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# WALK

Human rights are for everyone

**By John Ruggie**

How to bring private enterprise into the  
SDGs and the Paris Climate Agreement

**By Jeffrey D. Sachs and  
Lisa E. Sachs**

Women in mining

**By Gillian Davidson**



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This issue of WALK magazine offers thought-provoking solutions for a post-pandemic world. We evaluate the progress of companies in achieving the goals set by the United Nations in the SDGs. (We have ten years to make them reality). The Paris Climate Agreement is revisited. The urgent challenges faced by the Amazon are outlined and we examine how shared infrastructure, the Carajás Railroad, can be part of the solution for life in the world's largest rainforest. Our reporters discover solutions across cultures, in the Nordic countries, in China and Japan, as well as inspiration in the breathtaking art of Brazil's Inhotim Institute. We discuss the new role of women in mining and how COVID-19 will test the sustainability of finance. All of this is enveloped by the engaging reflections of some of the world's greatest authorities on corporate sustainability. We have learned much from this edition of WALK. We hope you will too.

**We hope that  
you too will find this  
WALK useful and  
inspiring.**

# How is business doing with the Sustainable Development Goals?

The implementation of the 17 Sustainable Development Goals (SDGs) will be a central element in the global economic agenda this decade. Established in 2015, these objectives create ambitious targets for United Nations member states and address the most significant global challenges in the world today: from social inequality and an uncontrolled climate crisis to women's rights, clean water, growing unemployment around the world and more. The SDGs are not, therefore, a typical international agreement, but a kind of guide to a global consensus, a "to-do list" for the planet – with a deadline set for the year 2030.

But it isn't going to be a walk in the park. Even getting close to achieving these goals looks challenging. The United Nations Development Program (UNDP) estimates that US\$5 to 7 trillion will be needed to carry out the SDGs. In developing countries, the situation is more difficult still. There is US\$2.5 trillion gap between

what the developed nations have offered via Official Development Assistance (ODA) and the sum needed to carry out the goals.

So to even begin to set out plans to achieve the SDGs, new ideas in finance and economic relations will be needed. These will no doubt encourage partnerships with the private sector and new thinking in the global marketplace. But how can we make these new ideas viable, practical and efficient? While the SDGs need business contributions to be successful, companies do not, at least in the conventional way, rely on the SDGs for commercial success. So far the answers to these questions are still inconclusive, but we have some interesting ideas in sight.

"When you see firms like BlackRock stating that it will direct part of its resources to companies that have socio-environmental concerns, we

realize that something has changed,” explains Pedro Saad, who holds a PhD in Business Administration from Pontifical Catholic University of São Paulo (PUC-SP in Portuguese). Saad is the author of *Companies and SDGs: prioritizing sustainable actions with greater economic, social and environmental returns for humanity*, a dissertation that proposes a method to assist companies in making decisions regarding sustainability. “At the last meeting in Davos it became clear that the environmental and social agendas are being integrated into business strategy,” he added.

At least in rhetorical terms, using SDGs as a lens to establish priorities is starting to become pretty standard practice. Companies are going through a mapping exercise to identify what they can do to support global goals and to set internal aims to achieve the global targets. These initiatives range from using the SDGs as a corporate strategy to educating staff about them and engaging customers. This is detailed by an extensive study commissioned by the [Canadian government](#) in November 2018, which interviewed 30 local entrepreneurs about the UN’s global goals, from small businesses to large multi-national companies. Remarkably, all of them had heard of the SDGs and many were already using them to help determine their core value propositions. SDGs provide, one can say, both a stimulus and a framework for corporate sustainability targets. “It is a moment of very high investment and great opportunities,” Saad said. “Today the best business in the world is to save it. So when a company carries out a change in its production model and in the provision of services, in a sustainable way, it becomes a first-rate competitor.”

Nonetheless, five years have passed since the adoption of the goals and, while a growing number of global companies are expressing awareness and support for the SDGs, there is a substantial risk that for many companies the goals will end up being only a communication tool. This is a trend that needs to be overcome at the moment.

**“At the last meeting in Davos it became clear that the environmental and social agendas are being integrated into business strategy”**

### **Amid ups and downs: Some hope and progress**

Recent studies on the progress made by companies in pursuing the SDGs have shown bittersweet results. According to a study released last year by Canadian consultancy GlobeScan, large companies are still perceived as failing to use their global influence to create long-term results for society and the environment. Non-governmental organizations (NGOs), the UN and social entrepreneurs are still seen as driving most of the progress towards achieving the goals.

For Saad, due to the large number of SDGs — compared to their predecessors, the quite successful Millennium Development Goals (MDGs) — the major obstacle for companies so far has been to establish priorities among the goals. Actions for now are only presented qualitatively, without any expected cost/benefit parameter that can assist companies and investors in decision making. Some guidelines have been developed by independent groups like Copenhagen Consensus, a project that defends prioritizing the SDG targets based on a return per dollar invested, but the overall picture is still evolving slowly. “We have had advances. Some of the goals are being addressed more effectively than others, but none of them is close to being effectively achieved,” Saad points out.

The 2030 Agenda seems to be also a difficult framework for companies to grasp. There is a role for companies as contributors to the global goals but when it comes to articulating clear expectations they have remained vague. One example is the way in which the private sector has been dealing with issues related to life under water (SDG #14). “The blueprint for oceans does not include two measures which could prove decisive, which are expanding reef areas through artificial reserves and protecting mangroves,” Saad said. “So when we talk about oceans, the impression of a layman, since we don’t have a hierarchical agenda or a cost-benefit analysis, is to pick up plastic as an ideal practice.”

Initiatives such as the World Benchmarking Alliance or the Global Compact’s Action Platform on SDG Reporting have emerged in recent years as important mechanisms to organize expectations on SDG engagement, but they are still in the early stages of development and implementation.



Time, actually, appears to be a kind of double agent for the SDGs. While there has been scarce progress on the part of companies from 2015 up until now, the proportion of experts who say progress has been poor has decreased from 85% to 49%, according to GlobalScan. From this trend, it is possible to conclude that full compliance of companies to the SDGs could be just a matter of giving the companies more time. For Carlo Linkevicius Pereira, executive director at UN Global Compact Network Brazil, it is not easy to turn this key when it comes to a corporate environment. “The Agenda was launched five years ago. Five years seems like quite a long time, but it is not. For a change in the mindset of companies, and not only in companies, in the economy as a whole, it is a very short time.”

He added that “even if, suddenly, a CEO was enlightened about the question, the executive may still find resistance in his/her board of directors, which in itself already constitutes a new fight.”

Pereira also admits that, although there is a strong risk that the Agenda’s goals will not be achieved, there is considerable progress being made compared to the early years of the 21st century. “Of course, we are full of anxiety, but the economic system is adapting. The financial sector, which 10 or 15 years ago did not even mention this agenda, is coming around swiftly now. So this is a significative change,” he pointed out.

One turning point for the SDGs is the growing concern about climate action (SDG #13). According to GlobalScan, this goal is the SDG receiving the most attention within organizations across a majority of regions. The only exception are companies based in Africa and the Middle East, who are slightly more likely to point to No Poverty (SDG #1) as a priority.

“As the scientific community has announced that the damage caused by climate change will impact not only developing countries, but also rich countries, climate action has started to become a private sector strategy. And this is very positive because it brings along with it, to a certain extent at least, the social question,” Saad points out.

Climate Action appears to be turning into a decisive hub for other SDGs. As the latest SDG Progress Report points out, climate crisis threatens to create a major obstacle to the other goals, including global health, poverty, hunger, life on land and life below water. In the worst scenario, according to the World Bank, 100-400 million people could be at risk of hunger and 1-2 billion more people may no longer have adequate water as a result of the climate crisis.

### The shadow link: Human rights agenda, developing countries and gender equality

As the main catalyst for the SDGs’ achievement, Climate Action brings up important issues such as human rights, economic inequality and gender equality.

Ensuring greater respect for human rights, for example, is one of the most important social development contributions that companies can make as adapting a humanist mindset to the core of companies is in line with the SDGs, spirit of “not leaving anyone behind.” Viewing the issues through a human rights lens could change how companies tackle sustainable development problems, prioritize them, assign responsibilities and establish targets.

But statistics are not encouraging. According to an [Oxfam study](#), even though more than 90% of global companies support human rights, there is little evidence that they are applying the SDGs from a humanist perspective — making reference to human rights principles and standards, conducting human rights due diligence and impact assessments, etc.

Some organizations are taking action, however. The Danish Institute for Human Rights recently created a database, which provides almost 100 examples of companies that have taken action to address their salient human rights issues. The accessible case stories are grouped according to frequently reported salient human rights issues and are categorized in line with the different steps of the human rights due diligence process outlined in the UN Guiding Principles on Business and Human Rights (UNGPs).



Another key issue is the economic inequality between countries and the need for technology transfer. While the poorest half of the world's population causes just 10% of carbon dioxide emissions, developing countries will carry an estimated 75% of the costs of the climate crisis, according to 2019 UN Human Rights Reports. Developed nations are the biggest polluters, and these trends put those who are least responsible for climate change — like low-lying island nations and Indigenous communities — at enormous risk. "Rich countries develop technology, become more competitive, and from there they add value in their production and depend less on developing states," Saad said. "So income distribution across nations doesn't happen."

When it comes to women's rights, numbers remain low. Last December, a World Economic Forum report concluded that, at the current rate of change, women will have to wait 257 years

for equal pay. The report measured the gender gap in 153 countries across politics, economics, health and education: Iceland was recognized as the most gender-equal country, while Norway, Finland, Sweden and Nicaragua rounded out the top five.

Wage in equity is not the only problem resulting from the gender gap. Unequal access to education and social autonomy are issues, as well. For Saad, society needs to support women with birth control and family planning: "In many poor or developing countries, women have no support, no information or methods of contraceptive control. So me women might have four or five children and end up trapped in a cycle of misery. Often these children do not have access to education, or a family structure and society as a result does not grow."

Pereira adds ethnic-racial exclusion as an aggravating factor related to women, especially



in Brazil. According to a 2015 survey by Ethos Institute, only 0.4% of black women, for example, achieve senior high management positions in companies. “This is an unacceptable and bizarre gap that we have to close,” he said.

### A World Economic

**Forum** report concluded women will have to wait 257 years for equal pay at current rate of change

### The Decade of Action: Expectations for 2030

Despite the apparent stalemate, the UN has called for “a decade of action” to deliver the 2030 Agenda and some promising initiatives are already crystallizing.

Last December, the United Nations Global Compact announced a CFO Task Force to put corporate finance at the centre of the Sustainable Finance agenda to advance the SDGs.

The CFO Task Force, which will be led by Enel and PIMCO, aims to leverage the nearly 10,000 companies participating in the UN Global Compact and include an annual survey to monitor the state of progress in the Global CFO community.

For Jorge Soto, Sustainable Development Director for the Brazilian company Braskem, one of the initiative’s co-founders, “the economic pillar is an inseparable part of sustainable development.” He adds: “We are trying to identify ways to strengthen the relationship between investors who want to have a more sustainable asset portfolio and companies who want to contribute and advance their business strategies integrated with the sustainable development principles.”

Recently, 17 global companies, including SAP, Unilever and Diageo, have joined forces under a new coalition called the Business Avengers. The campaign was launched during Climate Week New York and elects a goal for each company. Diageo, for example, will championing SDG #6 for clean water and sanitation, while Google is sponsoring SDG #8 for decent work and economic growth. At the same event, French company Danone launched the 19-company coalition **One Planet Business for Biodiversity** (OP2B), a project which aims to conserve and restore global biodiversity.

For Saad, this promising movement related to SDG investments is generated by competition. “For a company to be prosperous and long-lived a light environmental footprint and social concerns are fundamental; but that doesn’t mean these goals are easily achieved,” he adds.

The 2020s are going to be a critical decade to alter the trajectory on SDGs, requiring immediate action from the corporate and financial sectors. Companies are still charting their courses, but there is still time to update the map. We know where the destination is located.



**Jeffrey D. Sachs  
and Lisa E. Sachs**

Director of the UN Sustainable Development Solutions Network  
and Director of the Columbia Center on Sustainable Investment

# Aligning Business with the SDGs and the Paris Climate Agreement

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Business enterprises play a critical role in achieving the Sustainable Development Goals (SDGs) and the Paris Climate Agreement (PCA). Their product lines, business operations, supply chains, and interactions with government and society can make or break the SDGs. We therefore need accurate, reliable, and standardized guidelines and reporting standards to ensure that businesses align with the SDGs and the PCA. Such standards do not yet exist. There are several current initiatives that should be strengthened and harmonized to support the business sector as it reorients towards sustainable development, and to hold companies accountable that resist the necessary changes.

The UN Sustainable Development Solutions Network (SDSN) and the Columbia Center on Sustainable Investment (CCSI) are working to develop a robust framework for promoting and measuring business alignment with the SDGs and PCA across a number of industries, starting with the electric-utility and food sectors.



The proposed standards – for practice, disclosure and measurement – should reflect the needs of five main constituencies. The first are the boards and senior managers of the companies, who need objective guidance and information to ensure alignment of the company's operations with the SDGs and PCA and to assess performance relative to competitor firms. The second are the policymakers, who have choices to make from among interested investors and are charged with formulating and implementing key policies (such as emissions standards, impact assessments, disclosure requirements, and accounting). The third are investors, which are increasingly subject to ESG investment mandates that encourage them to consider the impacts of their investments, and not only ESG risks. The fourth are civil-society organizations that advocate for effective environmental and social policies and that hold governments and businesses accountable. The fifth is the general public, including customers, young people, and the broad citizenry.

Today's diversity of guidelines and reporting frameworks is causing serious problems for each of these constituencies. Standards, reporting frameworks and metrics are both divergent and inadequate to promote and measure holistic alignment with the SDGs; they often give a relatively free pass to companies that are promising more than they are delivering. Rigorous standards and assessment tools should hold companies to account for their real actions, not only their rhetoric, and clearly distinguish between good and weak performers.

The SDSN-CCSI framework recommends four dimensions of business alignment with the SDGs and PCA:

**1. Product lines are beneficial for society: What does the company produce? What are the impacts of the goods and services that it markets today and plans to market in the future?**

Some products have been transformative for health, clean energy, and quality of life, while others, like sugary beverages and fossil fuels, are inherently misaligned with improved living standards and the sustainability of our planet.

**2. Production processes are socially and environmentally sustainable: How does the company produce its goods and services? What are the resulting environmental and social impacts of production?**

There are many issues here, including strict limitations of environmental damages to biodiversity and human settlements; responsible engagement with and law-abiding consent from affected communities, especially marginalized communities; and the protection of all workers rights to health, working hours, representation, and fair remuneration.

**3. Value chains are socially and environmentally sustainable: Where does the company source materials from, and how are its products used downstream? Does it take responsibility for its value chain?**

Global value chains can be complex, involving energy, transport, services, agriculture, and other sectors. Companies must assume co-responsibility for the sustainability of their value chains both upstream and downstream, rather than shifting risks and externalities toward the producers or consumers.

**4. Good company citizenship: How does the company see its role in domestic economies and in the global economy?**

Good company citizenship includes: respect for and fulfillment of all applicable regulations and best practices; transparency in corporate affairs; gender equality in human resources; honest tax practices; responsible use of litigation; refraining from corporate lobbying to weaken regulations; and so forth.

We note that most existing reporting processes, including the annual sustainability and corporate reports of companies themselves, touch on a relatively narrow subset of the variables outlined above as key to SDG and PCA alignment.

SDSN and CCSI look forward to working with industry leaders to support their efforts to align with the SDGs and the PCA, and thereby to contribute to a more prosperous, healthful, inclusive, and sustainable world.

# Rainforest under **fire**

When news emerged in August 2019 that massive fires were raging in the Amazon, the world's most biodiverse ecosystem became an urgent geopolitical issue.

Images of deep orange flames engulfing towering trees and huge plumes of smoke billowing into the sky filled screens all over the world. Pundits made catastrophic forecasts of the rainforest's demise, and, tweet after tweet, voices from all corners of the planet pleaded with Brazil's government to save "the lungs of the Earth." Desolating pictures of ravaged

fields with a few charred tree trunks still standing touched the hearts of millions of people around the globe.

A swirl of Amazon deforestation data – some correct, some unwittingly misleading and many downright wrong – jolted social media and added a sense of urgency to the issue. After all, the notion that forest fires cause heat-trapping greenhouse gases – a key driver of global warming – has become widely recognized. And in a year when cities, countries and scientists around the world declared a climate emergency, the deforestation of the Amazon took centre stage.

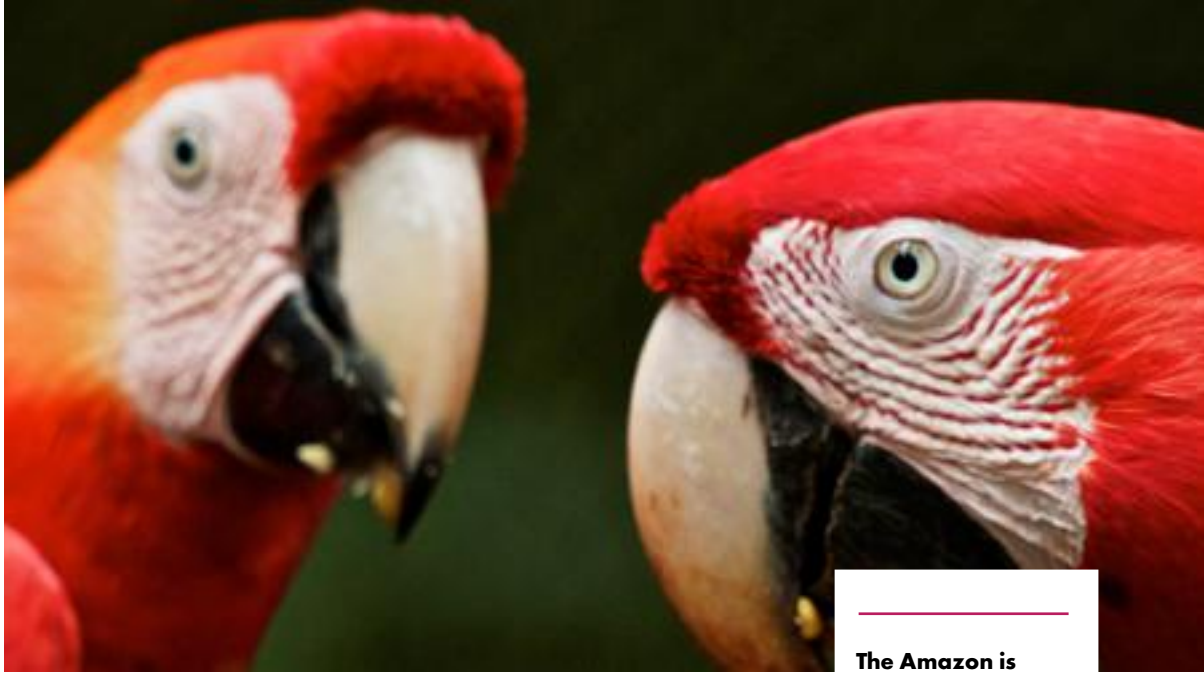


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**Carlos Nobre and**

**Thomas E. Lovejoy**, two renowned specialists who have dedicated their careers to the study of the Amazon, called attention in an 2018 article in *ScienceAdvances* magazine to the urgent need to "strictly curb further deforestation" in the region.





**The Amazon is starting to show signs that we are near a tipping point,** says climatologist Carlos Nobre

### **World leaders jumped in to action.**

French President Emmanuel Macron tweeted “our house is burning,” and called on his counterparts to make the Amazon a priority as they gathered for the Group of Seven Summit in southwest France in late August. British Prime Minister Boris Johnson and German Chancellor Angela Merkel joined the chorus, and the world’s richest nations pledged to provide at least 20 million euros (\$22 million) in emergency funding to help control the fires in the rainforest.

Canadian Prime Minister Justin Trudeau said he would send his country’s famous forest fire-fighting water bombers to help, and also promised a cheque for \$15 million. President Donald Trump, who had skipped the summit in France, said the U.S. was ready to assist Brazil in taming the flames.

Outside of the government arena, a constellation of celebrities took to their heavily-followed accounts to call on Brazil to act. “The lungs of our planet” was the most widely used description and #PrayforAmazonia became a social media mantra.

Actor and environmentalist Leonardo DiCaprio created a new environmental foundation –

Earth Alliance – and made a \$5 million pledge; Madonna took to Instagram to lament the destruction of species that make the rainforest the most biodiverse ecosystem in the world. Climate activist Greta Thunberg, while crossing the Atlantic Ocean on a sailboat to get to the UN Climate Action Summit in New York, warned her millions of followers that Brazil’s rainforest was nearing a tipping point and commanded: “our war against nature must end.”

From pop music stars Jennifer Lopez and Shakira to soccer player Cristiano Ronaldo and tennis legend Novak Djokovic, the rich and famous wanted to know what they could do “to help stop the fire in the Amazon.”

The 2019 fires were indeed exceptional. The burning was so widespread that smoke reached Sao Paulo thousands of kilometers away, blacking out the midday sun over Brazil’s largest city. The National Aeronautics and Space Administration (NASA) confirmed that smoke from the fires was clearly visible from space, as it had spread across several Brazilian states. “Although it is fire season in Brazil, the number of fires may be record-setting,” the agency tweeted.



There were nearly 73,000 fires detected by Brazil's respected National Space Research Agency, known as INPE. In the year to August, that represented an 83 percent increase compared with the same period in the previous year.

As of the end of August, more than 80,000 fires across Brazil were registered in the year by INPE, a 77% year-to-year increase for the same period in 2018. Of that total, more than 40,000 fires were tallied in the Brazilian Amazon, which comprises 60 percent of the entire Amazon basin. Similar year-on-year increases were reported in Paraguay, Bolivia and Peru.

"The fires were worse in 2019 than in any other year over the past decade, and the world is watching us because the Amazon is a global resource," said Carlos Nobre, one of Brazil's top climate scientists and a senior researcher at the University of Sao Paulo's Institute for Advanced Studies.

Traditionally, as humidity levels would start to tick up around the end of the dry season in November, fires would die down before getting too big. But this year was drier and hotter. July was the hottest month on record for planet Earth, according to the National Oceanic and Atmospheric Administration (NOAA).

Deforestation – which goes hand in hand with the fires – also increased markedly in 2019, when INPE observed a sharp uptick from previous years. Nearly 3,800 square miles – an area slightly smaller than Lebanon – lost forest cover in the 12 months through July, INPE said. The reading was almost 30 percent higher than the 2,900 square miles of forest cleared in the previous 12 months, and the highest level of deforestation since 2008.

While the data was eye-popping, setting the forest on fire to clear land isn't anything new in the Amazon – or in other areas of the world where forests have been converted to pasture

or agricultural land. Slash-and-burn forest clearing has been used in the Amazon region since large-scale development took off in the late 1960s. During the dry season, which runs from around July to November, it's a cheaper way to clear land because fires catch on more quickly. Smoke from fires in July and August, when land is being prepared for production, has been a fact of life for decades in the south-central and southeastern Amazon, where land has been heavily cleared for cattle and agriculture.

### Forces behind deforestation

The 2019 fires shed light on the complexity of the deforestation issue, and the many layers of geopolitical factors, global market forces and national policy elements that contribute to the problem. Booming global demand for cattle, agricultural commodities and minerals, which is the underlying forces propelling deforestation, is vastly overlooked in media coverage and political discussions about the Amazon on the world stage. Moreover, local land management and development policies adopted by Brazil have rarely considered the Amazon from a conservation perspective.

It is clear to scientists today that protecting the integrity of the Amazon biome can play a positive role in preserving immense reserves of biodiversity and in the maintaining hydrological cycles crucial to agriculture throughout much of South America. The Amazon ecosystem, like tropical forests in Indonesia and the Congo, is a crucial element in the battle against climate change on a global scale. Maintaining the great majority of this ecosystem intact can help protect the world against future pandemics, moreover, since deforestation drags humans into contact with formerly unknown viruses. Scientists are certain that a rational and efficient approach to preserving the Amazonian ecosystem has never been more urgent.



While there are some who attempt to dispute the significance and/or extent of the destruction of the Amazon with respected non-government and scientific organizations, peer-reviewed studies attest overwhelmingly that the climate is changing, influencing all life on Earth, and altering weather and hydrology patterns.

What scientists had predicted in the 1990s – when a consensus position emerged around global warming – is currently happening: loss of sea ice, accelerated sea level rise and longer, more intense heat waves. Extreme weather events such as slower and more powerful hurricanes and tropical storms, and longer and more intense droughts are also occurring more frequently.

The Intergovernmental Panel on Climate Change (IPCC) established a threshold warming of 1.5 degrees Celsius pre-industrial average temperatures in a sobering report last year. Scientists said the effects of climate change would be catastrophic if the world couldn't limit temperatures drastically. Even at those levels, the consequences of climate change would be far greater than previously thought. The past decade has already seen a series of record-breaking storms, droughts, coral bleaching events, forest fires, heat waves and floods around the world with an increase of just 1.0 degree Celsius.

A part of this complex equation which has been overlooked in the heated discussions under the Paris Climate Agreement is the value of forests in the global strategy for climate mitigation and adaptation.

The relationship between forests and the changing climate has become more clear over the past couple of decades as scientists research how the loss of tree cover contributes

to climate change, and, in the opposite direction, how forests can cool the climate and change weather patterns.

Forests are both a giant pool of carbon, containing more CO<sub>2</sub> than all reserves of fossil fuels, and a key weapon in the fight against climate change, absorbing over 25 percent of the carbon dioxide humans add to the atmosphere every year. Nobre says that avoiding forest carbon emissions is just as urgent as halting fossil fuel use.

When a forest is cleared and burned, all the carbon it has stored over centuries is immediately released to the atmosphere. In addition, once a forest is cut, the planet loses the future carbon sequestration it would provide if it were preserved. Clearcutting forests also releases enormous pools of carbon that are locked in forest soils, especially in pristine forests. Trees can be replanted and forests can recover some of their carbon-capturing capacity, but intact forests provide a much better service to the planet.

In the Amazon, the biggest terrestrial carbon sink on Earth, reducing deforestation and forest degradation rates, and reviving cleared forests with species that are more heat-resistant is a vital strategy for climate change mitigation, generating global benefits, scientists say.

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### **The Amazon rainforest is a unique**

**system** because it produces much of its own rainfall and enough moisture to send rainfall south to other areas in South America



## The power of trees

The preservation of forests and reforestation of degraded ones must be the focus of climate mitigation efforts, says Thomas Crowther, author of a study that concluded that adding 3 trillion new trees could capture about two-thirds of all man-made carbon emissions. That would be the equivalent of canceling out an entire decade of CO<sub>2</sub> emissions.

"The restoration of trees is even more effective than we thought in terms of strategies for climate mitigation," Crowther said. The scientists had published an original article this year – *The global tree restoration potential*. In the study, published by Science, the authors state:

"World temperatures won't stay below 1.5 if we don't save our forests and replant trees."

The Amazon rainforest has a big part to play in this strategy. It's a unique system because it produces much of its own rainfall, and also enough moisture to send rainfall south to other areas in South America. As moisture travels west from the Atlantic Ocean, the trees in the rainforest recycle it. Rainwater is also produced when trees draw moisture from the roots to the canopy, creating a cooling effect when water evaporates from the leaves and then is released to the atmosphere, where it creates more rain.

By observing this mechanism, Nobre was able to show that the Amazon generates approximately half of its own rainfall by recycling moisture five to six times as it moves west. But this raised the question of how deforestation affected the system. How much destruction would it take to cause the cycle to break down and stop supporting the rainforest?, he asked.

In a ground-breaking study in 2007 Nobre and Gilvan Sampaio, a climate researcher at INPE, forecast that if the rate of deforestation reached

# "World temperatures won't stay below 1.5 if we don't save our forests and replant trees."

40 percent, the loss of water-recycling capacity would mean that the remaining forest may not have enough rainfall to survive. The Amazon would turn into a savannah, similar to the Cerrado, the ecosystem that expands south of the rainforest through central Brazil, Nobre concluded from his models.

Over the past 50 years the Amazon has lost 17 percent of its forest cover, an enormous amount but still far from the estimated tipping point of 40 percent. But last year, in an editorial titled *Amazon Tipping Point*, Nobre and Thomas Lovejoy of George Mason University included more climate change variables in the model as well as the increase in fires and rate of deforestation. They revised the estimate of the threshold to 20 percent to 25 percent, scarily close to the current deforestation rate.

This year, another alarm bell rang when prominent Brazilian economist Monica de Bolle wrote that rising deforestation and the weakening of environmental protections by the current Brazilian government could push the Amazon to an irreversible tipping point within just two years, as soon as 2021. Beyond that point, "the rainforest can no longer generate enough rain to sustain itself," she wrote in a policy paper as a researcher at the Peterson Institute for International Economics.

Lovejoy and Nobre argue that climate change means that people have less and less control over how things will pan out. The higher rate of deforestation and jump in fires created a negative combination that is accelerating the forest's destruction. Recent extreme events in Brazil such as the 2005 drought and the floods in 2009, 2012 and 2014 were signs, Nobre says.

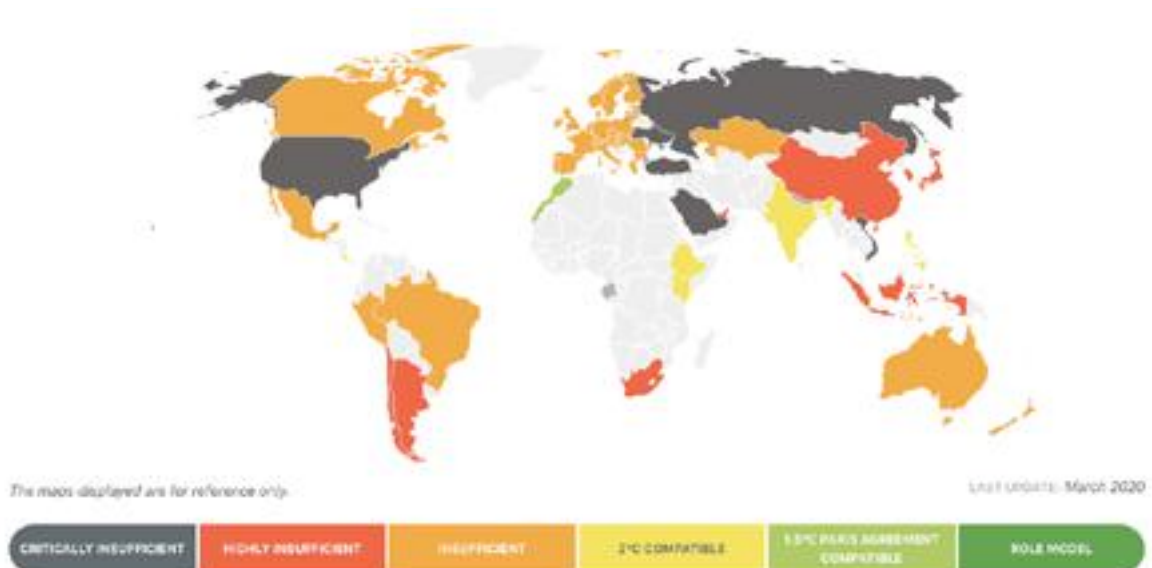
"We have seen since 2005 these very atypical weather patterns in the Amazon, and several record-breaking events. The Amazon is starting to show signs that we are near a tipping point," he says.

# The missing parties: Why Cop 25 was a big disappointment

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Disappointment with the results of the Conference of the Parties (COP) 25, which took place in Madrid at the end of 2019, did not take much time to reveal itself. Two days after the end of the meeting, the Director-General of the United Nations, Antonio Guterres, tweeted: "I am disappointed with the results of #COP25. The international community lost an important opportunity to show increased ambition on mitigation, adaptation & finance to tackle the climate crisis. But we must not give up, and I will not give up."

There were plenty of reasons for dismay. After some uncertainty about its realization due to the protests that were taking place in Chile, the meetings in Madrid failed to reach any effective progress in what were considered to be its three main objectives: the carbon market, compensation to countries most affected by climate change and the review of the Nationally Determined Contributions (NDCs) the goals that each country stipulates for its own emissions reductions.



Source: <https://climateactiontracker.org/countries/>

The lack of commitment to the goals established by the Paris Agreement on the part of major emitters, such as Russia, China, USA and Brazil, was likewise considered discouraging. The perception is that, despite the growth in the number of countries, cities and companies committed to the idea of reaching a net zero carbon balance, there are few that effectively work toward the two degree target. And only two, Morocco and Gambia, have adequate planning in place to reduce the increase in global temperature to 1.5° C.

In light of this situation, it is natural to inquire about the future of global climate initiatives and what will be the necessary agenda for COP 26, scheduled to take place in Glasgow, Scotland, in November 2020.

## At COP 25, the scope of the NDCs should have been reevaluated to bring the contributions in line with a goal of a 1.5C rise in temperature

With regards to the carbon market, one of the major disappointments at COP 25, it is expected that, throughout 2020, and especially at the COP 26 in Glasgow, it will be possible to finally reach an agreement on how to value the credits obtained by the Kyoto Agreement, which preceded the Paris Agreement, and how to define the standards and mechanisms needed to make Article 6 of the Paris Agreement effective. This would discipline the carbon market globally, but an agreement still hinges on the resolving clauses. The International Emissions Trading Association (IETA) published data on the economic potential of Article 6. The assessment is that global regulation of carbon markets will result in gains of approximately US\$320 billion by 2030.

The long-standing goal of mobilizing US\$100 billion per year in financing for developing countries impacted by climate change likewise awaits a diplomatic agreement to move forward.

Finally, at COP 25, the scope of the NDCs should have been reevaluated to bring them in line with a goal of a 1.5°C temperature rise in relation to the pre-industrial period. Since this did not happen, the alternative is to continue with parallel initiatives to adhere to this goal. Currently, 143 countries – which together account for less than 30% of global emissions – have committed to updating or increasing their contribution targets by the end of 2020. So far, only four have met this commitment.



The hope is that, by the end of COP 26, these issues will be resolved and all countries will be able to move forward with a mechanism to reduce their emissions. The time available to meet this goal is getting shorter and shorter.

# Can a human-centred 'super-smart society' be the future of our species? In Japan, it is a reality in the making

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It was late 2014 and she was in charge of the Fifth Science and Technology Basic Plan (2016-2020) for the government of Japan, a five-year planning system to formulate science and innovation policy, when the concept came up. Society 5.0. It's impossible to go on with business as usual, she said to herself. It's time to assess the past and to look ahead. Instead of identifying a road map for technologies, we should think about the future society. Society should always come first. And then, from this perspective, what should be the approach for scientific innovation? What are the key issues to prepare for it?

And the race was on, so to speak, with Dr. Yuko Harayama – former Executive Member of the Council for Science and Technology Policy

at the Cabinet Office of Japan and former Deputy Director of the Directorate for Science, Technology and Innovation at the Organization for Economic Cooperation and Development (OECD) – behind the wheel. The destination is a "super-smart society," human-centred, integrated and inclusive, in which everyone shares the same opportunities, and economic growth and well-being are guaranteed to all. Furthermore, in this society, various 21st century challenges will be addressed: the ageing population, climate change, food security, the limited availability of natural resources and the fulfilment of the 2030 Agenda for Sustainable Development.

Sound ambitious? Well, it is. And Dr. Yuko Harayama is hopeful.

**Society 5.0 is proposing solutions for a better human life that will be implemented through a combined use of Big Data, AI (artificial intelligence) and IoT (internet of things), which entails the use of augmented and virtual realities, 3D printers, and new business models such as FinTech (financial technology) and alike. Correct?**

**Yuko Harayama:** Yes. Things such as intelligent transport systems, community care and healthcare systems, food production and distribution, and disaster prevention are examples of such solutions. But the influence and impact of this concept have been extended immensely, just after three or four years. From science and innovation, it grew into a more general economic and social scope. Big companies are taking action to align with it, as well as local governments, universities and high schools. In a sense, it has become a type of social movement. Of course, this will take time. It's still a baby, but it'll grow up, it's a dynamic process.

**One of the issues that this “super-smart society” you are working towards deals with is population aging, a reality in Japan that is becoming more widespread, including in Brazil. What’s your strategy to address this?**

**YH:** Aging is an undeniable demographic trend. We're not only living longer; we also have to live with dignity. Elderly care systems should not be thought of in an isolated way, but combined with other infrastructure, like mobility, especially outside big cities, like Tokyo. And it is imperative that elders feel useful to society. That's a key driver in well-being. We have to combine all of the ingredients. The Japanese Minister of Health has implemented what they call the Orange Plan, which trains ordinary citizens to be in touch and care for elders with dementia. This is being put into place right now. We have to act in all areas at once to assure a healthier and more active life for the elderly. Traditional

families in Japan used to live in one home, two or three generations together, but this is not the case anymore. So, we have to find new ways to create a sense of community, finding proximity with neighbours, supporting each other mutually, and making elders feel useful to society.

**In mid 2019, the European Commission published its Ethics Guidelines for Trustworthy AI, a set of seven key requirements that AI systems should meet in order to be deemed trustworthy. For many people, AI feels like a double-edged sword. What’s your position on the matter?**

**YH:** AI is a key future technology, but one must also be careful with it. When I was in government, we set up a committee identifying key societal impacts and ethical issues of AI developments. It was a first in the Japanese government. And we called not only scientists, but economists, sociologists and even philosophers, societal stakeholders like journalists, to be members of this committee, and I asked them not to formulate policy, but to identify potential societal challenges with the use and development of AI. So, we set up basic principles. This is also being discussed on an international level, at the OECD in Paris. Digitalization is a means, but we humans must remain central actors.

**Is Society 5.0 in tune with other models for a future society you see out there? Do you see it taking roots in countries with, say, unequal distribution of access to electricity, water, coal, let alone internet and 5G?**

**YH:** When you have very well-established

**Digitalization is a means, but we humans must remain central actors.**




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### The evolution of society:

Taking a long view of history, Harayama explains, Society 1.0 can be defined as groups of people hunting and gathering in harmonious coexistence with nature; Society 2.0 as forming groups based on agricultural cultivation, increasing organization and nation-building; Society 3.0 as a society that promotes industrialization through the Industrial Revolution, making mass production possible; and Society 4.0 as an information society that realizes increasing added value by connecting intangible assets as information networks. Society 5.0 is an information society built upon Society 4.0, aiming for a prosperous human-centred society.

infrastructure, like we do in Japan, it is quite difficult to integrate a new system. And that's a lesson we had to learn: how to manage transition. In countries that do not yet have well-established infrastructures, on the other hand, sometimes it can be easier to test a new system. So, when we started, we were already interested in the practice of this model in other countries. The difference in our approaches is that we decided to focus first on the future society, human-centred. At the G7 Summit held in Italy in 2017, countries were already talking openly about taking human-centred actions. In parallel, while the concept of Society 5.0 was being prepared in Japan, discussions on sustainable development goals were ongoing at the United Nations. And we tried to align our thinking to it: a Japanese way of acting that was compatible with global actions. We're all moving in a similar direction. In a sense, it's not coordinated, but rather individual actions converging.

**Is that also true for the labour market? How will society incorporate these changes in regards to jobs?**

**YH:** There's a contradiction in integrating new types of jobs. We have very strong protection of the labour market in Japan if you're working for a big company. This prevents the creation of new jobs, new types of jobs. Salary and



pension systems are based on a traditional way of working in which you come out of college, are hired by a company and stay there until your retirement. Today that's changing. Younger generations change companies, or work from home. Yet the social security system hasn't adapted to this new kind of attitude. We have to redesign this Social Security System. We have to find ways to provide more security for those who wish to maintain a more flexible lifestyle, and that's the difficulty. Japanese society is quite conservative, and we now have to be more flexible and forward-looking, as advocated by society 5.0. You know, changes come little by little.

**Climate action is number 13 on the United Nation's list of Sustainable Development Goals to be met by 2030. How worried about the climate emergency are you, at this time?**

**YH:** Climate change is not abstract to us; we feel it in real time. Which makes us a rarity. It's all happening very frequently and in high amplitude. We have to take action for sure, not just locally, or nationally, but globally. I'm also in touch with new scientists, and they are ready and trying to combine their own individual work, with global changes. To give you some positive touch, I'm hopeful in the new generation to take care of themselves and their future society, the future of the world. We seniors have to support them, not dictate.

*\* Visit the website for the Public Relations Office of the Government of Japan to know more about Society 5.0: [bit.ly/2CilmBj](http://bit.ly/2CilmBj)*

**You can't hold back the tide**

According to Brazilian consultant, writer and professor Juliano Heinzemann Reinert, from the Catholic University of Santa Catarina, Brazil does not have its own local model and is therefore counting on others to supply such models, especially Society 5.0. "Presently, we see this more strongly in agribusiness, here in Brazil, through the use of autonomous harvesters and drones, which already qualify as part of this 'super-smart society,' even if in other aspects our Industry 4.0 has not yet been fully implemented. The

thing is that whether you want it or not, new technology will keep on coming. There's no way around it. And there will be disruption in pretty much every business model we know. If we're unprepared, it'll be chaos. So, we must prepare ourselves for the inevitable transformation that is coming."

Natural disasters, earthquakes, floods, hurricanes, superstorms, raising temperatures and pollution, limited power supply, changes in the security environment, our aging population, and impoverished rural communities are some of the challenges that Brazil and everyone else is dealing with, he points out. And, much like Harayama, professor Reinert does not waver from his belief that there's no other direction to move but forward. To tackle these challenges while providing high-quality lives for every citizen, he explains that the future society will: rely on data points we're generating all day long with our electronic devices; gather them on the cloud through the use of servers spread around the globe; process that on a scale and speed unthinkable to humans, thanks to the use of AI; and feed it back into the "real/physical" world – intelligent information upon which to base our human decisions. This is what is called the Cyber-Physical System, or CPS, an advanced fusion of cyber and physical spaces or realities.

Reinert is a firm believer that this revolution will benefit everyone regardless of age or gender; balance economic advancement with resolution of social problems; liberate people from cumbersome work, who in turn will effectively utilize their time; and provide goods and services that granularly address manifold latent needs without disparity. "We have been in constant evolution of our productivity," he states. And, indeed, once upon a time, every single object or tool was handcrafted, and no two items were alike. Then handcrafted became manual, still slow but a more standardized process. Then came semi-automated; automated; symbiotic autonomous (a human/machine partnership, our current stage); and finally, in the days to come, we'll supposedly reach the autonomous evolution. "This is what frightens most people, including myself, and which many countries wish to avoid." But, as the saying goes, you can't hold back the tide with a broom. Preparation, both Harayama and Reinert believe, is the only way out, through and beyond this to a better place.

## John G. Ruggie

Berthold Beitz Professor in Human Rights & International Affairs, Harvard University and Former UN Special Representative for Business and Human Rights

# Human rights belong to everyone

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The idea of human rights is both simple and powerful: human rights belong to everyone. They are not granted by the grace or at the discretion of others. Respect for one another's rights forms the basis of all sustainable social relationships.

Widespread understanding and acknowledgement of the responsibility of enterprises to respect human rights is a relatively recent development. To be sure, it was implied in the Universal Declaration of Human rights, adopted by the UN General Assembly in 1948, which calls on "every individual and every organ of society...to promote respect for these rights and freedoms." It was authoritatively established and elaborated in 2011, when the UN Human Rights Council unanimously endorsed the Guiding Principles on Business and Human Rights (UNGPs). Many large firms, not least in the mining industry, have sought to align their policies with the UNGPs.



But what does it mean to say, within a mining company, that human rights belong to everyone? Enterprises have human rights experts. Aren't they responsible for the enterprises' human rights conduct? Only in part. Their responsibility includes raising internal awareness, developing a human rights policy, training staff across the organization as well as suppliers, and advising and supporting business units in efforts to improve practices in line with human rights.

## It is its daily decisions and actions that determine whether an enterprise respects human rights

But they are not the CEO or General Manager. They don't recruit new employees or determine wages and working conditions. They don't drive company trucks that may speed through villages and run over families' chickens or goats. They don't handle procurement or oversee contractors. They don't conduct explorations on Indigenous lands or resettle local communities. They don't build tailings dams. It is the daily decisions and actions of all the people who do this work – across the enterprise and from top to bottom – that determine whether the enterprise respects human rights.

Another place where the role of enterprises in society meets up with human rights is the Sustainable Development Goals. While none of the 17 goals use the actual term human rights, they are inherent in most: no poverty, zero hunger, quality education, good health, gender equality, access to clean water, decent work, reduced inequality, peace, justice and strong institutions. Indeed, viewing the SDGs through a human rights lens can lead to significant multiplier effects: consider how many SDGs and human rights would be advanced by securing a fair living wage, not only for workers in the enterprise but also for those in its supply chain.

Human rights are simple and powerful. That does not mean that enacting respect for human rights is an easy undertaking. But what makes it easier is to remember that human rights belong to everyone, and that everyone across the enterprise has a role to play in, making human rights integral to how business is done.

# China and the Nordics: Modernity across cultures

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Around the globe, countries face significant socio-economic challenges. Inequalities, environmental issues, and increased loss of confidence in governments are problems that permeate countries of the most varied cultures and political heritage. How to balance factors such as technology, business, migration, and ecology sustainably in this scenario? Cultures so different, China and the Nordic countries converge on the same path. They have created their own sustainable development models and are becoming leaders and a reference among nations. On one side, an Asian giant with nearly a sixth of the world's population in its territory. On the other, snowy countries with around 27 million inhabitants in all. Language, culture, the system of government, demography, currency, geography, and climatic conditions would put China and the Nordics in an abyss of differences. However, their unique views on sustainability make them similar in this effort.

Since 1970, the Nordic countries have engaged in environmental policies, both nationally and internationally. They have assumed leadership

positions in the world of environmental actions. They have already promoted several initiatives, with the potential to become the cradle of eco-modernity, where the struggle surrounding economic productivity and social welfare can align with environmental concerns. The great challenge for Nordic countries is that they must constantly attempt to reconcile their ambitions of environmental leadership and high productivity, which comes from being states with advanced levels of social welfare. If the Nordics took a prominent position in the debate and promotion of environmental issues at the international level, their need for high productivity – to support the aspirations of welfare for all – would make them, in a way, reluctant to promote and implement specific ecological measures that would limit economic growth. Since the mid-20th century, Nordic countries have embraced an industrialized economy – a process that has resulted in environmental footprints. Their productive economy allowed them to build an advanced welfare state supported by a tripod focused on equitable distribution, high productivity, and social security.



## Sustainable modernity is the goal of the Nordic countries

In terms of biological capacity, three of the large Nordic countries – Finland, Norway, and Sweden – absorb their ecological footprints, given their vast territories and small populations. In terms of per capita climate emissions, however, the Nordics perform poorly. Regarding the implementation of climate policy, there is considerable Nordic diversity: most Nordic countries have taken the path towards reducing their carbon emissions. However, their trajectories vary widely, reflecting differences in industrial structure and resource bases. The belief in urban greening is widely shared, and Nordic capitals lead the ranking of green cities in Europe. Based on a green growth agenda, this movement can offer an attractive opportunity to link ecological preservation with economic development and allow Nordics to transcend their ecology-versus-growth dilemma.



### Sustainable modernity is the goal of the Nordic countries

– Denmark, Finland, Iceland, Norway, and Sweden – show there is a way. The Nordic model – which they have pioneered for decades – has some basic components: a state of social welfare with high-quality education and medical care; a “flexicurity” employment model, which combines flexible hiring and firing with strong social security; and open markets with low tariffs and minimal barriers to trade. Due to their wealth, low inequality, and well-functioning welfare states, Nordic countries are considered examples for other industrialized nations. Ideologists often point to a single factor in their success – widespread social support combined with free trade – and try to extract a label for the entire system from it. However, the model has more to do with a strong central commitment – which brought inclusive and sustainable progress – than with ideologies. “Early and strong environmental commitment determined how environmental issues were reinforced during the evolution of the welfare state. The health and safety of workers have always been central concerns for the labour movement and were gradually integrated into legislation and industrial practice. With the growth of extensive health care programs in the second half of the 20th century, environmental issues affecting public health have become a priority for Scandinavian welfare states. Furthermore, Nordic countries’ tradition allowed for a strong dependence upon – and interaction with – the natural environment. Up until the 21st century, narratives, habits, and practices in contact with nature dominated the Nordic national memory and cultural heritage,” says Norwegian Business School Professor Atile Midttun, author of the book *Sustainable Modernity – The Nordic model and beyond*.

### Chinese companies promote renewable energy abroad

As one of the great representatives of developing countries, China has gone through decades of massive industrial and technological revolutions without environmental measures being effectively put in place. The same factories that boosted Chinese economic growth have also polluted water, soil, and air – to the extent that environmental risks endanger the Chinese society and economy. In the coming decades, as China’s economy continues to grow and the pace of urbanization accelerates, the country must not only ensure that it has sufficient and safe energy resources but can also mitigate the impact that this growth will have on the environment.



China is home to a sixth of the world's population. In 2007, the country consumed about 2.7 billion tons of coal equivalent (TCE) and emitted about 7.5 gigatons of greenhouse gases, surpassing the United States as the main emitter in the world. China's energy demand – and the emissions and pollution associated with its use in industry, power generation, transportation, and landfills – also contribute to other environmental problems. In Northern China, desertification threatens arable land and pastures. Water shortage, for example, is a growing problem across the country.

Since the beginning of the 21st century, China has played a central global role in combating the loss of forests and green areas and climate change. The Chinese government's leadership philosophy of an "Ecological Civilization" brings a vision of harmony between commercial and environmental interests. In other words, "Ecological Civilization" represents the potential of the world's second-largest economy to decarbonize investments and infrastructure. According to experts, 2021 will be a crucial year, since China will host one of the UN meetings on biodiversity and climate change (COP 15), which will define the global structure on nature and set goals for the decade to come.

Regarding the green transition, China is taking the challenge very seriously. It is an intersectoral effort, with great governmental support. "China has invested heavily in renewable energy and played a relevant role in the fight against climate change in the Paris Agreement," says Sha Song, a Chinese specialist in sustainable development and consultant at the World Economic Forum in Beijing.

Chinese companies are increasingly taking on a prominent role in the promoting and developing renewable energy abroad, with an investment of 32 billion dollars. The country was also a

global leader in investments in renewable energy, accounting for 36%, 40%, and 36% of total global investments in hydro, wind, and solar power, respectively. From 2017 to 2020, the idea is that another 360 billion dollars will be invested in these types of energy sources. Also, China is pioneering the effort to turn the philosophy of "green cities" and "zero-waste cities" into reality. "China is also introducing new standards for water management in cities and new policies in sponge cities. Also, the government approved three sustainable development zones in 2019. The demonstration zones will be based on the United Nations Sustainable Development Goals for 2030 and China's national implementation plan," explains Song.

According to the expert, defining a mandatory ESG data disclosure structure will contribute positively to standardizing data communication on a global scale. "Companies should be required to report a standardized set of primary indicators. According to the Morgan Stanley Capital International (MSCI) emerging markets index, about 175 ESG regulations were issued in 2018, compared to just one in 2000. China can play a crucial role in bringing the standardization of ESG data to the global stage. The Harvard Business School report revealed that 90 high-sustainability companies have significantly outperformed low sustainability companies over 18 years. This is also a tool to measure and encourage the ecological behaviour of businesses," says Song.

In terms of protecting forests and biodiversity, there is an interesting and current case of a

## The Chinese government promotes the concept of an Ecological Civilization



partnership between companies. In the tropics, Huawei is working with Rainforest Connection (RFCx) to convert a large number of used Huawei mobile phones into devices powered by solar energy to monitor rainforests. So, these cell phones are becoming the “ears” of forests. Equipped with artificial intelligence, these phones are now used to hear and identify the sounds of trucks and chainsaws illegally cutting down trees, helping international environmental protection organizations to protect the planet more efficiently. Next year, another 6,000 square kilometers of tropical forest in different countries will benefit from these efforts.

### The role of technology

Chinese technology giants play a vital role in the country’s sustainable development. Tencent, Baidu, and Alibaba are among the ten largest internet companies in the world. “Online technology – especially e-commerce, internet banking, and social networks – is accelerating this change,” explains Song. An example: Ant Financial, a banking subsidiary of Alibaba and the most valuable startup in the world, is a founding partner of the Green Digital Finance Alliance. This alliance aims to use digital technology to promote and develop green finance. Besides, more than 200 million Ant users have signed up for Ant Forest, an application that gamifies carbon footprint tracking. The app asks users to reduce greenhouse gas emissions in real life. This shows the potential a fintech has in supporting sustainable development. Until January 2017, the initiative had already saved 150 thousand tons of CO<sub>2</sub>.

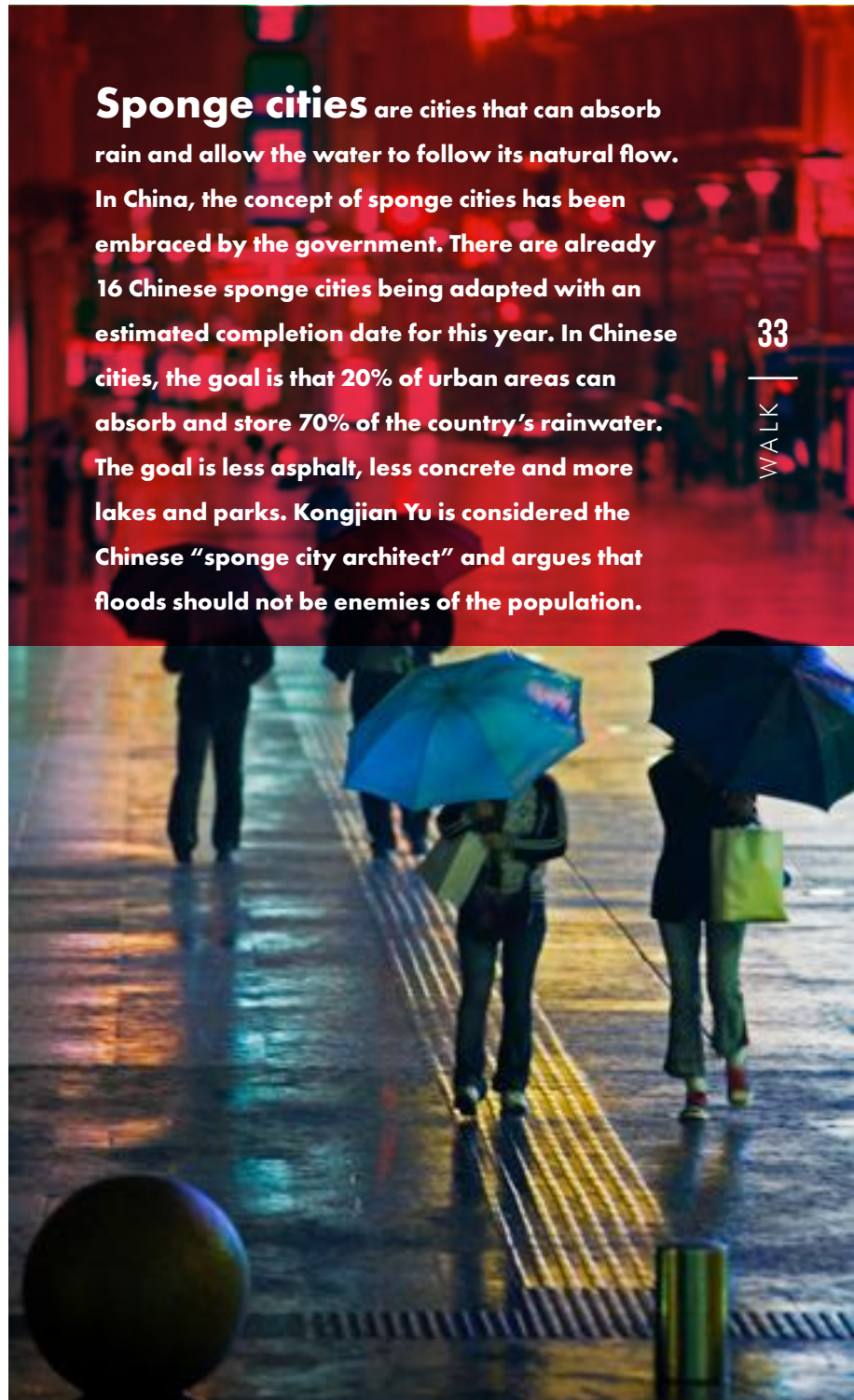
### Chinese commitment

Chinese President Xi Jinping has been consistent about the need for green policies to “protect the common home in which we live.” His position is also firm when it comes to China’s recent history,

which teaches us that only sustainable agriculture can offer safe food. Between 1978 and 2015, China invested a total of \$378.5 billion in 16 sustainability programs – most of them in the past 20 years. The investment involved over 500 million people and far surpasses any other national sustainability program.

**Sponge cities** are cities that can absorb rain and allow the water to follow its natural flow.

In China, the concept of sponge cities has been embraced by the government. There are already 16 Chinese sponge cities being adapted with an estimated completion date for this year. In Chinese cities, the goal is that 20% of urban areas can absorb and store 70% of the country’s rainwater. The goal is less asphalt, less concrete and more lakes and parks. Kongjian Yu is considered the Chinese “sponge city architect” and argues that floods should not be enemies of the population.



# How to share logistics infrastructure with everyone

Nicolas Maennling left Germany as a young man to study economics at the University of Birmingham, England. Years before, as a child, he had already visited a few countries in Latin America because his parents worked at an international cooperative company. Nicolas also lived in Mozambique at the beginning of his career, fresh out of university. Since he speaks Portuguese, he received another job offer for Timor-Leste. Today, at 36, Nicolas lives in Oslo, the capital of Norway. He works as a Senior Policy and Economics Researcher at the Columbia Center for Sustainable Investment (CCSI) at Columbia University in the United States.

This diversified life experience ended up instilling in him, as a researcher, a sensitivity to understand multicultural scenarios of peculiar characteristics, which involve different agents, even when it comes to the dry subjects of his economic research – among graphs, indicators, and amounts. In November 2019, to understand the singular format characteristics of Vale’s infrastructure, Nicolas was in Parauapebas and Marabá, in southeastern Pará, and São Luís, in Maranhão. There, he closely monitored the operation of the Carajás Railroad (EFC), from the ore mines to passenger transportation, and the arrival of the railway line at the Ponta da

Madeira terminal, in the capital of Maranhão, attached to the Port of Itaqui, in what is called The Northern Corridor.

Nicolas came to experience first-hand what his team at CCSI has called in recent studies “shared use of infrastructure.” It happens when a company bears the costs of implementing a logistics network and later divides, after closing several deals, and invests the proceeds in strategic product distribution. It happens on the 892 km of the Carajás Railroad (EFC in Portuguese) tracks, which run through the two states where the mining company has operations, through complex relationships with population groups living along this route, municipal managers, social movements, and hundreds of other companies that relate directly to the ore extraction activity. Besides sharing the road, there is also the shared use of other structures such as the Parauapebas airport, the bridge in Marabá, and the terminal in São Luís.

Based on comparative case studies around the world, Nicolas wishes to understand how the shared use of logistics infrastructure in this territory can boost economic and social development and fulfill the potential of the railway if used with other agents. These issues started dialogues during Maennling’s stay in



# The Carajás railroad has become a backbone of the commodities market

Brazil with Vale employees and other representatives of companies and local society in general, working in activities directly linked to the railway infrastructure.

“It is always good to see what is happening up close because we understand it much better. It is one thing to read on a book and another to see it with your own eyes,” says the researcher about the experience of collecting data in Brazil. He realized that there are unique characteristics in the mineral extraction logistics in Carajás, which ended up becoming a kind of backbone in the international commodities market. It moves not only of iron ore, but grains, fuel, coal, and other minerals, such as manganese, copper, nickel, and coal, with a structure that has 15 thousand wagons and 254 locomotives and operates 24 hours a day.

Maennling also believes that these logistics are directly linked to the principles of sustainability and can meet the Sustainable Development Goals (SDGs). “Many benefits can be explored, such as the possible sharing of internet access, if this project can be implemented, with a strong impact on local telecommunications, which expands to health and education. Our goal is to point out how different actors can work together to improve the result of this investment and what were the lessons learned,” he adds.

### The corridor and cargo: Minerals and general cargo

During an overflight on a cloudy and pleasant afternoon, Nicolas Maennling can check the size of the excavations for ore extraction in Carajás. He leaves from the Company’s hangar, flying over the employees’ residential village, all the mines in southeastern Pará, the railway branch, and the border between the National Forest (Flona) and the city of Parauapebas, during his one-hour helicopter ride. In 2020, the forecast is that 230 million tons of iron ore can be produced in the area, corresponding to the extraction of the Serra Norte and S11D mines.



# THE CARAJÁS RAILROAD

Nicolas Maennling went to check in loco what his team at CCSI has called "shared use of infrastructure."

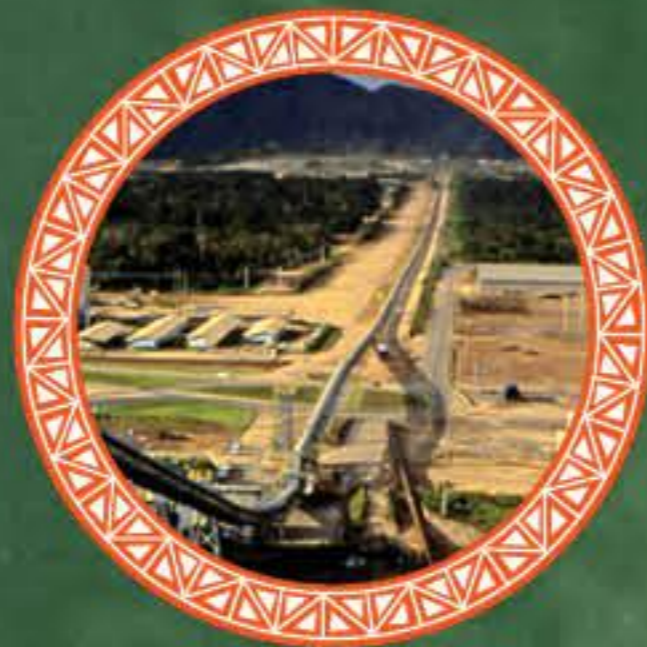
The German Nicolas Maennling, Senior Policy researcher and Economics Officer at the Columbia Center for Sustainable Investment (CCSI) of Columbia University, examined the operation of the Carajás Railroad (EFC in portuguese). He traveled 892 kilometers, from the mines where the ore wagons are loaded, through the passenger transportation hub on the train and onward all the way to Ponta da Madeira, in the capital of Maranhão, Port of Itaqui Annex, in what is called the North

PARAUPEBAS



Carajás National Forest

Iron Mine Carajás Road



Sossego Copper Mine



Extractivism Babassu Forest



Steelworks



Agribusiness

MARABÁ

S11D iron mine



AÇAILANDIA



Steelworks

Family farming



Trade



Carajás Railroad



SÃO LUÍS

SANTA INÊS



Tourism

Port of Itaqui - Ponta da Madeira



## Solutions for shared use infrastructure based on the social history of each country

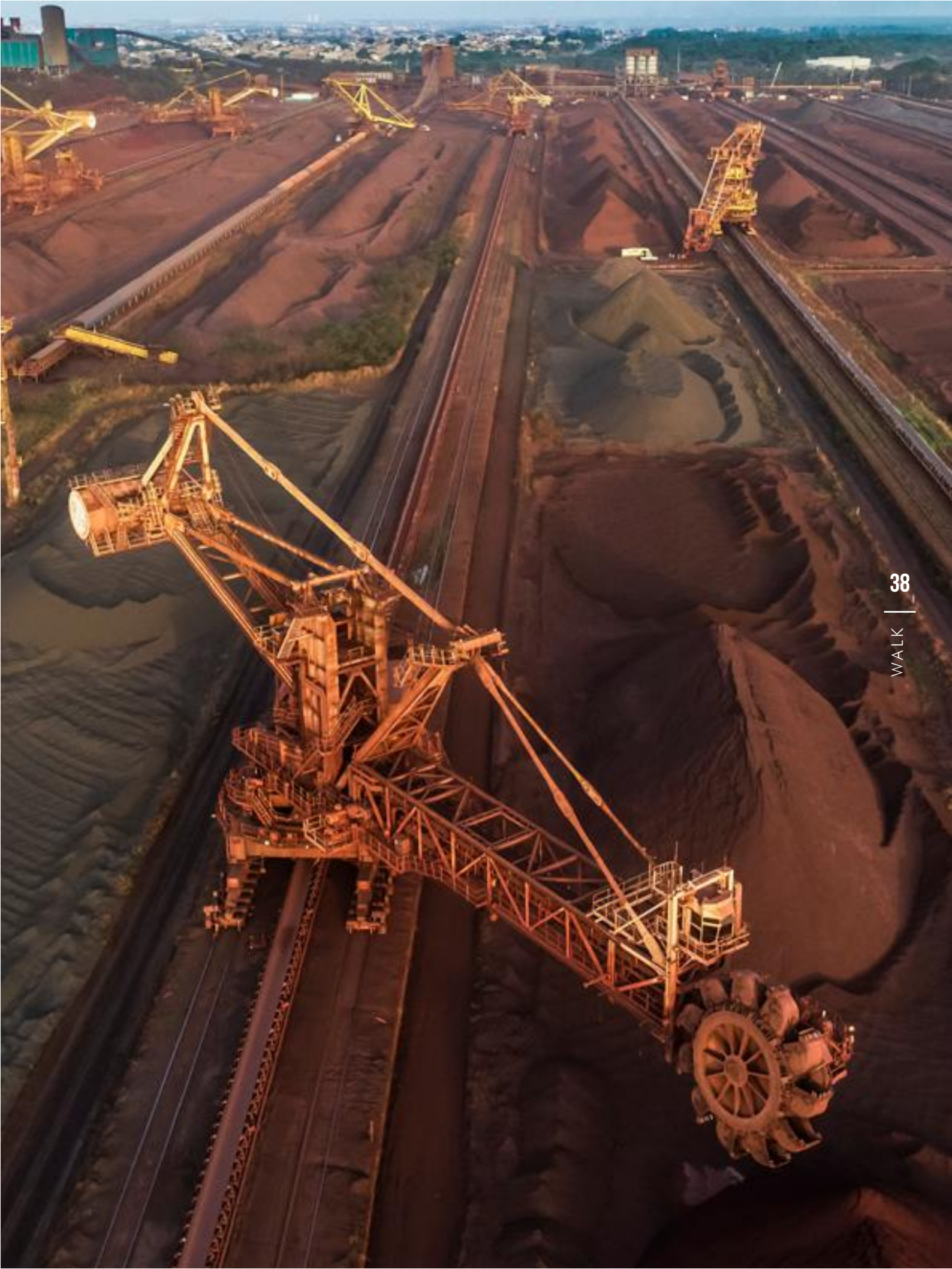
This required an even greater logistics preparation, with the duplication of 525 km of the Carajás Railroad, between Pará and Maranhão states, to transport the 230 million tons of iron ore cargo along the North Corridor. The logistic network would integrate the railway with the ports and export ships, such as Valemax, one of the largest in the world, transporting 400 thousand tons on each trip. For many years, Vale also operated the logistics of other cargo, in addition to minerals, which is commonly called “general cargo.” Therefore, to separate the logistics activity and the ore from this other demand, VLI was created in 2010. Today, the company operates a logistics system in nine states and the Federal District and uses the EFC railway network.

Another investment and sharing initiative within this system was the 2,340-meter bridge over the Tocantins River in Marabá, a mixed-use bridge that accommodates the highway and the railroad and was completed in 1985, as was the EFC. “For us at CCSI, it is very interesting to check this thoroughly, understand the costs, the negotiated rates, the advantages. Also, what is the most complicated issue in this relationship with other users? Which are the negotiated rates, and how does the sharing work in detail? It is good for the economy. The idea is to show Carajás as an example to help other countries interested in shared infrastructure,” says Nicolas. He also visited the port structure of Maranhão, where ore ships are loaded – following the paths so he can better understand this Northern Corridor logistics system.

In the case of the Ponta da Madeira Maritime Terminal (TMPM in Portuguese), owned by Vale, installed adjacent to the Port of Itaqui, in front of São Marcos Bay in São Luís, there is also a partnership for joint use of the grain vessel. This had been expected since the initial discussions to build the port in the state of Maranhão, and not in Pará state, due to the depth of the docking area, with a variation of up to six meters, which can accommodate larger ships.

“This format has to do with the political and social history of each country. Here, the government makes a concession and requests that there be transportation activities for other commodities to increment the development of other sectors, such as agriculture. So, that is why it is so interesting. It is not just a strategic decision; it has historical meaning,” explains Nicolas.





### The road and the people

Launched on February 28, 1985 – at a time when Vale needed to expand the production of iron ore and, therefore, think about the proper and safe transportation of the product – the railroad still has a particular connection with the life dynamics of the local population, besides transporting ores and cargo. Nicolas notes that in other countries, such as Australia and Canada, the logistical activity of mining is usually focused on the demands of the mining company, almost entirely. But here, the social format demanded relationships with the communities, which turned the EFC into a joint-use route. The researcher could also see it on a visit to train stations in the early hours of the morning in Marabá and São Luís.



Since its conception, the road already presented the challenge of being useful for passengers, as well as for ores. Currently, the daily average reaches 1,200 people, totalling 350 thousand per year. Transporting people requires an absolute commitment to their safety. So, before any departure, a wagon and its engineer sweep the tracks to identify complications that could put passengers at risk. Along the railroad, there is also an electronic detection system to ensure the integrity of the train tracks.

Homemaker Luzinete Oliveira Silva, 46, is from Maranhão, but the experience of this route has permeated her whole life since she moved to Parauapebas, searching for work. Living in Pará, she got married and had children. We met her at the Anjo da Guarda terminal in São Luís, on the way home, after going to Maranhão to visit her relatives with her granddaughter Camila Bianca Lopes, six years old. "This train ride is the best option, quiet and safe. The roads are dangerous, and planes are more expensive," she says.

## This train ride is the best option, quiet and safe.

All wagons are equipped with air conditioning, seats with trays for meals, and power plugs. The passenger train has a cafeteria and even smoke detectors – after all, smoking is banned onboard. The wagons were renovated three years ago and manufactured by Romania's Astra company, demanding an investment of \$55 million. The cost for passengers is low, just enough to cover the train's operation.

To further diversify the use of the train, two years ago Vale made another noble project official: The Social Wagon, a project that transformed one wagon into an exciting area for community interaction. There are workshops and lectures on health, environmental education, job and income generation, citizenship, and instructions on railway safety. The wagon also works as a health station, with medical and dental consultations and tests – for sexually-transmitted diseases, for example. There is also room for cultural presentations, such as Bumba Meu Boi, a strong folk tradition in the region.





## Gillian Davidson

Chair, International Women in Mining (IWIM)

# Women in Mining— A sustainability imperative (or develop- ing a generation of inclusive leaders?)

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We now know that the gender agenda is good for business; from the economic and safety performance of a company to the impact we can have on society.

So if gender equality is so good for business, why is the average female participation in the mining sector around 16-18% much less as we move up management levels, and pretty much unchanged since 2001?

This is at the same time we find ourselves in a period of rethinking how we can create the most sustainable value through our business models and intersections with society and the environment. Many companies are facing urgent challenges related to a

changing workforce due to a surge in retirements, ability to attract new recruits, managing expectations of a younger workforce and accessing the skills and expertise needed for the mine of the future. Access to talent is the most critical resource issue facing the resource sector today.

At the same time, the dynamics and expectations of our host communities and other stakeholders, such as consumers, emphasize the need for a more inclusive and participatory sector that can contribute positive and sustainable impacts achieve of the Sustainable Development Goals.

Given the battle for talent and the pivotal role of female participation to

the development agenda, what must we do to accelerate change? Here are five ideas:

- Mentoring, by men and women, has been proven to be one of the most important tools to support women in their careers through access to knowledge and networks. The mentoring programme at IWIM identified the three top issues raised to be career development, work-life balance and building confidence.
- Look around at our colleagues and scrutinize how we recruit, promote, pay and develop future talent pipelines across all areas of the company and at all levels.
- Better understand the role of technology and innovation, such

as digitization and automation, to reshape traditional roles and create new and more inclusive workplaces. If diversity unlocks innovation, are we tapping the necessary talent?

- Think locally and explore a range of ways for women in local communities to access opportunities, from employment to procurement to decision making.
- Use our own leadership. Just as

with safety, we each have the ability to help improve our organizations by creating the right culture, monitoring ourselves and others and upholding the values of inclusion and diversity.

The role of women in mining has become a sustainability imperative, essential to the success of our industry and our ability to realize our potential to innovate and create value for stakeholders and society. But change won't happen without asserted action by all of us.

**Our host communities emphasize the need for a more inclusive mining sector**



# COVID-19 will test ESG strategies

In early 2018, one of the world's most influential investors sent a clear message to chief executive officers running the biggest companies on the planet: do more than just make money; contribute to society; serve a higher purpose.

Laurence D. Fink, founder and chief executive of the investment firm BlackRock, which manages \$7 trillion in assets and is arguably the biggest trend-setter on global markets, said that delivering financial performance was no longer enough.

"Companies must benefit all of their stakeholders, including shareholders, employees, customers, and the communities in which they operate," Fink wrote in his 2018 letter to investors. "Without a sense of purpose, no company, either public or private, can achieve its full potential. It will ultimately lose the license to operate from key stakeholders."

His comments added explosive fuel to the long-simmering debate about social responsibility on Wall Street and beyond. It was a watershed moment in the mainstream investment community: the world's largest institutional investor - and a passive one - taking an activist position across its portfolio, and telling the entire market it had to do better. The letter raised questions that went to the very core of the world's market-driven global economy and capitalism, and propelled

environmental, social and governance (ESG) factors to centre stage.

ESG considerations cover a variety of issues that have not been part of financial analysis traditionally, yet are increasingly relevant to financial markets. Fink continued to address these issues in his two most recent letters, published in 2019 and 2020. ESG strategies may include how corporations deal with waste, how they manage their supply chains, how efficiently they use water or how they are respond and adapt to climate change. The social part of the triad has also gained significance as considerations on staff diversity, wage equality and a commitment to ending child labour and modern slavery have become key criteria for a growing number of investors. Governance factors take under consideration factors such as executive pay, accounting transparency, lobbying and political contributions, among others.

Last year, Fink expanded on his 2018 thoughts and told CEOs they must be leaders in a divided world - business must have a conscience, not just a purpose. And in 2020, he aimed at the biggest risk facing society.

"Climate change has become a defining factor in companies' long-term prospects," Fink wrote in his annual letter. "Awareness is rapidly

changing, and I believe we are on the edge of a fundamental reshaping of finance.”

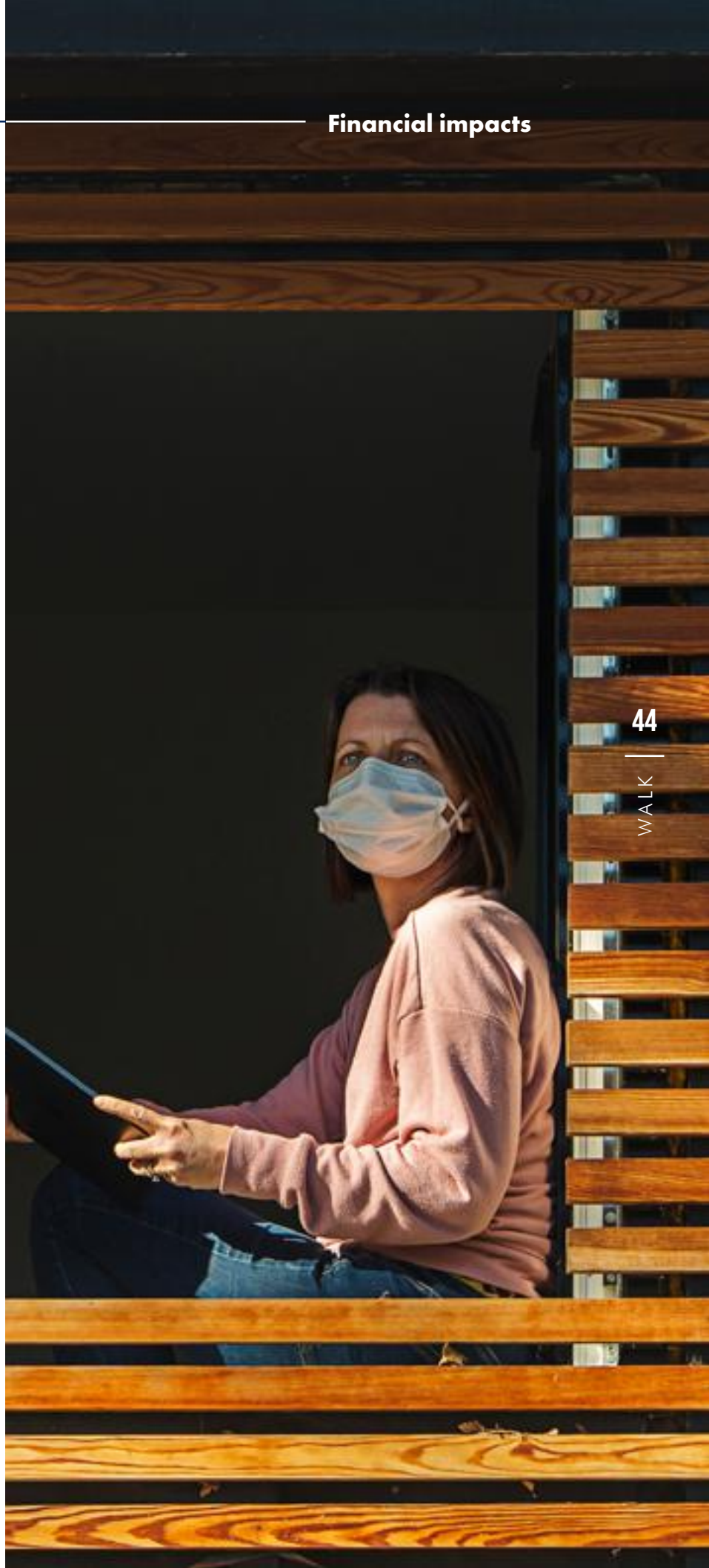
Fink’s comments on the need for long-term strategies to boost business sustainability and create resiliency for communities across the globe sounded eerily prophetic when the outbreak of the novel coronavirus began to wreak havoc on global financial markets in March. The longest bull market in US history came to a screeching halt on a March 12 selloff that marked the steepest one-day drop since the crash of 1987.

As the biggest public health emergency in generations spread from China to Europe and the Americas, investors panicked on fears the COVID-19 pandemic would ignite a global recession. The Federal Reserve slashed rates to zero and vowed to do whatever it could to prevent a credit crunch.

It didn’t help that oil prices had crashed just a few days before, suffering the biggest fall since the day in 1991 when the U.S. launched air strikes on Iraqi troops after they invaded Kuwait. Crude oil prices dropped 25% as Saudi Arabia and Russia began a price war in a global battle for market share.

ESG funds, not surprisingly, seemed to weather the downturn better than their conventional peers. And passive sustainable equity funds did better than funds tracking market indexes.

But by mid-March, with global leaders and the scientific community still fumbling to get a grip on the new virus, it was hard to say how long the COVID-19 pressure would last. ESG funds would likely not escape losing money when the entire market was in deep correction territory. Most of the growth in sustainable investing took place since the 2008 financial crisis, meaning





that ESG strategies were still untested in a market crisis like the one triggered by the coronavirus.

The epidemic and its far-reaching and long-lasting effects underscored how financial markets need more long-term thinking on how to deal with a changing world. The coronavirus showed how vulnerable and connected the global economy is.

Will investors finally embrace ESG as the pathway to building a more resilient world?

If investment in ESG through last year is any indication, evidence shows they already have.

Before the coronavirus crisis hit, ESG investments were already outperforming conventional choices. ESG funds saw record flows over the past few years, raking in nearly \$21 billion in total new assets in 2019, according to research firm Morningstar Inc. That was almost four times as much as the \$5.5 billion invested in these funds in 2018, which was the previous record. Sustainable investing now represents one in four dollars of the \$46.6 trillion in U.S. assets under management, or about \$12 trillion, according to the Forum for Sustainable and Responsible Investment.

They outperformed regular funds in 2019. Still, that's mostly institutional money. Among mutual funds and Exchange Traded Funds (ETFs), where individual investors put their money, sustainable funds had about \$137 billion in the U.S. at the end of last year - a very small fraction of the country's total \$20.7 trillion of fund assets, according to Morningstar, though inflows more than tripled in 2019

from the previous year and the number of ETFs using sustainable investing approaches grew to 69 in 2018 from just 25 in 2016, according to the Forum for Sustainable and Responsible Investment (US SIF).

While many saw BlackRock's letter in 2018 as a watershed moment, the conversation over sustainable financing had been going on for nearly two decades. And ideas based on the Socially Responsible Investment movement have been around, some would say, for at least two centuries.

A call to action in 2004 launched the ESG investment movement as it's known today. In January 2004 former UN Secretary General Kofi Annan wrote a letter to 55 CEOs of major financial institutions and invited them to join an initiative led by the UN Global Compact with the support of the International Finance Corporation (IFC) and the Swiss government. The idea was to integrate ESG into capital markets. Corporate leaders pitched in to develop guidelines on how the principles could be used by asset managers and securities brokers, and by the financial sector as a whole. A year later the effort led to the Who Cares Wins report, a landmark publication that argued that making ESG an integral part of capital markets was not only good for societies, it actually made business sense. At around the same time, the United Nations Environment Programme Finance Initiative (UNEP FI) produced the so-called Freshfield Report, which showed that ESG considerations are relevant for financial valuation.

These two reports culminated in the launch of the Principles for Responsible Investment (PRI) at the New York Stock Exchange in 2006 and the start of the Sustainable Stock Exchange Initiative (SSEI) the following year, creating a solid framework for sustainable finance.

Since then, ESG has only grown with a promise to shift world markets' focus on short-term gains and economic growth to a wider set of goals that prioritize gains for the environment and society. Pension funds, fund managers and companies have come under pressure to act in line with their investors' socially-responsible strategies.

But ESG still has a long way to go in truly influencing investment across the board. What's holding sustainable investment back is a combination of factors: the absence of standardized ESG regulations, concerns about returns and challenges over reporting - basically, giving investors the right information in the right format. How to measure and report on a company's purpose? And there is a general misconception, especially in emerging markets, that a focus on ESG comes at the expense of performance.

ESG is a fairly new concept in investment strategy and there is no conclusive methodology to define its components. Unlike financial data, ESG factors are interpreted and analyzed differently depending on the community or jurisdiction. But investors want to have relevant information that is comparable across companies and across geographical markets.

The integration of ESG into investment decisions is still hindered by a lack of universally-recognized guidelines, even as ESG ratings are little by little becoming an integral part of financial markets. A growing number of investment indices rely on companies' rankings for environmental, social and governance criteria, and some lenders are offering better borrowing costs to companies with strong ESG scores. But these are not like ratings given by credit agencies, decided on specific triggers such as the increase of a company's debt. And with so many different ESG methodologies from a growing number of providers, chances are the views on the same company will vary widely.

In emerging markets the situation is even more tricky. The adoption of ESG strategies is still patchy, and concentrated in a few countries. Emerging markets are particularly exposed to quicker population growth, corruption, wider income inequality, water stress, extreme weather events and slave labour. In those markets, it's crucial to track companies that are members of organizations such as the Network for Greening the Financial System (NGFS), the Principles for Responsible Investment (PRI), and the Principles for Sustainable Insurance (PSI), the Sustainability Stock Exchanges (SSE) Initiative.

# THE STRENGTH OF SUSTAINABLE ART

The day is hot and humid, as spring and summer usually are in the central region of the state of Minas Gerais. Along the curves of the chosen path, there are plants of all types, such as palm trees, fruit trees, and orchids.

When least expected, the visitor is faced with something unique to this route: art, in the form of installations, sculptures, and galleries. It is why the Inhotim Institute was created and continues to grow – to showcase the many possibilities to combine art and sustainability.

Located in the city of Brumadinho, 60 kilometers from the capital Belo Horizonte, Inhotim is a museum of contemporary art and a botanical garden with a visitation area spanning 140 hectares. It houses works by 60 Brazilian and foreign artists, while also featuring a greenhouse where specimens of approximately 4,500 species of plants from all continents grow.

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### **Gallery Adriana Varejão has six different works of art**

Adriana Varejão (born in 1964) works with painting. She also does photography, carving and installation, but for the most part she is a classic painter. Adriana uses typical materials and techniques from this traditional and beloved art field.

### **Viewing Machine, by Olafur Eliasson**

This artwork was inspired by a six mirror kaleidoscope. From the Greek kalos (beautiful), eidos (form) and scopos (observer), it means “observation of for beautiful forms,” something that the artist seeks and interprets with his piece Viewing Machine.



Juxtaposing environmental preservation and contemporary art provokes thought in two ways. The artist is challenged to interact with the context of the place where the work is being staged. And the botanical curation strives to ensure the green surroundings communicate, provoke reflection, and encourage people to change their habits. Sustainability can be powerfully promoted in context of the field of art.

**“We believe in change through beauty. Art can transform the world for the better.” – Juliano Borin, botanical curator at Inhotim**

## “Art can transform the world for the better.”

### When art provokes

The Inhotim Institute, idealized as a space for artistic enjoyment and nature preservation, values and reverberates a series of expressions that, brings forth the discussion of sustainability.

Because of its large expanse of space, it enhances artistic discourse by enabling the creation of site-specific artworks that dialogue directly with the natural setting – giving rise to reflections on the social, economic, cultural, and environmental contexts.

Next, WALK selects a few works that, in some way, may provoke discussions about sustainability.

**Robert Irwin (USA, 1928) is a pioneer of the Light and Space Movement.** He began his career as a painter in the 1950s and chose perception as his fundamental investigation in the art field. The artist has conceived more than 55 site-conditional projects, including the Central Gardens for the Getty Center in Los Angeles, 1992–98, and the architectural design and external area of the Dia:Beacon in New York, 1999–2003.

His work in Inhotim is an installation 20 feet high and 45 feet in diameter with eight concrete walls.



## Climate change in focus

Igloos are a common refuge in icy environments. They are used as protection against the almost permanent wintery climate in territories such as Canada's Arctic and Greenland. However, what if such structures are the best hope for a society facing a future marked by intense heat? What if the cold is the ideal refuge for the future?

A visit to the piece *By Means of a Sudden Intuitive Realization* (1996) by Olafur Eliasson provokes such a consideration. The igloo merges with the trees, palms, and other plants in the gardens of Inhotim, protecting the viewer from the hot climate. It also offers an additional experience: whoever enters the structure can witness, for thirty seconds, the formation of different visual sculptures, created by strobe lighting on a water fountain.

## The need for balance

Conflicting nature and technology, represented by the orishas Ossanha and Ogum, respectively was the central theme of the project *De Lama Lâmina*, (from mud, a blade) by Matthew Barney. It started as a performance during the Carnival of Salvador, in 2004, and concluded in 2009 with the installation by the same name at Inhotim.

The representation of technology and war, the orisha iron Ogum is created from a tractor filled with clay, which interacts with a high-density polyethylene sculpture in the shape of a tree. The work is protected by a geodesic structure in glass and steel, in the middle of a reforested eucalyptus forest. See the photo on page 52.

In this installation, the duality of productivity vs. the force of nature might refer to our need to think about more sustainable ways to live in the



Hummingbird feeding from a *costus*

world – through which the power of technology respects the strength and power of nature.

## Society in constant ruin

How is a sustainable city built? What is the fate of territories marked by conflict, social tensions, and disharmony? For Carlos Garaicoa, the answer lies in a cosmopolitan city in constant destruction.

It is the central motto of his work *Ahora juguemos a desaparecer (II)* (Now let's help disappear), from 2002. It depicts, a city created by candles, on a metal table being consumed by fire until it is completely gone – only to be replaced by the same structure, which is again exposed to fire, repeating its destruction process.

## Botany in art

Amid the hills of Inhotim's structure, a gallery constructed of extreme geometric shapes stands in counterpoint to the natural lines of the landscape. It is the Adriana Varejão Gallery, which houses several works by the artist.

The ambitious architectural project highlights the artist's works – one of them exposed in the centre of a small square created under a reflection pool. Her piece entitled *Panacea phantastica* (2003 – 2008) is a set of tiles depicting over 50 species of hallucinogenic plants from around the world.

Here, the artist presents the vast wealth of nature, as a starting point for an essential discussion on the use of psychoactive plants by traditional communities and medicine. The work provokes us to examine our prejudices against these species and to re-signify, and value, the potential of nature.

### **A raw material that communicates**

Another way to evoke the discussion on sustainability is by choosing materials and sustainable strategies for creating art. This is how Giuseppe Penone created his *Elevazione* (2000-2001). An important art movement known as "Arte Povera," or "poor art," which explores a wide range of materials beyond the traditional oil paint on canvas, bronze, or carved marble. Penone opts for non-traditional elements in his works, such as the bronze used at Inhotim to represent an element of nature.

His sculpture of a tree trunk supported by five other real trees of the Guaritá species, which, as they grow, give new meaning to the artist's work. In this context, the dialogue with nature is evident.

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### **Elevazione (2000 - 2001) bronze**

Giuseppe Penone is one of the greatest Italian artists of his time and, in the late 1960's, he was part of the Arte Povera Movement. Along with other artists from Europe and the USA, he shared interests in non-conventional materials, differentiating himself from the rationalist thinking that permeated the Anglo-Saxon world.





### Green harmony at Inhotim

At the highest point of the Inhotim Institute stands its most recent installation, launched in 2019. Conceived by American artist Robert Irwin, the sculpture *Untitled* is not made of any natural element, and is not installed in the middle of a garden. At the artist's request, the artwork intervenes in the landscape to the smallest possible extent, offering the viewer a series of interpretations and experiences.

However, it stands on the visiting area's highest point, where the grandeur of the contemporary art museum and its botanical garden is visible, as well as the wealth of the protected Natural Heritage Private Reserve.

Untitled work by  
Robert Irwin



**De Lama Lâmina (2004 - 2009)**  
**San Francisco, United States, 1967;**  
**New York, United States**

De Lama Lâmina (2009) is the outcome of Matthew Barney's partnership with Arto Lindsay that took place in Salvador's Carnival in 2004. From that meeting, they also recorded the homonym video exhibited in Inhotim the Marcenaria Gallery. For this work, Barney was inspired by the Candomblé folklore to portray the conflict among Ogum, orisha of iron, war and technology, and Ossanha, orisha of the forest, plants and nature's power.

Barney's work reflects his interest in ecology and also shows his vision on environmental issues. He portrays the natural elements from the orisha's universe with iron ore and eucalyptus trees. The tractor is used during the performance and in the video, but not in the traditional way: here, it's just a big frozen sculpture. This conflict represents the struggles between destruction and creation, progress and conservation, birth and death.

### **Natural Heritage Reserve (RPPN in Portuguese)**

The view alone reflects the museum's ambition to cause reflection through beauty.

### **Botanical curation**

The power of the botanical garden of the Inhotim Institute is not only its dialogue with works of art but also its gardens scattered throughout the visitation area. The gardens feature 4,500 species from all continents. Its collection of palm trees is extremely extensive, with about a thousand species and varieties.

Throughout the area open for visitors, the intention is to ensure the garden also expresses its plea for sustainability. There are fruit plants, small vegetables, and ornamental species that spark visitors' familiar memories. Furthermore, to guarantee the propagation and maintenance of all these species, Inhotim has a seed bank, nurseries, and research team specialized in preserving the species cultivated here.

### **Environmental education**

Is another stronger aspect of the museum's tradition. The work is done with students and all kinds of visitors. Children and adolescents can learn about the richness of the land where they live – and about the importance of preserving it.



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**Bromélia *Aechmea  
bromeliifolia***

### **About the Inhotim Institute**

The contemporary art museum and botanical garden opened in 2006, becoming one of the main tourist attractions in Minas Gerais state. Its collection includes paintings, sculptures, drawings, photographs, videos, and installations by about 60 artists from 38 different countries. Currently, the area has 560 works on display, produced from the 1960s to the present day. Inhotim encompasses significant remaining areas of the Atlantic Forest and the Cerrado. Of the 140 hectares of the visitation area, 42 are gardens. The institute also includes an Educational Nursery and a Private Natural Heritage Reserve (RPPN in portuguese) with 249 hectares.

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### **Location**

Rua B, 20 - Fazenda Inhotim, Brumadinho

### **Hours:**

- Tuesday to Friday: 9:30 a.m. to 4:30 p.m.  
- Saturday, Sunday and holidays: 9:30 a.m. to 5:30 p.m.

### **Admission**

- Tuesday, Thursday, Friday, Saturday, Sunday and holidays: R\$44,00 (adults)  
- Wednesday (except holidays): Free

For updated information, please visit:  
<https://www.inhotim.org.br/>







