THE RISK REPORT BY IAN BREMMER

The attack on Brazil's democracy is not over

WHEN SUPPORTERS of former President Jair Bolsonaro charged into the presidential palace, Congress, and the Supreme Court in Brasília on Jan. 8, they ignited a firestorm that continues to inflame passions.

The insurrection was condemned across the political spectrum, including by Bolsonaro himself. Polls suggest 3 out of 4 Brazilians, including large numbers who voted for the former President in the October election that he lost to Luiz Inácio Lula da Silva (popularly known as Lula), were horrified to see the ransacked offices, busted-up equipment and furniture, broken windows, and violence between rioters and police. Fewer than one-fifth of Brazilians supported the riots.

Authorities in Brazil have taken swift action in response. Of more than 2,000 rioters initially detained, around 1,200 remain under arrest, and dozens have been indicted and had their assets frozen. Investigations into whether perpetrators had inside help will continue, but arrest warrants have already been issued for several government security officials who failed to prevent or stop the violent protests. Bolsonaro's Justice Minister Anderson Torres, who was security chief for Brasília on Jan. 14 and was found to be in possession of a draft decree to illegally overturn the results of the election, was arrested on Saturday. Supreme Court Justice Alexandre de Moraes also suspended Federal District Governor Ibaneis Rocha, a Bolsonaro ally, for 90 days to ensure he won't interfere in the legal process. In addition, the Supreme Court has placed Bolsonaro under investigation for inciting the violence, a charge he denies. The former President faces several additional probes in the electoral court over comments made while in office, which could render him ineligible to run for President in 2026.

For the moment, a renewal of violence is unlikely, and the newly inaugurated President Lula will probably see a short-term boost in public support. But Brazil's radicalized opposition won't disappear. Though independent experts have dismissed claims of election fraud, public suspicion of the country's establishment has reached its highest point since the end of military rule in 1985. Polls show 40% of Brazilians believe Lula stole the election, and just over 36% favor military intervention to remove him. Many were already angry at what they saw as judicial and political overreach curtailing their free speech rights; now that the Lula administration is cracking down on people only loosely connected to the insurrection, this fear of persecution will only increase. As the retaliation expands, so will resentment of a government that many on the right already consider entirely illegitimate.

Lula supporters demonstrate in opposition to the riots that rocked Brasília on Jan. 8

THERE IS ANOTHER REASON this protest movement is likely to last: unlike those who heeded then President Donald Trump's figurative call to arms just hours before the ugly protests inside the U.S. Capitol in 2021, Brazil's surge of conspiracy theorists and vandals didn't need a sitting President to egg them on. Bolsonaro was already out of office and in Florida when the insurrectionists pushed past Brasília's barricades, and he had already offered a half-hearted admission of defeat.

Tough economic conditions and too few reliable allies in Congress suggest Lula's boost will be short-lived. As the economy deteriorates, those who consider Lula illegitimate may well take to the streets again. At the very least, large-scale demonstrations and paralyzing strikes will inflict economic and political damage.

For now, Brazil's right says Lula has crippled the country's democracy. Brazil's left says the protesters are fascists who never believed in democracy in the first place. And there is no evidence that the events of Jan. 8, dramatic and ugly though they were, have changed many minds. □

have to make sure crypto is integrated into, or at least made congruent with, our traditional systems.

Now you're working on bringing the World Economic Forum into the metaverse. A year ago, when Meta had changed its name, I became curious what [the metaverse] is and could it have an impact, as you did with crypto. So I asked many people, What does it really mean? Everybody gave to me a different answer. And for me, it became very clear: it's the capability to meet in a virtual three-dimensional room. I mean, you have two levels. First is just to meet around a table with your avatars. And second, is to combine it with an immersive experience—and that's what we will do in Davos.

We will showcase in Davos what we call the Global Collaboration Village and inaugurate it in the summer next year. This has such an importance because it can make global collaboration more open; you always can convene the most relevant and the most knowledgeable people. And second, it makes it more sustained, because you can work together on a continued basis, and not just come together for a physical meeting and then nothing happens for quite some time again. We created a community, which has at the moment 70 members, whom we call Village Partners, who support us. *[Salesforce, whose chair and CEO is TIME's co-owner Marc Benioff, is a Village Partner.]* I feel this could be a game changer in global collaboration.

What brings you optimism in this challenging time? I'm always an optimist—and if I tend to become a pessimist, I just think of my mentor Shimon Peres, who explained in Davos once the difference between optimists and pessimists: both, in principle, have the same lives, but optimists have a much happier life. This situation which we are in now is not the worst of all the times. It's a bad one. But at the end, change is what's happening. We can manage change.

This interview has been edited for length and clarity

TECHNOLOGY

DAVOS MEETS THE METAVERSE

There are many companies angling to make money in the metaverse at the moment, but far fewer trying to use its technology for public good. The World Economic Forum hopes to change that with the Global Collaboration Village, which will be introduced at Davos this year ahead of a full rollout. The virtual village has been designed to function—and look—like the real Swiss town, except that here the people convening in co-working spaces, attending conferences in government buildings, and browsing museums will be doing so as avatars.

WEF executive chairman Klaus Schwab, who has spent decades cultivating in-person interactions between world leaders, hopes the village will serve as a consistent meeting ground for Davos' stakeholders, transforming the conference from a cloistered one-week gathering to a year-round project. "This could revolutionize global collaboration," Schwab told TIME in the weeks before the January gathering.

The village is being built using Microsoft Mesh, the computing giant's still-in-the-works immersive upgrade of its collaboration software Teams. Schwab has already enlisted dozens of partners to populate the village, including Meta and the IMF. The goal is for many of these partners to have virtual buildings in which they can showcase projects. The village will be accessed either through virtual reality—there will be Oculus headsets available in Davos—or via your phone or laptop.

The World Economic Forum hopes that the village will be especially useful for projects that benefit from immersiveness. Ocean environmentalists, for instance, could create simulations of the sea's depths to show how soundscapes can help restore coral reefs, or how mangroves could play a role in combatting rising sea levels. "We're trying to do things that can only happen in the metaverse—because if it's better done in person or on paper, then it doesn't make sense," Kelly Ommundsen, the WEF's head of the Global Collaboration Village, said in an interview.

While the village will be rolled out at Davos, its impact could be much larger in the other 51 weeks of the year. After the conference, Schwab says, the WEF itself will start to hold many of its meetings in the village. Schwab is interested in how virtual meetings with 3D avatars might build more rapport, trust, and ideation potential between people across the world, compared with the nonimmersive Zoom meetings everyone has grown used to in recent years.

Schwab is aware that there are many people resistant to the idea of working in virtual spaces, and that there will be a learning curve for some early participants. But he's confident that meeting in the metaverse is only going to become more common, especially as the technology continues to improve, so he sees the project as a vital part of the WEF's initiative to expand its partnership base and to hear from a wider swath of people invested in improving the world in specific ways. "We need new ways of international cooperation, which will allow us to involve many more people into our discussions," he said. "Here, we can bring people together—and technology is only the means to achieve it." —*Andrew R. Chow*

Social Media's Perspective Pitfall

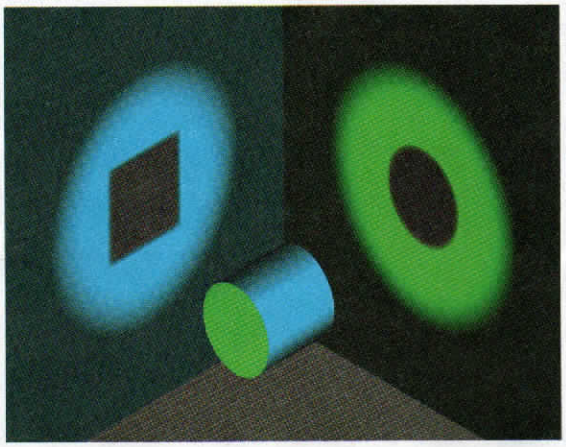
BY TRISTAN HARRIS

COOPERATION, THE THING WE NEED MOST TO solve big problems in the world, is being collapsed by the thing that promised to connect us and bring us closer together: social media. The problem is that social connection isn't actually the business model—"engagement" is.

Social media platforms (TikTok, Instagram, Snapchat, Twitter, and more) make choices to show us—the users—content that is most "engaging." Unfortunately, what is most engaging isn't always aligned with what we value. What gets the most engagement—follows, shares, and comments—are the fights, takedowns, and proverbial car crashes we can't take our eyes from.

Seeing more divisive content pushes us further into polarized ways of thinking on every topic—which spills over into our offline lives and makes cooperation a taller and taller task.

Yet today's world requires unprecedented levels of coordination and cooperation to meet unprecedented challenges. Whether it is climate change, reducing crime, or how to harness and keep humanity safe in increasingly AI-driven realities, our most pressing problems depend upon a shared reality.



A simple visual experiment demonstrates the power of one's point of view

THE IMAGE ON THIS PAGE shows how a 3D cylinder can cast a 2D shadow that can look like either a square or a circle depending on the light's angle.

If we focus from one angle, the 3D cylinder's shadow looks like a 2D square—but if you look from the other angle, the cylinder's shadow looks like a 2D circle. People standing on either side might fight back and forth, yelling more and more loudly at each other over which 2D shape is "true," increasingly convinced that the other side is wrong. Meanwhile, they would be missing the higher-dimensional cylinder, which requires synthesizing multiple perspectives.

Today's social media is designed in a way that rewards us for arguing in 2D about 3D issues—seeing the world in squares and circles.

Narrowly framed debates about circles and squares don't actually resolve our 3D problems. Take the issue of climate change: 2D squares/circles ask, "Is climate change really an existential risk or overblown media hype?" While the 3D-cylinder perspective question remains: "What trade-offs do we collectively want between economic growth, energy needs, global security, and emissions required for that growth?"

Additionally, the classic social media debate between free speech and censorship is a circle/square debate. Should platforms allow free speech? Or should platforms moderate content to keep users safe? Which is right: the circle or the square? Or can we ask a 3D-cylinder question: What kind of information ecosystem design and incentives will reward the most good-faith marketplace of ideas? For example, for all the talk of Twitter as a "public square," there is a big difference between the speech rewarded if that public square is designed like a Roman Colosseum that incentivizes violence and chaos, compared with the speech rewarded by a Quaker meeting that incentivizes reflection.

Cylindrical perspectives allow for nuance and promote a synthesis of ideas—not merely consensus or tyranny of the masses, but a merging of ideas into a Venn diagram of agreement.

By taking a cylinder view, we learn that we actually can discuss complex topics and reach cooperative solutions required in democratic societies.

Technology is made up of design choices. Engagement as a business model produced choices that have gotten us into the 2D situation we're in. But we can make new design choices. Software is malleable. We can rebuild existing technology and design new ones with a more humane philosophy that strengthens our capacities for synthesis and cooperation. Rather than fall into the trap of 2D debates on this issue of free speech vs. content moderation, we can take a collaborative 3D perspective. Change won't be easy, but the cooperation we need to tackle all of our other existential challenges is at stake.

WE ARE REWARDED FOR ARGUING IN 2D ABOUT 3D ISSUES

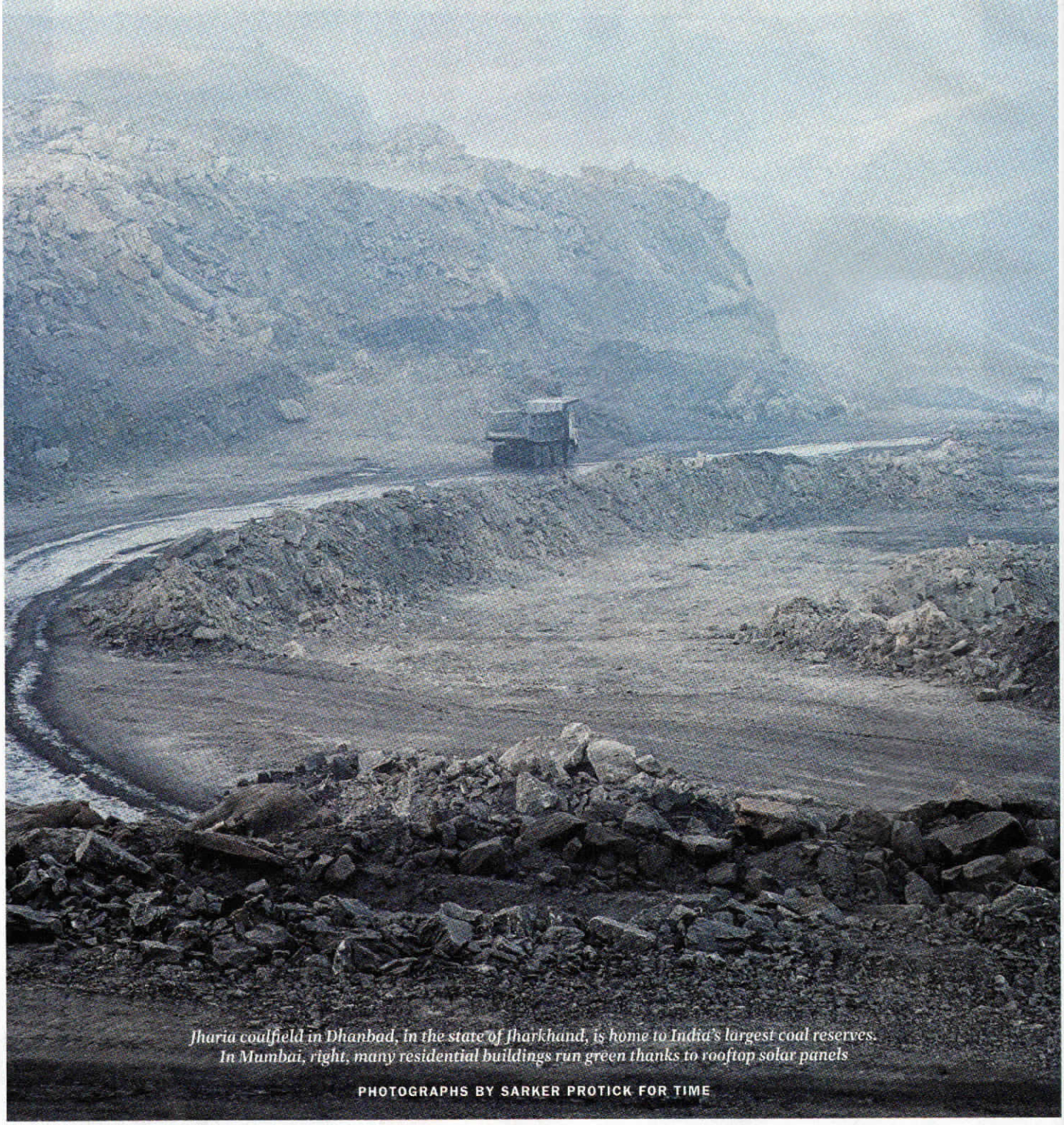
Harris is co-founder of the Center for Humane Technology and co-host of the podcast Your Undivided Attention

DAVOS • CLIMATE

INDIA'S PATH

HOW ONE COUNTRY BECAME THE MOST IMPORTANT PLAYER IN THE PLANET'S FUTURE

BY JUSTIN WORLAND/JHARKHAND, INDIA



Jharia coalfield in Dhanbad, in the state of Jharkhand, is home to India's largest coal reserves. In Mumbai, right, many residential buildings run green thanks to rooftop solar panels

PHOTOGRAPHS BY SARKER PROTICK FOR TIME

THE DRIVE FROM RANCHI TO Hazaribagh in the eastern Indian state of Jharkhand is only 65 miles, but it takes nearly three hours. We swerve to avoid schoolchildren chatting with friends and meandering down the highway, honk at cows to get out of the way, and accelerate past pickups reconfigured as makeshift transport vehicles overflowing with workers. Men in sandals push bicycles overloaded with bags of coal down the highway, while on the back roads close to Hazaribagh, women carry buckets of the stuff on their heads.

Coal is what brought me to Jharkhand, one of India's poorest and most polluted states. The pedestrian colliers, illegal miners trying to make ends meet, are just the start. All along the route to our destination, the Topa Open Coal Mine, a caravan of large, colorful trucks filled to the brim with coal barrel toward us in the opposite lane. When we finally reach the mine, I see the source of it all: an explosion has blasted through a wall of rock, opening access to new tranches of coal to feed the country's fast-growing power and industrial needs. says JK John, the senior mining supervisor on site employed by a subsidiary of the state-owned Coal India Ltd.: "Here, coal is in demand."

Two flights and more than 900 miles away, the northwestern state of Rajasthan is a world apart. Along a smoothly paved highway from the Jaisalmer airport, wind turbines dot the landscape as far as the eye can see. Farther from the town's center, we approach a field of solar panels, comprising a 300-MW power plant opened in 2021 by the Indian company ReNew Power, providing electricity for the growing population of the state of Maharashtra, home to Mumbai. Even as the region expands its renewable-energy industry, the atmosphere remains clean and pleasant enough to support a thriving tourist trade.

7%

INDIA'S CURRENT SHARE OF ANNUAL GREENHOUSE-GAS EMISSIONS

17.7%

THE SHARE OF THE GLOBAL POPULATION LIVING IN THE COUNTRY

Jharkhand and Rajasthan, so different in appearance, are being shaped by the same fundamental force: India is growing so rapidly that its energy demand is effectively insatiable. But the two states present starkly different answers to that demand. Historically, fossil fuels from places like Jharkhand powered industrialization. But today, with climate concerns rising, many experts are calling for India to ditch coal as soon as possible and embrace the green-energy model so prevalent in Rajasthan.

Much rides on which approach dominates India's energy future. In the three decades since reducing emissions became a discussion point on the global stage, analysts have portrayed the U.S., China, and Europe as the most critical targets for cutting pollution. But as the curve finally begins to bend in those places, it's become clear that India will soon be the most important country in the climate change effort.

In December, I spent 10 days in India, visiting coal communities, touring renewable-energy sites, and talking with leaders in the country's political and financial hubs to understand

From left: a lift operator in the control room at one of India's last underground mines; surface mining leaves a scene of dynamited mountaintops; in Jharia, 37 million tons of coal is estimated to have been consumed by a coal-bed fire that has been burning for longer than a century

India's approach to the energy transition. The picture that emerged is of a government following an approach uncharted for a country of its scale: pursue green technologies in the midst of industrialization while leaving the fate of coal to the market. "India, as a responsible global citizen, is willing to make the bet that it can satisfy the aspiration for higher living standards, while pursuing a quite different energy strategy from any large country before," says Suman Bery, who leads NITI Aayog, the Indian government's economic policymaking agency. India, Bery says, will pursue clean energy while seeking a "balance between energy access and affordability, energy security, and environmental considerations."

Where that balance is struck could tip the climate scales worldwide. India contributes 7% of the emissions that cause global warming today, a percentage that will expand alongside its economy. This growth will help determine whether—and by how far—the world blows past the goal of keeping global temperatures from rising more than the Paris Agreement target of 1.5°C. Equally important, India's approach is being watched elsewhere. If it can use low-carbon development to bring prosperity to its 1.4 billion people, others will follow. Failure could lead to a retrenchment into fossil fuels across the Global South.

'INDIA'S NOT MARRIED TO COAL. IT'S JUST WHAT INDIA'S GOT.'

—RAHUL TONGIA, CENTRE FOR SOCIAL AND ECONOMIC PROGRESS

What the Global North does matters too. The International Energy Agency (IEA) estimates India needs $1.4 trillion in additional investment in coming decades to align its energy system with global climate targets; that will very likely require reforms at international lenders like the International Monetary Fund (IMF) and the World Bank to facilitate the flow of money. The best outcome, observers say, is one where India gets the help it needs to make the best choice for everyone. "India has to do it for itself," says Rachel Kyte, the dean of the Fletcher School of international affairs at Tufts University. "And India needs to do it for the world."

IN A BITTER IRONY, coal-rich Jharkhand cannot provide reliable electricity even to hospitals, schools, and other essential-service providers. India's second poorest state may be an extreme example, but such problems pervade every corner of the country and are the crux of its energy and climate challenge. It is, fundamentally, a developing nation, and its leaders do not want to write off any fuel source while energy demand continues its meteoric rise. As the country's population swells to as high as a projected 1.8 billion over the next 40 years, and its economy grows at an even faster rate, the country will need to add a power system equivalent in size to that of the entire European Union, according to the IEA.

Historically, development at that scale happened one way: fossil fuels built a country's industrial base, and then leaders pivoted to a lower-carbon, service-oriented model. China, one of history's most successful examples of rapid modernization, built its industrial capacity by relentlessly adding coal-fired power plants and now

boasts the second largest economy in the world, run primarily on coal. With that base established, the country has recently begun its full-fledged expansion of renewable energy.

India, with its abundant coal resources, could simply do the same. While research shows that a rapid expansion of renewable energy could provide the country with reliable electricity given adequate investment, no other country has tried it at India's scale. Attempting a renewable revolution comes with some inevitable risks, like technical challenges and vulnerability to foreign supply chains. Meanwhile, coal is tried and tested.

Above all, leaders in India insist that they have the right to power up using coal. In the lingo of the climate world, every country has its own population-based "fair share" of emissions it can produce before the world hits unsafe levels of global warming. In this formulation, the U.S. and European countries have already far exceeded their limits; India, on the other hand, has contributed only 4% of global emissions since 1850, despite being home to 18% of the world's population, according to a 2019 U.N. report.

Whatever the reasoning, no one I spoke with in India, from academics to renewable-energy executives, would endorse a swift transition away from coal. "India's not married to coal," says Rahul Tongia, a senior fellow at the Centre for Social and Economic Progress in New Delhi. "It's just that's what India's got." Instead, government officials are working to promote renewable energy without actively working to shut down coal.

AT THE CENTER of this approach sits Prime Minister Narendra Modi. Modi, whose support for solar power extends back to his time as the top official in the state of Gujarat in the 2010s, has set bold renewable-energy targets, saying at COP26 in 2021 that the country would install 500 gigawatts of renewable-energy capacity by 2030. That's equivalent to 15 times California's current renewable capability.

To get there, the Modi government has merged its renewable-energy and clean-technology objectives with its policy of liberalizing the economy and boosting the private sector. Bery, of NITI Aayog, describes the government's approach as market-based: creating a context for clean technologies to "edge out coal in the market" rather than relying on government mandates. India, he tells me in his New Delhi office, should be "backing all these other technologies, so that it's a pure commercial choice, rather than a regulatory choice to phase out coal."

Industry insiders say this approach is working. The government-backed Solar Energy Corp. of India, for example, all but eliminated the risk that states would renege on their agreements—a significant worry for the banks that finance such projects—by serving as an intermediary between private-sector developers and states. If states don't pay, the agency can essentially force them to do so—an innovation that has played a "fundamental" role in allowing the industry to grow, says Sumant Sinha, who has led ReNew Power since 2011.

Using policy to drive private-sector investment is the norm in places like the U.S., but it's new for India. For decades, electricity production and distribution in India was controlled by state-owned enterprises, from state-owned coal mines to state-owned power plants to the state-owned grid. With the new approach, the private sector deploys clean-energy technologies, and the government facilitates.

This is a fundamental, ideological change in Indian governance. The preamble to India's constitution declares it a "socialist" state. But the investment in renewable energy that has led capacity to double since Modi took office has come almost entirely from private companies—and it isn't slowing down. "The most natural thing for India to meet this burgeoning electricity requirement is to meet it through renewable energy, because it's the cheapest, most commercially sound thing to do," says Sinha. The IEA projects that solar power will make up around 30% of India's electricity generation by 2040, matching coal's share. This private-sector vitality was on full display in Rajasthan, where I saw massive wind and solar farms that belong to the country's biggest private players, including the megacorporations Tata and Adani.

But the focus on markets also reflects hard politics. Driving around Jharkhand, a state of 33 million people, it's impossible to miss how entrenched the coal industry has become. Livelihoods depend on it, from educated supervisors running the show to indigent locals scrounging for scraps of coal. On the outskirts of the Topa mine, I saw an entire village abandoned to make way for miners to open a new coal seam.

THE EVOLUTION OF INDIA'S ENERGY STRATEGY

2003
ENACTS A NEW LAW ALLOWING FOR INCREASED COMPETITION IN THE POWER SECTOR, PAVING THE WAY FOR RENEWABLES

2008
LAUNCHES FIRST NATIONAL CLIMATE ACTION PLAN, WITH A FOCUS ON SOLAR POWER

2014
NEWLY BUILT COAL POWER CAPACITY PEAKS—THOUGH OVERALL COAL ENERGY KEEPS GROWING

2021
HOLDS UP COP26 AGREEMENT OVER A CLAUSE ENDORSING PHASING OUT COAL

2030
TARGET TO SOURCE HALF OF ELECTRICITY FROM RENEWABLES

2070
TARGET TO REACH NET-ZERO EMISSIONS

Birds swoop through smog in Delhi on a December morning with air quality in the "very unhealthy" category

Displacing such a colossus, policymakers say, cannot be done with a regulation here and there. "The minute you say 'no coal' there will be political implications. There will be riots," says Amitabh Kant, who is leading India's G-20 conference this year. "But if coal becomes commercially nonviable, that will be acceptable because the market will do it."

It's a bold bet. Even with a true transition from coal likely decades away, many local officials and activists across India have begun to call for dedicated programs to ensure a "just transition" that protects those affected by a move away from coal.

A SMOOTH TRANSITION matters not only for India but also for the rest of the world—it is a test case for how to implement an energy shift in developing countries while supporting their economic growth.

India's leaders are keenly aware of the global stakes. Wherever I traveled there, I saw signs celebrating India hosting this year's G-20, the annual forum for the world's largest economies, at which the host is keen to make climate a central topic. India will tout its efforts to spur behavioral change among consumers, and its nascent use of hydrogen as an energy-storage medium. The meetings, Kant says, could lead countries to come to agreement on how to reform institutions like the IMF and World Bank so they can help developing countries decarbonize. The energy transition globally will cost untold trillions of dollars, and most countries now agree that these international financial institutions need to create instruments to make investing in places like India less risky for private financiers.

To actually deliver on such an agenda, though, India must first convince the rest of the world that its model for low-carbon development can work. Modi and others have already begun a campaign to show the rest of the world how serious it is—and to point out Western hypocrisy. At COP27, the annual U.N. climate conference held in November in Egypt, India lobbied for countries to agree to phase out "all fossil fuels" rather than just coal, an implicit challenge to the U.S. and other Western countries that are rich in oil. "Why should only coal be phased out?" Kant asks me rhetorically. And Modi's LiFE campaign, which focuses on the role behavioral change can play in cutting emissions, stems from a recognition that India's per capita emissions are just 40% of the global average.

India's energy future remains India's "choice." But for all of the country's insistence on sovereignty, by marrying its energy policy to its economic liberalization it has chosen a path of interdependence. In leaving the speed of its green transition to the whims of the market, India has accepted a dependence on price signals, investment choices, and economic trends far beyond the control of New Delhi or Mumbai. "The political signals, the policy evolution, or even the international commitments are also contingent on how quickly the market participants are able to respond," says Arunabha Ghosh, CEO of the Council on Energy, Environment and Water, an Indian environmental NGO.

Which means our future on the planet, once again, depends on a collective choice. Political leaders across the Global North and South can reform the institutions that govern the global economy, ensuring that the market decisively favors clean energy over fossil fuels. Or, we can all bid farewell to global climate targets and gird ourselves for the far more costly dangers that come next. —*With reporting by* SOLCYRE BURGA *and* LESLIE DICKSTEIN/NEW YORK

MACHINE LEARNING WARNING

DEEPMIND'S CEO HELPED TAKE AI MAINSTREAM. NOW HE'S URGING CAUTION

BY BILLY PERRIGO/ LONDON

DEMIS HASSABIS STANDS HALFway up a spiral staircase, surveying the cathedral he built. Behind him, light glints off the rungs of a golden helix rising up through the staircase's airy well. The DNA sculpture, spanning three floors, is the centerpiece of DeepMind's recently opened London headquarters. It's an artistic representation of the code embedded in the nucleus of nearly every cell in the human body. "Although we work on making machines smart, we wanted to keep humanity at the center of what we're doing here," Hassabis, DeepMind's CEO and co-founder, tells TIME. This building, he says, is a "cathedral to knowledge." Each meeting room is named after a famous scientist or philosopher. "I've always thought of DeepMind as an ode to intelligence," he says.

Hassabis, 46, has always been obsessed with intelligence: what it is, the possibilities it unlocks, and how to acquire more of it. He was the second-best chess player in the world for his age when he was 12, and he graduated from high school a year early. As an adult he strikes a somewhat diminutive figure, but his intellectual presence fills the room. "I want to understand the big questions, the really big ones that you normally go into philosophy or physics if you're interested in," he says. "I thought building AI would be the fastest route to answer some of those questions."

DeepMind—a subsidiary of Google's parent company, Alphabet—is one of the world's leading artificial intelligence labs. Last summer it announced that one of its algorithms, AlphaFold, had predicted the 3D structures of nearly all the proteins known to humanity, and that the company was making the technology behind it freely available. Scientists had long been familiar with the sequences of amino acids that make up proteins, the building blocks of life, but had never cracked how they fold up into the complex 3D shapes so crucial to their behavior in the human body. AlphaFold has already been a force multiplier for hundreds of thousands of scientists working on efforts such as developing malaria vaccines, fighting antibiotic resistance, and tackling plastic pollution, the company says. Now DeepMind is applying similar machine-learning techniques to the puzzle of nuclear fusion, hoping it helps yield an abundant source of cheap, zero-carbon energy that could wean the global economy off fossil fuels at a critical juncture in the climate crisis.

Hassabis says these efforts are just the beginning. He and his colleagues have been working toward a much grander ambition: creating artificial general intelligence, or AGI, by building machines that can think, learn, and be set to solve humanity's toughest problems. Today's AI is narrow, brittle, and often not very intelligent at all. But AGI, Hassabis believes, will be an "epoch-defining" technology—like the harnessing of electricity—that will change the very fabric of human life. If he's right, it could earn him a place in history.

But with AI's promise also comes peril. In recent months, researchers building an AI system to design new drugs revealed that their tool could be easily repurposed to make deadly new chemicals. A separate AI model trained to spew out toxic hate speech went viral, exemplifying the risk to vulnerable communities online. And inside AI labs around the world, policy experts have grappled with near-term questions like what to do when an AI has the potential to be commandeered by rogue states to mount widespread hacking campaigns or infer state-level nuclear secrets. In December 2022,

Demis Hassabis by the Helicase—a sculpture that uses DNA's helix shape as a symbol of human endeavor and the pursuit of knowledge—at DeepMind's headquarters in London on Nov. 3, 2022

PHOTOGRAPH BY JAMES DAY FOR TIME

ChatGPT, a chatbot designed by OpenAI, went viral for its ability to write almost like a human—but faced criticism for its susceptibility to racism and misinformation. And the tiny company Prisma Labs went viral for its Lensa app's AI-enhanced selfies. Many users complained Lensa sexualized their images, revealing biases in its training data. What was once a field of a few deep-pocketed tech companies is becoming increasingly accessible; as computing power becomes cheaper and AI techniques become better known, you no longer need a high-walled cathedral to perform cutting-edge research.

It is in this uncertain climate that Hassabis agrees to a rare interview, to issue a stark warning about his growing concerns. "I would advocate *not* moving fast and breaking things," he says, referring to an old Facebook motto that encouraged engineers to release their technologies first and fix problems that arose later. The phrase has since become synonymous with disruption. That culture, subsequently emulated by a generation of startups, helped Facebook rocket to 3 billion users. But it also left the company entirely unprepared when disinformation, hate speech, and even incitement to genocide began appearing on its platform. Hassabis sees a similarly worrying trend developing with AI. He says AI is now "on the cusp" of being able to make tools that could be deeply damaging to human civilization, and urges his competitors to proceed with more caution than before. "When it comes to very powerful technologies—and obviously AI is going to be one of the most powerful ever—we need to be careful," he says. "Not everybody is thinking about those things. It's like experimentalists, many of whom don't realize they're holding dangerous material." Worse still, Hassabis points out, we are the guinea pigs.

Hassabis, left, captaining the England under-11s chess team at the age of 9

$500 MILLION

THE AMOUNT THAT GOOGLE REPORTEDLY PAID FOR DEEPMIND IN 2014

HASSABIS WAS JUST 15 when he walked into the Bullfrog video-game studios in Guildford, just southwest of London. A gaming obsessive, he had entered a competition in a video-game magazine to win an internship at the prestigious studio. His program—a *Space Invaders*–style game where players shot at chess pieces descending from the top of the screen—came in second place. He had to settle for a week's work experience.

Peter Molyneux, Bullfrog's co-founder, still remembers first seeing Hassabis. "This little slender kid came in, who you would probably just walk past in the street and not even notice. But there was a sparkle in his eyes: the sparkle of intelligence." In a chance conversation on the bus to Bullfrog's Christmas party, the teenager captivated Molyneux. "The whole of the journey there, and the whole of the journey back, was the most intellectually stimulating conversation," he recalls. They talked about the philosophy of games, what it is about the human psyche that makes winning so appealing, and whether you could imbue those same traits in a machine. "All the time I'm thinking, This is just a kid!" He knew then this young man was destined for great things.

After graduating from Cambridge University, Hassabis returned to Bullfrog to help Molyneux build his most popular game to date: *Theme Park*, a simulation game giving the player a God's-eye view of an expanding fairground business. Hassabis went on to establish his own game company before later deciding to study for a Ph.D. in neuroscience. He wanted to understand the algorithmic level of the brain: not the interactions between microscopic neurons but the larger architectures that seemed to give rise to humanity's powerful intelligence. "The mind is the most intriguing object in the universe," Hassabis says. He was trying to understand how it worked in preparation for his life's quest. "Without understanding that I had in mind AI the whole time, it looks like a random path," Hassabis says of his career trajectory: chess, video games, neuroscience. "But I used every single scrap of that experience."

By 2013, when DeepMind was three years old, Google came knocking. A team of Google executives flew to London in a private jet, and Hassabis wowed them

LEFT: COURTESY DEMIS HASSABIS; RIGHT: LEE JIN-MAN—AP

Hassabis celebrates DeepMind's victory over Go player Lee Sedol, right, in South Korea in 2016

by showing them a prototype AI his team had taught to play the computer game *Breakout*. DeepMind's signature technique behind the algorithm, reinforcement learning, was something Google wasn't doing at the time. It was inspired by how the human brain learns, an understanding Hassabis had developed during his time as a neuroscientist. The AI would play the game millions of times, and was rewarded every time it scored some points. Through a process of points-based reinforcement, it would learn the optimum strategy. Hassabis and his colleagues fervently believed in training AI in game environments, and the dividends of the approach impressed the Google executives. "I loved them immediately," says Alan Eustace, a former senior vice president at Google.

Hassabis' focus on the dangers was evident from his first conversation with Eustace. "He was thoughtful enough to understand that the technology had long-term societal implications, and he wanted to understand those before the technology was invented, not after the technology was deployed," Eustace says. "It's like chess. What's the endgame? How is it going to develop, not just two steps ahead, but 20 steps ahead?"

Eustace assured Hassabis that Google shared those concerns, and that DeepMind's interests were aligned with its own. Google's mission, Eustace said, was to index all of humanity's knowledge, make it accessible, and ultimately raise the IQ of the world. "I think that resonated," he says. The following year, Google acquired DeepMind for some $500 million. Hassabis turned down a bigger offer from Facebook. One reason, he says, was that unlike Facebook, Google was "very happy to accept" DeepMind's ethical red lines "as part of the acquisition." (There were reports at the time that Google agreed to set up an independent ethics board to ensure these lines were not crossed.)

In 2016, DeepMind won its first major coup. One of its algorithms beat one of the world's best players of Go, an ancient Chinese board game far more complex than chess. Forecasters had not expected the milestone to be passed for a decade. It was a vindication of Hassabis' pitch to Google: that the best way to push the frontier of AI was to focus on reinforcement learning in game environments.

But just as DeepMind was scaling new heights, things were beginning to get complicated. In 2015, two of its earliest investors, billionaires Peter Thiel and Elon Musk, symbolically turned their backs on DeepMind by funding rival startup OpenAI. That lab, subsequently bankrolled by $1 billion from Microsoft, also believed in the possibility of AGI, but it had a very different philosophy for how to get there. It wasn't as interested in games. Much of its research focused not on reinforcement learning but on unsupervised learning, which involves scraping vast quantities of data from the internet and pumping it through neural networks. As computers became more powerful and data more abundant, those techniques appeared to be making huge strides in capability.

While DeepMind, Google, and other AI labs had been working on similar research behind closed doors, OpenAI was more willing to let the public use its tools. In late 2022 it launched DALL·E 2, which can generate an image of almost any search term imaginable, and the chatbot ChatGPT. Because both of these tools were trained on data scraped from the internet, they were plagued by structural biases and inaccuracies. DALL·E 2 is likely to illustrate "lawyers" as old white men and "flight attendants" as young beautiful women, while ChatGPT is prone to confident assertions of false information. In the wrong hands, a 2021 DeepMind research paper says, language-generation tools like ChatGPT could turbocharge the spread of disinformation, facilitate government censorship or surveillance, and perpetuate harmful stereotypes under the guise of objectivity. (OpenAI acknowledges its apps have limitations, including biases, but says that it's working to minimize them and that its mission is to build safe AGI to benefit humanity.)

'I WOULD ADVOCATE *NOT* MOVING FAST AND BREAKING THINGS.'

—DEMIS HASSABIS

Despite Hassabis' calls for the AI race to slow down, it appears he may have other blind spots that could lead to unsafe applications of the technology. He wants the world to see DeepMind as a standard bearer of safe and ethical AI research, leading by example in a field full of others focused on speed. DeepMind has published "red lines" against unethical uses of its technology, including surveillance and weaponry. But neither company has publicly shared what legal power DeepMind has to prevent Alphabet—a surveillance empire that has dabbled in Pentagon contracts—from pursuing those goals with the AI DeepMind builds. In 2021, Alphabet ended yearslong talks with DeepMind about the subsidiary's setting up an independent legal structure that would prevent its AI being controlled by a single corporate entity, the *Wall Street Journal* reported. Hassabis doesn't deny DeepMind made these attempts, but downplays any suggestion that he is concerned about the current structure being unsafe. When asked to confirm or deny whether the independent ethics board rumored to have been set up as part of the Google acquisition actually exists, he says he can't, because it's "all confidential." But he adds that DeepMind's ethics structure has "evolved" since the acquisition "into the structures that we have now."

Hassabis says both DeepMind and Alphabet have committed to public ethical frameworks and build safety into their tools from the very beginning. DeepMind has its own internal ethics board, the Institutional Review Committee (IRC), with representatives from all areas of the company, chaired by its chief operating officer, Lila Ibrahim. The IRC meets regularly, Ibrahim says, and any disagreements are escalated to DeepMind's executive leaders for a final decision. "We operate with a lot of freedom," she says. "We have a separate review process: we have our own internal ethics review committee; we collaborate on best practices and learnings." When asked what happens if DeepMind's leadership team disagrees with Alphabet's, or if its "red lines" are crossed, Ibrahim only says, "We haven't had that issue yet."

ONE OF HASSABIS' favorite games right now is a strategy game called *Polytopia*. The aim is to grow a small village into a world-dominating empire through gradual technological advances. While Hassabis' worldview is much more nuanced—and cautious—it's easy to see why the game's ethos resonates with him. He still appears to believe that technological advancement is inherently good for humanity, and that under capitalism it's possible to predict and mitigate AI's risks. "Advances in science and technology: that's what drives civilization," he says.

WE NEED TO MAKE SURE THAT THE BENEFITS ACCRUE TO AS MANY PEOPLE AS POSSIBLE.'

—DEMIS HASSABIS

Hassabis believes the wealth from AGI, if it arrives, should be redistributed. "I think we need to make sure that the benefits accrue to as many people as possible—to all of humanity, ideally." He likes the ideas of universal basic income, under which every citizen is given a monthly stipend from the government, and universal basic services, where the state pays for basic living standards like transportation or housing. He says an AGI-driven future should be more economically equal than today's world, without explaining how that system would work. "If you're in a [world of] radical abundance, there should be less room for that inequality and less ways that could come about. So that's one of the positive consequences of the AGI vision, if it gets realized."

Others are less optimistic that this utopian future will come to pass—given that the past several decades of growth in the tech industry have coincided with huge increases in wealth inequality. "Major corporations, including the major corporation that owns DeepMind, have to ensure they maximize value to shareholders; are not focused really on addressing the climate crisis unless there is a profit in it; and are certainly not interested in redistributing wealth when the whole goal of the company is to accumulate further wealth and distribute it to shareholders," says Paris Marx, host of the podcast *Tech Won't Save Us*. "Not recognizing those things is really failing to fully consider the potential impacts of the technology." Alphabet, Amazon, and Meta were among the 20 corporations that spent the most money lobbying U.S. lawmakers in 2022, according to transparency watchdog Open Secrets. "What we lack is not the technology to address the climate crisis, or to redistribute wealth," Marx says. "[It] is the political will."

Back at DeepMind's spiral staircase, an employee explains that the DNA sculpture is designed to rotate, but today the motor is broken. Closer inspection shows some of the rungs of the helix are askew. At the bottom of the staircase there's a notice on a wooden stool in front of this giant metaphor for humanity. "Please don't touch," it reads. "It's very fragile and could easily be damaged." —*With reporting by* MARIAH ESPADA *and* SOLCYRE BURGA