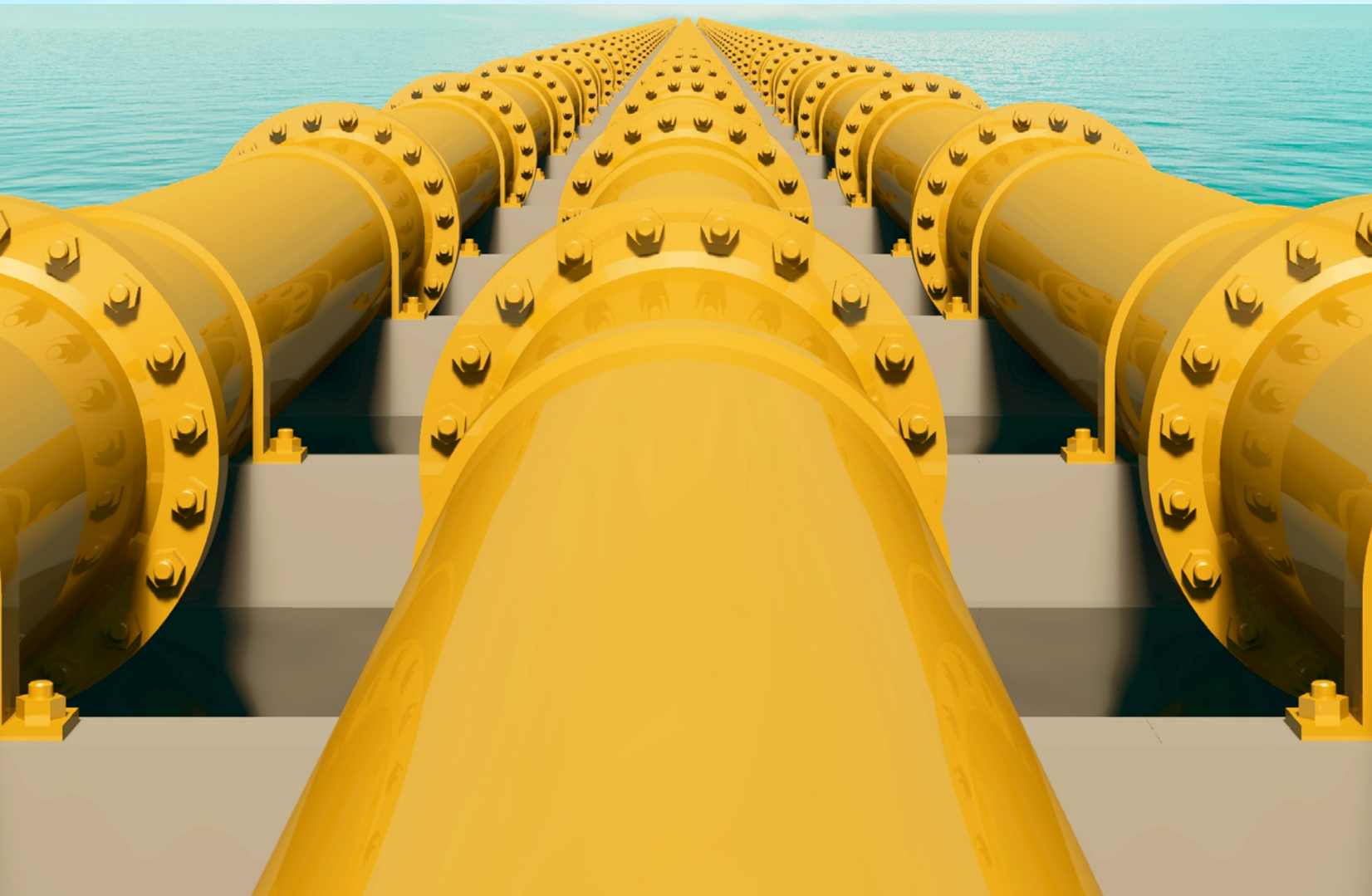
CLIMATE CHANCE

GLOBAL SYNTHESIS REPORT ON CLIMATE ACTION BY SECTOR

2022



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CLIMATE CHANCE

Since 2015, Climate Chance has been working to create a favourable environment to strengthen climate action and contribute to the attainment of the goals of the Paris Agreement. It is the only international organisation that aims to bring together all the non-state actors recognized by the United Nations Framework Convention on Climate Change (UNFCCC) – local authorities, companies, NGOs, trade unions, the scientific community, agricultural, youth, indigenous peoples' and women organisations – to develop common priorities and proposals and to strengthen stakeholder dynamics through networking within thematic coalitions, during the Climate Chance Summits and through the action portal.

THE OBSERVATORY AND THE SECTOR-BASED REPORT

In order to strengthen the action of non-state actors and give credibility to climate stabilisation scenarios, the Climate Chance Association launched in 2018 a Global Observatory of Non-State Climate Action, which aims to explain the evolution of greenhouse gas emissions, by crossing national public policies with sectoral dynamics, strategies of private actors, local public policies, and all the actions undertaken by non-state actors at the local level.

The Sector-based report is the flagship publication of the Observatory. It proposes a unique synthesis of the ongoing global trends in actions to explain the evolution of GHG emissions in the energy, transport, building, industry, waste, and land-use sectors.

THE CLIMATE CHANCE ASSOCIATION AND ITS OBSERVATORY ARE SUPPORTED BY

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How the coffee industry is dealing with climate change

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Coffee is the leading agricultural commodity on global markets in terms of value. All of the world's coffee producers are located in countries in the Global South, while nearly all of the processors and consumers are in the North, which puts the industry at the heart of the globalized economy: only 30% of the coffee volumes traded are consumed in the country they were produced in. The crop's vulnerability to climate change is therefore amplified by its likely impact on millions of small-scale farmers.

DATA OVERVIEW

Climate crisis, economic difficulties and rising demand: a hard-pressed coffee industry

Growing concentration of an expanding industry focused on export

The global production of coffee has grown 60% since the 1990s.[1] From 2000 and 2019 in particular, the production and consumption of coffee increased by an average 2% a year and forecasts based on demographic growth predict a doubling or tripling of demand by 2050,[2] depending on consumption patterns. Coffee is intensely traded on international markets: 70% of the world's production is exported, mostly from developing countries towards countries of the North. Fifty-six percent of global coffee consumption is concentrated in North America, Europe and Japan.[3] The increase in production since the 1990s is mainly driven by three countries,[4] with two different motors. In Brazil (+86%), the number one global producer, growth can be explained by the increased productivity of plantations,[5] while in Vietnam (+105%) and Ethiopia (+136%), the rise is due to an expansion of cultivated areas.[6,7] The high growth in production in these countries boosts their market share to the detriment of small producer countries. Thus, in 2018, the five biggest coffee producers took up 62% of market shares, compared to just 47% in 1995.[8]

The way that the industry is organized also generates inequalities. Coffee production is mainly the work of 25 million small producers that cover 80% of global production[9] but only marginally benefit from the profits created by actors upstream in the industry that are responsible for a large part of the value added in the chain, through coffee blends, different roasting methods, and symbolic attributes provided in bars and cafés.[10]

A series of shocks fuel already strong concerns about climate change

Despite this general upward production and consumption trend, in the short term, global economic and climate conditions and shocks create numerous variable factors in the supply and demand of coffee, reflected by a very volatile price. Following a strong downward trend since 2016, the price of coffee then doubled between 2020 and 2022, reaching 200 cents/pound after two years of successive shocks. In 2020, lockdowns all over the world saw a slump in consumption levels. Production was also perturbed by a lack of available labour and frozen international distribution channels.[11] In 2021, consumption took off again, but an exceptional drought and episodes of frost in Brazil saw global production take a dive: the price of coffee peaked. In 2022, consumption has dropped again in the wake of Russian and Ukrainian demand drops. The tension between supply and demand is easing slightly, but prices remain above 200 cents/pound.

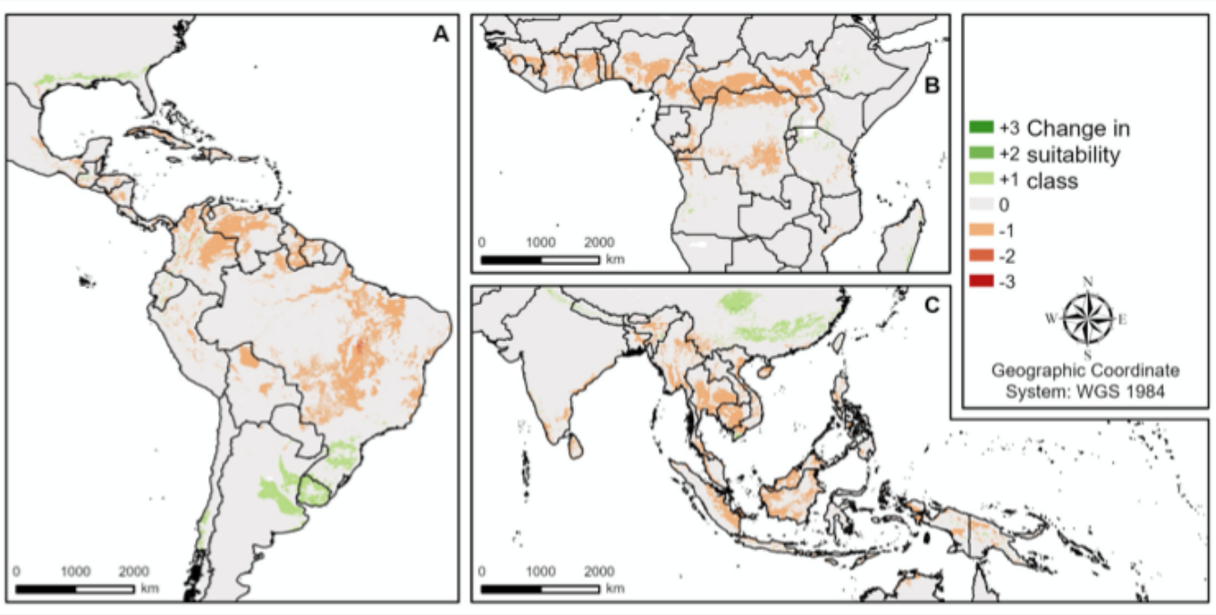
The medium-term effects of the Covid-19 crisis on coffee production are still unclear. Despite the price rise, which could encourage producers to invest, the economic difficulties facing small producers are reminiscent of the effects of the 2008 financial crisis. At that time, the drop in prices and the resources allocated to monitoring plantations led to the abandon of numerous plantations contaminated by a fungus causing coffee leaf rust, which then spread across the American continent from 2008 to 2013.[12] In 2022, the price of coffee is at its highest point but inflation is also pushing up the price of oil, and thus of fertilizers.

The industry's vulnerability to climate change is a cause for concern. Areas suitable for coffee crops could shrink by 50% by 2050 according to climate simulations.[13,14] Coffee plants only develop in specific climate zones: temperatures between 18 °C and 23 °C at altitudes between 1,000 and 2,000 m for arabica, which makes up 70% of global production; temperatures between 22 °C and 30 °C at altitudes below 800 m for robusta, although the optimal temperature was recently

FIGURE 1

CHANGE IN SUITABILITY OF LAND FOR GROWING COFFEE IN 2050 ACCORDING TO THE RCP 4.5 SCENARIO (INTERMEDIATE EMISSIONS)

Source: Grüter et al., 2021



reevaluated at around 20.5 °C.[15] Climate change brings five main risks for crops:[16,17] the shift of suitable areas to higher altitudes; an increase in water stress; temperatures too high for fruits to blossom and grow; the propagation of pests and diseases; and the increased vulnerability of small-scale producers.

Apprehensions not only concern plantations, but also the vulnerability of wild coffee plants, which are a reservoir of genetic diversity, since 60% of all wild coffee species are threatened by extinction due to climate change. In addition, deforestation and the proliferation of pathogenic attacks cause concern.[18,19]

The differing environmental footprints of coffee

The carbon footprint of coffee can be calculated using life cycle assessments (LCA), which add up the emissions at each stage of the coffee manufacturing process: manufacture of fertilizer from fossil gas, plantation, harvest, processing of coffee berries to produce green coffee, transport of coffee beans, and roasting. The scope of the analysis can be extended to include the commercialization stages with emissions related to packaging, distribution, manufacture and use of machines to prepare coffee right up to the consumer, the collecting and recycling of containers, and even emissions related to the company's operations. Despite standardized LCA methods, life cycle assessments evaluating the carbon footprint of a cup of coffee give very different results depending on the origin of the coffee, its cultivation, and transport. A global study of the carbon footprint of foodstuffs evaluated emissions related to coffee farming at 17 kgCO_2e/kg of green coffee.[20,21] But another study, focused on organic Costa Rican coffee consumed in Germany, gives a value of 5 kgCO_2e/kg of green coffee.[22] In Vietnam and Brazil, with conventional practices and exported production, the figures are reported as 16.04 and 14.61 kgCO_2/kg respectively, dropping to 3.64 and 3.37 kgCO_2/kg with sustainable practices, mostly thanks to transportation by cargo rather than air, which reduces the share of transportation in CO_2 emissions from 70% to 6% and 11% for Vietnam and Brazil respectively[23] and partly explains the variability between the different studies. When transport is left aside, as in a study on the local consumption of organic coffee in Thailand, the steps related to growing and harvesting represent up to 80% of total emissions.[24] With the cultivation stages being so important, conventional practices emit less than organic practices because they have a greater yield per surface unit.

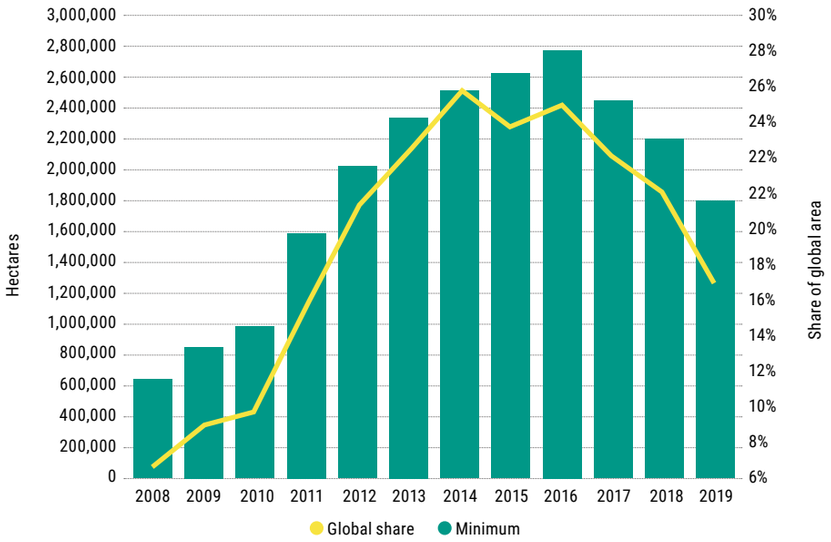
Drop in certification

Voluntary certification is one way of trying to respond to this concern. A reported 1.8 to 3.8 million hectares of cultivation are covered by one of the five voluntary standards available for coffee, which is between 16% and 34% of the global surface area of coffee crops.[25] Despite increasing demand from importing countries, and an initial rise in certifications of 78% from 2011 and 2016, coffee certification has in fact generally dropped since the mid-2010s: -31.5% between 2015 and 2019.[26,27] This contrasts with other certified raw materials following an upward trend, especially cotton and palm oil. The changing share of certified coffee is due to the investment difficulties faced by small-scale producers, at a time when production costs are rising, supply chains are disturbed, and demand is too low for these products that are sometimes sold without their label.[28] In fact, only 52% and 57% of the coffee production certified by the labels Rainforest Alliance and UTZ respectively is sold as such.

FIGURE 2

EVOLUTION OF THE SURFACE AREA OF COFFEE CROPS WITH A VOLUNTARY CERTIFICATION STANDARD

Source: ITC, 2021



THE OBSERVATORY'S LENS

The product life cycle as the primary lever of action for companies

For several years, stakeholders in the industry, from small-scale entrepreneurs to major distribution companies, have been trying to reduce the CO_2 emissions related to their activities and to coffee consumption in the Global North. Each company aims at one or more different stages of the product lifecycle.

At production level, generic tools directly target coffee growers. One example is "Cool Farm", a digital tool developed by a consortium of companies involved at all levels of the agribusiness industry. One of the objectives of Cool Farm is to put producers at the heart of action to combat climate change. In 2022, a pilot project distributed Cool Farm to organic coffee farms. Farmers use the application to input their yield, surface area, consumption of fertilizer, and energy consumption, and after several minutes receive an estimation of their carbon footprint with keys to understand the environmental implications of their practices. During this pilot project, 250 volunteer farmers will share their data and $200,000 of carbon bonuses will be distributed to those who demonstrate, using Cool Farm, the carbon sequestration in their farm.

Intercontinental distances between producers and consumers make transport a key process in CO_2 emissions linked to coffee. The Grain de Sail company, established in 2010, works to reduce the level of carbon emitted by international transportation of agricultural commodities. Four years of research and development resulted in the manufacture of an innovative cargo-carrying sailboat that complies with international expedition standards certified by independent experts (Bureau Veritas and the Marine Safety Centre). The boat can transport goods with a load capacity of 50 tonnes in a refrigerated hold using green energy. Thus, high-quality organic coffee is transported in a cargo-carrying sailboat to be roasted using high-end methods in an enterprise centred on the professional integration of people with disabilities.

Downstream in the value chain, one capsule market actor stands out for its efforts to tackle emissions relating to the final preparation of coffee by the consumer, by looking at the way that its coffee machines are made. French coffee roaster Malongo launched its ethical coffee machine, Eoh, in 2021, comprising 60% French-made parts and assembled in the Vendée region. The machine operates using pods made from unbleached paper and is guaranteed over a period of five years – compared to a legal obligation of two years.

Nespresso is a market leader in the coffee capsule segment and keeps a close watch on the entire life cycle of its coffee. According to the LCA carried out for Nespresso in 2020, 49% of emissions from a cup of coffee are generated during the coffee-growing stages, mainly as a result of fertilization (14%) and deforestation (13%).[29] In 2014, Nespresso invested €600 M in developing "The Positive Cup" plan, which aims to make its permanent "Grands Crus" range from 100% sustainable sources, increase capacities to collect aluminium capsules,

and only sell "carbon-neutral"[a] capsules from 2022 on five of its markets (USA, France, Austria, Australia, New Zealand) covering 41% of Nespresso's carbon footprint in the world.[30] The final report on the plan[31] describes the progress made. Concerning coffee-growing, 93% of the coffee purchased by Nespresso in 2021 respects the rules of its own AAA sustainable quality program, compared to 84% in 2014; 48% is certified by the Fairtrade or Rainforest Alliance labels compared to 39% in 2014. Since 2014, over five million trees have been planted, agroforestry being one of the pillars of the AAA program, which also supports the UN Sustainable Development Goals (SDGs). The recycling rate of capsules was 32% in 2020. The target of 100% "ASI" certified virgin aluminium in capsules has nevertheless been postponed and redirected towards targets to integrate recycled aluminium.

The plan implemented to reach "carbon neutrality" for capsules centres on six types of mitigation and compensation action: regeneration of parcels cultivated at each cycle to avoid deforestation, eco-design of coffee capsules and packaging using recycled and/or recyclable materials, the use of renewable energy sources for factories and stores, recycling of collected used capsules and coffee grounds, optimization of distribution logistics, and planting of trees and reforestation in and around coffee plantations. In 2021, the remaining emissions that Nespresso must compensate through the funding of certified carbon projects on voluntary markets to reach carbon neutrality in the five targeted markets amount to 506,760 tCO_2e/year. The amount of offsets required is therefore high and is likely to remain so, with an objective to reduce emissions by 20% from 2018 to 2025 established in its commitment to carbon neutrality. Nespresso's compliance with its carbon footprint and carbon neutrality objectives is assessed by a third party, the Carbon Trust Assurance, based on ISO 14067 standards (carbon footprint of products) and PAS 2060 (carbon neutrality),[b] which leave large room to carbon offsets.

Therefore, despite considerable efforts, the share of Nespresso activity covered by these commitments, in other words the production and distribution of capsules commercialized by Nespresso on five of its markets, only represents 41% of the company's overall emissions, and with a high dependence on carbon offsets.

In Costa Rica, the coffee produced by the Coopedota company has been certified as carbon neutral since 2011, also by the PAS 2060 institute. Certification was obtained after the cooperative changed its techniques, including a move to use biomass residue to produce energy, either by producing ethanol from waste to create fuel, or by burning plant waste in an electricity-producing unit, or using their own compost as fertilizer. From 2007 to 2009, Coopedota reduced its emissions from 3,889 tCO_2e to 938 tCO_2e, which is a 75% decrease.

Deforestation casts a shadow over the industry's climate footprint and worries consumers

As coffee demand continues to rise by 2% a year, climate change is threatening coffee yields. Concerns are emerging on the risk of deforestation already observed in some countries. In Vietnam, for example, production went from 19,400 tonnes a year in 1980 to 1.76 million tonnes in 2016. Although the boom can be partly explained by increased yields, currently 3.5 tonnes per hectare (compared to 0.8 tonnes in Thailand, for example), it is mostly the expansion of cultivated areas that has turned the country into the world's number two coffee producer. The production surface shot up from 50,000 hectares in 1986 to over 1.4 hectares in 2015, and continues its upward trend, with the coffee crop surface increasing by another 21% from 2010 to 2018. The Forest Trends report estimates that in 2019, deforestation to make way for coffee crops in Vietnam generated a million tonnes of CO_2 emissions.[32,33]

Action to combat deforestation in the coffee industry is organized at several levels. At institutional level, regulations are becoming stricter. In Europe, in September 2022, the European Parliament amended the proposal by the European Commission aimed at obliging private companies to ensure that agricultural products sold in the European Union, including coffee, do not come from deforested land after 31 December 2019.[34]

At company level, consortiums have been created. The "Sustainable Coffee Challenge", launched in 2015 at the initiative of Starbucks and the NGO Conservation International, now gathers 164 partners involved in the industry. Of these partners, 105 have signed 166 commitments on their actions to ensure the sustainability of the sector, including 33% roasters, 21% retailers, 19% investors, and 17% NGOs.[35] Sustainable Coffee Challenge encourages its partners to align their commitments with the UN SDGs. As a result, 50% of commitments are aligned with SDG 12 "responsible consumption and production", 39% with SDG 8 "decent work and economic growth", 31% with SDG 2 "zero hunger", 35% with SDG 13 "climate action", and 32% with SDG 15 "life on land". However, the 2021 report on partner commitments observed that only 10% of commitments made for 2020 had been met, and the 2022 report[36] esteems that only 36% of partners report on their progress after signing the commitment.

The large number of small-scale coffee farmers makes monitoring and verification of deforestation complex. Digital tools are now therefore widely used by governments, NGOs, companies and certifying bodies to evaluate the risks of deforestation. One example is GRAS (Global Risk Assessment Services).[c] Financed by the German Ministry of Food and Agriculture and developed by a multidisciplinary team comprising, among others, a consultancy firm on the use of

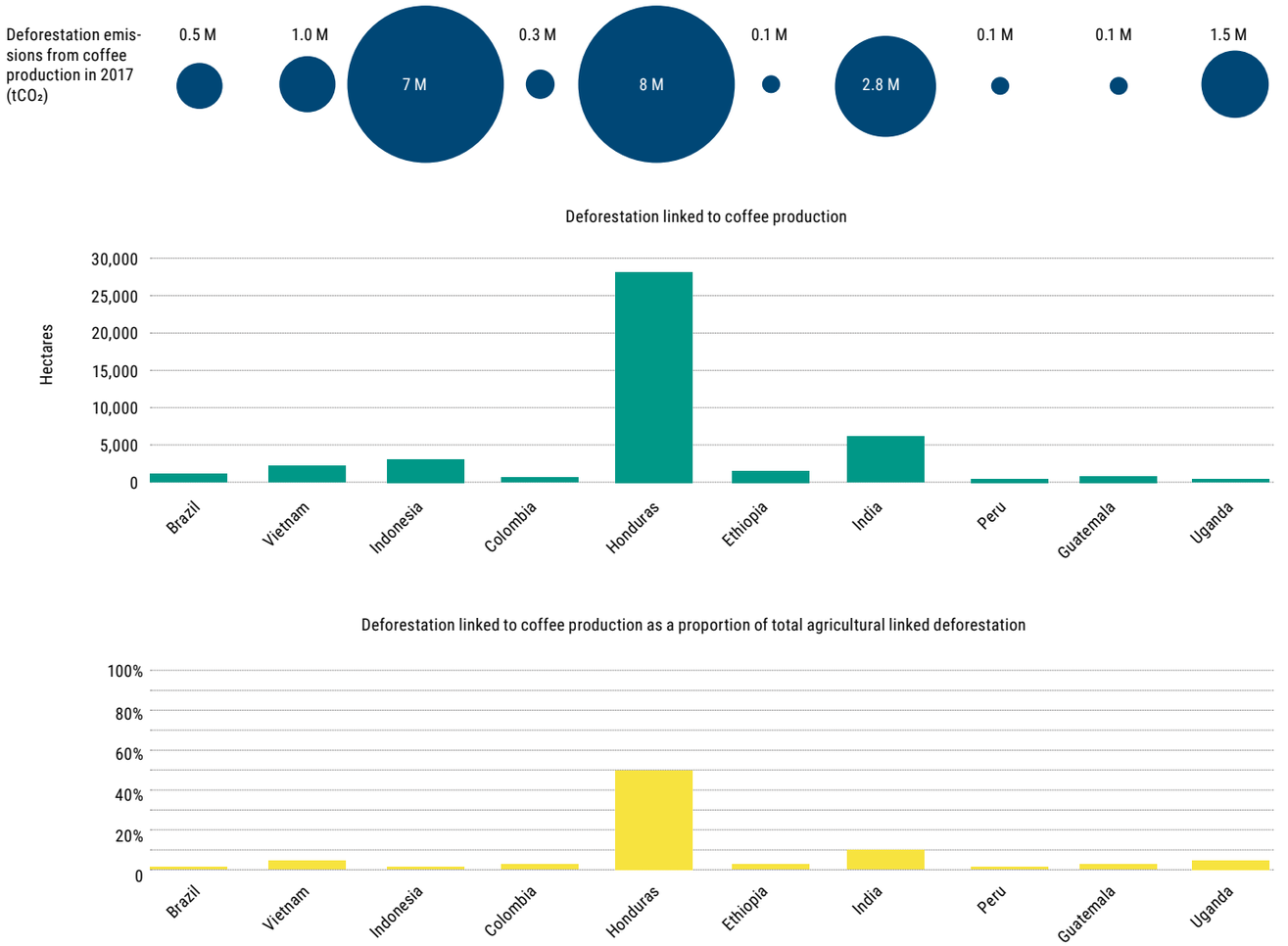
a The application of the concept of carbon neutrality at the scale of a product is controversial. To find out more, see *The Net Zero Target: The Voluntary Carbon Market Enters a New Dimension* in Global Observatory on Non-state Climate Action (2022). Global Synthesis Report on Climate Action by Sector. *Climate Chance*

b *Idem*. For more information on PAS 2060, see *The Net Zero Target: The Voluntary Carbon Market Enters a New Dimension* in Global Observatory on Non-state Climate Action (2022). Global Synthesis Report on Climate Action by Sector. *Climate Chance*

c https://www.gras-system.org/

FIGURE 3

LOSS OF FOREST SURFACE AND CO_2 EMISSIONS RELATED TO DEFORESTATION FOR COFFEE PRODUCTION IN THE TOP TEN PRODUCING COUNTRIES - *Source: Treanor, N.B., Saunders, J., 2021*



natural resources, a certifying body, and an aerospace research centre, GRAS employs high-resolution satellite images and data on forest areas, protected zones, and the timeline of past deforestations, to estimate the risk of deforestation for each plantation. The 4C coffee certification scheme uses this mapping tool to carry out its audits.

The fight against deforestation is also driven by consumer pressure in high-income countries, where the market for certified sustainable coffee is growing as citizens become more aware of the climate crisis. In response to this demand, roasters and retailers are undertaking different types of action. The French roaster Malongo has been committed to a sustainable approach since the 1990s. In 2022, 65% of the volume of coffee imported by Malongo is certified Max Havelaar, and 28% is certified AB (*Agriculture Biologique*). To make coffee more traceable for consumers, Malongo now includes a QR code on all of its coffee tins to inform consumers on the supplier villages, the timeline of the coffee's journey through different ports, the dates of control and roasting, and the means of preparation.[37,38] Along with roasters, some retail giants are making commitments on coffee featuring their own brands. In Europe this is the case for example for Aldi, Lidl and Sainsbury's, which only obtain their supplies from coffee certified UTZ, Fairtrade, Fairtrade USA or Rainforest Alliance. In 2022, 53% of everyday coffee sold by Aldi is certified to be sustainable, and 100% of its Simply Nature brand.[39] Retailer commitments also involve funding projects close to producers, such as the "Guatemala project" launched by Lidl in 2018. Given that women in Guatemala have less access to funding, land, and technology than men, and only 70% of women can read and write, the "Guatemala project" aims at both environmental and social issues. Its action involves supporting 92 small farms managed by women in order to help them increase their productivity and their resilience to climate change thanks to climate plans, training and technical assistance to adapt cultural practices and the introduction of new varieties, along with support to develop skills in business, management and gender issues to make women more independent.[40]

Adapting varieties and practices: intensive farming versus agroecology

Although 214 varieties of coffee plants are known today, global production turns around only two: arabica with 56% of global production, and robusta, with 43%. Arabica has a low tolerance for temperature increases and is very sensitive to coffee leaf rust, making it more vulnerable to climate change. Robusta is more resilient and resists high temperatures and leaf rust, but it has an inferior taste.

The first way of adapting coffee growing while maintaining the varieties currently cultivated involves changing practices. Coffee can in fact be grown in direct sunlight or in agroforestry, with trees planted between the coffee shrubs to give them shade. Developing crops using agroforestry currently appears to be a useful practice for adaptation and mitigation because it is a way of reducing the temperature for coffee plants by protecting them from the sun's rays while increasing carbon sequestration in land parcels.[41] The carbon stored in agroforestry parcels could be three to four times greater than in monocultures.[42,43]

A second option involves working with the genetic diversity of coffee plants to look for other varieties adapted to future climate conditions and resistant to diseases and pathogens while maintaining the quality of the coffee berries. The difficulty of this strategy is the near-extinction of wild coffee varieties. A study in 2019 estimated that 60% of coffee varieties were threatened.[44] Ethiopia and Sudan are the only two countries in which arabica grows in the wild. On the other side of the continent, in Sierra Leone, researchers working with historic specimens conserved by the Royal botanic gardens (United Kingdom) have located a planting of Coffea Stenophylla, a formerly cultivated variety that had not been observed in the wild since the 1950s.[45] The interest of this variety is that it resists temperatures 6 °C higher than arabica and 2 °C higher than robusta, and tolerates periods of drought. In addition, tasting tests carried out in a sensory analysis laboratory by a panel of experts judged that it had similar qualities to arabica.[46] Agronomic tests are being launched in Sierra Leone and on Réunion Island.[47]

Another approach is based on genetic selections from among the same variety and involves collaborations between genetic researchers, agronomists and farmers. The Breed CAFS research project, which received EU funding of €6 M, gathered researchers and farmers to select coffee varieties that are both resistant to health and climate risks and taste good in order to maintain farming revenues. Researchers have developed hybrid F1 varieties (first generation) of arabica by crossing American varieties with wild accessions originating from Ethiopia. These hybrids, which were selected for their good capacity for adapting to shade while maintaining high productivity, were tested in Vietnam, Cameroon, Nicaragua and Costa Rica. In Vietnam, for example, 40,000 seedlings were distributed to twelve farmers, planted in parallel with the Catimor arabica variety used as a control. The farmers then cultivated the hybrid plants in their farms located at different altitudes, using shading trees and sometimes interweaving annual crops in between the coffee shrubs. The Vietnam Academy of Agricultural Sciences and the Agricultural Genetics Institute then monitored the growth and health of the young plants up to the first harvest, which was then evaluated for its quantity and taste properties.[48] In the four countries where the experiment was carried out, the productivity gains ranged from 10% to 20% and the resistance to disease led to a 15% to 20% drop in the use of pesticides. The experiment has therefore been extended and a process to accredit new varieties is under way.

Cooperatives get together to boost the industry's socio-ecological resilience

Cooperatives constitute resilient organizations to tackle climate change and economic crises. Thanks to cooperatives, producers can access training on agricultural practices adapted to climate change and pool their processing and distribution services, thus increasing their profits and so boosting their investments.

Uganda features more than 1.5 million coffee producers and cultivates both varieties of coffee: robusta in the central plains, and arabica in the eastern highlands. The country also has the second youngest population in the world, with 78% of inhabitants aged under 30. Farms differ on a number of criteria – altitude, the surface area allocated to crops, the type of crops combined with coffee shrubs, the household members working outside the plantation, and the presence of livestock or not. A recent study explored the connections between the characteristics of a farm, the perception of climate risks, and the adoption of adaptation strategies.[49] The researcher showed that the adoption of adaptation practices differs depending on the level of education of the head of the family, the size of the farm, the share of dependent household members (children or old people), and the share of banana trees and coffee plants on the cultivated surface. In fact, a high level of education results in heads of family implementing more complex strategies that take into account the economic results of the farm, but that are further removed from indigenous practices. A small farm size and a high number of dependent household members weigh heavily on possibilities for investment, whereas a high share of banana and coffee trees, which are commercial crops, increases investment capacities. The gender of the head of the family also has an influence. The solutions chosen by women tend to be directed towards providing food by increasing the size of animal rearing or subsistence crops on fragile soil, while men are more likely to make structural changes, extend the surface rented, or change the varieties cultivated, with no direct relation to providing food for the household.

Faced with this diagnosis, cooperative groups make great sense and are often put forward as prerequisites to adaption action. For example, International Coffee Partners (ICP), which has an objective to support and develop the potential of small producers around the world, works with twelve cooperatives in Uganda to help each of them develop an action plan to adapt to climate change in line with their own characteristics.[50] A central component of this project is training farmers to use resourceful agricultural practices for the climate with

the aim of developing more resilient crops. Raising awareness about gender issues is also a key part of the action proposed in order to increase the number and influence of women in managing cooperatives. The current project includes 41% women on training courses and in activities organized by the projects, which concern 50,000 households.

In Rwanda, a collective of 3,000 women has gone further still by gathering female coffee farmers from six cooperatives to launch their own products under the brand *Angelique's Finest*, established in 2018 and now distributed in over 800 stores in Germany.[51] Thanks to taking charge of the entire value chain, from growing to distributing, the women have seen their profits increase by 55% compared to only selling green beans. For these women, selling their own coffee means having their own income and so financial independence. Support for this initiative from Fairtrade International is part of a goal to reduce gender inequalities in the coffee industry, where women only represent 15% of the 656 certified farmers.

KEY TAKEAWAYS

One of the most commercialized agricultural commodities in the world, coffee is facing a profound shift in its growing and consumption conditions due to climate change. Coffee production is concentrated among a handful of developing countries, and depends on very specific climate conditions. For this reason, changes in the aptitude of land to grow coffee crops is threatening the genetic diversity of species, increasing the vulnerability of plants, and exposing small farmers to revenue losses.

For producers, the industry's adaptation is taking place in two stages. One of them involves the transformation of farming practices via the development of agroecology, the selection of species, and the hybridization of varieties, all aimed at adapting coffee crops to a changing climate. The other involves the socio-economic reorganization of production units, designed to protect the farming communities that feed into and live from coffee production from the risks related to climate change. These cooperatives are a good way of pooling knowledge, disseminating practices, and boosting the resilience of producers.

In countries in the North, consumer pressure is pushing retail and producer companies to better control their impact on deforestation and its consequences for biodiversity and greenhouse gas emissions. Multilateral initiatives organize companies' implementation of their commitments to reduce emissions and deforestation. Major industry players are adopting life cycle assessment approaches to measure and trace the impact of their products throughout the industry; nevertheless, the volumes of certified coffee have been on a downward trend since the mid-2010s, due to the increase in investment costs and insufficient promotion of labelled products.

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SIGNALS

A ROUND-UP OF THE INITIATIVES, REGULATION CHANGES, AND MARKET TRANSFORMATIONS OF TODAY THAT SIGNAL THE CLIMATE ACTION TRENDS OF TOMORROW

Urban Planning • Greening the American Rust Belt

Cities forming the "Rust Belt" (a region in the United States that has been undergoing an industrial decline in the last half century) have been sitting on resources like abandoned neighbourhoods or factories for years. A few years ago, cities like Gary, Detroit and Buffalo, started working to put these sites to alternate uses – creating urban forests, farms, stormwater management lots and other green spaces. The movement, along with reducing urban temperatures and sequestering carbon emissions (by up to 14,000 tCO_2 over 15 years, as in the case of a tree-planting project in Gary and six other Rust Belt cities), also contributed to the economic revival of the cities, beginning with an increase in property values, as observed in the case of Detroit. With the ongoing economic inflation, as bigger cities become unaffordable, the Rust Belt is seeing a rebirth, with people moving into these cities, citing access to green spaces as a motivating factor.

Finance • France's pioneer thematic investment fund for the timber industry

With the RE2020 regulation set to encourage the use of timber in construction, IDIA Capital Investissement (Crédit Agricole) and the forestry investor network Forinvest have created the *Fonds Développement Filière Bois* (FDFB), the first French investment fund in the timber sector. A thematic fund selects its assets on the basis of a societal theme (e.g., global warming mitigation, water management, mobility, ageing, etc.), which can cover several sectors of activity, categories of companies and geographies. Between 2019 and 2021, assets under management in thematic funds tripled $806 bn worldwide, mostly in Europe (55%) and the US (21%), with a focus on water, security and robotics. With a hoped-for fundraising of €40 M, the FDFB will invest €0.5-5 M in minority stakes in projects across the entire sector: primary and secondary processing, construction, wood energy, wood chemistry, etc.

Spain • A land dispute over Europe's largest PV solar power plant

Two years after its commissioning in April 2022, the High Court of Justice of the Spanish region of Extremadura has ordered Iberdrola to close down 60% of the Nuñez de Balboa solar power plant, near the Portuguese border. With a capacity of 500 MWp installed on more than 1,000 ha, it is the largest photovoltaic plant in Europe. Its annual production of 832 GWh is expected to provide electricity to 250,000 inhabitants and avoid the emission of 215 $MtCO_2$/year. The court decision ruled that 525 ha of land were illegally expropriated for the plant. Natura Manager, which had a 25-year lease on the land, did not challenge the project: but the ruling states that Iberdrola did not follow the legal procedures for expropriation. The EU's RePowerEU plan aims to ease the procedures for installing solar and wind power to speed up the continent's energy transition.

PV Magazine, 20/06/2022

Indigenous peoples • Onondaga Nation recovers ownership and management of over 1,000 hectares of its ancestral lands

1,023 hectares of land will be returned to the Onondaga Nation, according to a June 29 2022 decision by the State of New York and the Department of the Interior. The land is located in the Tully Valley, a biodiversity hotspot rich in forests, wetlands and protected species such as brook trout, bald eagles and great blue herons. The Department of the Interior and NY State had previously assessed the damage to Onondaga Lake caused by Honeywell in a 2018 decree at $26 million. The transfer of title to the valley, held by the company, is one of 18 restoration projects included in the 2018 agreement. The "Landback" movement, officially launched on October 12, 2020, has thus achieved a major victory with this previously unmatched portion of ancestral land returned to an indigenous people. *Grist, 05/07/2022*

New Zealand • A tax on emissions from burping cows and sheep

New Zealand counts more than double the number of cattle, and five times the number of sheep than of people, and has about half its total greenhouse gas emission come from the agricultural sector. As per a recent plan drafted by representatives from the government and the farm community, farmers will have to pay a price for emissions from livestock. The scheme proposes incentives to farmers to reduce emissions of methane from their belching livestock through feed additives, while also allowing for on-farm forestry as a means to offset emissions. The revenue from the scheme is to be invested in research and development, and advisory services for farmers. This proposal, if accepted, will be the biggest regulatory disruption in the agriculture sector in the country, since the removal of subsidies in the 1980's.

Reuters, 08/06/2022

Carbon markets • AgriCarbon, a carbon credit programme for the transition of South African agriculture

In South Africa, livestock farming is one of the largest sources of greenhouse gas emissions. To help decarbonise the sector, the carbon offset operator Climate Neutral Group (CNG) has launched AgriCarbon, a programme to certify emission reductions from the agricultural sector. Forty dairy farms are participating in the project, committed for example to reducing their inputs of nitrogen fertiliser, which generates nitrous oxide (N_2O). More than 18,000 ha have been audited since the programme was launched, and 230,000 tCO_2 of carbon credits will be issued on the voluntary market this year, at a price of \$15-25/tCO_2e – well above the global market average (3.37\$/t). This initiative illustrates the growing interest in nature-based solutions, and in particular "carbon farming", which aims to value mitigation actions in the agricultural sector. In France, the France Carbon Agri Association engages 302 farmers to reduce their emissions, for a potential reduction of 138,800 tCO_2, while the European Commission is seeking to develop the potential of carbon farming in the EU.

Reuters, 06/04/2022

Agriculture • Adapting to climate change through a network of community seed banks in Nepal

Community seed banks in Nepal date back to 1994, initially being established with the aim conserving local species of crops, under the pilotage of local NGOs. As the practice grew in success, attracting more funding, it has also fulfilled more functions – including community and women empowerment, food security, and most recently, climate change adaptation. As the seed banks have coalesced into a national network (with the government recognising 53 seed banks in operation), increasingly larger numbers of farmers are resorting to them. Native species of crops, including staples like rice, have proven to be more resistant to local conditions, and the increased occurrence of extreme weather. While larger seed banks exists throughout the world, their importance highlighted in light of the Russia-Ukraine crisis, the strongest community-led trends appear to be in Asia, Latin America and Africa.

Mongabay, 14/07/2022

Wood fuel • A new EU amendment aims to exclude wood fuel from the list of renewable energy resources

If the new amendment tabled by Nils Torvalds is confirmed by a vote in the European Parliament in September, governments will no longer be able to grant subsidies for producing electricity from biomass from forests from 31 December, 2026. Wood fuel is the largest source of primary renewable energy production in Europe. However, for the same mass, it generates two to three times more CO_2 than burning fossil fuels. The deforestation caused also affects the carbon sink capacity of forests. This is particularly true of primary forests, which are the guardians of a larger carbon stock than other forests and of unique biodiversity resources. This is the message of an open letter by 500 scientists published in March 2021, which states that if wood fuel were to be increased to 2% of the world's energy mix, forest harvesting would have to be doubled. However, another group of environmentalists regretted that secondary biomass (sawdust, black liquor and wood waste) was not taken into account in the amendment. As for the bioenergy lobbies, they defended its importance as a means of freeing themselves from Russian gas.

Euractiv, 20/05/2022

CASE STUDIES

REGION CASE STUDY

COUNTRY	STATE	POPULATION	REDUCTION TARGET	NATIONAL EMISSIONS IN 2018
TANZANIA	MANYARA	59,734,213	-35% GHGS IN 2030 (BASE BAU)	11.58 MT

Yaeda valley • By protecting their land and wildlife, local populations obtain income through the carbon compensation mechanism

In the United Republic of Tanzania, a forest management policy is being developed involving local communities. This is the Yaeda valley project, which involves the Hadza community and contributes to achieving 12 of the 17 Sustainable Development Goals (SDGs) through a carbon offset scheme.

NGOs at the origin of an initiative to restore land rights to the Hadza

One of the last hunter-gatherer tribes in the Yaeda valley, the Hadza people have lived in Tanzania for about 40,000 years. Their very ancient way of life depends on forests which provide them with everything they need: seeds, fruits, meat, water, and pasture for livestock. Over the last century, their land was reduced by three quarters largely due to the influx of immigrant farmers who illegally converted forests into farmland. This change in land use threatens the existence of the Hadza, their traditional way of life, and the biodiversity of the Yaeda valley. Faced with this problem, in 2011, the NGO UCRT started to help the Hadza people protect their land by acquiring titles to at least 32,000 hectares. The Yaeda-Elyazi project sprang from this initiative.

The project was first developed in 2011 by Carbon Tanzania and UCRT in partnership with Hadza hunter-gatherer communities under the REDD+ label, a scheme for reducing emissions from deforestation and forest decline.

Protecting forests from poachers and encroaching agriculture

In its initial phase, the project covered 32,000 ha of ancestral Hadza forests. As of 2019, it covers 110,500 ha of forests belonging to the Hadza and Datooga peoples. Concretely, during the first phase of the project, the land use plans were worked out as required by the Tanzanian government (as a condition for obtaining the title), by zoning farm areas, housing, pastures, merged areas, cattle pens, water catchments, hunting grounds, and the setting aside of some land for nature.

During the second phase, members of the Hadza communities were trained as scouts to patrol and collect data. They also reported any changes in land use, such as invasive and illegal farming and poaching activities. Starting from 20 scouts initially, it now employs 57 people trained as patrollers in forest protection, the monitoring of wildlife, and the use of smartphones for mapping. Today, patrols protect 37 large mammal species, including the endangered elephant, the wild dog, the lion and the leopard, and 255 species of birds, including the endangered lappet-faced vulture and two endemic bird species, according to a scientific study conducted in 2019. The project has also maintained and revived the hunting traditions of the Hadza people.

An example of successful carbon offsetting

Each year, the project prevents the felling of 171,100 trees and the emission of 177,284 tCO_2e. These avoided emissions are quantified, certified as carbon credits, and then sold on the voluntary carbon market. After expansion of the project, at least 60% of the revenue from the sale of credits was given directly to the communities. The remainder covers the project follow-up and overheads. According to estimates, the project in its current phase is expected to return $450,000 per year to the local population. At present, the compensation company MyClimate is the main buyer of project credits.

Social and economic benefits for Indigenous communities

Until recently, the Hadza were marginalised in Tanzania. Revenues from the project made it possible to provide basic services to the 61,000 members of the community: health care, children's education, food security, and straightforward, sustainable jobs as community guards. For example, the project has bolstered their legal rights to their land and natural resources. The monthly payments to the community stimulate forest monitoring and protection. The project is helping to reduce gender inequalities: the women are employed as project leaders and are encouraged to participate in community meetings and to give their opinion on the management of the revenues. These revenues are used to ensure the primary and secondary education of more than 20 children and to finance the introduction of outreach clinics once per semester in the region.

REGION CASE STUDY

COUNTRY	STATE	POPULATION	NATIONAL MITIGATION TARGET	STATE EMISSIONS IN 2013
INDIA	WEST BENGAL	101,600,000 (2022)	-33 TO -35% IN EMISSIONS INTENSITY OF GDP BY 2030 (BASELINE 2005)	171,7 $MTCO_2e$

Sundarbans • Banking on mangroves for land, life and livelihood

The Sundarbans are archipelago of islands at the mouth of the Ganges, in eastern India and Bangladesh, and the world's largest estuarine mangrove ecosystem. In the face of increasingly frequent and devastating flooding and storm surges, local communities in the state of West Bengal, in India, have taken the lead in afforesting embankments with mangroves, enabled by a local NGO, the Nature Environment and Wildlife Society (NEWS), channelling funding from the private sector and international non-profits. Along with its immense carbon sequestration potential, these mangroves are also home to the Bengal tiger, and species of rare snakes, fish, and crustaceans – all of which have benefitted from the afforestation programme.

Adaptation through afforestation

The Sundarbans delta has already experienced the impacts of global warming, having lost more than 28% of its habitat, and nearly 4% of island surface area due to rising sea levels in the last century. While higher salinity in the water has affected fish populations and local agriculture, cyclones like Aila in 2009 have also caused significant damage to villages and settlements.

In this context, local communities have taken to planting more mangroves along the embankments protecting the land, with the project headed by NEWS, launched in 2011, having planted more than 16 million mangroves. Since then, 5,200 ha of mangroves have been restored, through rigorous planting drives every monsoon season. The mangrove forest has proven to protect the embankments, and subsequently, the settlements and habitats it hosts, against storm damage by reducing the height and velocity of waves. In 2020, when the Amphan cyclone hit the region, the restored mangroves played an important role in acting as bio-shields.

Climate and biodiversity benefits

One of the most significant outcomes of the mangrove restoration is the sequestration of carbon – blue carbon ecosystems (blue carbon referring to carbon that is stored in marine or ocean environments) are some of the most effective natural carbon sinks. The NEWS project in the Sundarbans, over a span of 20 years, is set to sequester 700,000 tonnes of CO_2. The project issues carbon credits to the private institutions financing it (such as Danone, Schneider Electric, Crédit Agricole and others, through the Livelihoods Carbon Fund), a model that has helped NEWS scale up the project and replicate it across more villages in the delta. Funding is also channelled from the domestic private sector, and from national and international non-profit organisations and initiatives.

The project has also contributed to a restoration of local biodiversity. The Sundarbans are the sole habitat of the Bengal tiger, the Ganges River dolphin, the Irrawaddy dolphin, the Indian Python, the Estuarine crocodile, and over 260 species of birds. The mangrove restoration has helped fish, bird, shrimp, crabs and other species to return, and have also contributed to livelihoods, through for example, the culture and local trade of shrimp and crabs.

Improving livelihoods

The project also has economic inclusion at its heart, and a goal to empower the local community, especially women – who have been the stewards of the project, right from making hand-drawn maps of the areas covered, working in the nurseries, and planting the mangroves, to surveying and protecting them. Their participation allows them to earn about $430 a year, a valuable addition to the household budgets.

In exchange for their work, NEWS also helped the local communities by launching a brand, Badabon Harvest (*Badabon* being the Bengali word for mangrove), accelerated by the start-up GRINS, to facilitate the access to the market in Kolkata to sell organically cultivated food. This permitted improved revenues, and the implementation of more sustainable methods of livestock breeding, agriculture, pisciculture, apiculture, and so on.

CITY CASE STUDY

COUNTRY	VILLE	POPULATION	GOAL	NATIONAL UNDERNUTRITION RATE	NATIONAL OBESITY RATE
SOUTH AFRICA	DURBAN - MUNICIPALITY OF ETHEKWINI	3,442,361 (2011)	INCREASE THE AMOUNT OF FOOD PRODUCED LOCALLY BY 50% BY 2030	45.6% (2013)	35.2% (2017)

Durban • Agroecology to fight against food inequalities

Since 1975, global obesity has almost tripled: 1.9 billion adults were overweight in 2015, and of these, 650 million were obese. In the same year, 340 million children and adolescents from five to 19 years of age became overweight or obese. Yet, the "Zero Hunger" SDG 2 solely focusses on the food deficit component, and does not mention in its targets the quality of nutrition or overconsumption. Globally, there are now more deaths from excess weight and obesity than from insufficient weight: this is called the double nutritional load. In this respect, South Africa is in a paradoxical situation, with half of the country's population suffering from malnutrition while there is an increase in problems related to being overweight.

Inequalities in access to food are the primary cause of this health scourge. Young people and women are particularly affected: 70% of women are overweight and 42% are obese. Low-income households tend to turn to junk food, which is widely accessible, more affordable, and a source of instant gratification.

The Municipality of eThekwini: public action in the service of small-scale farmers

The municipality of eThekwini (Kwazulu-Natal province), one of the eight metropolitan municipalities that make up South Africa, participates in the AgriHubs project initiative. While 55% of the eThekwini territory is made up of rural areas, the majority of the population is concentrated in urban centres. The Zulu population, in particular, (77.8 % of the population of Kwazulu-Natal) is concentrated in urban ghettos, a lingering legacy of Apartheid. Aware of the links between unemployment, food insecurity among young people, and the increase in obesity, the municipality supports the introduction of new farmers to land belonging to the metropolitan municipality and is developing a cross-cutting approach to meet SDGs 10 "reduced inequality", 13 "the fight against climate change" and 15 "life on earth". In 2020, 426 new farms were created in the territory.

In order to train these farmers and facilitate their access to the market, seven AgriHubs or "agrotechnological platforms" have been set up around the city. These multifunction sites offer training in agroecology (schooling farms) as well as shared tools and logistics. New farmers can thus develop their skills in order to increase their production while reducing their costs, thanks to donations of seeds, inputs, compost, or even fences. Spread throughout the territory, the AgriHubs make it possible to gather and store the farming products, which are then purchased by the municipality in order to supply the 589 small school refectories and soup kitchens in the territory, or be directly sold on wholesale markets. Supplying the schools with fresh fruits and vegetables contributes to curbing weight problems among the youngest. 400,000 healthy meals are in this way distributed to the city's children every day. Agroecology also reduces emissions related to agriculture, the second largest emitter of GHGs in South Africa.

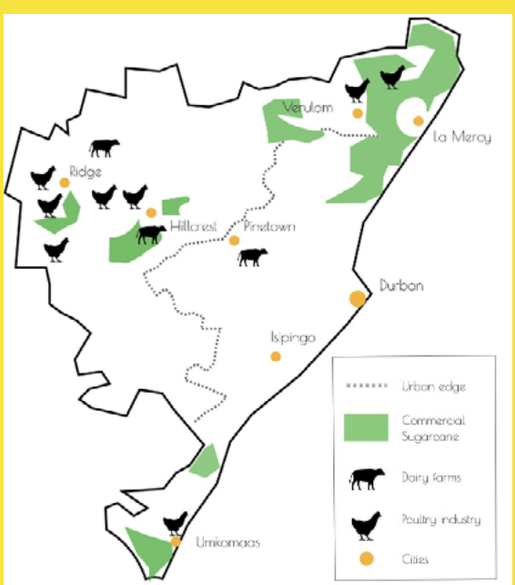
Public and private partners addressing the SDGs

The agroecology and agribusiness services of the eThekwini municipality work closely together in building a sustainable food system for the territory. The municipality is thus one of the main investors in the Fair Food Company social enterprise. The Fair Food Company supports and trains small farmers in sustainable and productive agricultural practices while offering them a variety of markets in order to increase their income. Since 2013, the company has been developing the Edamame bean industry. The beans are rich in proteins and are particularly beneficial for soil enrichment.

Fair Food Company has created many jobs in the vegetable business: it guarantees the purchase of a quantity of vegetables which will be processed and sold wholesale and to company restaurants. The company supports about 1,600 small farmers in the Kwazulu-Natal province.

IDENTIFICATION OF THE MAIN AGRICULTURAL AREAS IN THE METROPOLITAN AREA

Source: eThekwini Metropolitan Municipality, 2005, via Let's Food Cities



SPECIAL FEATURE

THE NET ZERO TARGET: THE VOLUNTARY CARBON MARKET ENTERS A NEW DIMENSION

GLOBAL SYNTHESIS REPORT ON CLIMATE ACTION BY SECTOR

2022

CLIMATE CHANCE

IN PARTNERSHIP WITH

ecoact
an atos company

SWEPT BY THE NET ZERO WAVE, THE VOLUNTARY CARBON MARKET DRIFTS TOWARDS NATURE-BASED SOLUTIONS

A barometer of climate action, carbon neutrality boosts the voluntary carbon credit market

137 States with a carbon neutrality target

Portion of global emissions covered by States' carbon neutrality commitments

zerotracker.net

NON-STATE ACTORS COMMITTED TO THE RACE TO ZERO CAMPAGNE

67 REGIONS

5,235 BUSINESSES

1,049 CITIES

441 INVESTORS

1,039 HIGHER EDUCATIONAL INSTITUTIONS

CITIES RACE TO ZERO

1,049 CITIES

SBTI GLOBAL COMPACT

1,225 BUSINESSES

$23,000 bn market capitalisation, across 53 sectors in 60 countries.

OF WHICH 64 BUSINESSES

are certified to the Net Zero Corporate Standard of the SBTi for their short-term and long-term strategy to acheive net zero.

NET ZERO ASSET MANAGERS INITIATIVE

273 ASSET MANAGERS

$61,300 bn in assets managed

NET ZERO INSURANCE ALLIANCE

20 INSURANCE COMPANIES

$7,000 bn in assets managed and 11% of the total premiums paid worldwide.

NET ZERO BANKING ALLIANCE

115 COMMERCIAL BANKS

$70,000 bn in assets managed, 38% of the global total.

RACE TO ZERO

Race to Zero is the global campaign to mobilise non-state actors towards carbon neutrality by 2050. It covers 25% of global CO_2 emissions and 50% of the global GDP.

Race to zero
C40, 2022
United Nations Global Compact & Science Based Targets initiative (SBTi)
The Net Zero Asset Managers initiative, 2022
UNEP FI, 2022
SBTi, 27/07/2022

The volume of carbon credits issued exceeds the volume of credits retired by 129% over the first 11 months of 2021. The difference is due in particular to the stocks of credits accumulated by intermediaries, and therefore does not necessarily reflect a demand deficit.

The size of the voluntary carbon market quadruples in 2021

VOLUME OF VOLUNTARY CARBON CREDITS EXCHANGED GLOBALLY IN 2021

Over 2021, traded carbon credits' value quadrupled and carbon volume increased by 143%.

Ecosystem Marketplace, 2022

CREDITS ISSUED

1,488,304,473 tCO_2e

VOLUME OF VOLUNTARY CARBON CREDITS PLACED ON THE MARKET

+129%

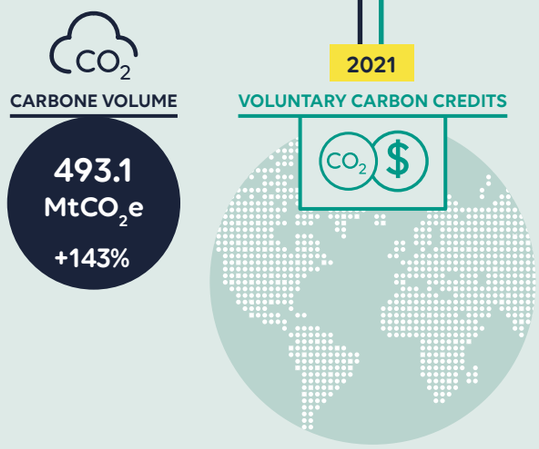
+40% BETWEEN 2020 AND NOVEMBER 2021

CREDITS RETIRED

792,746,307 tCO_2e

VOLUME OF VOLUNTARY CARBON CREDITS RETIRED FROM THE MARKET

+65% BETWEEN 2020 AND NOVEMBER 2021



For the first time, the voluntary carbon market crossed the billion-dollar mark.

$4/$tCO_2e$

AVERAGE PRICE PER TONNE TRADED

According to the work of the Carbon Pricing Leadership Council, the price of carbon should reach between $50 and $100/t in 2050 to serve the objectives of the Paris Agreement

Carbon Pricing Leadership Council, 2019

A market shifting towards Nature-based Solutions

$75 bn

APPROVALS OF REDD+ PROJECTS

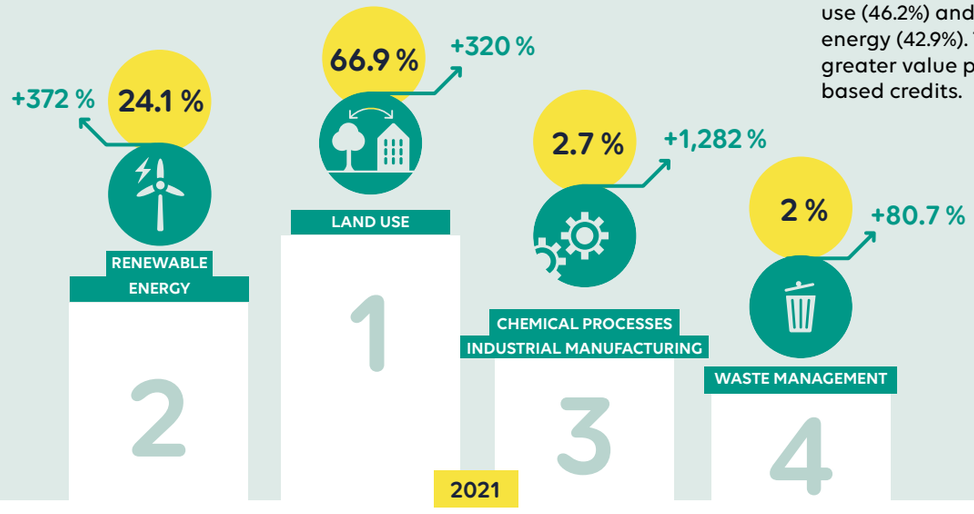
In 2021, only 75 million dollars of REDD+ conservation projects were approved, well below the annual average of 263 million dollars for the five preceeding years. Approvals have shifted however more in favour of projetcs integrating results-based payments.

Heinrich Böll Stiftung, 2022

CREDITS LINKED TO LAND USE OVERTAKE THOSE RELEATED TO RENEWABLE ENERGY PROJECTS

Ecosystem Marketplace, 2022

Nature-based carbon credits occupy more than two thirds of the market in value. In particular, credits with biodiversity co-benefits are highly valued. The last month of 2021 saw almost as many carbon credits traded as the rest of the year, by value. In contrast, carbon volumes are more balanced: 227.7 $MtCO_2e$ for land use (46.2%) and 211.4 $MtCO_2e$ for energy (42.9%). This is a sign of the greater value placed on nature-based credits.



DISTRIBUTION OF VOLUNTARY CARBON CREDITS TRADED BY SECTOR OF ACTIVITY

SPECIAL FEATURE
CARBON OFFSET

The Net Zero target: The voluntary carbon market enters a new dimension

ANTOINE GILLOD • Director, Global Observatory of Climate Action, Climate Chance[a]

Born from the 1997 Kyoto Protocol, the voluntary carbon market has taken up much space in debates of recent years on the transition pathways to "carbon neutrality". Now in full swing, the purchase and sale of carbon credits according to an emissions offsetting logic is being driven by a wave of non-state commitments towards "Net Zero". More than an arithmetic tool to balance the carbon footprint accounting of organisations, the trading of carbon credits is emerging as a channel for mobilising private capital at the service of mitigation projects. The market is progressively becoming regulated, the instruments are multiplying, and the volumes traded are increasing; but in the absence of universal regulation and standardisation of practices, financialization of the market raises concerns about the integrity of projects and the claims of "carbon neutrality" made by companies. This "special feature" of the 2022 Global Synthesis Report on Climate Action by Sector presents a panoply of recent regulatory trends, initiatives, and instruments for tracking carbon credit transactions.

1. CARBON CREDITS, AN INSTRUMENT OF ACTION TO ADDRESS THE CARBON NEUTRALITY CHALLENGE

Planet-wide carbon neutrality: A scientific and political objective

The 197 States that signed the 2015 Paris Agreement set themselves the goal of "*holding the increase in the global average temperature to well below 2 °C compared to pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels*" (Article 2). To achieve these goals, the Parties have agreed to "*reach global peaking of greenhouse gas emissions as soon as possible [...] and to undertake rapid reductions thereafter [...] so as to achieve a balance between anthropogenic emissions from sources and removals by sinks*" by 2050 (Article 4.1).

This commitment establishes the concept of carbon neutrality, defined by the Intergovernmental Panel on Climate Change (IPCC) in its special report on the consequences of global warming of 1.5 °C. The report assesses the possible pathways available for staying within the carbon budget imposed by a 1.5 °C trajectory and concludes:

"*Staying within a carbon budget of 580 GtCO_2 means that the CO_2 emissions would reach carbon neutrality in about 30 years; this period is reduced to 20 years for a residual carbon budget of 420 GtCO_2 (high level of confidence).*"

In this context, achieving carbon neutrality means reducing net CO_2 emissions to zero: "*This means that the amount of CO_2 entering the atmosphere must equal the amount removed.*" This goal is sometimes restricted to carbon dioxide, the main source of greenhouse gases in the world (about 72%),

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or extended to other greenhouse gases with greater global warming potential (GWP), such as methane (CH_4), nitrous oxide (N_2O) or sulphur hexafluoride (SF_6). Regardless of the entry route or scope of gases included in the strategy, reduction of climate change boils down to two physical objectives which the actors can implement using three levers:

- Objective 1: Limiting the flows of greenhouse gases emitted into the atmosphere (level 1: **avoiding** emissions and level 2: **reducing** emissions);

- Objective 2: Increasing the flows captured and sequestered by natural carbon sinks (forests, oceans) or technological ones (direct air capture, capture and sequestration of carbon at factory outlets, etc.) (level 3: **removing** carbon emissions).[1]

From this perspective, offsetting emissions with carbon credits on the voluntary carbon market (VCM) is one financial instrument among others, which is available to actors, enabling use of one of these three levers. A carbon credit can be defined as a deed that certifies the reduction, avoidance, or removal of a certain quantity of emissions by a project somewhere in the world: installation of renewable energy generation capacity, improvement in energy efficiency, woodland conservation, creation of new green areas, etc. Once issued, the credit can either be placed in the assets of the project leader who wishes to have its impact on GHG emissions recognised, or be put for sale on the voluntary market (*issuance*).

For the organisation that sells carbon credits on the voluntary market, the objective is to finance its project through an influx of private capital obtained through the sale of credits. By doing so it renounces claiming for itself the emissions reduced, avoided, or removed thanks to its project.

For the organisation that purchases credits on the voluntary market, its investment is generally motivated by the prospect of being able to credit the mitigation results obtained by the project in its own carbon footprint. By doing so, it may wish to eventually claim a form of "carbon neutrality" (included in its climate strategy) to highlight its mitigation efforts, once the remaining volume of emissions following its own reduction efforts equals the compensated volume of emissions. Once included in the carbon accounting of an organisation, the credit can no longer be traded on the market; the credit is then said to be "retired" (*retirement*).

In the absence of universal regulation of the voluntary carbon market, both the quality control of certified projects and the verification of the integrity of the climate strategy of the organisation purchasing credits are the subject of numerous technical, political, and even philosophical controversies. Within these discussions, it is necessary to distinguish those that concern each of the three key elements of the voluntary carbon market:

- the "carbon credits", in other words, the rules and methodologies that govern the certification of the impact on emissions of a mitigation project;

- the "market", that is, the rules and credit trading conditions between sellers, buyers, and intermediaries;

- the "compensation", which relates to the criteria an organisation has to abide by to claim for itself the mitigation results obtained by the purchase of carbon credits, and then communicate its own "carbon neutrality" regarding the robustness of its climate strategy and its reduction efforts.

BOX 1 • **KEYS TO UNDERSTANDING**

CARBON PRICING, A SINGLE CONCEPT FOR MULTIPLE INSTRUMENTS

The World Bank defines **carbon pricing** as "an instrument that captures the external costs of greenhouse gas (GHG) emissions – the costs of emissions that the public pays, such as damage to crops, health care costs from heat waves and droughts, and loss of property from flooding and sea level rise – and ties them to their source through a price, usually in the form of a price on the carbon dioxide (CO_2) emitted." Various mechanisms put a price on carbon:

• The **Emissions Trading System (ETS)**, where "cap and trade" are intended to bring about emissions reductions of regulated emitters. These markets operate according to the "polluter-pays" principle as applied to GHG emissions: each emitter is allocated an emission quota beyond which it is forced to change its activities to reduce its sources of emissions, or to purchase other quotas from companies that have not exceeded their own limit. The evolution of the price then depends on the level of constraint applied to the supply of credits allocated on the market compared to the demand – the objective being to reach a price high enough to encourage companies to prefer undertaking transformational measures rather than resorting to the purchase of quotas.

• The **"baseline-and-credit" markets**, such as those provided by Article 6 of the Paris Agreement **(see below)**, which entails generating carbon credits based on the reduction of emissions compared to a reference scenario (business-as-usual). There is, therefore, no limit to the number of available credits. The purchase of these credits, in a carbon offsetting approach for example, makes it possible to finance the mitigation project.

• A **carbon tax** is a fiscal instrument which, while also adhering to a "polluter-pays" logic, predetermines a certain level of levy on the emission of one tonne of CO_2.

There are other mechanisms, such as the **results-based climate finance**, which delivers funds as a function of emission goals set beforehand, or the **internal carbon pricing**, set by organisations to guide their decisions based on the opportunity costs represented by the reduction of emissions.

Source: World Bank, Carbon Pricing Dashboard

This study intends to draw up an inventory of the dynamics of the voluntary carbon market, and to analyse recent changes in the rules and standards governing the use of carbon credits and the communication surrounding carbon neutrality.

Net zero and carbon neutrality, a barometer of the voluntary strategies of the actors

The carbon neutrality concept was initially conceived on a planetary scale: since emissions have no borders, the concentration of GHG in the atmosphere is non-discriminatory and its effects are felt on the entire globe. However, since its definition in major international agreements and in the work of the IPCC, States and non-state actors have gradually appropriated the language of "neutrality", both as the ultimate goal of their emission reduction strategies, and as a narrative framework for describing their transition.

The vast majority of States have now set carbon neutrality at various deadlines aligned with their climate strategies. Since Sweden first adopted carbon neutrality in June 2017, the 137 countries which have formulated a "net zero" goal now cover 83% of global emissions, 90% of GDP and 85% of the population according to Net Zero Tracker.[2] While the IPCC talks of achieving global carbon neutrality by mid-century, the deadline set by States on their own emissions scope varies according to the country and the levels of emissions, from Costa Rica's 2021 target to India's 2070 target. Bhutan and Suriname are today the only two countries said to have a "negative" carbon balance, i.e., whose GHG emissions are lower than their absorption.[3] The quality of these commitments is assessed against the precision of the detailed plans and strategies to achieve the objective of carbon neutrality, by independent organisations such as Climate Action Tracker.

Since 2015, the UNFCCC secretariat has wanted to extend the adoption of neutrality to actors not party to the Convention. The Climate Neutral Now initiative was launched for this purpose to promote the voluntary use of carbon market mechanisms by local authorities, companies, civil society organisations, and citizens.

Today, the Race to Zero mobilisation campaign serves this purpose. Initiated by the High-Level Climate Champions Nigel Topping and Gonzalo Muñoz prior to COP26, Race to Zero listed, in February 2022, 67 regions, 1,049 cities, 5,227 companies, 1,039 educational institutions, 441 financial institutions and more than 3,000 hospitals among 52 signatory health services for carbon neutrality in 2050. All of these actors cover 25% of global CO_2 emissions and 50% of GDP. By establishing "minimum criteria" for participation in the campaign, Race to Zero aims to act as an "umbrella" initiative that encompasses many independent initiatives for actor commitment to carbon neutrality.

In October 2020, the NewClimate Institute listed **929 local governments with a net-zero commitment**, covering 880 million inhabitants and representing an emissions reduction potential of 6.5 $GtCO_2$/year.[4] The Carbon Neutral Cities Alliance network brings together 22 international cities (New York, London, Rio de Janeiro, Yokohama, etc.) committed to carbon neutrality, with a view to supporting them in reducing their emissions through the implementation of transformative climate actions in the spirit of just transition.

BOX 2 • **KEYS TO UNDERSTANDING**

CARBON NEUTRALITY TERMS

"Carbon neutrality", "Net Zero"... The Glossary of the IPCC Group III Climate Change Mitigation Report, published in April 2022,5 has updated the definition of the various terms in use:

• **Carbon neutrality** refers to the condition "*in which anthropogenic carbon dioxide (CO_2) emissions associated with a subject are balanced by anthropogenic CO_2 removals. The subject can be an entity such as a country, an organisation, a district or a commodity, or an activity such as a service and an event. Carbon is often assessed over the life cycle including indirect ("scope 3") emissions, but can also be limited to the emissions and removals, over a specified period, for which the subject has direct control*". Greenhouse gas neutrality applies more broadly to all greenhouse gases (CH_4, SF_6, N_2O, etc.), and not just to carbon dioxide, as in the definition of "carbon neutrality".

• **Net zero CO_2 emissions** refer to the condition "*in which anthropogenic carbon dioxide (CO_2) emissions are balanced by anthropogenic CO_2 removals over a specified period.*". **Net zero GHG emissions** also include all gases. The difference between "net zero" and "carbon neutrality" sometimes remains unclear and varies according to use. The IPCC holds that at the global scale, the terms "net zero" and "carbon neutrality" are equivalent. On a smaller scale, "net zero" is restricted to emissions or removals that are under the direct control or territorial responsibility of the entity, while "carbon neutrality" also applies to emissions and removals beyond this scope. In practice, net zero can refer to a trajectory aligned with the 1.5 °C goal, such as for the Science-Based Target Initiative (SBTi, see below), whereas carbon neutrality is a state of static equilibrium between emissions and absorptions not based on any trajectory.

It should be noted that following AR6, the IPCC has adopted a broad view of the neutrality concept which allows it to be used at the organisation or product level. So far, in the special report on the consequences of global warming of 1.5 °C, "net zero emissions" was only envisaged as "*when anthropogenic CO_2 emissions are globally balanced by anthropic CO_2 uptake over a period of time. Net CO_2 emissions is also referred to as carbon neutrality.*" In other words, the carbon neutrality of organisations such as cities or companies was not mentioned here. It should be remembered in this regard that the IPCC is not a normative authority, and this broad definition of neutrality continues to be debated (Box 3).

At the European Union level, the NetZeroCities consortium coordinated by EIT Climate-KIC, brings together 33 partners from thirteen countries to support thirty pilot projects between cities. These projects aim to promote rapid learning on how to achieve climate neutrality at the city level. Funded by the Horizon Europe programme, NetZeroCities addresses over a four-year period (2021-2025) a Mission proposed by the European Commission in September 2020 as part of the Green Deal, "100 Climate-neutral Cities by 2030 – by and for the Citizens". The Mission should give rise to 100 carbon neutral cities in 2030 to act as centres of innovation and experimentation with all other cities by 2050. At the national level, numerous initiatives also exist for the alignment of cities and regions with carbon neutrality, such as the UK100 Net Zero pledge in the United Kingdom, which brings together 97 signatory cities, or the RAMCC (*Red Argentina de Municipios frente al Cambio Climático*) network, with 259 member municipalities.[6]

By November 2021, **1,045 companies representing more than $23 trillion in market capitalisation, across 53 sectors in 60 countries**, had made a commitment to formulate emission reduction objectives aligned with the 1.5 °C target based on science (*1.5 °C-aligned science-based targets*), according to a press release issued by the United Nations Global Compact and Science Based Targets initiative (SBTi) during COP26.[7] Of the 2,000 largest companies in the world, 417 (one third of the total turnover) have set a net-zero target.[8]

This movement extends to companies operating in carbon-intensive business sectors, and even reaches companies reluctant to undertake climate action. In early October 2021, the International Council on Mining and Metals (ICMM), which brings together 28 of the largest mining companies in the world, published an open letter stating that all of its members have committed to reducing emissions and to aiming for "carbon neutrality" by 2050.[9] Several of its members had already adopted climate plans several months previously with "carbon neutrality" as an objective. Among the major European oil companies, BP, Shell, TotalEnergie, ENI and Equinor have integrated carbon neutrality into their growth strategies.[10] Even the American ExxonMobil, still embroiled in anti-climate lobbying cases, recently introduced the term "net zero" across its operations in the Permian Basin.[11]

As regards financial actors, the Net Zero Asset Managers Initiative, launched in December 2020, claims 220 signatory **asset managers** with $57 trillion under management, committed to supporting the goal of net zero GHG emissions by 2050; similarly, the Net Zero Asset Owner Alliance claims 74 committed **institutional investors** ($10.6 trillion in assets). The Net Zero Banking Alliance has 113 signatory **commercial banks** covering $69 trillion of assets under management, while the more recent Net Zero Insurance Alliance brings together 20 **insurers** ($7 trillion in assets under management). In April 2021, the Global Financial Alliance for Net Zero (GFANZ) was launched by the UN Special Envoy for Climate Action Mark Carney and the High-Level Champions in order to bring together all actors from the finance sector around the Race to Zero. It now claims 450 member firms representing more than $130 trillion in assets under management.

Verifying the individual carbon neutrality of organisations: Corporate standards

Within the context of the mass adoption of the language of "neutrality", the credibility of commitments (*pledges*) rests on the ability of the actors to rely on solid standards for (1) taking *inventory*, (2) setting *objectives,* (3) formulating *plans*, (4) implementing *actions*, and (5) assessing their *impact* on the reduction of emissions. For each of these steps, numerous international standards exist and are still being developed, aimed at providing both technical methodologies for verification, and a frame of reference for the interpretation and communication of the results.

Discussions about the assessment of the requirements of these standards currently revolve around several criteria for assessing their ambition:

- The degree of constraint applied by the standards on organisations to reduce their GHG emissions;
- The range of qualified carbon credits that comply with the standard for offsetting, with regard to their age (vintage) and the requirements of the project certifying body;
- The assessment method;
- Communication on the efforts made.

The PAS 2060 standard was created in 2010 by the British Standard Institution (BSI) and updated in 2014. It not only certifies organisations, but also products or events. It is now one of the most widely used standards in the world. The PAS 2060 certification process is organised according to four criteria:

- Assessing 100% of Scope 1 and 2 emissions and Scope 3 emissions that contribute more than 1% of its carbon footprint.
- Reduction of emissions according to a plan which sets out an agenda, specific reduction goals, the means to achieve them, and how to offset residual emissions.
- Offsetting surplus emissions with carbon credits that meet the additionality and permanence criteria, avoids double counting without carbon leaks.
- Documentation and verification for reporting, based on self-validation, validation by external parties, or validation by independent third parties.

PAS 2060 nevertheless suffers from a mixed reputation of its certification criteria. The weakness of the Scope 3 requirements, extensive use of compensation allowed by the standard, and the self-validation of the authorised statement weaken the credibility of the commitments. This last point means it is not possible to judge whether the efforts to reduce emissions declared by the organisation are sufficient before resorting to offsetting residual emissions. It is one of the main criticisms of PAS 2060: companies are authorised to claim being "neutral" based on 100% compensation in the first year. They

must then present a mitigation plan, but it is not subject to any minimum level of ambition.

PAS 2060 is set to serve as the basis for the future ISO 14068 standard.[12] Under preparation since February 2020, this new standard should provide a standardised definition of carbon neutrality. These terms are the object of consultations and negotiations in a workgroup (comprising representatives from almost 60 countries) which will determine its degree of ambition. In the "Preparation" phase for two years, the adoption process must undergo a long series of steps before its validation, expected in 2023. The "Greenhouse gas and climate change management and related activities" committee (ISO/TC 207/SC 7)[b] steers the process; however, the committee's site has not been updated since 2019, and little public information on the status of negotiations is available.

The **CarbonNeutral Protocol** was published for the first time in 2002. Supported by the American group Natural Capital Partners, this standard also makes it possible to certify companies, products, and activities. Like PAS 2060, the CarbonNeutral Protocol does not constrain companies regarding the degree of internal emission reduction required to obtain the CarbonNeutral® status: organisations are only "encouraged" to use the management tools to define the right balance between reduction and offsetting. Similarly, it is not required that their internal reduction efforts be "science-based", that is, aligned with the Paris Agreement objectives. The CNP only invites organisations to use the Science-Based Target initiative to align with the 2 °C or 1.5 °C objectives.

In fact, **the Science-Based Target initiative (SBTi) is now the reference standard for assessing emission reduction strategies** with regard to the Paris Agreement objectives. As of February 23, 2022, it showed 2,530 companies committed to setting a "science-based" emissions reduction target, aligned with the 1.5 °C and 2 °C Paris Agreement objectives. Among them, 1,181 were certified "science-based"; in other words, their emission reduction objectives were approved according to the SBTi methodology.[13] This methodology is internal to the initiative, developed by a Technical Advisory Group and a Scientific Advisory Group, bringing together companies, researchers, NGOs and certification standards.

In October 2021, SBTi unveiled its net zero standard for companies in partnership with CDP, Global Compact, the World Resource Institute, and the WWF. Called the **"Corporate Net-Zero Standard" (CNZS)**, it describes itself as the world's first standard aimed at providing guidelines, criteria and recommendations to help companies formulate "net zero" goals that are based on science and aligned with the 1.5 °C and 2 °C Paris Agreement objectives.[14] In summary, the SBTi defines "corporate net zero" as:

The reduction of Scope 1, 2, and 3 emissions to zero or to a residual level compatible with achieving net zero emissions at a global or sectoral level, in a course of action aligned with the 1.5 °C objective (approximately 90% reduction in emissions). 95% of emissions must be covered;

- The **neutralization** of all residual emissions *in the target year* and any GHG emissions released into the atmosphere thereafter.

For their "Net Zero emissions" commitments to be "science-based" certified, companies must meet two criteria:

- Set a short-term (5-10 year) SBT objective aligned with a 1.5 °C trajectory;
- Set a long-term (2050 or beyond) SBT objective aligned with a 1.5 °C trajectory;

Optionally under the SBTi criteria, they can also:

- Take measures to remove carbon from the atmosphere and store it permanently so as to "neutralize" residual emissions;
- Carry out actions or make investments to reduce emissions outside of its value chain.

Unlike PAS 2060, the CNZS is very robust on short- and long-term emission reduction requirements. However, the CNZS is weaker on the compensation component, and does not provide instructions nor clear criteria on the quality of the carbon credits that may be used, unlike PAS 2060. Although it ties the terms of "net zero" claims to the "target year", SBTi does not give any clear indication on the possibilities of producing this claim at an intermediate date.

So far, only 33 companies have met the first two criteria and have received the "science-based" certification for their net zero goals, the first being Holcim Ltd., CVS Health, JLL, Dentsu International, Orsted, AstraZeneca, Wipro and even Ricardo PLC. SBTi is a verification standard: it produces its assessment according to its own methodology without third-party certification. This double stance raised questions on the independence of the standard (**SEE BELOW**), to which the SBTi responded by excluding oil companies from its field of activity, and by deciding to extend the certification time frames.[15] The SBTi is also developing a similar standard intended for financial institutions.[16]

b See the site: https://committee.iso.org/home/tc207sc7

BOX 3 • **KEYS TO UNDERSTANDING**

IMPOSSIBLE NEUTRALITY? THE CONTRIBUTION PARADIGM

More than a semantic controversy, the discussion surrounding the "neutrality" terms divides the actors according to two paradigms regarding the possibility offered to organisations to claim to be "net zero", "carbon neutral", etc. On the one hand is **the "offsetting" paradigm**, which conceives that a company or an organisation can claim carbon neutrality on its territory or its scope of activity by offsetting its residual emissions via the financing of reduction, avoidance, or removal projects according to arithmetic logic. On the other hand is **the "contribution" paradigm** which only conceives carbon neutrality at a planetary level and therefore rejects the possibility of declaring "zero net emissions" at the individual actor level, preferring instead to refer to the "individual contribution to collective neutrality".

This second paradigm draws from the exclusively "planetary" definition of carbon neutrality that the IPCC used to employ. In France and abroad, the Net Zero Initiative and the companies it supports continue to advocate this approach. In June 2022, the "10 principles for an ambitious corporate climate strategy" presented by NZI adopt this restrictive conception of carbon neutrality.[17] Among the 46 signatory organisations active in supporting the climate action of companies is the Ademe, the ecological transition agency in France. This public institution had already positioned itself in this direction in two "expert opinions" on carbon neutrality (May 2021) and on its use in communications (February 2022), in which it calls on organisations to "*relinquish the purely arithmetic approach to neutrality*" and to "*communicate in a transparent, proportionate and distinct manner on the different levers for contributing to collective carbon neutrality*". However, the Ademe still grants the possibility for States to claim neutrality at a national level.

In the context of a voluntary market, companies are essentially driven by the possibility of promoting and communicating their actions. In order to preserve this investment driver, while further incorporating corporate communications, other avenues advocate regulating "carbon neutrality" claims **(see below)**.

2. VOLUNTARY CARBON MARKETS SWITCH TO NATURE-BASED SOLUTIONS

"Ecological compensation corresponds to actions in favour of certain components of nature, whose objective is to produce ecological gains deemed to be quantitatively or qualitatively equivalent, or better than, ecological losses suffered elsewhere by these same components as a result of human activities".[18] Among the ecological compensations, carbon offsetting specifically aims to address the global warming problem caused by atmospheric GHG concentrations. Carbon offsetting may be required within a regulatory framework (example: CORSIA, the voluntary offset framework for the international aviation sector), or be the subject of a voluntary approach by a committed actor. The voluntary carbon market allows the free trade of carbon credits aimed at financing projects contributing to the reduction, avoidance or removal of GHG emissions, such as energy production, energy efficiency, agriculture, or forestry. The voluntary carbon market is an important potential channel for low carbon transition projects. The voluntary carbon market differs from "polluter pays" regulations, in that it is based on the funding of field projects.

Nature-based solutions are taking root; removal projects are still at an early stage

Whether it is part of an "offsetting" or a "contribution" logic, the purchase of carbon credits in the voluntary market is booming. In its *Net Zero Stocktake 2022* report, 40% of the 702 companies listed on the stock exchange tracked by Net Zero Tracker are explicitly considering using offset credits to achieve their goals (only 2% do not, and the majority did not specify).[19]

For the first time, the market value exceeded the $1 billion mark in 2021, and quadrupled year-on-year to nearly reach $2 billion, according to Ecosystem Marketplace.[20] Thus nearly 500 $MtCO_2e$ were traded on the voluntary market in 2021, at an average price of $4/tCO_2e$. Overall, these are much lower volumes than those observed in some regulatory carbon markets,[c] but they do not reflect the same reality. The prices in "cap and trade" markets are directly influenced by the ratio-

c The market value of CO_2 emission permits traded around the world increased by 164% in 2021, to reach 760 billion euros, according to the firm Refinitiv. 90% of this increase is attributable to the European Union Emissions Trading System (EU ETS), the largest in the world. While it has capped at €5/t for the majority of the time it has existed, between 2005 and 2018, the price per tonne of carbon increased in June 2022 to 88€/t (with a peak of 97€/t in February), due in particular to the drop in the volume of free allowances and the general tightening of supply. This is a level compatible with the Paris Agreement, according to the Carbon Pricing Leadership Council, which estimated in 2019 that only a carbon price of 50 to 100$/t can have sufficient leverage to bring about the necessary changes.

ning of allocated quotas, and thus reflect the opportunity cost to the company between the purchase of additional quotas and a capital expenditure of transition. Conversely, on the voluntary market, the price of credits is mainly based on the real cost of certified projects. However, growing intermediation and increasing financing of the market, the tightening of certification standards, and the growth in demand expected in view of the net zero commitments is likely to generate a greater price variation, as observed.

Indeed, while the average prices of the voluntary market remain quite low, on the whole they increased sharply during 2021, before falling – sometimes abruptly – in the first quarter of 2022 under the effects of inflation and rising energy prices, which may have reduced demand **(FIG. 2)**. In addition, the volume of credits issued on the market exceeded retirements by 129% over the first eleven months in 2021,[21] whereas they were at equilibrium until 2017. This difference does not necessarily mean that the demand does not follow the growth in supply of credits. Rather, it reflects a dual market orientation towards standardised long-term contracts and increasing market intermediation. Indeed, the World Bank[22] notes a trend towards the standardisation of contracts, in particular through the emergence of futures contracts in organised markets, making it possible to assemble carbon credit "package" offers that share common features (vintage, type of project, co-benefits, standards, etc.). Over-the-counter (OTC) spot contracts between seller and buyer of credits is still the norm, but the massive entry of financial intermediaries (brokers, traders, investment funds, etc.) into the voluntary market in recent years complicates the landscape and exposes the market to speculation as it becomes more lucrative.

The voluntary carbon market is gradually shifting towards "nature-based solutions" (NbS). According to the Voluntary Carbon Market Dashboard facilitated by Climate Focus, a think tank, the issuance of NbS credits increased by almost 170% between 2020 and 2021. Representing 45.2% of the credits issued in 2021 (31.6% in 2020), they are now ahead of renewable energy projects (37.6% in 2021 compared to 47% in 2020) which have dominated the market for several years. Among these credits, emissions avoidance activities are dominant, amounting to 80% (174.7 $MtCO_2e$) of these new NbS credits in 2021-2022.[23] For the most part, these are forest conservation projects funded via REDD+ (*Reducing emissions from deforestation and forest degradation*), the UNFCCC programme for the protection of forests. However, methods to estimate the carbon impact of avoided deforestation suffer from uncertainty.[24] Carbon Direct, a carbon management consulting firm, is also concerned that the renewable energy projects do not meet the additionality criterion: with or without carbon credit, the projects would have taken place in view of the growth of the renewables market.

FIGURE 1

THE ECOSYSTEM OF VOLUNTARY CARBON MARKET

Source: Abatable, 2022

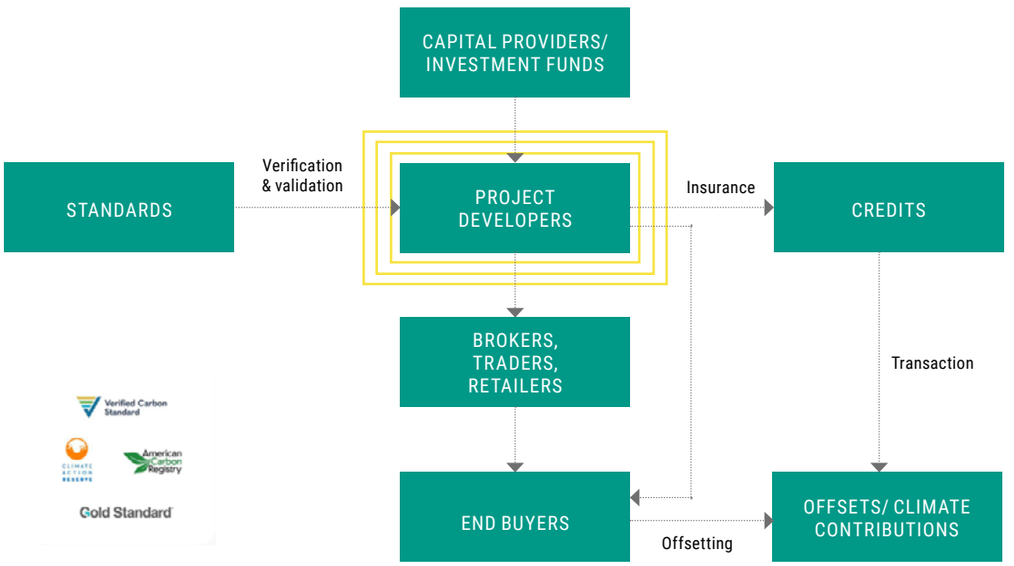
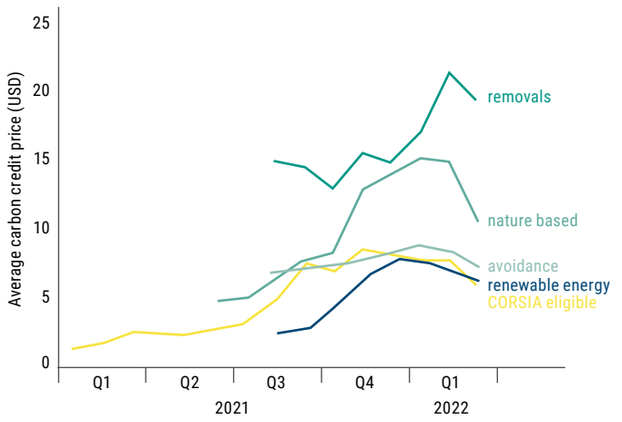


FIGURE 2

PRICES OF STANDARDISED CARBON CREDIT CONTRACTS

Source: World Bank, 2022



The volume of removal credit transactions which aim to develop natural carbon capture and storage projects (via reforestation, or afforestation), or technological ones (Direct Air Capture, CCUS), remains modest. In 2021, the traded volume of carbon reduction credits was 21 times greater than that of carbon removal credits, according to Ecosystem Marketplace. According to Carbon Direct,[d] pure removal projects represent only 3% of the credits issued in 2021, with the credits for combined removal and reduction amounting to 13%. No sustainable removal credit, making possible the removal of carbon in the very long term and ensuring a real impact on the concentration of GHGs in the atmosphere, was issued in 2021.[25]

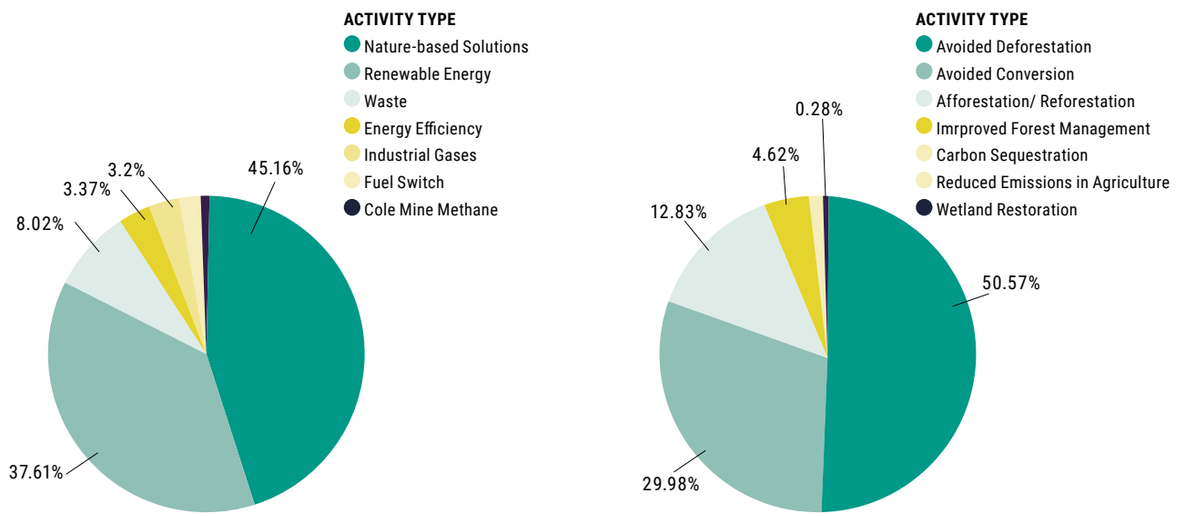
Still, the increase in demand for NbS credits is reflected in the prices observed on the market. From less than \$5/tCO_2e in June 2021, the Platts CNC index for natural avoidance and removal credits rose to \$14.55/tCO_2e. Highly sought after by customers in the face of a tight supply, these are credits tied to the removal of carbon which drove average prices up, rising to \$19/tCO_2e in March 2022.[26] Thus, there may be observed a narrowing of the spread between natural removal credits (Platts Natural Carbon Capture) and avoidance credits (Platts Nature-based Avoidance), from \$7/tCO_2e in August to 0.95/tCO_2 at the end of 2021.

The market shift towards nature-based credits is part of the trend of recent years. Indeed, according to Ecosystem Marketplace, it is also the credits linked to afforestation and reforestation projects that were traded at the highest price in a sustainable way between 2019 and 2021 (\$8.1/t in 2021). By comparison, the trading of credits for household appliance installation projects (especially improved cookstoves) fell by 40% but their price continues to increase and remains above average, from \$3.84/t in 2019 to \$5.75/t in 2021. The price index for renewable energy credits also increased at the end of the year, to a level close to CORSIA credits.[27] Conversely, the switch from credits linked to the agricultural sector, which is booming (+876% in one year), to low-cost pasture management credits precipitated the price drop from \$11.8/t in 2019 to \$1.36/t in August 2021 (**BOX 4**).

FIGURE 3

TYPOLOGY OF CARBON CREDITS (LEFT) AND NATURE-BASED CREDITS (RIGHT) PLACED ON THE MARKET IN 2021

Source: Climate Focus, 2022



d Carbon Direct's analysis is based on data from Berkeley's Voluntary Registry Offsets Database (VROD), which aggregates all carbon management projects from the four largest voluntary compensation registries: American Carbon Registry (ACR), Climate Action Reserve (CAR), Gold Standard (GS) and Verra (VCS) – is more than 1.5 GtCO_2 from more than 5,000 projects.

BOX 4 • **EXPERIENCE FEEDBACK**

CARBON FARMING, A NEW DEVELOPMENT IN NATURE-BASED SOLUTIONS

On a global scale, carbon credits linked to agricultural activities, although maintained at a marginal portion of the market, are flourishing. The mitigation potential of agricultural soils prompted the European Commission to adopt a Communication on sustainable carbon cycles in December 2021, as part of its Farm to Fork Strategy. The Commission wishes to promote "carbon farming" in this context, based on existing funding programmes (Common Agricultural Policy, LIFE program, Interreg, etc.) to encourage farming practices favourable to the sequestration and reduction of emissions (agroforestry, soil protection, restoration, etc.). In particular, the EU plans to strengthen the standardisation of methodologies for monitoring, reporting and verification of carbon farming. Such a framework has existed in France since 2019. The Low Carbon Label is a national certification framework for local projects to reduce and sequester greenhouse gas emissions. Operational since 2019, it was designed by the Ministry of Ecological Transition and technical partners, such as the think tank Institute for Climate Economics (I4CE). 233 projects now benefit from the Low Carbon Label, having met the criteria set by one of the sectoral methods established by the Ministry to assess reduced or removed emissions compared to a reference scenario. These methods now mainly cover the forestry and agricultural sectors, but also construction and transport. The Carbon Agri method gave birth to France Carbon Agri Association, which groups 302 farmers committed to reducing their emissions, for a potential reduction of 138,800 tCO_2. In South Africa, in 2021, the AgriCarbon programme run by the local operator Climate Neutral Group conducted the certification of 40 milk farms committed to the reduction of their carbon and environmental footprint, and the issuance of 230,000 tCO_2 of credits, sold at between $15 and $25/t. [28]

Sources: *Ecologie.gouv, n.d.; France Carbon Agri Association, 12/02/2021; Climate Neutral Group, n.d.*

Beyond carbon: the co-benefits of compensation projects increase the value of the credits

The growing success of NbS credits is based on their potential as natural carbon sinks. The extent of the mitigation potential resulting from the planting of trees has been the subject of global modelling exercises that have led to academic controversies. In 2019, a study conducted by researchers at the Swiss Federal Institute of Technology in Zurich (ETH Zurich) estimated that ecosystems could support 0.9 billion hectares of additional continuous forest, i.e., a 25% increase in forest area. At maturity, this would represent a carbon sink of more than 200 Gt, and the capacity to store 25% of atmospheric carbon.[29] This study raised many debates and elicited many responses, both on the method of modelling on such a scale and on the "simplistic" conclusions to which the study could lead regarding the value of trees as a solution to environmental problems.[30] This "carbon-centred" view of the NbS also questions their co-benefits for biodiversity, the economy, and local communities. All academic literature generally tends to show that the impacts of nature-based solutions are complex and vary according to local contexts, with synergies or compromises with the Sustainable Development Goals (SDGs).

Co-benefits refer to all the additional environmental, social and other benefits derived from a carbon project. In its "Special Report: Global Warming of 1.5 °C", the IPCC emphasises this point: "*Mitigation options consistent with a 1.5 °C pathway are associated with multiple synergies and trade-offs across the Sustainable Development Goals (SDGs).*"[31] Thus, the co-benefits of an emission reduction, avoidance or removal project can be assessed according to whether it facilitates the access to energy (SDG 7), reduces gender inequalities(SDG 5) and/or economic inequalities(SDG 10), creates economic value or employment (SDG 8), or protects land (SDG 15) and marine (SDG 14) biodiversity.

Forest conservation projects, which represent the majority of nature-based projects, can in particular generate important co-benefits for biodiversity in addition to carbon sequestration. In this respect, the countries participating in the REDD+ programme for the conservation of forests increasingly tend to integrate non-forest biodiversity indicators into their national forest inventories, but the methodologies are still very disparate, according to one study.[32]

However, researchers believe that tree planting is more often motivated by its utilitarian and commercial benefits than by its value for biodiversity and as a carbon sink. The number of organisations, especially for-profit ones, supporting and developing tree planting projects (afforestation or reforestation) in tropical and subtropical areas has almost quadrupled in the last 30 years. For the most part, they implement agroforestry systems, planting campaigns of mixed or single species, or carry out assisted natural regeneration. The species most often reported are cocoa, teak, moringa, mango and coffee, which primarily meet the economic needs of local populations.[33]

A recent example of this utilitarian and commercial approach is that of Gabon, whose forests still occupy 88% of the territory. Environment Minister Lee White recently announced the issue of 187 million carbon credits under REDD+, with the aim of selling half of them on the voluntary market before COP27. It would be the largest carbon credit issuance ever. The minister of Gabon thus hopes to generate revenue, estimated at $291 million, in order to preserve national forests, but also to ensure the sustainable exploitation of resources.[34] A few days earlier, TotalEnergies announced the acquisition of 49% of the shares of Compagnie des Bois du Gabon, which manages 600,000 ha of FSC-certified forests in the country, in order to generate carbon credits and offset its emissions.[35]

In general, social and environmental co-benefits increase the value of carbon credits on the voluntary market: accor-

ding to Ecosystem Marketplace, credits certifying projects with co-benefits reach a weighted average price of $5.95/t, against $2.77/t for other projects. A recent study of 2,259 projects certified under the Kyoto Protocol's Clean Development Mechanism (CDM) reckons that the projects with the highest guarantee of co-benefits received a 30.4% higher price compared to projects with lower co-benefits, with an additional premium for CDM projects certified with the Gold Standard.[36]

In fact, the evaluation of the co-benefits of carbon credits has for a long time been included in the evaluation criteria of the main certification standards. Since its birth in 2003, the Gold Standard has prescribed the assessment of the impact of carbon projects on neighbouring communities and populations. In 2017, the "Gold Standard for Global Goals" (GS4GG) became its new reference standard, intended to meet the objectives of the Paris Agreement as well as the SDGs. More recently, the Gold Standard has mandated the use of the SDG Impact Tool, an instrument introduced in December 2021 to help project leaders assess the impact of their carbon project on the SDGs. In 2019, Verra presented the Sustainable Development Verified Impact Standard (SD VISta), a set of rules and assessment criteria that allow an independent assessor to certify a project's contribution to the SDGs.[37] Under its Climate, Community & Biodiversity (CCB) Standards programme, Verra labels certified projects (VCS) that generate positive benefits for local communities and biodiversity. So far, 51 projects have been validated, 75 verified, and more than 310,000,000 credits have been issued with the label (about 30% of all issued VCS credits).[e]

The growth of interest in NbS also calls for regulation of practices to ensure the credibility of projects and credits issued. In July 2021, the Natural Climate Solution Alliance (NCSA), a multi-actor coalition led by the World Business Council for Sustainable Development (WBCSD) and the World Economic Forum, published a guide on the use of nature-based credits. The document, entitled "Natural Climate Solutions for Corporates", provides guidelines for actors in the supply and demand of credits, on the credible and integrated use of credits certifying nature-based projects.[38] In May 2022, NCSA sanctioned six nature-based trailblazer projects, all of which were Verra certified. Other initiatives such as Nature4Climate, launched in 2017 made up of 19 specialist organisations, are campaigning to develop investments in this sector.

3. INTERNATIONAL REGULATORY FRAMEWORKS FOR CARBON MARKETS ARE BEING STRENGTHENED

Rules for the application of Article 6 of the Paris Agreement adopted at COP26

After several years of negotiations, the rules for the application of Article 6 (*Article 6 rulebook*) were finally adopted on November 13, 2021. They include a number of significant advances which settle controversial debates that were under discussion since the signing of the Paris Agreement. In particular, the accounting rules to avoid double counting have raised a lot of concerns. Certain conclusions remain open to interpretation, and many implementation methods will be the subject of a work programme in the coming years.[39] The provisions of Article 6 will have direct consequences on the functioning of the voluntary market.

Article 6 of the Paris Agreement aims to define the rules for voluntary cooperation between Parties to implement their Nationally Determined Contributions (NDCs). Two market mechanisms are provided:

- **Article 6.2** provides for the possibility for States to carry out bilateral international trading of mitigation outcomes (internationally transferred mitigation outcomes – ITMOs) among themselves within the framework of "cooperative approaches".

- **Article 6.4** establishes a new multilateral, centralised market with its own office, in the manner of the Kyoto Protocol's Clean Development Mechanism.

The Glasgow decisions allow ITMOs that are eligible under Article 6.2 to be traded with a view to not only help Parties achieve their own NDCs, but also for other "international mitigation purposes" or even "other purposes" as determined by the Parties. The "international mitigation purposes" are not specified, but are understood to refer implicitly to the emissions reduction programmes of the ICAO for aviation and IMO for maritime transport. The reference to "other purposes" suggests that States are free to decide whether their ITMOs can be used in the voluntary carbon market. If they are not authorised by the Parties to be traded under Article 6.2 (then referred to as "unauthorised credits"), the mitigation outcomes can then be credited to the NDC, or be used for domestic purposes, results-based financing, or in a voluntary

e See the Verra Registry: www.registry.verra.org/#/ccb

carbon market.

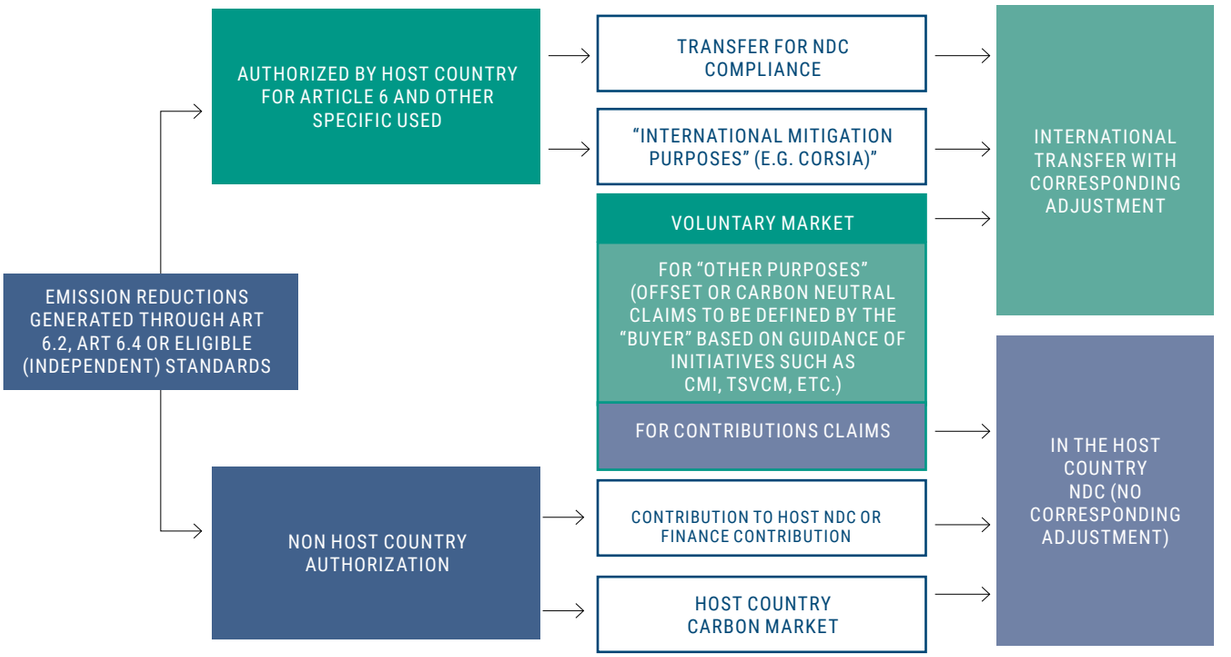
All ITMO trades must lead to a "corresponding adjustment" in order to avoid double counting when a Party credits its NDC with the mitigation outcome transferred from another Party. As a result, two parties cannot claim the same mitigation outcome on their balance sheet. In contrast, the Glasgow decisions leave it to the discretion of the Parties whether or not to make a corresponding adjustment to "unauthorised credits" for Article 6.2 that are used in the voluntary market, and to certifiers and credit programmes whether to discriminate these credits or not. In other words, the question is whether a country like the United States can claim in its carbon accounting a mitigation outcome obtained by a domesticallybased company, such as Amazon, via the purchase of carbon credits on the voluntary market, at the risk of weakening its proactive reduction policies.

By the rules established by the Voluntary Carbon Markets Integrity Initiative (VCMI) in its provisional Code of Practice in June 2022 (**SEE BELOW**), corresponding adjustments will not be mandatory. Verra,[40] then Gold Standard – which had, however, announced the opposite at the start[41] – have aligned themselves with this position. Four States among the 32 signatories of the "San José Principles" for the integrity of international carbon markets have already declared that they will not use or transfer a mitigation outcome without a corresponding adjustment.

FIGURE 4

THE CORRESPONDING ADJUSTMENTS SYSTEM AND ELIGIBILITY OF CARBON CREDITS UNDER ARTICLE 6.2

Source: World Bank, 2022



Article 6.4 seals the end of the Clean Development Mechanism

Article 6.4 establishes the creation of a new mechanism to replace the Clean Development Mechanism (CDM) of the Kyoto Protocol. Under the CDM, developed countries with an emission reduction target (known as "Annex B" countries) could purchase "Emission Reduction Certificates" (ERCs) generated by projects implemented in developing countries. To be delivered an ERC, a CDM project had to achieve an "additional" emissions reduction that would not otherwise have occurred. But CDM credits have acquired a bad reputation owing to the weakness of the standards governing their certification. The negotiation of this article proved to be particularly delicate, owing to the opposition of Brazil, China, India, and South Korea to the rules preventing double counting. The Glasgow decisions prompted the evolution of the Article 6.4 mechanism to address several criticisms of the CDM:

- Corresponding adjustments when transferring emission reductions (called "A6.4ER" in the jargon) between the Parties or to CORSIA or Emission Trading Systems (ETS).
- To boost the ambition of the mechanism compared to the CDM, a "global emissions reduction goal" has been set. This means that 2% of the A6.4ER credits will be cancelled at the time of their issuance, and therefore cannot be credited to any Party for the purpose of pure compensation.
- An obligatory share of 5% of transactions will be deducted to feed the Adaptation Fund.
- One item remains controversial regarding the use of old CDM credits in the Parties' NDCs. The ERCs issued between 2013 and 2020, i.e., about 100 $MtCO_2$, have finally been admitted for use by the Parties to meet the objectives of their first NDC cycle.

Under pressure from the pandemic, CORSIA fails to take off

In order to "*achieve carbon neutral growth from 2020 and reduce its carbon emissions by 50% compared to 2005 levels*",[f] since 2016, the international civil aviation sector has been organised around the Carbon Offsetting Scheme for International Aviation (CORSIA), an emission compensation programme set up by the International Civil Aviation Organisation (ICAO). The programme is planned in three main implementation phases: the pilot phase (2021-2023) and the first phase (2024-2026) are voluntary; the programme only becomes compulsory from the second phase onwards (2027). The pilot phase of the programme was launched on the 1st of January, 2021. During this phase the participating companies will only have to compensate the flights between the countries which will have volunteered to test the programme. There are now 107 countries ready to participate, among the 193 members of ICAO, representing 76% of international activity. From 2027 onwards, the offsetting obligations will become mandatory for all international flights.

Since its creation, the CORSIA program has struggled to answer questions about its real ability to drive the sector's transition. The ICAO council has gradually strengthened its rules of application, restricting qualified credits for the programme to eight certification registries[g] and prohibiting the use of credits linked to projects that started before the 1st of January 2016.

But the SARS-Cov2 pandemic halted the programme before it even started. In June 2020, the ICAO council decided to activate a safeguard clause contained in the CORSIA agreement to lower the programme's reference threshold to 2019 emissions level instead of the sector's average emissions in 2019-2020, as initially planned.[42] This decision actually delays the entry into the programme by three years, since with emissions still lower than those of 2019 due to the drop in traffic induced by the pandemic, the volunteer companies will, in theory, have no additional emissions to compensate during the entire pilot phase.[43] In 2021, the weighted average price of credits traded in five of the compensation programmes eligible for CORSIA was only $3.08/t, compared to $4.89/t in 2020. This is lower than the average market price (4$/t), with a spread between $0.5/t and more than $45/t.[44] This drop in price is normally attributable to the renewable energy credits (**SEE ABOVE**).

In addition, the voluntary phase, which will end in 2026, will only impose compensation on flights between two voluntary countries, reducing its scope to around 44% of total international aviation emissions.[45] Sixteen new countries have joined the voluntary programme as of 2022, but China, Russia, Brazil and India are still among the notable abstentions.[46] Finally, there is a significant risk of double-counting emission reductions if countries transferring credits to airlines do not make a "corresponding adjustment".

To inform carbon credit purchase decisions, at the end of 2020, the International Air Transport Association (IATA) launched the *Aviation Carbon Exchange*, an electronic platform thanks to which airline companies can identify, select, and exchange voluntary emission units eligible under CORSIA.[47] JetBlue, a low-cost U.S. airline, inaugurated the programme by purchasing credits for the development of the *Larimar* wind farm in the Dominican Republic. When completed, the project will credit the company with 200,000 tCO_2 avoided per year.[48]

f As stated by ICAO in the resolution adopted at its 39th Session in October 2016, thereby creating the CORSIA programme.

g These eight registries are: American Carbon Registry, China GHG Voluntary Emission Reduction Program, Clean Development Mechanism, Climate Action Reserve, The Gold Standard, Verified Carbon Standard, Global Carbon Council and Architecture for REDD+ Transactions.

To this system, major companies around the world have added voluntary compensation programmes, several of which began in 2020. However, in May 2021, an investigation published by Unearthed[h] and The Guardian newspaper, showed how, out of a selection of projects aimed at reducing deforestation (funded by British airline companies and certified by Verra, the largest carbon credits purveyor in the world), the methodologies used did not make it possible to draw conclusions on the real reductions in CO_2 emissions.[49] In particular, the notion of "avoided deforestation", measured arbitrarily by the certifying body without any oversight from an independent central authority, was questioned.

4. GOVERNANCE OF THE VOLUNTARY CARBON MARKET IS TAKING SHAPE

New standards to regulate "claims"

As it allows for the financing of a mitigation project outside the scope of its activity, the prospect of being able to claim being "carbon neutral" is the main incentive for an organisation to finance a project through the purchase of carbon credits on the voluntary market. But in the absence of universal standards and a central regulating authority, the net zero commitments of companies lack a certain credibility.
In a report published in February 2022 entitled "*Corporate Climate Responsibility Monitor 2022*" (CCRM) Carbon Market Watch and the NewClimate Institute have pinned down the carbon neutrality commitments formulated by 25 of the world's largest companies. While their cumulative emissions reported in their inventories amount to 2.7 $GtCO_2e$, i.e., 5% of global annual emissions,[50] the objectives formulated by these companies only commit them to an aggregate reduction in their emissions of 40% on average at the due date they have set for themselves. Only 13 companies out of these have matched their commitments with their reduction targets, and only eight take into account the entire value chain (Scope 3).

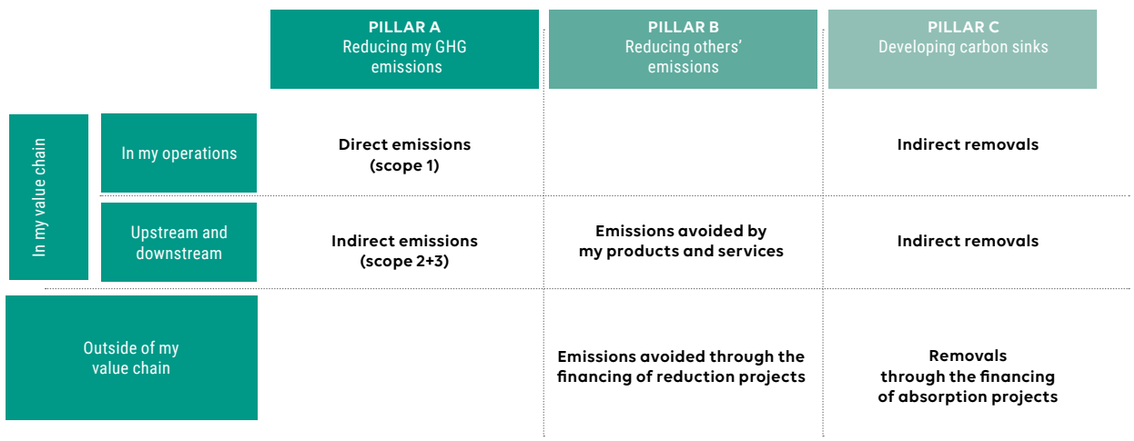
This analysis runs counter to the assessments made by the main standards and assessors of corporate climate strategies. The authors of the study reckon that for the majority of the 18 companies in the sample, the endorsement by SBTi of their carbon neutrality objective according to the "Net Zero" standard is in reality "contentious or inaccurate". In particular, the CCRM notes reference years that are too high, and inconsistencies between SBTi assessments and the companies' own monitoring and progress reports. The authors point in the end to a "potential conflict of interest" for the SBTi, which produces fee-based assessment of companies against its own standards, and raise the question of whether it is "realistic and acceptable to conduct mass assessments for companies without sufficient resources to probe further."[51]

In France, the consulting firm Carbone 4 presented the Net Zero Initiative (NZI) standard in April 2020.[52] This standard for companies offers a normative definition of "corporate neutrality" in order to reconnect it with the objective of planetary neutrality. Concretely, NZI supports and provides a framework for companies to implement their carbon neutrality climate strategies.

FIGURE 5

THE THREE PILLARS OF THE NET ZERO INITIATIVE BENCHMARKS FOR "CORPORATE NEUTRALITY"

Source: Carbone4, 2020



h Unearthed is a Greenpeace news initiative.

NZI is based on a restrictive but ambitious view of carbon neutrality, which it only conceives on a collective scale – planetary or national. In the NZI, unlike the CNZS, an individual organisation cannot therefore claim to be "carbon neutral", but can instead communicate around its "contribution" to planetary or national neutrality. To maximise the contribution of companies, the NZI standard, like CNZS, distinguishes between a company's own emissions reduction actions (which it calls "Pillar A"), the reduction of others' emissions ("Pillar B") and removals through development of carbon sinks ("Pillar C").

Within the framework of the NZI standard, the purchase of carbon credits therefore constitutes only one instrument among others that can be mobilised by the organisation within the framework of its Pillar B or C. Within the framework of Pillar B, the carbon credit certifies the financing of a project leading to the avoidance of emissions (compared to a reference scenario) outside the company's value chain. Within the framework of Pillar C, the carbon credit certifies the funding of a project leading to the sequestration of carbon. In both cases, the company cannot claim "possession" of the reduction, but only its funding, within the spirit of a "contribution" to collective neutrality.

To address the need for credibility and integrity of companies that claim to be "carbon neutral", **the Voluntary Carbon Markets Integrity Initiative (VCMI) unveiled a "Claim Code of Practice" in June 2022**. In particular, the Code provides that a claim must first be based on a "net zero" objective (pledge) based on science, recommending certification of the SBTi Net Zero Standard for this **(SEE BELOW)**; it also requires the purchase of carbon credits allowing mitigation outside of the organisation's value chain, and the use of high quality credits.

Subject to consultation until August, the code has already raised some concerns. The NGO Reclaim Finance describes it as a "greenwashing manual", considering in particular that it does not sufficiently compel companies to reduce their emissions before resorting to offset credits and to be able to claim a "net zero" claim, and that it lacks precision in all of its expectations.[53]

In the end, some States have taken up the subject and have undertaken to regulate the carbon neutrality claims of companies. This is the case for France, which in the Climate and Resilience Law voted in August 2021, prohibits an advertiser from claiming "carbon neutrality" for its product or service without presenting an easily publicly accessible and yearly updated GHG balance sheet for its entire life cycle.[54] The European Union is also considering an initiative to regulate "green claims" more generally.

Standards for building a common approach to offsetting aligned with the Paris Agreement

As with organisations' commitments and claims to carbon neutrality, there is no regulatory authority for the voluntary carbon market. Since 2008, the International Carbon Reduction and Offset Alliance (ICROA) has been accrediting organisations, active in the emissions reduction and compensation value chain and which comply with its own "Code of Good Practices", with a view to enhancing the integrity, quality, and impact of carbon credits. In 2011, it joined the International Emission Trading Association (IETA), created in 1999 following the signing of the Kyoto Protocol. In recent years, several standards have been developed to promote adherence to common principles of integrity and robustness in the area of compensation.

Published in September 2020, **the Oxford Principles seek to define common principles in order that all Net Zero commitments may converge to the same propositions and requirements regarding the use of carbon credits**. These principles aim to provide credit buyers with a consistent understanding of the role of compensation as part of an overall mitigation strategy.[55] The Oxford Principles have been integrated into the Race to Zero campaign mobilising coalitions of businesses, investors, universities, cities, states and regions committed to carbon neutrality.[56] The principles of the *Race to Zero* campaign include:

- **Principle 1.** Prioritise reducing your own emissions first, ensure the environmental integrity of any offsets used, and disclose how offsets are used;
- **Principle 2.** Shift offsetting towards carbon removal, where offsets directly remove carbon from the atmosphere;
- **Principle 3.** Shift offsetting towards long-lived storage, which removes carbon from the atmosphere permanently or almost permanently;
- **Principle 4.** Support for the development of a market for net zero aligned offsets.

The principles proposed by the study are intended to be applicable to all non-state actors who, on the demand side, wish to use offsetting in the carbon neutrality plans. By encouraging carbon capture and storage (CCS), the Oxford Principles prioritise a resolutely technological approach to offsetting over a "nature-based" approach, arguing for greater permanence of storage made possible by CCS.[i] A position shared by Carbon Direct in its analyses **(SEE ABOVE)**, which pleads for the multiplication of long-term sequestration credits.

i Regarding the status of carbon capture and storage technologies, read "CCUS is entering a pivotal period", by Guillaume Marchand, page 141 in: Global Observatory of Non-State Climate Action (2021). Global assessment of non-state climate action by sector. *Climate Chance*

At the same time, in September 2020, the **Taskforce on Scaling Voluntary Carbon Markets (TSVCM)** was born, an international multi-actor initiative aimed at driving the growth of the voluntary carbon market. Initiated by Mark Carney, United Nations Special Envoy for Climate Action and financial adviser to Boris Johnson for COP26, the TSVCM has brought together more than 250 representatives of private companies (Nestlé, Shell, Maersk, Tata Steel, Etihad, etc.), carbon offsetting operators (EcoAct, South Pole, etc.), certifying agencies (Gold Standard, Verra, ACR, etc.), financiers (BNP, UBS, Goldman Sachs, etc.), and even researchers (LSE, etc.). The work of the taskforce has resulted in the publication of several reports and the formation of a new governance body in October 2021, called the **Integrity Council for Voluntary Carbon Markets (IC-VCM)**.

The IC-VCM is now responsible for developing the *Core Carbon Principles (CCPs)*, a "meta standard" that should serve as a common denominator for certification methodologies to promote high-quality and transparent carbon credits. The first step in IC-VCM's work was to appoint three members from indigenous peoples and local communities to its governing board to represent people living in the regions of the world most affected by carbon projects.[57]

KEY TAKEAWAYS

2021 was a banner year for the voluntary carbon market, driven by the upsurge of corporate commitments to achieve "net zero emissions". By exceeding a billion dollars for the first time and multiplying fourfold year-on-year between 2020 and 2021, the value of credits traded globally shows the growing interest of companies in this instrument within the framework of their transition plans. In particular, credits certifying nature-based solution projects (afforestation, reforestation, conservation, etc.) are enjoying a thriving success and occupy the leading position in the market. The co-benefits for biodiversity and the socio-economic development of local communities are also highly sought after. However, emission removal credits allowing the capture and additional sequestration of CO_2 in the long term, remain very underdeveloped.

While it is dynamic, the size of the voluntary carbon market nonetheless remains modest and still far from carbon pricing levels considered compatible with a trajectory that limits global warming to 2 or 1.5 °C. While it allows channelling of private financial resources towards projects beneficial to the mitigation of greenhouse gas emissions, the possibility offered to companies and other organisations to claim "carbon neutrality" in the absence of universal standards incites controversy. Therefore, alongside this development, new governance frameworks and standards are being created, that structure and regulate the use of carbon credits and strategies based on carbon neutrality. Though the adoption of Article 6 of the Paris Agreement may not result in a change on the fundamentals of the market for the time being, it will allow better integration of the voluntary market with that of the signatory States.

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