-chain-reporting-mandatory-human-rights-due-diligence/>, viewed in December 2022.
71. FAOStat (2022), "Crops and livestock products", online: <https://www.fao.org/faostat/en/#data/QCL>, viewed in August 2022.
72. Observatório da Cana (n.d.), Moagem de Cana-de-Açúcar e Produção de Açúcar e Etanol - Safra 2020/2021 [Excel].
73. CONAB (2022). "Nova estimativa de cana-de açúcar traz produção de 572,9 milhões de toneladas", online: <https://www.conab.gov.br/ultimas-noticias/4725-nova-estimativa-de-cana-de-acucar-traz-producao-de-572-9-milhoes-toneladas>, viewed in February 2023.
74. Monteiro de Castro, N. (2022, December 22), "Brazil to remain a large sugar producer amid fuel price uncertainties", S&P Global.
75. Barros, S. (2022, September), Biofuels Annual Brazil, USDA GAIN Report BR2022-0047, p. 19.
76. Ministry for Mining and Energy (2021), PDE 2030 – Plano Decenal de Expansão de Energia, p. 248
77. Martins, A.L., Wanke, P., Chen, Z. and N. Zhang (2018, May), "Ethanol production in Brazil: An assessment of main drivers with MCMC generalized linear mixed models", Resources, Conservation and Recycling, Vol. 132: 16-27.
78. Sentelhas, P.C. and A.B. Pereira (2019, April 8), "El Niño – Southern oscillation and its impacts on local climate and sugarcane yield in Brazil", Sugar Tech, Vol. 21: 979-985;
- FTS (2016, April 28), "How El Niño droughts impact sugar crops now, and into the future", online: <https://ftsinc.com/posts/how-el-nino-droughts-impact-sugar-crops-now-and-into-the-future/>, viewed in September 2022.
79. Hayes, P. (2019), "Riding the wave", Sugar Producer, June/July, p. 22;
- Price, J. (2021, June 15), "World sugar market price signals may promote better decision-making", online: <https://www.suedzucker.com/world-sugar-market-price-signals-may-promote-better-decision-making/>, viewed in September 2022.
80. OECD-FAO (2022), Agricultural Outlook 2022-2031, pp. 178-187.
81. Wright, C. (2021, February 8), "Ethanol vs. sugar: the price relationship that keeps Brazil's sugar market guessing", Czarnikow Blog, online: <https://www.czarnikow.com/blog/brazil-sugar-market-ethanol-sugar>, viewed in September 2022.
82. Wright, C. (2021, February 8), "Ethanol vs. sugar: the price relationship that keeps Brazil's sugar market guessing", Czarnikow Blog, online: <https://www.czarnikow.com/blog/brazil-sugar-market-ethanol-sugar>, viewed in September 2022.
83. Gro Intelligence (2022, March 22), "Sugar prices could rise if Brazil tilts to greater ethanol production", online: <https://gro-intelligence.com/insights/sugar-prices-could-rise-if-brazil-tilts-to-greater-ethanol-production>, viewed in December 2022.
84. Barros, R. and M. Teixeira (2022, September 2022), "Brazil sugar production rises late in August, ethanol output down", Nasdaq, online: <https://www.nasdaq.com/articles/brazil-sugar-production-rises-late-in-august-ethanol-output-down>, viewed in September 2022.
85. Reuters (2022, September 19), "Brazil to export record volume of ethanol to Europe this year -S&G Global", online: <https://www.reuters.com/markets/commodities/brazil-export-record-volume-ethanol-europe-this-year-sp-global-2022-09-19/>, viewed in September 2022.
86. FAO (2023, January 27), "Monthly sugar price index worldwide from January 2000 to December 2022", online: <https://www.statista.com/statistics/1111365/impact-of-coronavirus-on-monthly-sugar-price-index-worldwide/>, viewed in February 2023.
87. S & P Global (2023, January 5), "Commodities 2023: European ethanol market to face high energy costs, feedstock challenges", online: <https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/agriculture/010523-european-ethanol-market-to-face-high-energy-costs-feedstock-challenges-in-2023>, viewed in January 2023;
- Martins Sousa, D. (2022, October 19), "Europe Is Buying Up Cheaper Brazilian Ethanol Amid Energy Crisis", Bloomberg.
88. Barros, S. (2022, September), Biofuels Annual Brazil, USDA GAIN Report BR2022-0047, p. 22;
- USDA Foreign Agriculture Service (2022, June 30), "Impacts and repercussions of price increases on the global fertilizer market", online: <https://www.fas.usda.gov/data/impacts-and-repercussions-price-increases-global-fertilizer-market>, viewed in December 2022;
- NovaCana (2022, March 4), "Produtores de cana em Ribeirão Preto (SP) avaliam reduzir uso de potássio nas lavouras", online: <https://www.novacana.com/n/cana/plantio/produtores-cana-ribeirao-preto-sp-reduzir-uso-potassio-lavouras-040322>, viewed in December 2022.

89. Observatório da Cana (n.d.), “Área e produções”, online: <https://observatoriodacana.com.br/listagem.php?idMn=4>, viewed in August 2022.
90. BNamericas (2021, August 11), “Spotlight: The strategy behind Raízen’s IPO”, online: <https://www.bnamericas.com/en/features/spotlight-the-strategy-behind-raizens-ipo>, viewed in September 2022.
91. Shell (n.d.), “Low carbon fuels”, online: <https://www.shell.com/energy-and-innovation/new-energies/low-carbon-fuels.html#iframe=L2ZvcmlzL2xvd19jYXJib25fZnVlbHM>, viewed in September 2022.
92. Bioenergy International (2021, August 11), “Raízen completes Biosev incorporation transaction”, online: <https://bioenergyinternational.com/raizen-completes-biosev-incorporation-transaction/>, viewed in July 2022.
93. NovaCana (2022, December 2022), “0 ano de 2022 para o setor sucroenergético”, online: <https://www.novacana.com/etanol/retrospectiva-o-ano-2022-para-setor-sucroenergetico-201222>, viewed in December 2022;
- Bautzer, T. (2022, August 11), “Mubadala, Raízen in final round to buy BP-Bunge Brazilian ethanol venture – source”, Reuters, online: <https://www.reuters.com/markets/deals/mubadala-raizen-final-round-buy-bp-bunge-brazilian-ethanol-venture-source-2022-08-10/>, viewed in August 2022.
94. Shell (2022), “Sustainability report 2021 – Biofuels”, online: <https://reports.shell.com/sustainability-report/2021/achieving-net-zero-emissions/fuelling-mobility/biofuels.html>, viewed in December 2022.
95. IAE Bioenergy (2021), Implementation of Bioenergy in Brazil – 2021 Update.
96. Shell (2022), “Shell and Raízen sign large cellulosic ethanol deal”, online: <https://www.shell.com/business-customers/trading-and-supply/trading/news-and-media-releases/shell-and-raizen-sign-large-cellulosic-ethanol-deal.html>, viewed in March 2023
97. Reuters (2022, November 7), “Brazil’s Raízen to sell second-generation bioethanol to Shell”, online: <https://www.hydrocarbonprocessing.com/news/2022/11/brazils-raizen-to-sell-second-generation-ethanol-to-shell>, viewed in December 2022.
98. Barros, S. (2022, September), Brazil Biofuels Annual, USDA GAIN Report BR2022-0047, p. 18.
99. Barros, S. (2022, September), Brazil Biofuels Annual, USDA GAIN Report BR2022-0047, p. 19.
100. Bloomberg (2011, September 29), “Logum Logistics wins \$924 million loan for ethanol pipeline”.
101. Barros, S. (2021, August 30), Brazil Biofuels Annual, USDA GAIN Report BR2021-0030.
102. Tereos (2019, November 2017), Tereos’ sugarcane milling grew and achieved 18.8 million tons in this harvest season
103. Brazilian shipment data.
104. ComexStat (n.d.), “General imports and exports”. Online: <http://comexstat.mdic.gov.br/en/geral>, viewed in August 2022.
105. Federal Public Service for Health, Food Chain Safety, and Environment (FOD Health) (2022).
106. Brazilian shipment data.
107. Oxfam Belgium (2021), Fueling Human Rights Violations – Consequences of EU and Belgian Biofuel Policies in Northern Peru, pp. 8-9.
108. Oxfam Belgium (2021), Fueling Human Rights Violations – Consequences of EU and Belgian Biofuel Policies in Northern Peru, p. 8.
109. Nolte, G. (2022, December 5), Biofuels Annual Peru, USDA FAS GAIN Report, PE2022-0018.
110. FAOStat (2022), “Crops and livestock products”, online: <https://www.fao.org/faostat/en/#data/QCL>, viewed in August 2022;
- Oxfam Belgium (2021), Fueling Human Rights Violations – Consequences of EU and Belgian Biofuel Policies in Northern Peru, p. 23.
111. Coazucar (n.d.), “About us”, online: [http://www.coazucar.com/esp/coazucar\\_nosotros.html](http://www.coazucar.com/esp/coazucar_nosotros.html), viewed in December 2022.
112. Grupo Gloria (n.d.), “Agroaurora SAC”, online: <https://grupo.webteliawebs.com/empresas/interna/p/38/agroaurora-s.a.c>, viewed in July 2022;
- SCS Global Services Report (2017), Certification Evaluation Report – Roundtable on Sustainable Biomaterials: AgroAurora S.A.C. and Agrobijito S.A.;
- Coazucar (n.d.), “About us”, online: [http://www.coazucar.com/esp/coazucar\\_nosotros.html](http://www.coazucar.com/esp/coazucar_nosotros.html), viewed in December 2022.

113. Nolte, G. (2021, October), Biofuels Annual Peru, USDA FAS GAIN Report, PE2021-0025.
114. Grupo Romero (n.d.), "Caña Brava", online: [http://www.gruporomero.com.pe/en-GB/empresas/cana\\_brava/](http://www.gruporomero.com.pe/en-GB/empresas/cana_brava/), viewed in July 2022.
115. Nolte, G. (2022, December 5), Biofuels Annual Peru, USDA FAS GAIN Report, PE2022-0018.
116. Peruvian shipment data.
117. Agnitio (2022, November 7), "El terminal portuario de Paita se encuentra listo para iniciar operaciones", online: <https://agnitio.pe/2022/11/07/el-terminal-portuario-de-paita-se-encuentra-listo-para-iniciar-operaciones/>, viewed in December 2022.
118. Tank Storage Magazine (2013, February 5), "Record ethanol cargo loaded at Peruvian port", online: <https://www.tankstoragemag.com/2014/02/05/record-ethanol-cargo-loaded-at-peruvian-port/>, viewed in August 2022.
119. BNAmericas (2016, August 24), "AIH's Q2 loss widens on drop in sales, higher costs", online: <https://www.bname-ricas.com/en/news/aihs-q2-loss-widens-on-drop-in-sales-higher-costs>, viewed in December 2022.
120. US Grains Council (2022, April 19), "USGC successfully defeats threat to Peruvian ethanol market", Ethanol Producer Magazine, online: <https://ethanolproducer.com/articles/19187/usgc-successfully-defeats-threat-to-peruvian-ethanol-market>, viewed in August 2022.
121. ePURE (2014, February 4), "ePure raises red flag about surging ethanol imports from Peru", Press release.
122. Nolte, G. (2021, October), Biofuels Annual Peru, USDA FAS GAIN Report, PE2021-0025.
123. Peruvian shipment data
124. The News (2018, December 18), "Govt links ethanol export to in-house use of molasses", online: <https://www.thenews.com.pk/print/407172-govt-links-ethanol-export-to-in-house-use-of-molasses>, viewed in December 2022.
125. Congreso de la República del Perú (2003), Ley no. 28054. Ley de promoción del mercado de biocombustibles, p. 1.
126. Oxfam Belgium (2021), Fueling Human Rights Violations – Consequences of EU and Belgian Biofuel Policies in Northern Peru.
127. Gato Encerrado (2022, November 11), "Grupo Gloria sale de compras: habría adquirido Caña Brava del Grupo Romero", online: <https://www.gatoencerrado.net/store/noticias/152/152471/detalle.htm>, viewed in December 2022.
128. Sol TV Viviate (December 3, 2022), "Problema de falta de agua en Paita. Sería la captación en el Arenal", online: <https://www.facebook.com/100064202491872/posts/pfbid035khmRVoNNXE7gJpP8FjCAkdXrwnWWsuMab78yv4dU-3et4pKmjvzVtmsztTJ2YGpl/?sfnsn=mo>, viewed in December 2022.
129. Defensoría del Pueblo. Adjuntía para la Prevención de Conflictos Sociales y la Gobernabilidad (2022, August), Reporte de Conflictos Sociales N. 222, p. 91.
130. Caña Brava (n.d.), "Somos un solo equipo", online: [https://www.canabrava.com.pe/?page\\_id=87](https://www.canabrava.com.pe/?page_id=87), viewed in August 2022.
131. Quiroz, D., Kuepper, B., Rijk, G., Achterberg, E. (2021, May 5), The Sugarcane Value Chain in Latin America and Asia. Main Actors, Market Mechanisms, Labour Issues and Opportunities, Amsterdam: Profundo, p. 81
132. Congreso de la República del Perú (2018), Ley no. 308884. Ley que regula el plástico de un solo uso y los recipientes descartables.
133. Huamán-Tejo, A (2019), El paradigma modernizador de la agroindustria de caña para etanol: La agricultura por contrato y la ilusión del progreso, Debate Agrario, 49: 129-165
134. Huamán-Tejo, A (2019), El paradigma modernizador de la agroindustria de caña para etanol: La agricultura por contrato y la ilusión del progreso, Debate Agrario, 49: 129-165
135. Oxfam Belgium (2021), Fuelling Human Rights Violations – Consequences of EU and Belgian Biofuel Policies in Northern Peru, p. 22.
136. Oxfam Belgium (2021), Fueling Human Rights Violations – Consequences of EU and Belgian Biofuel Policies in Northern Peru, p. 24.
137. Radio Culturalú (2020, October 22), "La Huaca: dirigentes denuncian que Caña Brava vuelve a desviar el agua del río Chira hacia sus cultivos", online: <https://www.cutivalu.pe/la-huaca-dirigentes-denuncian-que-cana-brava-vuelve-a-desviar-el-agua-del-rio-chira-hacia-sus-cultivos/>, viewed in August 2022.
138. Ojo Público (2022, November 6), "Alerta sanitaria: dengue y malaria se incrementan en el norte y la Amazonía de Perú", online: <https://ojo-publico.com/3837/alerta-sanitaria-dengue-y-malaria-aumentan-el-norte-y-la-amazonia>, viewed in December 2022.

- 139.** Jurado-Arenas, O. A. F. (2020), Regulación ambiental y la quema de caña de azúcar en el distrito de La Huaca, Piura, Período 2015-2018, p. 140
- 140.** OEFA (2022, February 25), "El OEFA instaló dos estaciones de monitoreo de calidad del aire en tiempo real en el distrito de la Huaca, Piura", online: <https://www.oefa.gob.pe/el-oefa-instalo-dos-estaciones-de-monitoreo-de-calidad-del-aire-en-tiempo-real-en-el-distrito-de-la-huaca-piura/webmaster/>, viewed in December 2022.
- 141.** Mongabay (2019, November 30), "In surprise move, Brazil has removed restrictions on Amazon sugarcane production", online: <https://news.mongabay.com/2019/11/in-a-surprise-move-even-to-the-sugarcane-industry-president-bolsonaro-has-removed-restrictions-on-sugarcane-production-in-the-brazilian-amazon-experts-expect-land-speculators-to-benefit/>, viewed in August 2022.
- 142.** Lula da Silva, L. I. (2019, September 13), "Biofuels are no Villain", online: <https://www.un.org/en/chronicle/article/biofuels-are-no-villain>, viewed in December 2022; De Oliveira Bordonal, R., Nunes Carvalho, J. L., Lal, R., Barretto de Figueiredo, E., Gonçalves de Oliveira, B., La Scala Jr, N. (2018), Sustainability of sugarcane production in Brazil. A review, *Agronomy for Sustainable Development*, 38 (13); La Via Campesina (2010), Industrial Agrofuels Fuel Hunger and Poverty, p. 16; Cantarella, H. (2018, February 26), "With Brazilian biofuels on the rise, can we keep ethanol green?", online: <https://www.ft.com/content/16ad268e-05ac-11e8-9650-9c0ad2d7c5b5>, viewed in December 2022.
- 143.** Lima, M., da Silva Junior, C. A., Deotti Pelissaria, T., Lourençonia, T., Santos Luza, I. M., Araujo Lopes, F. J. (2020), Sugarcane: Brazilian public policies threaten the Amazon and Pantanal biomes, *Perspectives in Ecology and Conservation*, 18(3): 210-212.
- 144.** Correio Braziliense (2023, January 1), "Governo Lula prorroga isenção de impostos de combustíveis", online: <https://www.correio braziliense.com.br/economia/2023/01/5063063-governo-prorroga-isencao-de-impostos-de-combustiveis.html>, viewed in January 2023.
- 145.** Rodrigues Reis, C.E. and Bo Hu (2017, April 10), "Vinsasse from sugarcane ethanol production: Better treatment or better utilization?", *Frontiers in Energy Research*, Vol. 5, Article 7;
- Fuess, L.T., Rodrigues, I.J. and M.L. Garcia (2017, February 17), "Fertirrigation with sugarcane vinsasse: Foreseeing potential impacts on soil and water resources through vinsasse characterization", *Journal of Environmental Science and Health*, Vol. 52 (11).
- 146.** Novacana (2018, November 7), "[Atualizado] Usina da Atvos é acusada pelo Ministério Público de causar desequilíbrio ambiental", online: <https://www.novacana.com/n/cana/meio-ambiente/usina-atvos-acusada-causar-desequilibrio-ambiental-ministerio-publico-061118>, viewed in August 2018.
- 147.** Ministério Público Mato Grosso do Sul (2020, September 9), "Acordo firmado entre o MPMS e usina garante R\$ 1,6 milhão em pesquisa e solução de problemas ambientais causados pelo manejo incorreto de vinhaça", online: <https://www.mpms.mp.br/noticias/2020/09/acordo-firmado-entre-o-mpms-e-usina-garante-r-16-milhao-em-pesquisa-e-solucao-de-problemas-ambientais-causados-pelo-manejo-incorreto-de-vinhaca#>, viewed in December 2022.
- 148.** Novacana (2018, August 13), "Usina de MS é multada em R\$ 495 mil por atear fogo em lavoura de cana sem autorização", online: [https://www.novacana-com.translate.google.com/n/industria/usinas/usina-ms-multada-r-495-mil-atear-fogo-lavoura-cana-sem-autorizacao-130818?\\_x\\_tr\\_sl=auto&\\_x\\_tr\\_tl=en&\\_x\\_tr\\_hl=en-US&\\_x\\_tr\\_pto=op,wapp](https://www.novacana-com.translate.google.com/n/industria/usinas/usina-ms-multada-r-495-mil-atear-fogo-lavoura-cana-sem-autorizacao-130818?_x_tr_sl=auto&_x_tr_tl=en&_x_tr_hl=en-US&_x_tr_pto=op,wapp), viewed in August 2022.
- 149.** Alvorada Informa (2017, June 15), "AGORA: Incêndio destrói mais de 500 he de canavial na usina Santa Luzia da Odebrecht em Nova Alvorada do Sul", online: <https://alvoradainforma.com.br/agora-incendio-destroi-500-hec-cana-vial-na-usina-santa-luzia-da-odebrecht-nova-alvorada-do-sul/>, viewed in August 2022.
- 150.** Comissão Pastoral da Terra Nordeste II (2021, November 30), "Acidente em usina mata um trabalhador", online: <https://cptne2.org.br/indicamos/34>, viewed in August 2022.
- 151.** Papel Social. ACT (2022), O Sabor do Açúcar: Trabalho escravo, desmatamento e violência contra povos indígenas na cadeia produtiva dos refrigerantes, p. 79.
- 152.** Papel Social. ACT (2022), O Sabor do Açúcar: Trabalho escravo, desmatamento e violência contra povos indígenas na cadeia produtiva dos refrigerantes, p. 80.
- 153.** Papel Social. ACT (2022), O Sabor do Açúcar: Trabalho escravo, desmatamento e violência contra povos indígenas na cadeia produtiva dos refrigerantes, p. 82.
- 154.** Papel Social. ACT (2022), O Sabor do Açúcar: Trabalho escravo, desmatamento e violência contra povos indígenas na cadeia produtiva dos refrigerantes, p. 83.
- 155.** Globo (2021, August 30), "Dois trabalhadores que estavam em ônibus cercado por incêndio em canavial de Ituiutaba são sedados e intubados", online: <https://g1.globo.com/mg/triangulo-mineiro/noticia/2021/08/30/dois-trabalhadores-que-estavam-em-onibus-cercado-por-incendio-em-canavial-de-ituiutaba-sao-sedados-e-intubados.ghtml>, viewed in December 2022.

156. Survival International (2011, September 6), "Brazilian Indians demand Shell leave their land", online: <https://www.survivalinternational.org/news/7674>, viewed in August 2022.
157. Papel Social. ACT (2022), O Sabor do Açúcar: Trabalho escravo, desmatamento e violência contra povos indígenas na cadeia produtiva dos refrigerantes, p. 105.
158. Survival International (2011, August 24), "Gunmen destroy indigenous camp, Brazil", online: <https://www.survivalinternational.org/news/7622>, viewed in August 2022.
159. Survival International (2013, December 3), "Breaking news: Guarani leader and film-star murdered", online: <https://www.survivalinternational.org/news/9797>, viewed in August 2022.
160. Land Portal (2021, April 20), "Landmark decision: Brazil Supreme Court sides with Indigenous land rights", online: <https://landportal.org/es/node/99460>, viewed in December 2022.
161. Survival International (2012, June 13), "Shell scraps controversial biofuels plan after Brazilian Indian protest", online: <https://www.survivalinternational.org/news/8399>, viewed in August 2022.
162. Raízen (2023), Response to Oxfam's report. February 7, 2023. Sao Paulo, SP Brazil
163. Papel Social. ACT (2022), O Sabor do Açúcar: Trabalho escravo, desmatamento e violência contra povos indígenas na cadeia produtiva dos refrigerantes, p. 106.
164. Survival International (2021, April 9), "Brazilian Supreme Court takes crucial step towards recognizing indigenous rights", online: <https://www.survivalinternational.org/news/12561>, viewed in August 2022.
165. Gonzales, J. (2021, March 24), "Guarani Indigenous men brutalized in Brazilian 'expansion of violence'", Mongabay, online: <https://news.mongabay.com/2021/03/guarani-indigenous-men-brutalized-in-brazilian-expansion-of-violence/>, viewed in August 2022.
166. Friends of the Earth International (2022, July 11), "Internationalist solidarity with the Guarani Kaiowá peoples", online: <https://www.foei.org/internationalist-solidarity-with-the-guarani-kaiowa-peoples/>, viewed in August 2022.
167. Amazon Watch (2022), Complicity in Destruction III: How Global Corporations Enable Violations of Indigenous People's Rights in the Brazilian Amazon, p. 29.
168. Mongabay (2023, January 9), "'Funai is ours': Brazil's Indigenous affairs agency is reclaimed under Lula", online: <https://news.mongabay.com/2023/01/funai-is-ours-brazils-indigenous-affairs-agency-is-reclaimed-under-lula/>, viewed in January 2023.
169. Oxfam (2013, June), Nothing Sweet About It: How Sugar Fuels Land Grabs.
170. Bouckley, B. (2013, December 17), "Coke supplier Bunge cops flak from Guarani Indians", Beverage Daily, online: <https://www.beveragedaily.com/Article/2013/12/17/Coke-supplier-Bunge-cops-flak-from-Guarani-Indians>, viewed in August 2022.
171. Oxfam (2016), Land Rights and Soda Giants: Reviewing Coca-Cola's and PepsiCo's land assessments in Brazil.
172. ActionAid (2020, October), Women's Rights Violations in Dutch Palm Oil Supply Chains: the case of Guatemala.
173. Açúcar Ético (2016, May), Violações de Leis Trabalhistas e Ambientais por Usinas do Estado de São Paulo – Brasil, p. 13.
174. Comissão de Direitos Humanos e Minorias (2021), Relatório 2020, p. 41.
175. Papel Social. ACT (2022), O Sabor do Açúcar: Trabalho escravo, desmatamento e violência contra povos indígenas na cadeia produtiva dos refrigerantes, p. 79.
176. Papel Social. ACT (2022), O Sabor do Açúcar: Trabalho escravo, desmatamento e violência contra povos indígenas na cadeia produtiva dos refrigerantes, p. 81.
177. Penha, D. (2018, May 16), "Raízen deve voltar a pagar horas de transporte de funcionários, decide Justiça", Repórter Brasil, online: <https://reporterbrasil.org.br/2018/05/justica-determina-que-raizen-volte-a-pagar-horas-de-transporte-aos-trabalhadores-de-araraquara/>, viewed in August 2022.
178. Raízen (2023), Response to Oxfam's report. February 7, 2023. Sao Paulo, SP Brazil
179. Acidade (2018, June 2), "Justiça manda 'recontratar' os 250 demitidos da Usina Tamoio em Araraquara", online: <https://www.acidadeon.com/araraquara/economia/NOT,3,7,1305521,Justica-manda-recontratar-os-250-demitidos-da-Usina-Tamoio-em-Araraquara.aspx>, viewed in August 2022.
180. Raízen (2023), Response to Oxfam's report. February 7, 2023. Sao Paulo, SP Brazil

181. Penha, D. (2018, October 24), "Exaustos, trabalhadores cortavam 22 toneladas de cana por dia para Raízen", Repórter Brasil, online: <https://reporterbrasil.org.br/2018/10/exaustos-trabalhadores-cortavam-22-toneladas-de-cana-por-dia-para-raizen/>, viewed in August 2022.
182. Repórter Brasil (2020, June 24), "Dos frigoríficos às plantações de cana: como o agronegócio expôs indígenas à covid-19", online: <https://reporterbrasil.org.br/2020/06/dos-frigorificos-as-plantacoes-de-cana-como-o-agronegocio-expos-indigenas-a-covid-19/>, viewed in August 2022.
183. Repórter Brasil (2020, June 24), "Íntegra das respostas da reportagem sobre frigoríficos e indígenas", online: <https://reporterbrasil.org.br/2020/06/integra-das-respostas-da-reportagem-sobre-frigorificos-e-indigenas/>, viewed in August 2022.
184. Papel Social. ACT (2022), O Sabor do Açúcar: Trabalho escravo, desmatamento e violência contra povos indígenas na cadeia produtiva dos refrigerantes, p. 101.
185. Novacana (2019, August 2), "Decisão exime usina da Atvos de pagar deslocamento de funcionarios", online: <https://www.novacana.com/n/cana/trabalhadores/decisao-usina-atvos-pagar-deslocamento-funcionarios-020819>, viewed in August 2022.
186. Papel Social. ACT (2022), O Sabor do Açúcar: Trabalho escravo, desmatamento e violência contra povos indígenas na cadeia produtiva dos refrigerantes, p. 84.
187. Repórter Brasil (2018, September 26), "'Musa do veneno', deputada Tereza Cristina recebe doações de empresários ligados a agrotóxicos", online: <https://reporterbrasil.org.br/2018/09/musa-do-veneno-deputada-tereza-cristina-recebe-doacoes-de-empresarios-ligados-a-agrotoxicos/>, viewed in August 2022.
188. Repórter Brasil (2018, September 26), "'Musa do veneno', deputada Tereza Cristina recebe doações de empresários ligados a agrotóxicos", online: <https://reporterbrasil.org.br/2018/09/musa-do-veneno-deputada-tereza-cristina-recebe-doacoes-de-empresarios-ligados-a-agrotoxicos/>, viewed in August 2022.
189. Papel Social. ACT (2022), O Sabor do Açúcar: Trabalho escravo, desmatamento e violência contra povos indígenas na cadeia produtiva dos refrigerantes, p. 104.
190. Bonsucro (n.d.), "About Bonsucro", online: <https://www.bonsucro.com/what-is-bonsucro/>, viewed in August 2022.
191. International Sustainability & Carbon Certification (2020, May), Creating a better world with ISCC certification.
192. Roundtable of Sustainable Biofuels (n.d.), "About RSB", online: <https://rsb.org/about/>, viewed in August 2022.
193. Forest Peoples Programme (2022, August 31), "Views from the ground – Commodity certification, human rights and certification", online: <https://www.forestpeoples.org/en/certification-series-views-from-the-ground>, viewed in September 2022.
194. Quiroz, D., Kuepper, B., Rijk, G. And E. Achterberg (2021, May), The Sugarcane Value Chain in Latin America and Asia, Amsterdam, Netherlands: Profundo, commissioned by CNV Internationaal.
195. Monteverdi, F. (2023, January), L'agro-industrie met le feu au Brésil, Brussels, Belgium : Entraide & Fraternité. Available online : <https://entraide.be/publication/lagro-industrie-met-le-feu-au-bresil/>
196. Cohen, M., Compain, G., Kesteloot, T., Meijer, M., Munoz, E., Murtagh, S., Saarinen, H. (2022, September), Fixing Our Food: Debunking 10 myths about the global food system and what drives hunger, Oxford, United Kingdom: Oxfam. Available online: <https://policy-practice.oxfam.org/resources/fixing-our-food-debunking-10-myths-about-the-global-food-system-and-what-drives-621411/>



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