

Global Market Report: Soybeans

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The demand for soybeans is currently tied to global meat consumption and is expected to grow, fuelled by Asia.

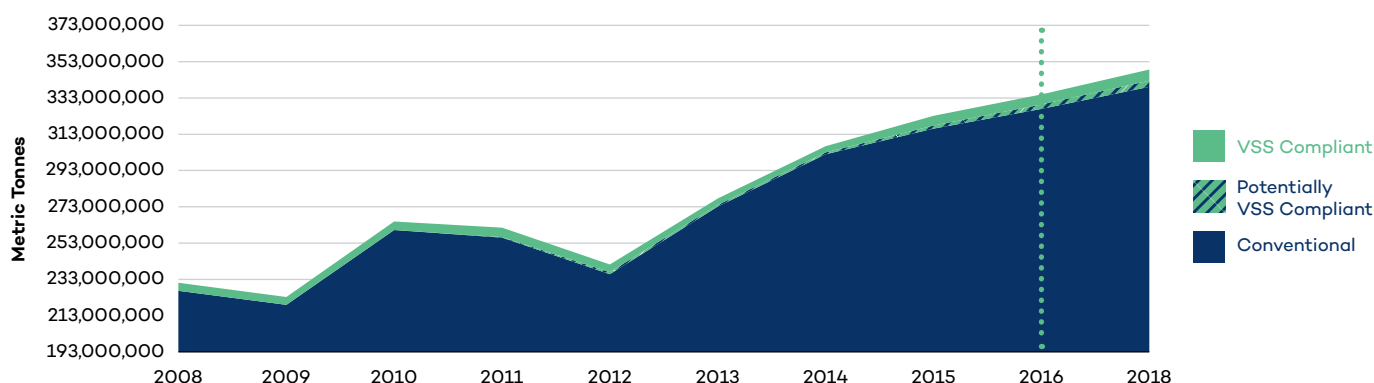
Soybeans are among the few complete protein vegetable-based foods with nine essential amino acids.^{1,2} For this reason, the soybean has become an important source of human and animal protein, with 85% of its cultivation destined for animal feed and the remaining destined for direct human consumption.^{4,5} This “king of beans” is mostly crushed into soy oil and meal and is found in hundreds of edible and non-edible products, ranging from cooking oil, animal grains, vegan food, and milk to biodiesel and other industrial applications.⁴ After palm oil, soybean oil is the most consumed cooking oil

in the world.⁴⁵ It is also a major export good: nearly 44% of all soybeans produced in 2017 were exported, accounting for 150.1 million tonnes at a value of USD 58 billion.^{11,46} The overall sector had a total (retail) market value of around USD 146.23 billion in 2017.⁷

The soybean sector is also highly concentrated, with cultivation mainly focused in the United States, Brazil, and Argentina, with India ranking a distant fourth. The top three countries together accounted for 80%⁵³ of total production in 2017 and dominated world exports. This cultivation requires large landmasses: in 2017, soybeans were cultivated on 131 million hectares, primarily in a small number of large-scale private plantations in the leading growing countries. Estimates indicate that these large-scale farmers account for over

VSS-compliant soybean production accounted for 1.62% of total soybean production in 2016 and increased to nearly 2% in 2018.

Figure 1. Global soybean production trend 2008–2016 and 2018^{26,91}



Note: VSS-compliant production volumes refer to soybeans produced in compliance with one or more voluntary sustainability standards (VSSs). Conventional production volumes do not comply with any existing VSSs. Production volumes that are defined as potentially VSS-compliant cannot be definitively listed in either category with the data currently available. This graph has been produced with data reported to IISD, the International Trade Centre, and the Research Institute of Organic Agriculture by the following schemes: the ProTerra Foundation, Organic, and Round Table on Responsible Soy (RTRS). While the analysis was conducted for the period 2008–2016, consistent with other reports in this series, we have also included 2018 figures in this figure to reflect data published in October 2020.

80% of total soybean production, with the remaining being in the hands of small-scale farmers.⁴⁷

Soybean production grew significantly, from 0.26 million to almost 56 million hectares in South America from 1961 to 2014^{8,9}, driven by world population growth and increased demand for meat, leading to greater production of soy-based animal feed.⁴⁸ The introduction of herbicide-resistant, genetically modified (GM) soybeans has also allowed for increased productivity levels and a smaller workforce, enabling the crop's rapid expansion.^{8,9} In the United States, soybean cultivation is projected to overtake wheat and corn as the crop covering the greatest area of agricultural land, driven by the increased need for animal feed and the expansion of soybean exports to China, the world's largest soybean importer.¹⁰

The largest soybean-exporting countries in 2017, by value, were Brazil (USD 26.1 billion), the United States (USD 22.8 billion), and Argentina (USD 3 billion), and the largest importing countries were China (USD 38.1 billion), Mexico (USD 1.7 billion), and the Netherlands (USD 1.6 billion).⁶ Soybean-producing countries ended up with year-end stocks ranging from 34 million to 52 million tonnes from 2014 to 2019.¹¹ This trend is projected to continue into 2020, with soybean-producing countries expected to end the production year with approximately 47 million tonnes of stocks.¹¹ Given the impact of COVID-19 on the food supply chain, these soybean stocks could be even higher than expected. Even with high levels of COVID cases in the main producing countries, the soybean industry continues to operate, with farmers in the United States, Argentina, and Brazil crushing record amounts of soybeans.^{49,51} However, logistical bottlenecks have limited the crushing, transport, and export of the crop, and farmers in these countries, particularly in Argentina, are considering stockpiling their production to sell it later for when market conditions improve, given the impact of the lockdowns and reduced crop demand.^{49,50,51} This might have an effect on soybean prices if accumulated soybean stocks of soybean get dumped all at once into international markets.

Demand for soybeans is projected to continue growing in the coming years, due to a variety of factors. The consumption of meat and soy-based health products is on the rise, while population figures are slated to increase, and policy-makers are more supportive of biodiesel as a fuel alternative.^{7,12,13,53} Looking

specifically at the projected increase in global meat consumption, this is expected particularly among the growing middle class in emerging economies, meaning that there will be strong demand for soybeans as the animal feed of choice.⁷ However, in the short-term, this trend may change. This is due to national lockdowns and forced closures of slaughterhouses, meat-packing facilities, restaurants, hotels, and other meal services in response to the COVID-19 crisis, which has significantly curbed the demand for meat and its derivative products. The massive closure of businesses and the logistical bottlenecks derived from port closures, trade restrictions, and other disruptions in food supply chains⁵⁵ have also affected livestock farmers and, in turn, soybean producers since meat production represents the major purchaser for the soybean industry.^{50,54}

Furthermore, the versatility of soybeans will be a major factor in maintaining demand growth, as the soybean market can be segmented into animal feed, food and beverage, personal care, dietary supplements, pharmaceuticals, and biomaterials, including biofuels.⁷ At a regional level, Asia is expected to drive soybean demand growth. This demand will be led by China, considering that, in the last decade, the country accounted for almost two thirds of global demand growth.⁵³ Europe is the second-largest market for soybeans, consuming approximately 12% of global soybean production in 2017.⁹⁰ It imports mainly soymeal and cake for feed for pigs, poultry, and cattle and soybean oil to produce biodiesel.⁵³ Also, many European countries are important trans-shipment hubs, meaning that a portion of their imports is re-exported in the form of beans or processed and then exported as soymeal and oil.⁹⁰

Recent consumer trends suggest a shift in dietary preferences in Europe and other developed countries toward choosing plant-based protein products as a meat substitute, given the increasing concerns by private sector actors and governments on the environmental and health impacts of producing and consuming animal meat. This trend is expected to benefit the consumption of soybean-based products such as tofu,^{57,58} soybean-based dairy substitutes, and processed meat. In fact, some of the big players in the fast-food industry, such as retailers and supermarkets in North America and Europe, are increasingly selling plant-based meat substitutes to respond to consumer demand.⁵⁸

Another development in the soybean market is the initial adoption of voluntary sustainability standards (VSSs), with varying environmental and social requirements and level of assurance,⁸⁰ by soybean producers. However, the VSS adoption rate remains low: in 2016, only 1.62% of the market was made up of VSS-compliant soybeans, accounting for 5,417,036 tonnes. Soybeans that were potentially VSS-compliant represented 0.75%, while conventional soybean production made up 97.6% of the market (see Figure 1).²⁶ In the period 2016–2018, the volume of VSS-compliant soybeans increased at a compound annual growth rate (CAGR) of 6.65%, reaching 6,161,241 tonnes. This represented 1.8% of the total volume of soybeans produced globally.⁹¹

Soybean production is associated with major social and environmental issues.

The market advisory firm Transparency Market Research predicts that the global conventional soybean market will experience a 5% CAGR from 2017 to 2025, reaching a total market value of USD 214.36 billion.⁷ This might potentially help balance the existing oversupply, should market conditions recover quickly from COVID-related disruptions in the sector. According to the International Monetary Fund, the negative economic outlook for 2020 means a global recession is forthcoming, and the impacts of this shock on the soybean sector are not yet clear.⁵⁹

Nevertheless, the sector faces important economic, social, and environmental challenges that might influence this growth forecast. For instance, there could be a sudden change in appetite for meat products due to health and ethical reasons and/or in order to combat deforestation and climate change. This would then result in slowing and shifting soybean cultivation that is normally destined for animal feed to other products, such as biodiesel.^{14,16}

From an environmental perspective, the rise in global demand for meat consumption—and in turn, of soybean production—poses a challenge to soil fertility. Soybean monoculture has been shown to cause soil erosion, soil compaction, and nutrient depletion.⁶⁰ Cases of high erosion rates have been reported in the top producer countries, such as Argentina and Brazil. The removal of native vegetation through deforestation and the subsequent planting of soybeans leads to water evaporation, resulting in soil erosion and soil infertility—even if the crop is “nitrogen fixing” and thus improves

LIVELIHOODS

Large-scale farmers account for over 80% of total soybean production.

The remainder 20% is in the hands of small-scale farmers.

United States, Brazil, and Argentina account for 80% of total production.

soil quality. Since soybean is a highly mechanized crop cultivated in monoculture, soil compaction may occur, which prevents soil from taking in necessary nutrients, water, and air.^{25,61,62} In the long term, soil erosion and soil compaction can lead to soil infertility and subsequently reduced crop yields.⁶³

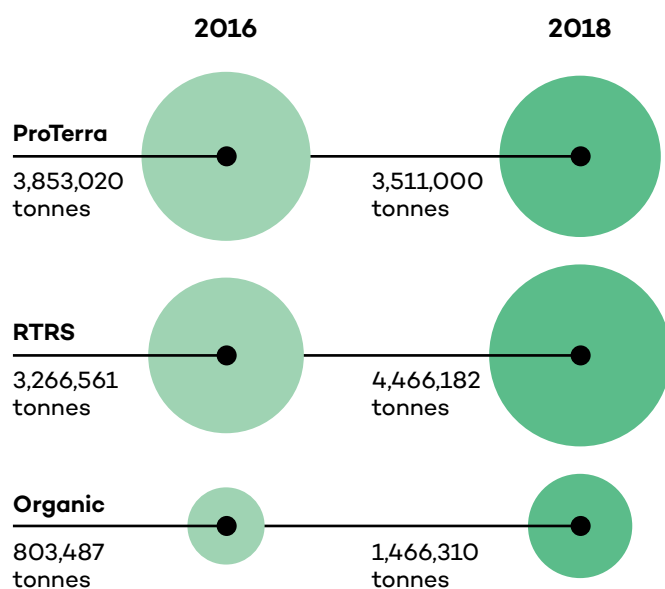
Another environmental concern relates to the use of GM soybeans. More than 80% of soybean varieties are GM, given their resistance to herbicides, which leads to better crop yields. Despite such benefits, these varieties can also be highly polluting, with long-term adverse impacts on the environment and biodiversity.^{17–20} Moreover, some studies reveal that weeds become more resistant to the herbicides that are associated with GM soybeans. This can then lead to the increased use of agrochemicals, which contaminates local ecosystems, including water streams, soil, and fed livestock.^{64,65}

Soybean cultivation is also associated with the ongoing deforestation and ecosystem conversion of the Amazon tropical rainforest and the Brazilian biome known as the Cerrado. Despite the 70% decrease in deforestation rates from 2005 to 2014 in the Amazon basin that followed the signature of two “zero deforestation” agreements⁶⁸ (the 2006 Soy Moratorium and the 2009 Brazilian Federal Prosecutors’ Terms of Adjustment of Conduct), soybean cultivation moved to the Cerrado. This is one of the world’s most important ecosystems,⁶⁹ and soybean cultivation there has led to increased deforestation and habitat loss.^{66,67} Evidence suggests that an estimated 22 million hectares of native vegetation have been deforested in the Cerrado biome due to the expansion of beef and soybean production between 2006 and 2017, causing major habitat losses for plant and animal endangered species, such as the giant anteater. Deforestation has also led to the release of 210 million tonnes of carbon dioxide equivalent emissions.⁶⁶

There have been measures in recent years to address this challenge. The deforestation rate in the Cerrado

How many tonnes of soybeans are certified by each standard?

Figure 2. Standard-compliant soybean production volumes in 2016 and 2018^{26,91}



biome decreased in the period 2005–2014, thanks to the implementation of different public policy and supply chain interventions by the Government of Brazil, some private sector actors, and civil society groups.²¹ These interventions include the Cerrado Manifesto, set up by the World Wildlife Fund and Greenpeace, aimed at eliminating the conversion of native vegetation in the biome. The Cerrado Manifesto was signed by over 70 corporations, civil society organizations, and governmental institutions.⁶⁷ However, this call for action has encountered some resistance from traders who had moved their operations from the Amazon to the Cerrado region after the Soy Moratorium signature.⁷⁰ Recent evidence suggests that deforestation rates have begun to gradually increase in the Cerrado and Amazon biomes in recent years. Deforestation and the conversion of biodiverse grasslands for soybean cultivation have also advanced in large areas of Argentina, Bolivia, and Paraguay, including the Gran Chaco, an important carbon stock that includes one of South America's largest forests, second only to the Amazon rainforest.^{53,68,71}

From an economic perspective, the soybean market is highly concentrated, with five leading traders and exporters accounting for almost 90% of the total market⁷² and global imports concentrated in China. This concentration has a direct impact on price volatility

and farm prices, especially given China's market power. As a leading consumer, China has recently driven farm prices down by increasing its supply of soybeans.⁷³ This trend is expected to continue due to China's goal to increase its domestic production of soybeans.

China's international trade and domestic production policies have a direct effect on expanding the existing oversupply and stock levels of soybeans, which in turn influence price volatility and drive down farm prices.^{73,11} Indeed, soybean prices have been falling since 2012 due to a supply boom, and, as mentioned above, soybean stocks are expected to remain unchanged, which might continue to influence low price levels.¹¹

In addition, the current U.S.–China trade war has been an important factor in reshaping soybean trade flows at the global level, since the United States represents around 40% of total soybean exports to China.¹⁰² This conflict could lead to unforeseen impacts on the soybean market. In July 2018, China imposed a 25% tariff on imports from the United States, including soybeans. The resulting U.S. surplus was then exported to other countries in Latin America and Europe. Meanwhile, China increased its imports of soybean coming from Brazil, driving its prices upward.^{74,75} This situation is not expected to change, given that COVID-19's disruptive effects on supply chains and oil prices have contributed to strengthening the U.S. dollar against other currencies, such as the Brazilian real. In turn, Latin American countries remain a more attractive market for Chinese soybean purchases.^{50,54}

From a social perspective, the cultivation of soybeans is also associated with inequality, given that only a few large-scale farmers hold the vast bulk of soybean plantations. In Paraguay alone, where soybeans represent over three quarters of the total land cultivated area, the sector only generates 15% of total employment. According to Oxfam, 71.3% of soybean plantations in the country are controlled by only 1% of large-scale farmers.^{62,14} There are also reports of land grabbing in leading producing countries, displacing small farmers and communities, who have had to migrate to urban locations looking for jobs and better livelihoods.^{85–89} Cases of modern slavery and poor working conditions have also been reported in a number of Brazilian soybean plantations, as workers are asked to work for free to pay back “advances” in the form of transport services, clothing, or food.^{25,77}

Different public and private sector actors, including VSSs, are working to address some of the soybean industry's largest challenges to improve its sustainability performance and ensure the sector's growth. Among their primary objectives are helping combat deforestation, protecting essential human and workers' rights, and advancing equitable land ownership.

Expanding VSS uptake in the soybean sector could help protect the environment and smallholders.

VSS^A uptake in the soybean sector expanded significantly at the turn of the century. Although certified Organic soybeans have been produced since the 1970s, the ProTerra Foundation (PF) and the RTRS started operating in 2006. The Rainforest Alliance certified small quantities of soybean crops in the period 2013–2015.^{14,26} Another main scheme operating in the sector is the International Sustainability and Carbon Certification (ISCC), which mainly certifies soybeans serving the biofuels feedstock industry—but also feed and food under different certification systems to target several markets (i.e., ISCC EU, ISCC Plus).⁷⁹

As mentioned above, natural habitat and biodiversity loss, deforestation, excessive use of herbicides, and human rights violations, such as unlawful land appropriation and slavery, are important concerns associated with soybean production.^{14,15,23–25} The VSSs operating in the sector encourage soybean plantations to comply with certain criteria that prevent deforestation, enhance ecosystem rehabilitation, and protect rare and threatened species. They also promote practices that protect basic labour rights, including free labour, and support decent working conditions, such as fair and timely wages. RTRS and PF are the schemes more widely used by value-chain actors, and both include deforestation-free criteria. ISCC also includes provisions to avoid deforestation while ensuring the protection of wetlands and native vegetation.⁷⁹

Recent benchmark studies suggest that these three schemes have strong safeguards to support deforestation-free soybeans, along with the protection of ecosystems, wetlands, and High Conservation Value Areas. RTRS and ISCC Plus are reported to be the

strongest in the level of assurance systems.^{80,81} The Organic standard stands out for including criteria to avoid the fragmentation of ecosystems and requiring biodiversity risk assessments.⁸¹

VSSs monitor the enforcement of their criteria on the farm and can either follow this up by tracking and tracing soy-based products through the entire value chain and/or certify farmers and sell certificates (or credits) as proof of compliance. The former is possible by applying chain of custody models across the value chain. These models include segregation—when VSS-compliant soybean products cannot be traced back to the producing farm but are physically separated from non-VSS-compliant volumes—and mass balance—when volumes of soybean-products that are VSS-compliant and non-compliant are mixed, but an exact account of the volume ratios is registered.⁹² However, applying these chain of custody models has some inherent challenges. Much like other “embedded” commodities, soybeans are not only purchased directly as a product by businesses and trade companies, they are also purchased indirectly as an animal feed ingredient for the production of other consumer goods, such as meat, dairy, and processed foods. Even when various systems allow for locating the farms that soy-based animal feed comes from, the complexity of the value chain and the decentralization of food and animal feed processing industries makes measuring, estimating, and tracing physical soy usage one of the most challenging issues for soy-based companies.

Another option that VSSs such as RTRS offers is to use certificates of VSS-compliant soybeans that supply-chain partners can buy from certified farmers to compensate for each tonne of soybeans used that is not VSS-compliant (a book and claim chain of custody model). The certificate refers to volumes of VSS-compliant soybeans that may be from a different area than where the buyer's physical soybeans come from. In non-GM markets, physical supply, for the most part, must be non-GM. This is why VSSs such as the ProTerra Foundation are using new technologies, including satellite monitoring, to track soybean plantations and the movement of soy products along the supply chain. A promising example of the application of

^A The United Nations Forum on Sustainability Standards (UNFSSs) defines VSSs as “standards specifying requirements that producers, traders, manufacturers, retailers or service providers may be asked to meet, relating to a wide range of sustainability metrics, including respect for basic human rights, worker health and safety, the environmental impacts of production, community relations, land use planning and others.”³⁶ To review the purpose of various VSSs and the set of requirements producers need to comply with under each scheme, please access the State of Sustainability Initiative's Reviews at the following link: <https://www.iisd.org/ssi/>

satellite technology in Brazil is the recent partnership between ProTerra, soybean producers, and salmon feed producers exporting to Europe. They aim to incorporate a semi-automated tracking system in each delivery of soybean-based products to feed producers, which allows for the identification of the origin and location of the sourcing farm, whether the farm is ProTerra-certified, and other information related to a farm's compliance to no-deforestation practices. Through this system, salmon feed producers are aiming to provide traceability information to European importers regarding their suppliers' environmental and social practices.⁸²

The parallel development of VSSs for GM soybeans is an important development for the sector. Danube Soya (otherwise known as Donau Soja), Rainforest Alliance, Organic, and the ProTerra Foundation certify non-GM soybeans, while RTRS, in practice, mostly certifies GM soybeans, although it has a non-GM option in place.

There have been some signs of growing VSSs uptake on the supply side in recent years, but it still remains very low: VSS-compliant soybeans experienced a CAGR of about 2.62% from 2008 to 2016, accounting for at least 1.62% of total soybean production. This share slightly increased in 2018 to 1.8%, with VSS-compliant soybean production growing at CAGR 6.65% in the period 2016–2018.²⁶ The ProTerra Foundation, RTRS, and Organic were the main VSSs in the soybean sector when ranked by production size in 2016.²⁶ However, in 2018, RTRS registered the highest volume of certified soybeans⁹¹ (Figure 2). Overall, low demand for VSS-compliant soybeans is one of the main causes behind its slow growth.⁷⁹ Another factor that might have influenced this limited uptake in recent years is that the main soybean traders and processors have also developed their own schemes. These include the Cargill Triple S, the Amaggi Responsible Soy Standard, and Bunge Pro-S, which might be a preferred option compared to sourcing soybeans that are compliant with independent third-party schemes.

In 2016, at least 5.4 million tonnes of soybeans were VSS-compliant, valued at USD 2.2 billion. This value is derived from the average producer prices per country, as reported by the Food and Agriculture Organization of the United Nations, which is then applied to the volume of VSS-compliant soybean produced per country.^{26,27} The majority of VSS-compliant production, at approximately 79%, comes from Latin America (Brazil, Argentina, and Paraguay) with some important volumes

coming from Asia (China and India) as well as Italy, the United States, and Germany.²⁶ As mentioned above, in 2018 the volume of soybeans produced in compliance with VSSs increased to reach at least 6.2 million tonnes.

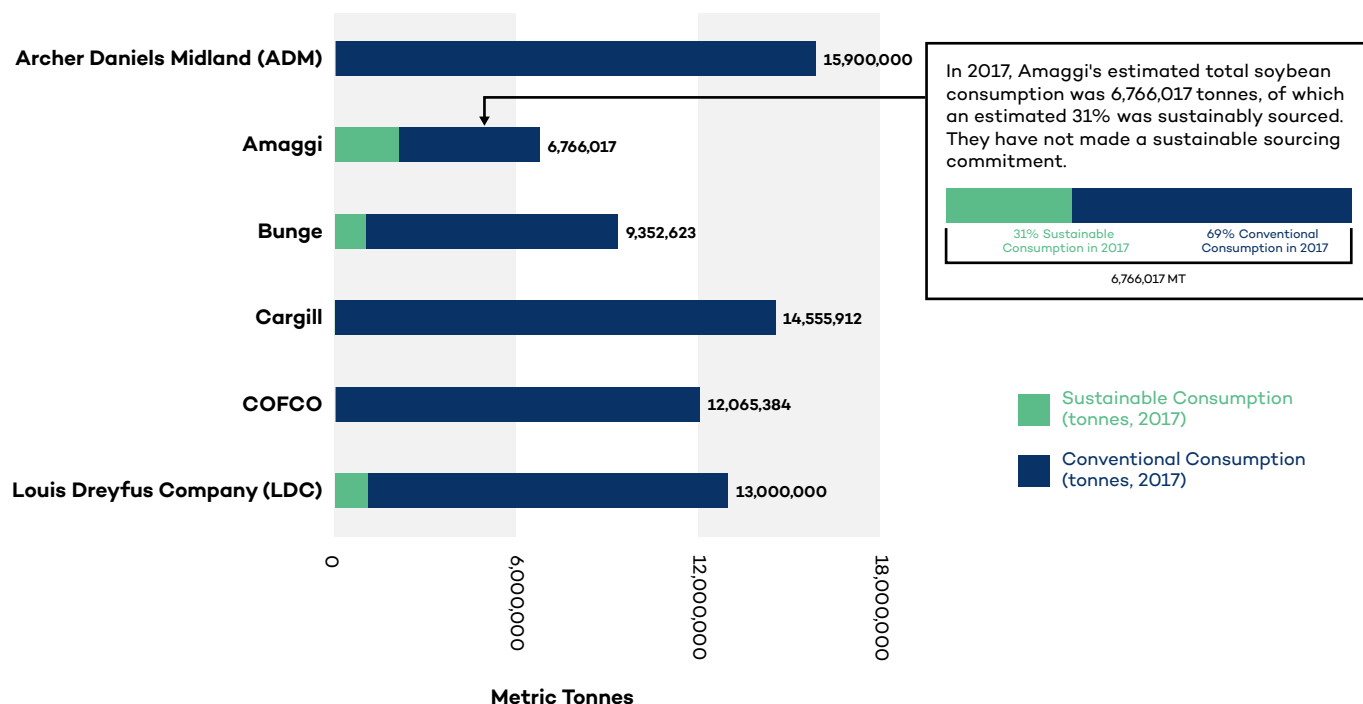
On the demand side, six of the largest soybean purchasing and trading companies listed in Figure 3 traded 71.6 million tonnes of soybeans in 2017, accounting for approximately 21% of total soybean consumption. From this total and based on the available information, 4.2 million tonnes was VSS-compliant, which represents only 5.8% of the total traded volume in that year. According to our research, none of these companies has defined sustainable sourcing commitments related to producing and sourcing VSS-compliant soy; sourcing volumes and commitments from other leading soybean traders were not available. All of the listed companies have signed the Soy Moratorium, but recent evidence suggests that none of them has signed the Cerrado Manifesto to date.⁹³

Leading traders' sourcing volumes are driven mainly by end-consumer preferences to purchase more sustainable and healthy products, particularly in Europe, where some countries have instituted a general ban on GM crop cultivation and imports.²⁵ Indeed, commitments from European countries to consume deforestation-free soybeans and non-GM soybeans have partly driven the demand for more sustainably produced soybeans. However, there is also growing market uptake by food manufacturers and retail companies to source responsible soybeans in the form of credits, mainly provided by RTRS, often without any direct consumer communication.^{94,95} This trend might be behind the recent increase of VSS-compliant soybeans certified under the RTRS scheme. As mentioned above, these credits compensate for feed and other soybean uses that are not sourced from sustainable sources.

Demand for VSS-compliant soybeans is growing mainly in Europe and the United States but not as fast as supply. The mismatch between VSS-compliant production and sales limits current market uptake^{79,96} and could limit VSS-compliant soybean market growth potential. In 2012, only 30% of all VSS-compliant soybeans were sold as standard-compliant. Since soybeans are processed and incorporated into a variety of end products, creating demand for VSS-compliant soybeans among consumers at the grocery store is more difficult compared to other commodities, such as coffee, tea, or cocoa, which are easier for these

Progress toward sourcing more sustainable soybeans

Figure 3. Major processing and trading soybean companies, and their sustainable sourcing consumption of soybeans in 2017¹⁰³⁻¹²⁰



Notes:

All traders and processors from the list have announced commitments to no-deforestation, including provisions related to no-deforestation, no expansion on peat, and no exploitation. Most of them have put in place corporate initiatives to ensure they are not sourcing from areas embargoed by the Brazilian Institute of Environment and Renewable Natural Resources; by the Mato Grosso State Secretariat of Environment and areas concerning Indigenous Lands and Conservation Units; or from forest areas in the Amazon biome after the Soy Moratorium.⁵⁶

Sustainable consumption volumes reported might include book and claim volumes, especially when referring to RTRS, which offers this option.

Amaggi: Sustainable consumption volumes refer to their own scheme called Amaggi Responsible Soy Standard.

Bunge: Sustainable consumption includes different standards: International Sustainability and Carbon Certification (ISCC), 2BSvs and the Renovabio program in Brasil, CARB.

ADM: Sustainable consumption volumes apply only to RTRS-certified soybeans. The company sources from other standards, such as 2BSvs, ISCC, Proterra, and has developed its own corporate scheme, called the ADM-Responsible Soy Standard (third-party verified). However, sourcing volumes from these standards were not found.

Cargill: The company reports sustainable sourcing volumes for 2018 compliant with their own corporate scheme, called Cargill triple-S (Sustainably Sourced & Supplied), with 540,000 tonnes of soybeans. The company sources from other schemes, such as the ISCC program and 2BSvs, but sourcing or traded volumes were not found.

COFCO: The company decided in 2017 to cancel RTRS certification due to a lack of commercial benefits, arguing that there was no demand for RTRS-certified soybeans from their customers. For the same reason, the company decided to cancel its RTRS-certified soybean production in Argentina from 2018 onwards.

LDC: Sustainable consumption volumes refer to 2BSvs-compliant soybeans sourced from Argentina and Paraguay only. The company sources from other schemes including RTRS, ISCC, and their own corporate sustainability scheme.

MARKET VALUE

Over USD 2.2 billion in VSS-compliant soybeans based on 2016 soybean producer prices

CAGR 2008–2016

Conventional production is up by 4.68% while VSS production is up by 2.62%

CAGR 2016–2018

Conventional production is up by 1.83% while VSS production is up by 6.65%

SOYBEAN PRODUCTION IN LHDCs

0.5% of total soybean produced

0.13% of VSS-compliant soybean produced based on 2016 data

consumers to distinguish.^{14,26} More recently, research suggests that VSS-compliant soybeans might not be sold as such in the market. For instance, Danube Soya and ProTerra did not sell all their certified volumes in 2019, while demand for RTRS credits surpassed production.⁹⁰ In addition, since most of the soybeans grown for feed end up being a hidden ingredient in animal protein products, its visibility is minimal, also limiting uptake in the market.

According to the *European Soy Monitor*, only 13% of soybean-based products used in the European Union in 2017 were compliant with several deforestation-free standards, which increased to 19% in 2018.^{90,97} Meanwhile, 22% of such products were compliant with any of the 17 standards recognized by the European Feed Industry in 2017.⁸³ In 2018, this share increased to 38%.⁹⁷ Demand for more sustainable soybeans needs to grow among manufacturers and processors of food, animal feed, and biomaterials.²⁹ In addition to overcoming demand challenges, VSS-compliant soybeans are not always available at the right times and in the right qualities and quantities to facilitate growth.³⁰ These VSS-compliant soybean supply chain challenges can be overcome by actively engaging with its stakeholders, specifically major traders and processors, to identify main bottlenecks across the value chain and propose solutions jointly.³⁰

Demand for organic soybeans has grown over the past 10 years and is expected to increase at a CAGR of 12.15% from 2017 to 2022, faster than conventional soybeans, reaching a total market value of USD 635.45 million.⁴⁵ The Asia-Pacific region leads in the consumption of organic soy-based products, accounting for an estimated 61.2% of this market in 2017.⁴⁵ This trend is expected to continue, with other countries such as the United States, the United Kingdom, and Germany showing increased consumption of organic soy-based products at retail. This increasing consumption trend responds to similar consumer preferences that drive conventional soybean demand toward consuming soy-based products as a healthy substitute for animal protein.^{45,84}

Demand for GM versus non-GM soybeans is another important factor in the level of VSS-compliant soybean production. Evolving tendencies to either accept or reject GM crops will impact VSSs operating in the soybean sector that prohibit or accept the use of GM varieties. The RTRS certification program is expected to expand significantly since they are the major VSS, with an international presence, that certifies the GM soybeans currently dominating the soybean market. However, as mentioned above, there are various other schemes available, sometimes owned by traders themselves, that are less known by end buyers and vary in quality.⁸⁰

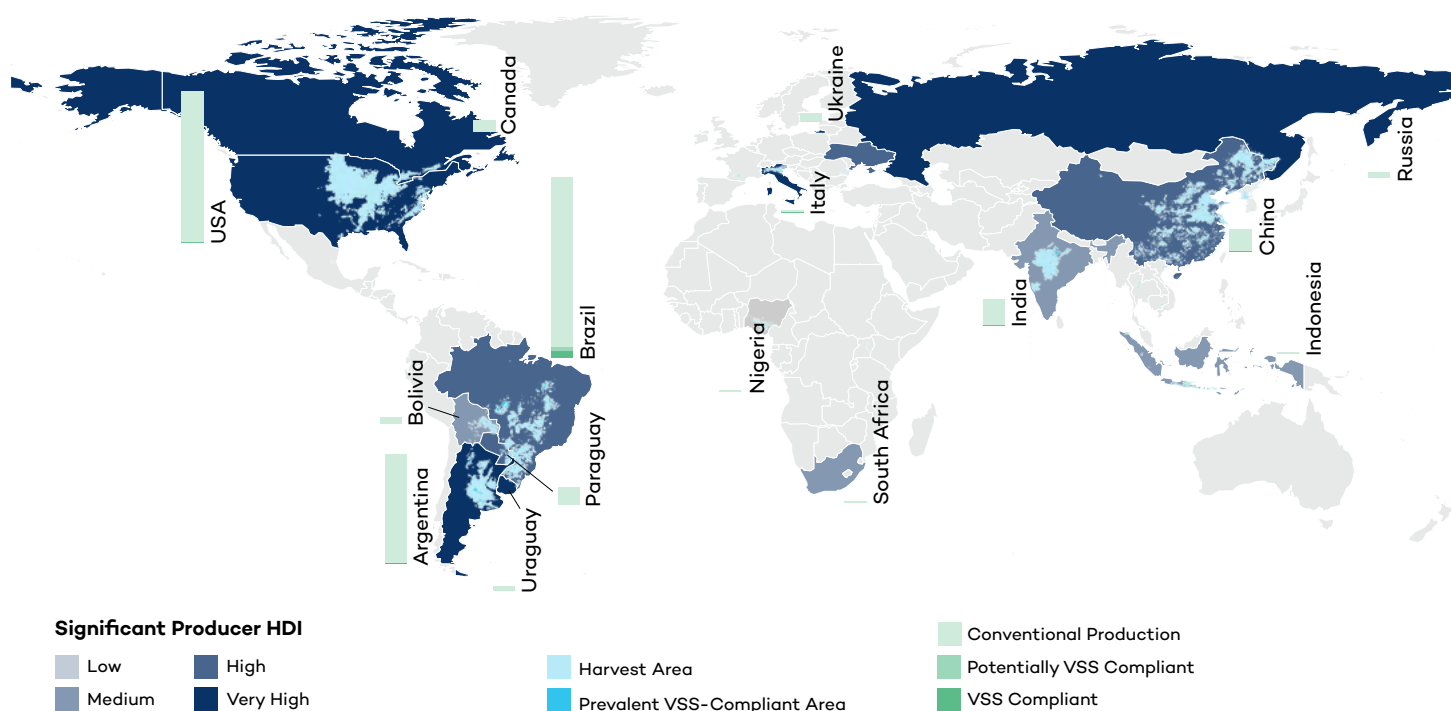
Going forward, concerns associated with deforestation might motivate many governments and more private sector companies to commit to buying VSS-compliant soybeans as a compliance and reporting mechanism. The above-mentioned Amazon Soy Moratorium in 2006 and the Cerrado Manifesto in 2017 are two initiatives that many companies have signed to curb the loss of natural habitats in Latin America.²¹ Similarly, no-deforestation prescriptions, along with mandatory due diligence requirements in national regulations, cross-border frameworks, and trade agreements, could potentially leverage the uptake of VSS-compliant soybean.^{68,79}

The potential for the expansion of VSS-compliant soybeans in LHDCs is limited.

Despite growing demand for non-GM soybeans from European countries, developing demand in China for VSS-compliant soybeans is crucial given the country's role as the world's largest soybean consumer, accounting for 66.1% of the global total in 2016.^{6,31} Thus far,

Soybean-growing regions of the world

Figure 4. Distribution of soybean production in the top 15 producing countries in 2016^{26,98–100}



Download high resolution version of the map at <https://www.iisd.org/sites/default/files/publications/ssi-global-market-map-soybeans.pdf>

demand for more sustainable soybeans has not been a priority for China.^{30–32}

Another core consideration in assessing opportunities for expanding VSS compliance in the sector is the human development level of soybean-producing countries, as assessed by the Human Development Index (HDI). Out of 93 soybean-growing countries in 2016, 18 were ranked as LHDCs under the HDI, and five of these LHDCs produced VSS-compliant soybeans: Benin, Burkina Faso, Mali, Togo, and Côte d'Ivoire.²⁶ These LHDCs accounted for 0.5% of the total soybean crops grown in 2016 and were responsible for 0.13% of the total VSS-compliant soybean crops produced worldwide that same year.²³ There have been promising signs of growth in VSS-compliant production among these LHDCs: looking at the 2008–2016 time period, VSS-compliant soybean production in LHDCs increased at a CAGR of approximately 8%, with Organic as the only VSS that had soybean production volumes coming from LHDCs. *The expansion of VSS-compliant soybean production in LHDCs could result in important*

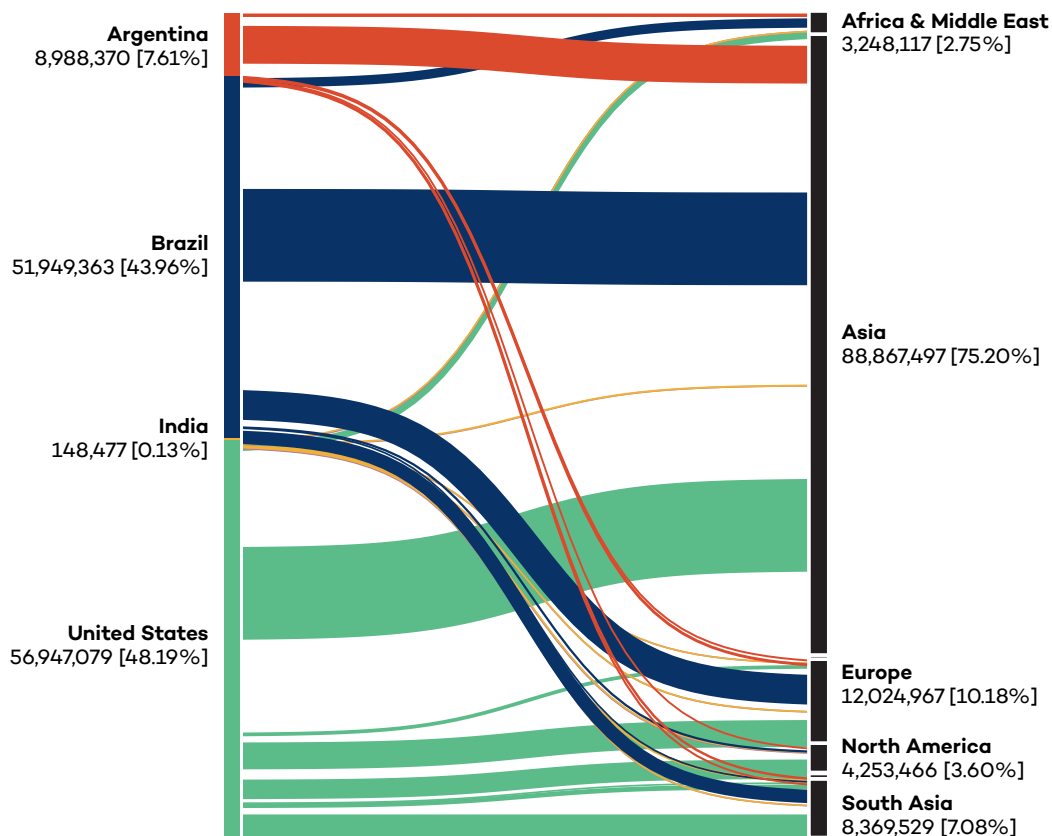
environmental and societal development benefits via the adoption of more sustainable agricultural practices. These benefits include reduced deforestation and biodiversity loss, along with better working conditions.

There are promising signs of VSS expansion potential among countries that are already producing significant shares of the world's soybeans and have begun to adopt VSSs. Of the top soybean-growing countries, the United States, Brazil, Argentina, India, and China offer good prospects for increased sustainable soybean production, considering their total soybean output and the existing presence of VSSs.²⁶ The overall contribution of LHDCs to global soybean production is currently small compared to the largest soybean producers.

In terms of the opportunities for expanding VSS-compliant soybean production in LHDCs and the potential for maximizing sustainable development outcomes, the countries that show the most potential for growth in light of their share of total soybean production, the presence of VSSs, and their HDI value are Nigeria and Benin, followed by Malawi and Uganda,

In 2016, the bulk of soybean production was concentrated in the United States, Brazil, Argentina, and India, with Asia being the primary destination.

Figure 5. Trade flows of the largest soybean-producing countries in 2016, in tonnes^{98,101}



Note: These four countries represented 83% of global soybean production in 2016. The percentage in brackets for each country represents their proportion of global soybean exports, by volume, in 2016. The percentage in brackets for each region on the right represents the proportion of the total volume of soybeans imported in 2016 from the four countries.

according to our analysis based on 2016 figures.²⁶ Positive development outcomes through the expansion of VSSs can also take place in some of the largest soybean-producing countries, such as the United States, Brazil, Argentina, India, and China. While these are not LHDCs, the smallholder soybean farmers operating in the four emerging economies continue to experience poverty, and pursuing greater VSS compliance might contribute to improving their livelihoods.^{25,35} For instance, the expansion and concentration of soybean farming in Brazil, Argentina, and Paraguay has led to the displacement of smallholders and the exploitation of workers.^{24,37} More than 650,000 Indigenous Brazilians from over 200 tribes are threatened by agricultural expansion.²⁴ This threat has been heightened by the COVID-19 global pandemic, as illegal loggers have been taking advantage of reduced environmental enforcement and the retreat of Indigenous communities, who are

especially vulnerable to this respiratory disease, in order to extract wood from conservation areas.^{24,37}

Although these figures suggest that there may be opportunities for expanding VSS-compliant soybean production in LHDCs, the sector has become highly mechanized. These LHDCs are also competing with larger farms in the United States and Brazil, which have leveraged economies of scale. This poses a formidable challenge for smaller and less modern farms, much as these have greater potential for providing livelihoods and alleviating poverty.²⁵ Soybean cultivation on 400 hectares in Northern Brazil employs approximately two people on large, mechanized farms versus 80 people on small, non-mechanized farms.²⁵ Catering to niche markets such as non-GM and identity-preserved soybeans might provide opportunities for smallholder farmers in developing countries.²⁵⁻³⁸

Nevertheless, climate change impacts on soybean production could result in a drop in yields, although the impacts will be variable depending on the context. World Bank climate modelling research estimates that soybean yields in Brazil could drop by 30% or more by 2050, but that drop would be less pronounced in other Latin American countries such as Argentina, Bolivia, Colombia, and Uruguay.³⁹ The study states that projected climate impacts could be offset by longer crop-cycle varieties, different sowing dates, and irrigation.³⁹ Clearly, soybean producers will need to adopt appropriate measures to prevent significant losses from climatic shifts.

Except perhaps for dairy-based protein, soybeans remain one of the most accessible forms of protein in the world.⁷ The crop has become an important source of direct and indirect protein, mostly as feed for livestock, ending up in pigs, chickens, eggs, cheese, and other dairy products, though it is still a minority as a direct source through soybean-based products. Barring important shifts away from meat-based diets, soybeans are likely to remain a valuable crop for maintaining global food security now and into the future, given their role as a key source of direct and indirect protein. Though the challenges in VSS uptake are significant, especially in LHDCs, the growing ecological and health awareness among consumers could help motivate much-needed change. In addition, the enforcement of regulatory frameworks banning deforestation in soybean plantations could also be a potential catalyst for sourcing more VSS-compliant soybeans. A greater shift toward VSS compliance in the soybean sector could also help address the mounting adverse socio-environmental impacts of conventional soybean production and consumption, such as the large-scale forest and grassland losses in the Amazon and Cerrado biomes and Gran Chaco, along with the proliferation of GM soybeans and its potential human health implications (i.e., allergies, liver damage, and fertility) and the effect of meat-based diets on food security.^{40–43} With demand on an upward trend for healthier, more nutritious, and sustainable foods and a need to grow more flexible and versatile crops, VSSs are expected to continue having an important role in enabling the production and consumption of more sustainable soybeans.^{7–13} Alongside VSSs, coordinating efforts from supply-chain players and state actors in both producing and consuming countries are needed to move the sector toward sustainability.

FIGURE 3 NOTES: ESTIMATIONS MADE FOR CALCULATING SOURCING VOLUMES FOR THE FOLLOWING COMPANIES

ADM

- **Purchase volume total (15,900,000 tonnes):** The company reported a total use of 18,124 tonnes of soybeans certified by RTRS in 2018. This represents less than 1% of the total soy used by ADM.¹⁰³ According to media reports, the company processed 15.9 million tonnes of soybeans in 2018. This figure was used as a proxy for 2017.

Amaggi

- **Purchase volume total (6,766,017 tonnes):** This figure was obtained from the forest section of Amaggi's CDP report 2018.¹²⁰ The company reported that a total of 569,017 tonnes originated from their own plantations, and 6,197,000 tonnes was obtained from other suppliers in 2017. This data only applies to operations in Brazil.
- **Purchase volume standard-compliant (2,090,000 tonnes):** This figure includes the total volumes of production and purchases for RTRS (945,000 tonnes), Proterra (830,000 tonnes), and the Amaggi Responsible Soy Standard (315,000 tonnes) in 2017.¹⁰⁶

Bunge

- **Purchase volume total (9,352,623 tonnes):** This figure was obtained from the average of soybean exports by the company in Brazil, in 2016 (11,005,247 tonnes),¹⁰⁵ and the total volume of edible oil products used by the company in 2017 (7,700,000 tonnes).¹⁰⁹

Louis Dreyfus Company

- **Purchase volume total (13,000,000 tonnes):** This figure was obtained from the total volume of soy used in South America in 2017, from Argentina, Brazil, and Paraguay, according to the 2018 RTRS report.¹¹⁹ This figure was used as a proxy for 2017.
- **Purchase volume standard-compliant (1,074,649 tonnes):** This figure was obtained by adding the total volume of soybean certified under 2BSvs in 2017 in Argentina (994,000 tonnes) and Paraguay (80,649 tonnes).¹¹⁷ No data was found for Brazilian operations.

Cargill

- **Purchase volume total (14,555,912 tonnes):** This figure was estimated by adding the total volume of soybeans processed and exported in Brazil in 2016 (8,910,912 tonnes),¹⁰⁵ and Paraguay (900,000 tonnes)¹¹² and Argentina in 2018 (4,745,000 tonnes).¹¹¹

COFCO

- **Purchase volume total (12,065,384 tonnes):** This figure was estimated by adding the total volume of soybeans processed and exported in Brazil in 2016 (4,582,884 tonnes)¹⁰⁵ and Argentina in 2018 (7,482,500 tonnes from 20,500 tonnes of daily capacity).¹¹⁶
- **Purchase volume standard-compliant (25,550 tonnes):** This figure refers only to RTRS-certified soybeans produced by the company in Argentina in 2017. They also sourced from 2BSvs in Argentina and Paraguay, but those volumes were not available.⁹⁶

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The Sustainable Commodities Marketplace Series provides a market performance overview and outlook for key agricultural commodities that comply with a number of voluntary sustainability standards (VSSs), focusing on global sustainable consumption and production. Each year, the series focuses on a different overarching theme, with individual reports for that year devoted to providing a market update for a chosen commodity. These reports are designed to be accessible and relevant for a range of audiences, including supply chain decision makers, procurement officers, policy-makers and producers. The series builds on *The State of Sustainable Markets 2018: Statistics and Emerging Trends*, a joint publication from IISD, the International Trade Center (ITC), and the Research Institute of Organic Agriculture (FiBL), which examines over a dozen sustainability standards for various commodities.

This *Global Market Report* analyzes recent trends in soybean production, consumption, trade flows, and other relevant areas. The report also emphasizes the potential for expanding VSS-compliant production in Low Human Development Countries (LHDC), given factors such as share of global soybean production, VSS presence, and Human Development Index (HDI) value. It uses 2016 data across all three factors, given that this is the latest year with data available for VSS-compliant soybean when conducting the analysis. By comparing the growth rates and patterns of standard-compliant versus conventional consumption and production of soybeans, this report provides insights on how sustainable and conventional markets are performing at a global level, along with highlighting which countries have the potential to produce more VSS-compliant soybeans.

The State of Sustainability Initiatives (SSI) is an international transparency and capacity-building project that aims to improve strategic planning and sustainable development outcomes related to VSSs. It does so by providing in-depth, credible, and needs-based information on VSS characteristics, market performance, and potential contributions to addressing development challenges.

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