

# A Summit of Substantial Success: The Performance of the 2021 Leaders Summit on Climate

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On March 26, 2021, U.S. president Joe Biden formally announced that he would hold a “Leaders Summit on Climate” on April 22–23 (White House 2021). This move was Biden’s first full step in providing proactive American global leadership on climate change. He was mounting a major innovative initiative, rather than merely reversing what his predecessor Donald Trump had done and returning the United States to where Joe Biden and President Barack Obama had left the world when they left office almost half a decade ago. Biden’s “Earth Day” summit would “underscore the urgency — and the economic benefits — of stronger climate action.” It would be “a key milestone on the road to the United Nations Climate Change Conference (COP26) this November in Glasgow,” seeking to “catalyze efforts” to keep within reach the goal of limiting global warming to under 1.5°C from preindustrial times. It would “also highlight examples of how enhanced climate ambition will create good paying jobs, advance innovative technologies, and help vulnerable countries adapt to climate impacts.”

In this March 26 announcement, the United States promised that before the summit it would announce “an ambitious 2030 emissions target as its new Nationally Determined Contribution under the Paris Agreement.” Biden urged the invited leaders to use the summit to do so too. He did not make doing so a condition of receiving an invitation, as a recent climate summit had.

To select the invitees, he first chose those from the U.S.-led Major Economies Forum on Energy and Climate (MEF), which Republican president George W. Bush had created on May 31, 2007, with its first meeting held in Washington DC on September 27–28 that year. Its 17 members now produce about 80% of global greenhouse gas emissions and gross domestic product (GDP). Biden added leaders from all remaining G20 countries and leaders showing strong climate leadership, those most vulnerable to climate impacts or “charting innovative pathways to a net zero economy” (White House 2021). He included “a small number of business and civil society leaders.”

The summit sought to encourage all invited leaders to improve their very inadequate nationally determined contributions (NDCs) well before the UN’s Glasgow Summit in November. This was especially important as the preparatory process for Glasgow had stalled, due to the absence of in-person meetings. The United States was expected to announce a new, more ambitious NDC before or at the summit, to encourage others to follow.

## The Debate

The summit’s prospects and performance aroused a debate among several schools of thought. The first school saw a welcome start in many ways (Kirton 2021b). Biden’s summit built on the results of the special G7 Virtual Summit on February 19 and his Quadrilateral Summit on March 12. It produced momentum for the G7’s Cornwall Summit in June and the G20’s Rome Summit in

October (Beament 2021). Biden was not letting the continuing COVID-19 crisis crowd out action on climate change but sought immediate action in a forum more inclusive than the G20, but much more manageable than the universal UN, with its entrenched coalitions and caucus groups that had so frustrated President Obama at Copenhagen in 2009 (Obama 2020, 503–16). But missing from the White House announcement were references to health, gender, Indigenous Peoples, invitees from multilateral environmental organizations and robust attention to nature-based solutions.

The second school saw a U.S.-centred summit theatre. Rachel Kyte thought it could be “extremely impactful if there is a big centerpiece ... the U.S. plan” (Friedman 2021).

The third school saw a cooperative China creating summit success. David Sandalow thought China could and would improve its climate credentials and reduce overall frictions with the U.S. by issuing a stronger emissions cutback commitment and thus make the summit a success (Friedman 2021).

The fourth school saw hopes boosted by a U.S.-China deal announced on April 17 (White and Hook 2021). It declared climate change to be a “crisis” and would “sharply increase the momentum on climate action globally” including at Glasgow, especially as it came amid rising U.S.-China tensions overall.

The fifth school saw a climate finance opportunity. The UK’s COP26 coordinator, Alok Sharma (2021), said it had “earmarked [the U.S. Earth Day Summit and others] as opportunities to secure further climate finance pledges from developed countries.”

The sixth school saw potential failure, due to other countries’ lack of trust in Biden’s ability to deliver his own improved emission cutback plans. Taiya Smith thought they might treat this as another American fad, while others pointed to Biden’s difficulty in getting cooperation from a Congress that his party barely controlled (Friedman 2021).

The seventh school saw “far from certain” followership (Gearan et al. 2021). It noted that Biden’s was a high-risk summit that would be livestreamed around the world, with no promises in advance from many of the biggest climate polluters that they would commit to more action there. They knew that Biden would not be president in 2030 to keep the promises that he would make to deliver on that date, and that his Congressional support was precarious even now. However, the prospect of carbon border adjustments by the United States could induce China and other export-dependent economies to move.

## Puzzles

These schools largely did not specify what the Earth Day Summit had to do to qualify as a success, nor what the U.S. and China had to promise to make it one. Nor did they look beyond the U.S. and China to other consequential countries, such as India, Russia, Brazil and G7 members, to what they had to do to make the summit a success. They did not consider how well the two earlier MEF summits in 2008 and 2009 and the 16 G20 summits from 2008 to 2020, whose members were at the core of this Earth Day one, had worked and why (see Appendix A). They overlooked other causes, such as newly soaring COVID-19 cases that could again crowd out action on climate change, even as rapid economic and thus emissions growth in China and the U.S. meant more real action was required now to meet the Paris Agreement goals.

## The Thesis

The Earth Day Summit’s success depended critically on the size, speed and credibility of the new climate actions that China, India, Russia, Brazil, Japan and Canada promised to take in the short and

medium term. The long-anticipated U.S. increases were important in their own right but primarily insofar as they incentivized these other leading climate polluters to act, but they depended on Congress passing the green components of Biden's \$2.2 trillion infrastructure plan and new climate legislation. The key tests for the summit would be ending the financing, development, production and consumption of coal; stopping fossil fuel subsidies; reducing methane and hydrofluorocarbons (HFCs); curbing air pollution; and enhancing nature-based solutions from forests and peat. Far less important were solving the many long deadlocked issues in the COP26 process, which could be left for ministers to overcome later in the year. A key referent was how much closer the summit could bring the world to the 45% reductions in greenhouse gas emissions from 2010 levels by 2030 that UN Secretary General António Guterres had said is needed to reach the Paris Agreement target (World Meteorological Organization [WMO] 2021).

On its first day, the Earth Day summit got more than halfway there. The leaders of countries producing over 50% of global GDP publicly promised to take new actions that put them on track by 2030 to meet the Paris target of keeping global temperature under 1.5°C above pre-industrial levels. A majority of G20 leaders made new commitments. All G7 leaders just before or at the summit promised emissions reductions averaging 50% or more by 2030. The BRICS leaders from China, Brazil and South Africa made meaningful new commitments. Korea and Mexico, members of MIKTA (along with Indonesia, Turkey and Australia — all G20 members) as well as the Organisation for Economic Co-operation and Development, did too. There was strong action to kill killer coal and to nurture nature-based solutions to serve as carbon sinks. But Russia, India, Saudi Arabia and Australia promised nothing new, and too little was done to end fossil fuel subsidies and increase climate finance.

Propelling this substantial performance was the leaders' realistic recognition of the severity and urgency of the climate crisis, even if the diversionary shock of COVID-19's third wave and consequent economic downturn constrained the willingness of India, Russia, Indonesia and others to act. The multilateral organizational failure of the UN's COP26 preparatory process spurred these "G40" leaders to step up to fill the gap, even after John Biden had the U.S. rejoin the Paris Agreement that his presidential predecessor had renounced. The G40, with the G20 at its core, possesses over 80% of the global economy and emissions. Their internally equalizing capabilities, led by rapid recovery of China and the U.S. from COVID-19 lockdowns, reduced the temptation for coercive or beneficent hegemonic leadership from a single country and free riding by the others, inducing many to contribute to the collective good. Helping was the G40's upwardly converging democratic character and environmental performance, now that the downward drag from U.S. president Donald Trump was gone. Domestic political cohesion was strong in the U.S. during a highly experienced and climate-committed Biden's first 100 days in the White House. It was also strong in China and in G7 countries too. The G20 and MEF at the core of this new virtual G40 helped make it a club at the hub of an extensive network of global summit governance, expanded with the other non-G20 leaders now brought in.

## Plans and Preparations

This reconfiguration of global climate governance came under American leadership for the first time (Kirton and Kokotsis 2015). It began on January 20, when Joe Biden was inaugurated as president and immediately brought his country back into the Paris Agreement. Three weeks later, on March 12, he chaired a new summit of the Quadrilateral Indo-Pacific democratic powers of Japan, India and Australia, which made three commitments on climate change (Kirton 2021a).

In rejoining the Paris Agreement and mounting these new summits, Biden was swiftly fulfilling the promises he had repeatedly made in his presidential campaign. They were backed by a succession of domestic executive orders to repeal the many anti-environmental moves Trump made. Biden also

created a much stronger American executive team for climate action, led by former secretary of state John Kerry as his special envoy with cabinet rank.

To prepare the Earth Day summit, Kerry toured Europe and Asia and made contact with his Chinese counterpart. In the first few months of 2021 he made six overseas visits and many conference calls. He secured early indications of increased NDCs from Canada's Justin Trudeau. Trudeau announced on April 19 that Canada would raise its target for reducing emissions by 2030 from 2005 levels by 36%, rather than the 30% it had long had. Indications of substantially improved medium-term targets also came from Prime Minister Yoshihide Suga of Japan. Hesitant, coal-friendly Prime Minister Scott Morrison of Australia resisted, but might be moved if Biden promised to help his partner in the Quadrilateral Summit to withstand China's threats.

The most important signal of progress came on April 17, in the "U.S.-China Joint Statement Addressing the Climate Crisis" (U.S. Department of State 2021). Its title showed that the world's two leading economic powers and climate polluters had agreed on the critical fact that climate change constituted a crisis and, implicitly, required major action now. It also promised "concrete actions in the 2020s" rather than waiting three or more decades to 2050 or 2060 for lofty targets to be met. Yet it contained no details about what specific targets and timetables the United States or China would actually adopt.

## Lead-Up Promises

In the lead-up to the summit, several key countries announced improved climate actions and NDCs. The UK had already raised its to a 68% cut in emissions from 1990 levels by 2030. It signalled it would go to 78% by 2035 by the COP26 in Glasgow, which it will co-chair in November (Harvey 2021). It did on April 20, when Prime Minister Boris Johnson announced he would legislate by the end of June the "world's most ambitious climate change, cutting emissions by 78% by 2035 compared to 1990 levels" (UK Department for Business, Energy and Industrial Strategy 2021). It would include aviation and shipping emissions for the first time and "bring the UK more than three quarters of the way to net zero by 2050." Johnson was set to speak in the opening session of the Leaders' Summit on Climate, urging others to follow the UK in "reducing emissions by 2030 to align with net zero."

The European Union had earlier created the world's first renewable energy transition, carbon market, and big emissions cutback targets. It had promised a 55% cut. On April 21 it agreed to embed this 55% cut below 1990 levels by 2030 in legislation. Thus Biden's America would be following the UK, as the G7 and UN host in 2021, and the EU. But Biden's America would still be leading the world as a whole, which had not yet followed the UK-EU lead.

Canada's budget on April 19 raised its emissions reduction target to 36% below 2005 levels by 2030 (Radwanski 2021). Trudeau signalled that more would come at the Earth Day Summit itself. The budget added CA\$5 billion to the CA\$3 billion allocated in December 2020 to the New Zero Accelerator to transform large-emitting sectors, and gave CA\$4.2 billion to nature-based solutions, among other measures. On April 21, environment minister Jonathan Wilkinson said Canada would announce an ambitious new target at the summit, having just consulted with the opposition parties about their desires (Graney, Walsh and Radwanski 2021). The National Democratic Party asked for 50% below 2005 levels by 2030, and the Green Party asked for a 60% cut.

By April 20, Joe Biden was reportedly planning to announce U.S. cutbacks of up to 50% by 2030, or about double the 26%–28% cuts the Obama administration had pledged for the Paris Agreement of 2015. On April 20, it was reported that the U.S. cuts would be at least 50%, perhaps in a range whose upper level would exceed 50% (Dennis and Eilperin 2021). The U.S. would achieve this in part

through existing moves to reduce methane emissions from natural gas and oil drilling and reducing HFCs by 85% by 2035.

China signalled flexibility. In September 2020 President Xi Jinping announced its carbon emissions would peak by 2030 and reach net zero by 2060. In mid April 2021, while Kerry was visiting Shanghai, in a spontaneous “climate summit” call with Emmanuel Macron and Angela Merkel Xi promised to reduce China’s use of HFC refrigerants (Shepherd 2021). In his keynote address to the Boao Forum for Asia on April 20, Xi did not raise China’s pledges, as some had expected. Yet some felt he would in his address to the summit. China, with an export-dependent economy, could be induced to act by the EU’s threat of imposing border carbon adjustment, if the U.S. added its support (Sandbu 2021).

Japan, which had submitted an NDC in 2020 that was the same as the one five years before, had promised a substantial improvement (Harvey 2021).

Brazil, in a letter sent to Joe Biden a week before the summit, promised to end illegal deforestation in the Amazon rainforest by 2023 (Harris 2021). The letter was initiated by President Jair Bolsonaro himself, signalling a new policy from the top. It was a significant shift, as deforestation in the world’s biggest rainforest had soared to the highest level since 2008, after Bolsonaro took power in 2019. Yet skeptics said it merely repeated a pledge made by former president Dilma Rouseff, and came with a recent demand from Brazil’s environment minister Ricardo Salles for \$1 billion in financial assistance before action against illegal deforestation would begin.

Still reluctant and resistant were India, Russia, Korea, Indonesia, South Africa, Saudi Arabia, and Australia, while Mexico had recently reduced its promised NDCs (Harvey 2021).

Private sector actors also moved in advance, led by finance and energy firms. The new Glasgow Financial Alliance for Net Zero was announced on April 20, combining banks, insurers and fund managers with assets of \$70 trillion (Jones 2021). They included members of the existing Net-Zero Banking Alliance, operating under the UN Environment Programme Finance Initiative. Most asset managers and owners were already part of the New Zero Asset Managers Initiative. Less convincingly, on April 21 ExxonMobil offered a plan for carbon capture and storage near Houston that could attract \$100 billion in investment if the U.S. government would price greenhouse gases (Jacobs 2021). BP promised to stop flaring natural gas in Texas’s Permian oilfields by 2025. EQT, the biggest U.S. natural gas producer, announced it supported U.S. government methane regulations.

In the U.S., on April 16, 13 utilities including Exeelon, National Grid and PSEG pressed Biden to introduce a clean energy standard to reduce carbon emissions in the power sector by 80% below 2005 levels by 2030 (Dennis and Eilperin 2021). Calls for bold action also came from major firms such as Apple and Walmart.

## At The Virtual Table

At the summit itself, in the first session, where all G20 leaders spoke, several made new commitments of an important kind. They were led by the U.S., Japan and Canada, which joined their G7 partners of the UK and EU, which had announced their new ambitions on the summit’s eve.

The United States went first. Biden declared the U.S. would reduce emissions by 50%–52% by 2030. Suga said Japan would reduce its by 46% by 2030. Trudeau promised that Canada would cut its by 40% to 45% by 2030. With the UK promising cuts of 68% by 2030 and the EU legislatively

embedded cuts of 55% by then, all G7 members thus reinforced 2030 as the central deadline and cuts averaging 50% as their collective target.

From the broader G20, several emerging and developing countries made new commitments. They were led by the critical ones of China, as the world's largest climate polluter, and Brazil, as the custodian of the Amazon rainforest and China's partner in the BRICS.

In his much anticipated address, Xi announced that China would “strictly control coal-fired power generation projects, and strictly limit the increase in coal consumption over the 14th Five-Year Plan period,” and phase down coal use from 2025 for five years, in the period covered by its 15th Five-Year Plan (Xi 2021; Hook and Hodgson 2021). China also decided to accept the Kigali Amendment to the Montreal Protocol and tighten regulations over non-carbon dioxide emissions. Xi also promised that China's emissions would peak before 2030.

Bolsonaro said Brazil would reduce its emissions by up to 40% by 2030, and reach net zero by 2050, 10 years earlier than its previous 2060 deadline. He also promised to end illegal deforestation by 2030, a move which would reduce greenhouse gas emissions from deforestation by 50% by then.

President Cyril Ramaphosa of South Africa, another BRICS member and a developing country, also offered more. He promised South Africa's emissions would decline by 2035, 10 years earlier than previously announced. Thus three of the five BRICS members did more, with only India and Russia left out.

Of the two MIKTA members that made new commitments, by far the most important was Korea. President Moon Jae-in promised to end financing for overseas coal plants and quickly phase out 10 of its coal plants at home. Mexican president Andrés Manuel López Obrador promised, much more weakly, to expand reforestation.

## Performance

The Earth Day summit produced a substantial performance overall, with strong or significant progress on many dimensions (Kirton and Kokotsis 2015).

### Domestic Political Management

Domestic political management was strong. All G20 leaders attended the summit and spoke at the opening session, including King Salman of Saudi Arabia (see Appendix B). They were joined by 19 other leaders from a well-balanced array of countries from all regions, at all levels of development, with democratic polities dominating by a ratio of 16 to three (excluding the G20 countries). There were four from Europe (Denmark, Norway, Poland, Spain), four from Latin American and the Caribbean (Antigua and Barbuda, Chile, Colombia and Jamaica), six from Asia and the Pacific (Bangladesh, Bhutan, the Marshall Islands, New Zealand, Singapore and Vietnam), four from Africa (Democratic Republic of the Congo, Gabon, Kenya, Nigeria), and two from the Middle East (Israel and the United Arab Emirates). Also attending were the executive heads of four major international organizations: the G20 members of the International Monetary Fund (IMF) and World Bank, and the UN and African Development Bank.

Four days before the summit started, Xi had not confirmed his participation (Kim 2021). He did so on April 21, with a promise to deliver an important speech. He did both. Biden stayed for much of the summit's opening session, and apologized when he had to leave. He returned several times and closed the conference on the second day. This full attendance from 40 leaders was unusual, especially as 11 of the 15 regular G20 summits had some leaders stay home (see Appendix A).

Speech compliments were significant. Most G20 leaders complimented Biden for calling the summit and for rejoining the Paris Agreement. A few complimented him for the historic cutback commitment he made in his opening address. A few also referred in a positive tone to other leaders such as Xi Jinping.

Media attention and approval were significant. The U.S. edition of the *Financial Times* (2021b) on April 23 featured on its front page, above the fold, a story with an evocative picture and the positive headline of “Earth Day Climate Goals Stepped Up. It reported the new commitments made by the U.S., Japan, Canada and Korea and China’s promise to phase down coal use from 2025. It ended with Greta Thunberg’s judgement that “the new targets were ‘very insufficient’ and full of loopholes.”

Also marginally positive was a column on the editorial page by Gillian Tett (2021) titled “The Developing World Is Key to Climate Action.” She opened with “some nuggets of good (ish) news” from China and India during Kerry’s pre-summit trip to Asia. It reported that at the summit, Xi had promised to phase down coal usage. She ended by suggesting another such summit, recommending that “the next time that Biden holds a climate summit, he should not just invite the biggest countries to participate but include those such as Pakistan too” so it “might yet offer a way to turn this week’s rhetoric into granular, collaborative progress.”

### Deliberation

Public deliberation was strong. Each of the G20 leaders’ speeches was livestreamed and most were released in textual form. Together, those from the 21 G20 leaders, including the two from the EU, totalled 13,879 words (see Appendix C). This is above the average of 12,871 words from the somewhat equivalent collective documents issued in the leaders’ name at each G20 summit. The largest portion came from Biden (who spoke twice) with 13.2% of the total. He was followed by China’s Xi with 10.8%, giving the “G2” 24% together. They were followed by Brazil’s Bolsonaro with 6.2%. The lowest came from Saudi Arabia’s King Salman at 2.09%.

Among the G20’s component groups, G7 members led with 45% of the total words. They were followed by the BRICS with 30%, MIKTA with 20% and the others with 5%. Thus the group that made the most new commitments and the most ambitious ones, with all its members contributing, led the opening session, and thus helped make its main message the new ambitious action the summit made.

In their statements, G20 leaders covered several subjects (see Appendix D). Climate change led with 6,422 words or 54% of the 11,935 total of the subjects identified. Energy was second with 18%, followed by the environment in third with 11% and biodiversity (including nature-based solutions such as forests) in a very close fourth with 11%. Then came health with 5% and food and agriculture with 3%. Indigenous people appeared in 1%. Gender had none. Unlike the G7 and G20 summits over the past 13 months, there was no COVID-19 crowd out here at all.

Leaders from the G20’s different component groupings emphasized different subjects. The G7 and MIKTA focused heavily on climate change, energy and health. The BRICS added biodiversity and the environment. Food and agriculture were noted by Japan, France, Brazil and Australia. Indigenous peoples were noted only by Canada and Brazil. China gave more attention to biodiversity and the environment combined than it did to climate change itself.

Private deliberation was slender. The digital format allowed none of the spontaneous and casual contact that in-person summits do. A virtual summit covering 12 time zones made personal interaction even more difficult, as the interruptions in Macron’s pre-recorded address showed. Indeed, the Earth Day summit resembled the opening session of the UN General Assembly each

September, where leaders would each give a prepared speech within a few days of one another, with no expectation that other leaders would even be present to hear what they said.

Yet there were some signs of informality. Most came from Boris Johnson (2021), who was one of the leaders who addressed Biden as “Joe.” He also used the colloquial language of his voters, with “bunny hugging” his most memorable phrase.

### **Direction Setting**

Direction setting, through the affirmation of key principles, was small.

Leaders affirmed the urgency and existential nature of the climate crisis, that controlling it was necessary for economic growth and human health, that they were each responsible for doing so and that they must take immediate action to meet the Paris targets. Yet some repeated their constraining attachment to respective historic contributions since the start of the industrial revolution, to the principle of common but differentiated responsibilities, and to their limited capabilities to act during the next 10 years. They were a backward-looking group, rather than one focused on the clear and present danger with forward-looking solutions.

### **Decision Making**

Decision making was solid. In their future-oriented, politically binding commitments, a majority of the G20 leaders offered at least one. They were led by the leading climate polluters of China, the U.S. and EU. They came from all G7 members (including Japan and Canada), three of the five BRICS (China, Brazil and South Africa) and two of the MIKTA ones (see Appendix E).

Many of the major polluters announced improved NDCs, with a medium-term deadline of 2030. Those from the G7 averaged cutbacks of just over 50%, with the biggest powers and polluters of the U.S., EU and UK offering more, and Japan and Canada promising a little less. Together they established for all developed countries a new norm of 50% by 2030. As Macron (2021) said, “2030 is the new 2050.”

There were several important commitments to curb coal financing, production, transportation or use, with Korea and China offering them. There were many to rely on nature-based solutions, especially by planting trees, stopping the loss of rainforests by Brazil, and expanding marine-protected areas, although some were descriptions of moves already made. There were few clear promises on climate finance, to help reach the overdue target of giving developing countries \$100 billion a year by 2020, although on the sidelines the U.S. made a multibillion dollar pledge. No one made new promises to end fossil fuel subsidies, as the G20 had promised to do repeatedly since September 2009.

### **Delivery**

The delivery of these decisions remains in doubt. When Kerry was asked what prevented a future or present or Congress from reversing Biden’s promises, he said the private sector would not let them, and pointed to the decision of Tesla and soon General Motors to make only electric vehicles. Based on what supports compliance with climate change commitments made at G7 and G20 summits, delivery would probably be enhanced by creating G40 ministerial and official-level institutions to follow up; calling for annual COP summits rather than just one every five years; calling for the G7, BRICS and G20 summits to act in specific ways; and issuing a long communiqué. None of these appeared.

The UK is likely to comply with the more ambitious cutback commitments it made on April 20. It stood first in the G20 in complying with the summit’s climate change commitments, with its 87% average followed by Germany’s 85%, the EU’s 83%, and Canada’s 81%, while the U.S. has 76%,

India 68%, China 64% and 57%. At home, it has “over-achieved against its first and second Carbon Budgets and is on track to outperform the third Carbon Budget which ends in 2022 ... with the UK bringing emissions down 44% overall between 1990 and 2019” (UK Department for Business, Energy and Industrial Strategy 2021).

In the G7, compliance with summit commitments on climate change averaged 74%. It was led by the EU at 91%, followed by the UK at 83%, Germany at 82%, Canada at 76% and Japan at 74%. They were followed, below the average, by France at 72%, the US at 70%, and Italy at 55%.

U.S. secretary of state Anthony Blinken (2021) said the United States would follow up with a strong message in May to the G7, whose members produced one quarter of global greenhouse gas emissions. It would also do so at the Arctic Council ministerial meeting in May, with Russia, Canada and some EU members there.

### **Development of Global Governance**

The development of global governance was small. On the first day, no new G40 institutions were created.

Outside the G40, there were many references to the UN’s COP26 in Glasgow and the COP21’s Paris Agreement of 2015. But there were few to any other bodies.

At the summit, the heads of the IMF, World Bank and UN did not commit to making climate action their central mission or to using their full array of instruments to meet the G40’s annual targets and the Paris Agreement’s goals. The World Bank has only begun to take small, selective steps toward this (Rappeport 2021).

Nor were the executive heads of any of the major multilateral environmental organizations invited to the summit. The established multilateral organizations were dominated by the finance and economic ones from 1944, with the newer environmental ones completely left out. The latter included the old World Meteorological Organization, UN Environment, UN Climate, UN Biodiversity and the Organization for Animal Health. Although several leaders at this climate summit said multilateralism was necessary to solve the climate crisis, they appeared to believe that multilateral environmental organizations were not, nor even relevant at all.

### **Summary**

A strong summit performance would have seen many leaders announcing improved NDCs and other commitments that together made a solid contribution to reducing net emissions, pledging more climate finance and helping close the gap between current levels and their overdue promise to provide \$100 billion a year to developing countries by 2020. The key referent was how much their summit promises, if fully implemented, would generate the 45% reductions in greenhouse gas emissions from 2010 levels by 2030 needed to reach the Paris Agreement target.

By this standard, the summit was a substantial success. A majority of G20 members made new commitments, including the leading climate polluters of China, the U.S. and EU. New commitments came from all G7 members (including Japan and Canada), three of the five BRICS (China, Brazil and South Africa) and two MIKTA ones. Yet preventing a strong success were the lack of new promises from India, Russia and Indonesia (which will host the G20 in 2022, followed by India in 2023). Moreover, there were very few new specific promises to produce more climate finance to reach or exceed the long promised and now overdue \$100 billion a year.

## Causes

Several forces propelled this substantial performance.

### Shock-Activated Vulnerability

Shock-activated vulnerability was high.

The U.S.-China declaration on April 17 recognized climate change as a “crisis.” In the summit’s opening addresses of the G20 leaders, climate change was recognized as an “existential threat” by several leaders. Many referred to recent and rising extreme weather events

In the elite media, in the 31 days between the Quadrilateral Summit on March 12 and April 19, the front page of the *Financial Times* included climate stories on 10 days or 32%, compared to 97% for health, 74% for the economy, 42% for digitalization and 16% for democracy. On April 19 it headlined the story of the U.S.-China bilateral deal.

Physical climate shocks continued, led by fresh memories of the deadly Arctic storm in February that froze the energy grid and much else in Texas and damaged many other U.S. states (see Appendix F).

Recent scientific reports offer stark results. In March the International Energy Agency (IEA) reported that global energy-related carbon emissions in December 2020 surpassed those in December 2019 (Hodgson 2021).

On April 19, the WMO (2021) issued an updated *State of the Global Climate Report*. It confirmed that 2020 was one of the three hottest years ever, and that the six years between 2015 and 2021 were the hottest ones ever. In 2020 concentration levels of greenhouse gas emissions rose to a new high of 410 parts per million (ppm) and were on track to hit 414 ppm in 2021. New highs in ocean heat came in 2019 and in sea level rise in 2020, the latter at a rising rate as the ice in the Arctic and Antarctica melted, split and broke off at increasing speeds. The report’s summary of extreme weather events in 2020 included those in the U.S., China, India, Russia, Japan, Brazil, Argentina, South Africa, Korea, Australia, France, the UK and Canada.

On April 20, the IEA said the world was heading in 2021 for the second largest ever increase in energy-related carbon emissions, due to renewed coal use in Asia, especially in China (Hodgson 2021). This was the highest increase since 2010, reversing the 80% drop in 2020. Coal demand in 2021 would rise 4.5% to approach its 2014 peak, as it increased in China, the U.S. and EU.

On April 20, Guterres said no new coal plants must be build now and coal must be completely phased out everywhere by 2040 (Hodgson 2020). That day Petteri Taalas, WMO secretary general, gave a 20% chance that the world would warm temporarily by 1.5°C in the next five years.

Anticipated shocks were very high. The World Economic Forum’s 16th *Global Risks Report*, released in January 2021, saw respondents to its Global Risks Perception Survey overwhelmingly put climate change and associated environmental risks in first place. It reported “among the highest likelihood risks of the next ten years are extreme weather, climate action failure and human-led environmental damage ... Among the highest impact risks of the next decade, infectious diseases are in the top spot, followed by climate action failure and other environmental risks” (World Economic Forum 2021).

### Multilateral Organizational Failure

Multilateral organizational failure remains high. Preparations for COP26 have been delayed as some members refuse to engage in them in the prolonged virtual form. The UN reported that if all

members fully implemented their existing NDCs, it would produce only 1% of the progress needed to reach the Paris Agreement goal.

### **Predominant Equalizing Capabilities**

The predominant equalizing capability of summit participants is high. G40 members produce more than 80% of the world's gross domestic product and greenhouse gas emissions. Both China and the United States led all other summit participants in the levels and increases in their economies and ensuing emissions in the first quarter of 2021. More broadly, the IMF forecast that advanced economies would enjoy a per capita economic growth increase from 2019 to 2020 of just 1% less than in January 2020, while emerging and developing countries would drop 4.3% (or 5.8% without China) and 6.5% respectively (Wolf 2021).

Moreover, short-term shifts in exchange rates have increased the internal economic equalization and thus the prospects for success. On April 19 the U.S. dollar declined to a six-week low, as the currencies of the climate-committed UK, euro area and other developed countries rose. However, India's rupee, which rose 1% from January to March, dropped 3% since the start of April, as its COVID-19 cases and deaths soar to new peaks (Lockett and Parkin 2021).

In the specialized capabilities for controlling change, the G40's global predominance and internal equality are very high. China stands first in the production and export of solar panels, wind turbines, electric vehicles and batteries and holds almost one third of the world's renewable energy patents, as Blinken noted on April 20 (Manson and Hook 2021). The UK and Europe lead in offshore wind power, where the U.S. was far behind.

### **Converging Characteristics**

Converging democratic characteristics and environmental performance are high. Among G20 members there are only three non-democracies (Saudi Arabia, China and Russia), with democracies dominating by 85%. Over the past year democratic retreats in China over Hong Kong and in Russia with the imprisonment of Alexei Navalny have been offset by advances in the U.S. with Donald Trump no longer president and his followers' violent assault on the U.S. Congress on January 6, 2021, fading from view.

Among the 19 non-G20 leaders participating, with only three non-democracies, the democratic dominance is almost equal, at 84%. Together the strong predominance of democratic polities makes it more likely the summit commitments would be complied with, and more ambitious ones would be made in future, given the tendency of democratic polities to have better environmental performance than non-democratic ones (Fiorino 2018).

### **Domestic Political Cohesion**

Domestic political cohesion in key participants is high. In the U.S., Biden as host is fully committed to climate action, and has extensive international experience as a senator and as Obama's vice-president for eight years. He is starting his four-year term as president, with his Democratic Party narrowly controlling both Congressional chambers and helping him have strong approval ratings during his first 90 days in office.

In China, Xi Jinping has over half a decade of G20 and BRICS summit experience, will be in power for many more years, and has complete control of his government and much of its economy as well. To preserve social stability, he knows he must respond to his citizens' concerns about the growing ecological vulnerability that his aging population suffers from.

Canada is critical, as a country adjacent to the United States and highly integrated economically and ecologically with it, and as a major oil and gas producer whose large Arctic expanse gives it very high per capita emissions. Trudeau, elected in 2015 with a majority government, has attended seven G20 summits. His Liberal Party now has only a minority government following its re-election in 2019, and its opposition Conservative Party has just adopted carbon pricing as a policy for the first time. Polls show that Trudeau's Liberals, with a 7% lead over the Conservatives, would probably win a majority if an election were held now. The April 19 budget included major spending for climate-controlling instruments, similar to and compatible with that in Biden's own American Jobs Plan.

In the UK, domestic support is high. Conservative Party prime minister Johnson is a veteran of several G7 and G20 summits, is host of the 2021 G7 summit and co-host of COP26, has a majority government, and does not face an election until 2024. A recent Opinium poll found 58% support for making international climate agreements legally enforceable, including 47% of Conservative, 73% of Labour and 68% voters of Liberal Democratic voters (Stone 2021).

In Germany, support is very high. Merkel was the longest serving veteran at G7, G20 and UN summits, and a former physical scientist and environment minister. She will step down as chancellor just before the general election in September. A poll released on April 20 showed the Green Party in first place, seven percent ahead of Merkel's centre-right CSU-CDU, currently governing in a coalition with the Social Democratic Party (*Financial Times* 2021c).

Globally, public support for national governments tackling climate change is high (*Financial Times* 2021a). An IPSOS poll reported on April 22 found that over 60% of global respondents believed that their government would have failed it if did not act now on climate change. They were led by those in Chile, Mexico, the UK, Brazil and India. Below average were those in the U.S. with just over 60%, Germany and China at just over 50%. Oil-exporting Russia had just over 40% and Saudi Arabia just under 40%.

### **Club at the Hub**

As the club at the hub of an expanding network of global climate summit governance, the Earth Day Summit's position is substantial. To be sure, it is the first gathering of this large group of 40 countries, whose leaders have not all yet confirmed they would attend, even though the virtual format eliminates most transaction costs.

But both Biden and Xi value plurilateral summitry. Both lead countries that pioneered the MEF summits in 2008 and 2009, the latter attended by Obama a few months after Biden took office as his vice-president.

The MEF formula has proven its worth (Happaerts 2015; Kirton and Kokotsis 2015, 13–14). It first met at the ministerial level in Washington DC on September 27–28, 2007 (Kirton 2021b). Its first summit took place on July 9, 2008, as part of the G8's summit in Hokkaido, Japan, and included 17 leaders, all from G20 countries but without Saudi Arabia, Turkey and Argentina. They made 30 commitments. Two assessed for compliance averaged an adequate 67%, although U.S. compliance was only 50%. Together the G8 and MEF at Hokkaido made 54 climate commitments, and the five commitments assessed for compliance averaged a significant 77%.

The second MEF summit, announced by Obama on March 28, 2009, was held as part of the G8 summit in L'Aquila, Italy, on July 9, 2009. Leaders from the same 17 countries came and made nine commitments, while the G8 alone made 33 climate ones. Compliance with the G8's commitments averaged a strong 82%. The global financial crisis raging then did not crowd out the MEF's significant climate performance.

The Earth Day Summit was the first in which both Biden and Xi participated. They would otherwise have had to wait until the G20 in Rome on October 30-31. The Earth Day Summit extended the network of global summit governance radiating outward, by doubling the number of participating countries from 20 to 40 and according equality to all.

## Conclusion

The Leaders Summit on Climate thus produced a substantial performance, due to the skillful leadership of a powerful, newly committed United States. But its legacy will largely be determined by how its leaders comply with their new commitments, what institutions they develop to continue and expand their work, and how their substantial start spurred stronger climate action at the summit of the G7 at Cornwall in June, the G20 in Rome in October and then the UN in Glasgow in November.

As the Earth Day summit ended, the key question was how well its leaders conclusions and new commitments matched the most effective steps scientists said were needed to control climate change. The top 20 steps identified by Project Drawdown as the most cost-effective include both emissions sources and sinks, with nature-based solutions playing a critical part (Hawken 2017) (see Appendix G).

There was considerable overlap, with the summit's emphasis on wind power ranked second, solar power fifth and tenth, and, less strongly tropical forests fifth and silvopasture ninth. Yet there was also much left out. The greatest summit omission was on gender, as educating girls and family planning ranked fourth and fifth on the scientists' list. Perhaps this was due to the low number of female leaders at the summit (see Appendix H). Also missing were reducing refrigeration in first place, preserving peatlands in 13th and growing geothermal power in 18th. Heavily under represented, with only 2.6% of the G20 leaders' speeches covering food and agriculture, were reducing food waste in third and shifting to a plant-based diet in fifth.

So there was a great need for another G40 climate summit soon, to fill these and other gaps in time. The leaders should thus call another G40 summit and make it an institution. They should start with two summits a year, as the G20 did when it started its summitry to control the global financial crisis from 2008 to 2010.

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Appendix A: G20 Summit Performance, 2008–2020

Summit	Grade	Domestic political management			Deliberation			Direction setting				Decision making	Delivery			Development of global governance					
		Attendance	# compliments	% members complimented	# days	# documents	# words	Stability	Inclusion	Democracy	Liberty	# commitments	Compliance	Compliance	# Assessed	Internal		External		Engagement groups	
																# references	Spread	# references	Spread	# references	Spread
2008 Washington	A-	100%	0	0%	2	2	3,567	16	2	10	2	95	+0.51	76%	8	0	4	39	11	0	0
2009 London	A	100%	1	5%	2	3	6,155	29	6	9	0	129	+0.13	57%	8	12	4	120	27	0	0
2009 Pittsburgh	A-	100%	0	0%	2	2	9,257	11	21	28	1	128	+0.37	69%	17	47	4	115	26	0	0
2010 Toronto	A-	90%	8	15%	2	5	11,078	47	32	11	1	61	+0.40	70%	16	71	4	164	27	0	0
2010 Seoul	B	95%	5	15%	2	5	15,776	66	36	18	4	153	+0.34	67%	42	99	4	237	31	0	0
2011 Cannes	B	95%	11	35%	2	3	14,107	42	8	22	0	282	+0.41	71%	26	59	4	247	27	4	2
2012 Los Cabos	A-	95%	6	15%	2	2	12,682	43	23	31	3	180	+0.54	77%	21	65	4	138	20	7	2
2013 St. Petersburg	A	90%	15	55%	2	11	28,766	73	108	15	3	281	+0.35	68%	26	190	4	237	27	9	5
2014 Brisbane	B	90%	10	40%	2	5	9,111	10	12	1	0	205	+0.42	71%	29	39	4	42	12	0	0
2015 Antalya	B	90%	0	0%	2	6	5,983	13	22	0	2	198	+0.42	71%	24	42	4	54	11	8	6
2016 Hangzhou	B+	95%	7	25%	2	4	16,004	11	29	34	5	213	+0.43	72%	31	179	4	223	19	14	6
2017 Hamburg	B+	95%	0	0	2	10	34,746	42	61	2	11	529	+0.38	69%	36	54	6	307	19		
2018 Buenos Aires	B-	90%	0	0	2	2	13,515	23	53	7	2	128	+0.56	78%	22	20	5	24	15		
2019 Osaka		95%	0	0	2	2	6,623	13	16	7	6	143	+0.56	78%	19	56	5	54	17		
2020 Riyadh (virtual)		100%*	3	10%	2	1	5,697	13	20	6	6	107									
Total			66		30.0	63.0	193,067	452.0	449.0	188.0	34.0	2832.0	-	-	278.0	933.0	60.0	2001.0	289.0	42.0	21.0
Average	N/A	90%	4.4	0.1	2.0	4.2	12871.1	30.1	29.9	14.5	2.6	188.8	+0.41	71%	21.4	66.6	4.3	142.9	20.6	3.8	1.9

Notes:

N/A = not applicable. Only documents issued at a summit in the leaders' name are included.

Grade is based on a scoring scheme created by John Kirton, as follows: A+ Extremely Strong, A Very Strong, A-Strong, B+ Significant, B Substantial, B- Solid, C Small, D Very Small, F Failure (including made things worse). available at <http://www.g20.utoronto.ca/analysis/scoring.html>.

Domestic political management: participation by G20 members and at least one representative from the European Union and excludes invited countries; compliments are references to full members in summit documents.

Deliberation: duration of the summit and the documents collectively released in the leaders' name at the summit.

Direction setting: number of statements of fact, causation and rectitude relating directly to open democracy and individual liberty.

Decision making: number of commitments as identified by the G20 Research Group.

Delivery: scores are measured on a scale from -1 (no compliance) to +1 (full compliance, or fulfilment of goal set out in commitment). Figures are cumulative scores based on compliance reports.

Development of global governance: internal are references to G20 institutions in summit documents; external are references to institutions outside the G20; engagement groups are references to engagement groups. Spread indicates the number of different institutions mentioned.

\*2020 Riyadh attendance = Donald Trump attended, but left early and was first replaced by Treasury Secretary Steven Mnuchin and then by Larry Kudlow.

## Appendix B: Attendance at the Leaders' Summit on Climate

### Participating Leaders

	State	Represented by	Title
1	Antigua and Barbuda	Gaston Browne	Prime Minister
2	Argentina	Alberto Fernandez	President
3	Australia	Scott Morrison	Prime Minister
4	Bangladesh	Sheikh Hasina	Prime Minister
5	Bhutan	Lotay Tshering	Prime Minister
6	Brazil	Jair Bolsonaro	President
7	Canada	Justin Trudeau	Prime Minister
8	Chile	Sebastián Piñera	President
9	China	Xi Jinping	President
10	Colombia	Iván Duque Márquez	President
11	Democratic Republic of the Congo	Félix Tshisekedi	President
12	Denmark	Mette Frederiksen	Prime Minister
13	France	Emmanuel Macron	President
14	Gabon	Ali Bongo Ondimba	President
15	Germany	Angela Merkel	Chancellor
16	India	Narendra Modi	Prime Minister
17	Indonesia	Joko Widodo	President
18	Israel	Benjamin Netanyahu	Prime Minister
19	Italy	Mario Draghi	Prime Minister
20	Japan	Yoshihide Suga	Prime Minister
21	Jamaica	Andrew Holness	Prime Minister
22	Kenya	Uhuru Kenyatta	President
23	Republic of Korea	Moon Jae-in	President
24	Republic of the Marshall Islands	David Kabua	President
25	Mexico	Andrés Manuel López Obrador	President
26	New Zealand	Jacinda Ardern	Prime Minister
27	Nigeria	Muhammadu Buhari	President
28	Norway	Erna Solberg	Prime Minister
29	Poland	Andrzej Duda	President
30	Russia	Vladimir Putin	President
31	Saudi Arabia	Salman bin Abdulaziz Al Saud	King
32	Singapore	Lee Hsien Loong	Prime Minister
33	Spain	Pedro Sánchez	President
34	Turkey	Recep Tayyip Erdoğan	President
35	United Arab Emirates	Sheikh Mohammed Bin Rashid Al Maktoum	Prime Minister
36	United Kingdom	Boris Johnson	Prime Minister
37	United States	Joe Biden	President
38	Vietnam	Nguyen Xuan Phuc	President
39	European Commission	Ursula von der Leyen	President
40	European Council	Charles Michel	President

### Heads of International Organizations

Organization	Represented by	Title
African Development Bank	Akinwumi A. Adesina	President
International Monetary Fund	Kristalina Georgieva	Managing Director
United Nations	António Guterres	Secretary-General
World Bank Group	David Malpass	Group President

**Schedule**

Day 1–April 22	
8:00 a.m.–Session 1	
Raising Our Climate Ambition	President Biden and Vice President Harris will open the inaugural session of the Summit. This session will underscore the urgent need for the world’s major economies to strengthen their climate ambition by the time of COP 26 to keep the goal of limiting warming to 1.5 degrees Celsius within reach. It will provide an opportunity for leaders to highlight the climate-related challenges their countries face and the efforts they are undertaking, and to announce new steps to strengthen climate ambition.
Speakers (not in speaking order)	U.S. Participants: Secretary of State Antony J. Blinken Special Presidential Envoy for Climate John Kerry Leaders: United Nations Secretary-General António Guterres Prime Minister Gaston Browne, Antigua and Barbuda President Alberto Fernandez, Argentina Prime Minister Scott Morrison, Australia Prime Minister Sheikh Hasina, Bangladesh Prime Minister Lotay Tshering, Bhutan President Jair Bolsonaro, Brazil Prime Minister Justin Trudeau, Canada President Sebastián Piñera, Chile President Xi Jinping, People’s Republic of China President Iván Duque Márquez, Colombia President Ursula von der Leyen, European Commission President Emmanuel Macron, France President Ali Bongo Ondimba, Gabon Chancellor Angela Merkel, Germany Prime Minister Narendra Modi, India President Joko Widodo, Indonesia Prime Minister Mario Draghi, Italy Prime Minister Yoshihide Suga, Japan President David Kabua, Republic of the Marshall Islands President Andrés Manuel López Obrador, Mexico President Moon Jae-in, Republic of Korea President Vladimir Putin, The Russian Federation King Salman bin Abdulaziz Al Saud, Kingdom of Saudi Arabia President Matamela Cyril Ramaphosa, South Africa President Recep Tayyip Erdoğan, Turkey Prime Minister Boris Johnson, United Kingdom
10:30 a.m.–Session 2	
Investing in Climate Solutions	This session will highlight the urgent need to scale up climate finance; efforts to increase public finance for mitigation and adaptation in developing countries; and efforts to shift trillions of dollars of private investment to finance the transition to net zero by 2050.
Speakers (not in speaking order)	U.S. Participants: Secretary of the Treasury Janet Yellen Special Presidential Envoy for Climate John Kerry National Economic Council Director Brian Deese Leaders: President Félix Tshisekedi, Democratic Republic of the Congo President Charles Michel, European Council Prime Minister Andrew Holness, Jamaica Prime Minister Jacinda Ardern, New Zealand Speakers: Akinwumi A. Adesina, President, African Development Bank Oliver Bäte, CEO, Allianz Jane Fraser, CEO, Citigroup

	<p>Kristalina Georgieva, Managing Director, International Monetary Fund                  Marcie Frost, CEO, CalPERS                  Yannick Glemarec, Executive Director, Green Climate Fund                  David Malpass, Group President, World Bank Group                  Brian Moynihan, Chairman and CEO, Bank of America; Chair, International Business Council; Co-Chair, Sustainable Markets Initiative                  Day 1 Featured Speakers:                  Pope Francis                  Carolina Schmidt, Environment Minister, Chile; President, 25th United Nations Climate Change Conference (COP 25)                  Alok Sharma MP, United Kingdom; President, 26th United Nations Climate Change Conference (COP 26)                  Xiye Bastida, Fridays for Future</p>
12:30 p.m.–Session 3 (Breakout Sessions, Round 1)	
Adaptation and Resilience	<p>This session will highlight the climate adaptation and resilience challenges faced by all countries, especially those most vulnerable to climate impacts, and cutting-edge approaches to strengthening resilience in the face of climate change and climate variability.</p>
Speakers (not in speaking order)	<p>U.S. Participants:                  Secretary of Agriculture Tom Vilsack                  Secretary of Homeland Security Alejandro Mayorkas                  Speakers:                  Aiyaz Sayed-Khaiyum, Attorney-General and Minister for Economy, Public Enterprises, Civil Service, Communications, Fiji                  Eamon Ryan, Minister for the Environment, Climate and Communications and Minister for Transport, Ireland                  Aziz Rabbah, Minister of Energy, Mines and Environment, Morocco                  Cora van Nieuwenhuizen, Minister of Infrastructure and Water Management, Netherlands                  Malik Amin Aslam, Federal Minister of Climate Change, Pakistan                  João Pedro Matos Fernandes, Minister for the Environment and Climate Action, Portugal                  Abdullah Subai, Minister of Municipality and Environment, Qatar                  Jeanne d’Arc Mujawamariya, Minister of Environment, Rwanda                  Varawut Silpa-archa, Minister of Natural Resources and Environment, Thailand</p>
Climate Action at All Levels	<p>This session will highlight the critical efforts of subnational and non-state actors (cities, states/regions, and indigenous groups) that are contributing to green recovery and working closely with national governments to advance climate ambition and resilience on the ground.</p>
Speakers (not in speaking order)	<p>U.S. Participants:                  Environmental Protection Agency Administrator Michael S. Regan                  Speakers:                  Sinéia B. do Vale, Member, Indigenous Council of Roraima, Brazil                  Mayor LaToya Cantrell, New Orleans                  Mayor Anne Hidalgo, Paris, France                  Hindou Oumarou Ibrahim, President of the Association for Indigenous Women and Peoples of Chad                  Governor Yuriko Koike, Tokyo, Japan                  Governor Michelle Lujan Grisham, New Mexico                  Fawn Sharp, President, National Congress of American Indians                  Mayor Claudia Sheinbaum, Mexico City, Mexico</p>
1:30 p.m.–Session 3 (Breakout Sessions, Round 2)	

A Summit of Substantial Success: The Performance of the 2021 Leaders Summit on Climate

Climate Security	This session will highlight the global security challenges posed by climate change, the impact on the military and readiness, and efforts underway to address the threat multipliers to energy, economic, and national security.
Speakers (not in speaking order)	U.S. Participants: Secretary of Defense Lloyd J. Austin III Director of National Intelligence Avril Haines Ambassador Linda Thomas-Greenfield, U.S. Representative to the United Nations Speakers: Ben Wallace MP, Secretary of State for Defense, United Kingdom Kishi Nobuo, Minister of Defense, Japan Monica Juma, Cabinet Secretary, Ministry of Defense, Kenya Jens Stoltenberg, Secretary General, NATO Carlos G. Dominguez III, Secretary of Finance, The Philippines Jumaah Enad, Minister of Defense, Iraq Margarita Robles Fernández, Minister of Defense, Spain
Nature-based Solutions	This session will highlight the critical role of nature-based solutions in reducing emissions and strengthening climate resilience, including efforts to reduce deforestation and the loss of wetlands, restore marine and terrestrial ecosystems, and promote sustainable agricultural practices.
Speakers (not in speaking order)	U.S. Participants: Secretary of the Interior Deb Haaland Speakers: Jonathan Wilkinson, Minister of Environment and Climate Change, Canada Andrea Meza, Minister of Environment and Energy, Costa Rica Lee White, Minister of Water, Forests, the Seas, and Environment, Gabon Luhut B. Pandjaitan, Coordinating Minister for Maritime Affairs and Investment, Indonesia Gabriel Quijandría, Minister of the Environment, Peru Flavien P. Joubert, Minister for Agriculture, Climate Change and Environment, Seychelles Tuntiak Katan, General Coordinator, Global Alliance of Territorial Communities Archana Soreng, Member, Youth Advisory Group on Climate to the U.N. Secretary General; Kharia Tribe, Sundergarh, India
Day 2–April 23	
8:00 a.m.–Session 4	
Unleashing Climate Innovation	This session will highlight the critical role of technological innovation in achieving a net-zero, climate-resilient economy; the importance of accelerating public and private investment in climate innovation; and the enormous economic opportunities in building the industries of the future.
Speakers (not in speaking order)	U.S. Participants: Secretary of Energy Jennifer M. Granholm Secretary of Commerce Gina M. Raimondo Special Presidential Envoy for Climate John Kerry Leaders: Prime Minister Mette Frederiksen, Denmark Prime Minister Benjamin Netanyahu, Israel President Uhuru Kenyatta, Kenya Prime Minister Erna Solberg, Norway Prime Minister Lee Hsien Loong, Singapore Prime Minister Sheikh Mohammed Bin Rashid Al Maktoum, United Arab Emirates Speakers: Fatih Birol, Executive Director, International Energy Agency Anna Borg, President and CEO, Vattenfall Shirley Ann Jackson, President, Rensselaer Polytechnic Institute Danielle Merfeld, Vice President and Chief Technology Officer, GE Renewable Energy Audrey Zibelman, Vice President, X
9:15 a.m.–Session 5	

<p>The Economic Opportunities of Climate Action</p>	<p>This session will highlight the broad economic benefits of climate action, with a strong focus on job creation. It will explore the economic benefits of green recovery and long-term decarbonization and the importance of ensuring that all communities and workers benefit from the clean-energy transition.</p>
<p>Speakers (not in speaking order)</p>	<p>U.S. Participants:                  Secretary of Transportation Pete Buttigieg                  United States Trade Representative Katherine C. Tai                  National Climate Advisor Gina McCarthy                  Leaders:                  President Muhammadu Buhari, Nigeria                  President Andrzej Duda, Poland                  President Pedro Sánchez, Spain                  President Nguyen Xuan Phuc, Vietnam                  Speakers:                  Jack Allen, CEO, Proterra                  Roxanne Brown, International Vice President at Large, United Steelworkers                  Sharan Burrow, General Secretary, International Trade Union Confederation                  Brett Isaac, CEO, Navajo Power                  Erica Mackie, CEO, Grid Alternatives                  Nthabiseng Mosia, Co-Founder and CCO, Easy Solar                  George Oliver, Chairman and CEO, Johnson Controls International; Chair, Business Roundtable Energy &amp; Environment Committee                  Lonnie R. Stephenson, President, International Brotherhood of Electrical Workers                  Day 2 Featured Speakers:                  Michael Bloomberg, U.N. Special Envoy on Climate Ambition and Solutions                  Bill Gates, Co-Chair of Bill and Melinda Gates Foundation and Founder of Breakthrough Energy                  Brenda Mallory, Chair, White House Council on Environmental Quality                  Peggy Shepard, Executive Director, WE ACT for Environmental Justice; Co-Chair, White House Environmental Justice Advisory Council</p>

## Appendix C: Length of Leaders' Opening Addresses

April 22

Taken from official texts released by leaders' offices unless otherwise indicated.

Biden opening statement	1,038	13.2% (7.48% + 5.72%)
Biden second statement	794	5.72%
Bolsonaro (unofficial transcript through translator)	863	6.22%
Draghi	468	3.37%
Erdoğan (unofficial transcript through translator)	853	6.15%
Fernandez (unofficial transcript through translator)	467	3.36%
Johnson	670	4.83%
López Obrador	444	3.20%
Macron	598	4.31%
Merkel (unofficial transcript through translator)	509	3.67%
Michel	621	4.47%
Modi	356	2.57%
Moon (unofficial transcript through translator)	481	3.47%
Morrison (unofficial transcript)	512	3.69%
Putin	803	5.79%
Ramaphosa	629	4.53%
Salman (unofficial transcript through translator)	290	2.09%
Suga	519	3.74%
Trudeau (official text in English)	529	3.81%
von der Leyen	525	3.78%
Widodo	410	2.95%
Xi	1,500	10.81%

Totals (note this includes both Biden texts):

G20	13,879	100%
G7	6,271	45.18%
BRICS	4,151	29.91%
MIKTA	2,700	19.45%
Other	727	5.45%

## Appendix D: Subjects Covered in G20 Leaders Opening Addresses

Leader	Climate	Health	Energy	Biodiversity (forests)	Environment	Food- Agriculture	Gender	Indigenous Peoples	Total words
G7									
United States	478	151	64	0	0	0	0	0	1038
Japan	348	0	51	51	51	64	0	0	519
Germany	276	30	88	71	0	0	0	0	509
France	210	0	68	25	67	33	0	0	598
UK	349	36	111	78	0	0	0	0	670
Italy	255	18	14	0	20	0	0	0	468
Canada	216	37	85	18	0	0	0	40	
European Union	464	0	61	49	0	0	0	0	525
BRICS									
China	943	125	429	319	790	0	0	0	1500
Russia	651	0	97	0	27	0	0	0	803
India	219	73	110	32	0	0	0	0	356
Brazil	575	0	156	305	216	156	0	95	863
South Africa	426	0	21	0	0	0	0	0	629
MIKTA									
Mexico	20	0	117	113	0	0	0	0	444
Indonesia	313	27	88	192	0	0	0	0	410
Korea	274	30	153	0	0	0	0	0	481
Turkey	89	0	84	0	0	0	0	0	853
Australia	120	0	209	0	52	52	0	0	512
Other									
Saudi Arabia	91	0	130	0	32	0	0	0	290
Argentina	115	52	46	41	41	0	0	0	467
Total words	6,432	579	2,182	12,94	1,296	305	0	135	11,935
Total %	54%	4.8%	18.2%	10.8%	10.8%	2.55%	0	1.13%	100%

Note: By number of words in their speeches

## Appendix E: Announced Actions and Estimated Impact

Country	Progress	Commitments	Estimated Impact
Australia	<ul style="list-style-type: none"> <li>• Reduced emissions by 19% from 2005 levels (36% excluding exports)</li> <li>• Applying renewable energy 10x faster than global average/person</li> <li>• Highest uptake of rooftop solar worldwide</li> <li>• 100 cutting edge projects to safeguard the Great Barrier Reef</li> </ul>	<ul style="list-style-type: none"> <li>• Will update long term emission reduction strategy for Glasgow</li> <li>• Invest AUD20 billion in clean hydrogen, green steel, energy storage and carbon capture</li> <li>• AUD100 million to protect oceans, coastal ecosystems and pioneer blue carbon initiatives</li> <li>• AUD1.5 billion in practical climate finance</li> </ul>	<ul style="list-style-type: none"> <li>• Will meet and beat Paris commitments</li> <li>• &gt;AUD80 billion in investment in the next 10 years</li> <li>• Cheapest clean hydrogen at AUD2/kg</li> <li>• Net zero ASAP</li> </ul>
Brazil	<ul style="list-style-type: none"> <li>• Accounts for &lt;3% of annual global emissions</li> <li>• One of the cleanest energy mixes in the world</li> <li>• Produce more using less – Brazilian agriculture one of the most sustainable in the world</li> <li>• Conserve 84% of Brazilian Amazon</li> <li>• Conserve 12% of worlds drinking water</li> <li>• In past 15 years, avoided emission of &gt;7.8 billion tons of carbon</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthen environmental bodies</li> <li>• Double funds for inspection action</li> <li>• Support sustainable development in the Amazon</li> <li>• Enhance land governance</li> <li>• Accommodate efforts of all Brazilians, including Indigenous and traditional communities</li> </ul>	<ul style="list-style-type: none"> <li>• Reducing emissions by 37% for 2025 and 40% for 2030</li> <li>• Carbon neutrality by 2050</li> <li>• Eliminate illegal deforestation in Brazil by 2030</li> <li>• Reduce greenhouse gas emissions by almost 50% by 2030</li> </ul>
China		<ul style="list-style-type: none"> <li>• Harmony between man and nature</li> <li>• Green development</li> <li>• Systemic governance</li> <li>• People-centered approach</li> <li>• Multilateralism</li> <li>• Common but differentiated</li> <li>• Strictly control and limit coal fired power generation projects</li> <li>• Build a green Belt and Road</li> </ul>	<ul style="list-style-type: none"> <li>• Peak carbon dioxide emissions between 2030</li> <li>• Achieve carbon neutrality before 2060</li> </ul>
India	<ul style="list-style-type: none"> <li>• Emissions 2 degrees C compatible</li> <li>• Per capita carbon footprint is 60% lower than global average</li> </ul>	<ul style="list-style-type: none"> <li>• 450 gigawatts of renewable energy by 2030</li> <li>• India-US Climate and Clean Energy Agenda 2030 Partnership</li> </ul>	<ul style="list-style-type: none"> <li>• Mobilize investment, demonstrate clean tech, enable green collaborations</li> </ul>
Russia	<ul style="list-style-type: none"> <li>• Compared to 1990, Russia has reduced greenhouse gas emissions more than many other countries</li> <li>• Emissions have halved (3.1 billion to 1.6 billion tons of CO2 equivalent)</li> <li>• Restructuring of industry and energy</li> <li>• 45% of energy mix is low emission energy (including nuclear)</li> <li>• Carbon pricing system and mechanism for carbon trading pilot program</li> </ul>	<ul style="list-style-type: none"> <li>• Significantly reducing net accumulated emissions by 2050</li> <li>• Building infrastructure to produce hydrogen as a fuel and energy source</li> <li>• Absorb CO2 in the atmosphere</li> <li>• Take into account ever factor contributing to global warming and foster international cooperation to calculate and monitor all harmful emissions</li> <li>• Sustainable green development alongside other development (e.g. poverty)</li> </ul>	<ul style="list-style-type: none"> <li>• Become carbon neutral as soon as 2025</li> </ul>

Country	Progress	Commitments	Estimated Impact
	<ul style="list-style-type: none"> <li>• Absorbing 2.5 billion tons of CO2 equivalent per annum</li> </ul>		
South Africa	<ul style="list-style-type: none"> <li>• National Climate Change Adaption Strategy</li> <li>• Low Emissions Development Strategy</li> </ul>	<ul style="list-style-type: none"> <li>• Emphasize the importance of multilateralism and full implementation of the UNFCCC</li> <li>• Updating Nationally Determined Contribution</li> <li>• Strengthen renewable energy capacity</li> <li>• Contributing fair share to reduce global emissions (poverty/inequality/underdevelopment)</li> <li>• Low-carbon and climate resilient society</li> <li>• Do not leave behind most vulnerable</li> <li>• Advance Paris Agreement</li> <li>• Scale up support (financing, tech, capacity building)</li> <li>• Separate climate change aid from ODA</li> </ul>	<ul style="list-style-type: none"> <li>• Emissions decline from 2025</li> <li>• Generate over 17 gigawatts of renewable energy by 2030</li> </ul>

Source: Hawken (2017).

## Appendix F: Major Climate and Ecological Shocks 2021

### January

- 10 Spain's worst snowstorm (Filomena) since 1980s in Madrid, 4 dead
- 15 Indonesian earthquake kills at least 105 people in West Sulawesi Province

### February

- 14 Himalayan glacier's collapse caused by rising temperatures and deforestation kills 52
- 16 Record cold and snow throughout lower 48 U.S. states kills many, causes blackouts, delays COVID vaccinations and sends energy prices to new highs
- 16 Snow smothers Athens, Greece
- 20 Oil spill on Israel's Mediterranean coasts forces it to close its beaches

### March

- 20 Earthquake in seabed off north Japan causes minor injuries, is felt in Tokyo, and awakens memories of the Fukushima disaster on March 11, 2011, just after its tenth anniversary
- 21 Record floods in New South Wales, Australia, force evacuations

### April

- 4 Tropical Cyclone Seroja kills at least 165 in Indonesia
- 10 Indonesia earthquake kills six in Java

## Appendix G: Nature-Based Solutions by Climate Impact

### Top Solutions

1. Refrigeration
2. Wind turbines (onshore)
3. Reduce food waste
4. Plant-rich diet
5. *Tropical forests*
6. Educating girls
7. Family planning
8. Solar farms
9. Silvopasture
10. Rooftop solar
11. Regenerative agriculture
12. *Temperate forests*
13. *Peatlands*
14. *Tropical staple trees*
15. *Afforestation*
16. Conservation agriculture
17. *Tree intercropping*
18. *Geothermal*
19. Managed grazing
20. Nuclear

### Sinks: Foster Forests, Preserve Peat

5	Tropical forests	benefit 61.23 gigatons	cost to be determined
12	Temperature forests	benefit 22.61 gigatons	cost to be determined
13	Preserve peat	21.57 gigatons reduced	1,2230.38 saved, TBS
14	Tropical staple trees	benefit 20.19 gigatons	cost \$120.1 billion, net \$627 billion
15	Afforestation	benefit 18.06 gigatons	cost \$29.4 billion, net \$392.4
17	Tree intercropping		
35	Bamboo		
38	Forest protection		

### Sources

18	Grow geothermal	Benefit 16.6 gigatons	cost \$155.5 billion, net savings \$1.03 trillion
29	Tame tidal power: tidal and wave	Benefit 9.2 carbon dioxide reduced	cost \$411.8 billion, Net \$1 trillion
42	Harness heat pumps	benefit 5.2 gigatons	cost \$118.7 billion, Net \$1.55 trillion
48	Increase in-stream hydro	benefit 4 gigatons	cost \$202.5 billion, net % 568.4 billion
77	Promote pumped hydro storage	Energy storage (utilities)	

## Appendix H: Gender Balance Earth Day Summit

- In total, 37 summit leaders were men and seven women, or eight including Vice President Kamala Harris who opened the summit alongside President Joe Biden
- The women leaders came from Bangladesh, Denmark, Germany, New Zealand, Norway, the European Commission and the International Monetary Fund
- For G20 members, the men to women ratio was 18:2
- For non-G20 members the men to women ratio was 19:5

	State	Represented by	Title	Gender
1	Antigua and Barbuda	Gaston Browne	Prime Minister	Man
2	<i>Argentina</i>	<i>Alberto Fernandez</i>	President	Man
3	<i>Australia</i>	<i>Scott Morrison</i>	Prime Minister	Man
5	Bhutan	Lotay Tshering	Prime Minister	Man
6	<i>Brazil</i>	<i>Jair Bolsonaro</i>	President	Man
7	<i>Canada</i>	<i>Justin Trudeau</i>	Prime Minister	Man
8	Chile	Sebastián Piñera	President	Man
9	<i>China</i>	<i>Xi Jinping</i>	President	Man
10	Colombia	Iván Duque Márquez	President	Man
11	Democratic Republic of the Congo	Félix Tshisekedi	President	Man
13	<i>France</i>	<i>Emmanuel Macron</i>	President	Man
14	Gabon	Ali Bongo Ondimba	President	Man
16	<i>India</i>	<i>Narendra Modi</i>	Prime Minister	Man
17	<i>Indonesia</i>	<i>Joko Widodo</i>	President	Man
18	Israel	Benjamin Netanyahu	Prime Minister	Man
19	<i>Italy</i>	<i>Mario Draghi</i>	Prime Minister	Man
20	<i>Japan</i>	<i>Yoshihide Suga</i>	Prime Minister	Man
21	Jamaica	Andrew Holness	Prime Minister	Man
22	Kenya	Uhuru Kenyatta	President	Man
23	<i>Korea</i>	<i>Moon Jae-in</i>	President	Man
24	Marshall Islands	David Kabua	President	Man
25	<i>Mexico</i>	<i>Andrés Manuel López Obrador</i>	President	Man
27	Nigeria	Muhammadu Buhari	President	Man
29	Poland	Andrzej Duda	President	Man
30	<i>Russia</i>	<i>Vladimir Putin</i>	President	Man
31	<i>Saudi Arabia</i>	<i>Salman bin Abdulaziz Al Saud</i>	King	Man
32	Singapore	Lee Hsien Loong	Prime Minister	Man
33	Spain	Pedro Sánchez	President	Man
34	<i>Turkey</i>	<i>Recep Tayyip Erdoğan</i>	President	Man
35	United Arab Emirates	Sheikh Mohammed Bin Rashid Al Maktoum	Prime Minister	Man
36	<i>United Kingdom</i>	<i>Boris Johnson</i>	Prime Minister	Man
37	<i>United States</i>	<i>Joe Biden</i>	President	Man
38	Vietnam	Nguyen Xuan Phuc	President	Man
40	<i>European Council</i>	<i>Charles Michel</i>	President	Man
4	Bangladesh	Sheikh Hasina	Prime Minister	Woman
12	Denmark	Mette Frederiksen	Prime Minister	Woman
15	<i>Germany</i>	<i>Angela Merkel</i>	Chancellor	Woman
26	New Zealand	Jacinda Ardern	Prime Minister	Woman
28	Norway	Erna Solberg	Prime Minister	Woman
39	<i>European Commission</i>	<i>Ursula von der Leyen</i>	President	Woman

### Heads of International Organizations

Organization	Represented by	Title	Gender
African Development Bank	Akinwumi A. Adesina	President	Man
International Monetary Fund	Kristalina Georgieva	Managing Director	Woman
United Nations	António Guterres	Secretary-General	Man
World Bank Group	David Malpass	Group President	Man

Compiled by Julia Kulik, April 23, 2021