

# G-20 Zero-Carbon Policy Scoreboard 2024

Extended executive summary

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BloombergNEF

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## Executive summary

57%

Average G-20 score for power and road transport

42%

Average G-20 score for buildings and industry

39%

Average G-20 score for agriculture

The Group of 20 has made limited progress in the year since BloombergNEF last evaluated the quantity and quality of members’ decarbonization policy. The economies forming this club scored, on average, just 49% in the fourth annual edition of the *G-20 Zero-Carbon Policy Scoreboard* – a paltry 1 percentage point rise from last year’s assessment.

While performances continue to vary widely across the G-20, the general lack of advancement is a red flag for wider climate action given that the group accounts for around 75% of global greenhouse gas emissions. Governments need to rapidly introduce more and better low-carbon policy support if the world is to reach net zero by mid-century and achieve the goals of the Paris Agreement.

Figure 1: Total 2024 scores in BNEF’s latest G-20 Zero-Carbon Policy Scoreboard

	Power	Fuels/CCUS	Transport	Buildings	Industry	Circular economy	Agriculture	Total
France	78%	71%	82%	77%	65%	70%	53%	71%
Germany	75%	71%	71%	76%	67%	64%	54%	71%
EU	75%	66%	75%	73%	60%	62%	50%	68%
Italy	74%	53%	64%	73%	51%	67%	44%	64%
UK	75%	65%	69%	52%	64%	63%	49%	63%
US	66%	76%	65%	45%	45%	41%	41%	60%
Japan	62%	50%	62%	60%	46%	68%	44%	58%
Canada	59%	67%	64%	50%	59%	36%	43%	58%
South Korea	60%	54%	64%	52%	50%	58%	41%	57%
Mainland China	63%	34%	65%	54%	43%	37%	44%	53%
Australia	57%	39%	44%	38%	44%	34%	47%	49%
South Africa	59%	25%	28%	38%	26%	32%	31%	45%
India	62%	41%	55%	34%	31%	37%	27%	44%
Brazil	55%	49%	43%	25%	21%	32%	45%	42%
Mexico	40%	24%	40%	35%	30%	40%	41%	37%
Argentina	44%	37%	33%	27%	23%	26%	38%	35%
Indonesia	35%	31%	29%	26%	20%	27%	19%	27%
Turkey	37%	27%	28%	32%	11%	37%	27%	27%
Saudi Arabia	38%	18%	24%	27%	15%	17%	18%	26%
Russia	29%	12%	27%	14%	13%	34%	16%	21%

Source: BloombergNEF. Note: Darker shades indicate higher scores, and white text is for scores of 50% or more. Fuels/CCUS includes low-carbon hydrogen, biofuels and carbon capture, utilization and storage. Each member’s total score is weighted by each sector’s share of the member’s greenhouse gas emissions.

To limit global warming to 1.5C, developed economies should lead by example but it will be especially important for large emerging markets to make progress.

- The European Union, its member states and the UK continue to sit atop BNEF's latest ranking thanks to their provision of incentives for low-carbon solutions and increasingly stringent regulatory measures targeting emission-intensive technologies (Figure 1). This support is also starting to drive decarbonization in practice.
- However, these leaders, as well as the US, saw their total score decrease this year. In some cases, they scrapped low-carbon programs like Germany's purchase subsidies for electric vehicles, slowed progress on the ground such as renewables build, or faced other challenges including political and industry opposition, and red tape for clean energy projects.
- The top-ranked G-20 members especially lost points for increasing uncertainty among consumers, industry and investors. This was due to insufficient or delayed information on new policies and abruptly ending programs earlier than expected. Some also weakened low-carbon regulations or pushed back those measures' deadlines.
- All G-20 markets need more support in 'harder-to-abate' sectors where cleaner options are currently limited or very costly. They averaged 57% for clean power support and 51% for road transport – where economic low-carbon solutions are more readily available – compared with 41% for the other sectors in this report. These hard-to-abate areas need a mix of incentives and regulations, especially to build up demand and ensure any required infrastructure is built.
- The dividing line of economic wealth persists. In general, developed economies have more and better low-carbon support than emerging markets. Members of the Organisation for Economic Co-operation and Development<sup>1</sup> scored, on average, a total of 57% in BNEF's latest assessment, compared with 37% for non-OECD economies.
- To limit global warming to 1.5C, it will be especially important for developed economies to take the lead by implementing increasingly ambitious regulations and mandates on emissions-intensive technologies and practices.
- But it will be equally important for large emerging markets to make progress, and developed economies can support policymakers there. Accounting for 43% of the world's emissions, the 'BRICS' – Brazil, Russia, India, mainland China and South Africa – have an average policy score of 42%.

### Cross-sector policy – substantial public fossil-fuel support endures

- The G-20 continues to provide hundreds of billions of dollars per year in public support for coal, oil, natural gas and fossil-fuel-fired power generation. These policies distort markets, promote overconsumption and investment in emissions-intensive technologies, and disproportionately benefit wealthy consumers.
- G-20 policymakers have made more progress on carbon pricing by rolling out new schemes, implementing reforms, and expanding existing programs. But few of these economies have made significant headway in introducing policies and regulations to drive companies and financial institutions to evaluate their exposure to climate risks and spur action to reduce them. There are concrete actions that can be taken in the short to medium term (Table 1).

<sup>1</sup> This includes the EU as a bloc because 22 out of its 27 member states are in the OECD.

Table 1: G-20 cross-sector low-carbon policy – short-to-medium-term recommendations

Area	Recommendation
<b>Policy practice</b>	<ul style="list-style-type: none"> <li>• Publish sufficient information on a forthcoming policy to allow companies and the public to understand how it will affect them.</li> <li>• Hold stakeholder consultations on policy proposals and release tools enabling companies and individuals to track a program’s status.</li> <li>• Minimize policy changes and announce amendments well in advance of implementation.</li> </ul>
<b>Fossil-fuel support</b>	<ul style="list-style-type: none"> <li>• Define and identify inefficient fossil-fuel subsidies and devise a phase-out plan, starting with support aimed at producers.</li> </ul>
<b>Carbon pricing</b>	<ul style="list-style-type: none"> <li>• Establish a clear timeline for introducing a mandatory carbon price.</li> <li>• For existing schemes, reduce concessions to companies, such as free allocation of permits and tax-free allowances.</li> </ul>
<b>Climate-risk policy</b>	<ul style="list-style-type: none"> <li>• Mandate generic environmental disclosures from companies.</li> <li>• Establish a voluntary green taxonomy, with a clear timeline for making it mandatory.</li> </ul>

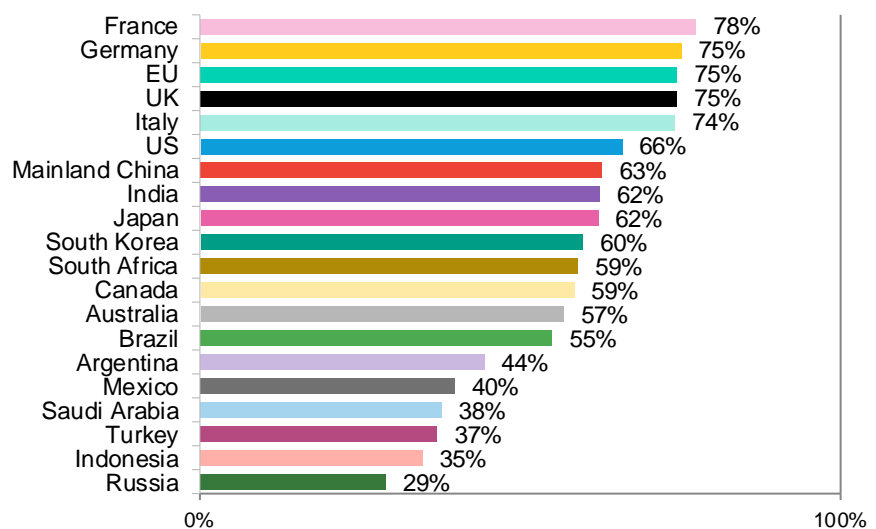
Source: BloombergNEF

Australia and South Africa achieved the biggest increase in score – by 11 and 10 percentage points respectively.

### Power – Europe and US remain in front

- The EU and its member states, the UK and the US have retained their lead for power policy (Figure 2). This is due to bold clean energy goals, renewables incentives and mandates, coal-fired electricity regulations and phase-out targets, and strong carbon pricing regimes.
- However, the clean power scores for the EU as a whole dropped this year, in part due to the decline in the bloc’s carbon price, which made it less effective at driving decarbonization. In addition, EU lawmakers reached a deal in December allowing member states to continue subsidizing coal-fired power plants until at least the end of 2028. France also lost points after announcing a three-year delay to its coal phase-out to 2027.

Figure 2: Power sector scores in BNEF’s 2024 G-20 Zero-Carbon Policy Scoreboard



Source: BloombergNEF

- Australia and South Africa have achieved the biggest increase in their score – by 11 and 10 percentage points, respectively. Australia launched and expanded a competitive tender

program to procure renewables and clean dispatchable capacity. Meanwhile South Africa's own auction program continues to drive clean energy build, and small-scale solar adoption has surged as residential and commercial customers seek to take advantage of regulatory changes and adapt to rolling blackouts.

- Turkey has seen the biggest drop in its score out of the G-20. A relatively weak set of policies contributed to growth in its renewables capacity build slowing to 51% in 2022, compared with 77% growth at the global level. In addition, the market continues to add more coal-fired capacity.

**Table 2: G-20 power sector policy – short-to-medium-term recommendations**

Area	Recommendation
<b>Competitive price signals</b>	<ul style="list-style-type: none"> <li>• Bring in competitive price signals for both generating capacity development and dispatch.</li> </ul>
<b>Fast track land use permits</b>	<ul style="list-style-type: none"> <li>• Ensure land-use regulations are not overly strict and do not unduly benefit some more than others – for example banning wind turbines close to radar systems, or zoning of barren land as agricultural.</li> <li>• Fast track permits for projects on land deemed likely to be suitable, in order to shorten permitting timelines, particularly for onshore wind.</li> </ul>
<b>Smooth paths to generation licensing</b>	<ul style="list-style-type: none"> <li>• Streamline the process for obtaining a generation license – for example, by ensuring renewable energy and storage project developers do not need to acquire multiple licenses, or owners of grid-connected power plants do not have to qualify as a utility.</li> </ul>
<b>Grid extension plans</b>	<ul style="list-style-type: none"> <li>• Create central long-term plans for grid expansion, including interconnectors, to match the amount of renewables capacity targeted by 2030 or beyond.</li> <li>• Consider inter-regional networks can be a vital part of this, both in island nations like the UK, Indonesia and Japan, or regions with vast land masses like the US and mainland China.</li> </ul>

Source: BloombergNEF

All but three G-20 members have improved their policies to promote clean hydrogen, biofuels and carbon capture and storage.

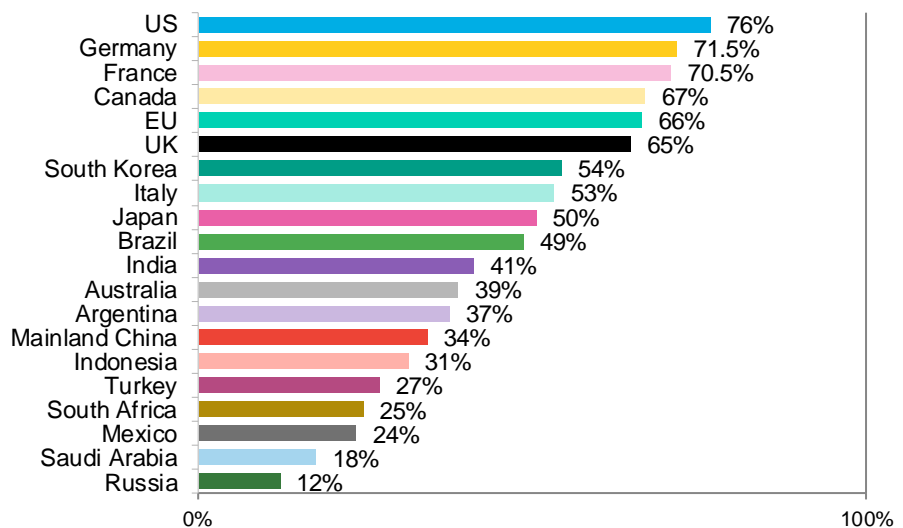
### Low-carbon fuels and carbon capture, utilization and storage – room for improvement

- All G-20 members except Japan, South Africa and Turkey have improved their policies to promote clean hydrogen, biofuels and carbon capture, utilization and storage (CCUS). This is important because limiting global warming to 1.5C will require fuels and technologies beyond clean power and electrification.
- However, in general, emerging markets in the G-20 have much more room for improvement than developed economies: the scores for low-carbon fuels and CCUS policy had the biggest gap of all the sectors between OECD and non-OECD members at 31 percentage points.
- The US has cemented its place at the top of the G-20 ranking for low-carbon fuels and CCUS policy, with a rise of 6.5 percentage points from last year (Figure 3). It has long been a world leader in the biofuel markets, and the improved 45Q tax credit for CCUS as part of the Inflation Reduction Act helped drive a record number of project announcements in 2023.
- In addition, the IRA's new hydrogen tax credit and other funding mean that the US could provide \$161 billion to clean hydrogen projects. However, delays to finalizing the rules have hindered developers in reaching final investment decisions and timelines could be extended due to the November election.
- France has raised its score by 6 percentage points after adopting a new CCUS roadmap in 2023, helping to bolster its project pipeline considerably. It also offers \$9.7 billion in subsidies for clean hydrogen projects, while Germany's support amounts to some \$27 billion. Germany is also the first market to begin a carbon contract for difference program for heavy industry,

which subsidizes the difference between clean hydrogen costs and natural gas prices plus any carbon levies.

- The strong performance of France and Germany, and increased score for Italy, have helped the score for the EU as a whole climb 6 percentage points. The high EU carbon price relative to other schemes directly incentivizes emissions cuts and increases funding for clean technology deployment.
- In addition, as part of efforts to rival the US IRA, the EU held the first round of its Hydrogen Bank auction, offering a fixed premium per unit of renewable hydrogen to producers. It also has some of the strongest demand-side incentives for clean hydrogen and biofuels as part of the latest version of the Renewable Energy Directive, and separate regulations on aviation and shipping.

**Figure 3: Low-carbon fuels and CCUS scores in BNEF’s 2024 G-20 Zero-Carbon Policy Scoreboard**



Source: BloombergNEF

France has raised its score by 6 percentage points due to a new CCUS roadmap, ambitious biofuels goals and clean hydrogen support.

- India achieved the biggest increase in score for low-carbon fuels and CCUS at almost 7 percentage points. In January, it held its first auctions for green hydrogen production and electrolyzer manufacturing. In addition, the government released a carbon management strategy in 2023, together with a tax credit for CCUS akin to the US 45Q.
- Japan saw the biggest score decrease for this sector this year, falling almost 3 percentage points. While it issued an updated hydrogen strategy in 2023, the new targets for demand and electrolyzers appear infeasible without more significant support akin to the IRA or hydrogen use mandates. But most of Japan’s lost points after biofuel production growth faltered in recent years. This may not change after the government set the ethanol blending mandate at the same rate for the next five years.

**Table 3: G-20 low-carbon fuels and CCUS policy – short-to-medium-term recommendations**

Area	Recommendation
<b>Hydrogen</b>	
<b>Targets and plans</b>	<ul style="list-style-type: none"> <li>• Release a strategy outlining how the government intends to scale up deployment, including focus areas, feasible targets and dedicated policy support to achieve them.</li> </ul>

Area	Recommendation
<b>Financial or fiscal incentives</b>	<ul style="list-style-type: none"> <li>• Provide sufficient subsidies to close to the cost gap between low-carbon and fossil fuels as soon as possible.</li> </ul>
<b>Demand-side incentives</b>	<ul style="list-style-type: none"> <li>• Introduce regulations on the end-use sectors of hydrogen, in the form of either carbon pricing, carbon intensity thresholds or even mandates.</li> </ul>
<b>Standards</b>	<ul style="list-style-type: none"> <li>• Set a clear and internationally consistent emissions accounting methodology for clean hydrogen.</li> </ul>
<b>Infrastructure</b>	<ul style="list-style-type: none"> <li>• Set a clear regulatory framework for hydrogen transport and storage infrastructure.</li> </ul>
<b>Biofuels and biogas</b>	
<b>Diversify biofuels supply</b>	<ul style="list-style-type: none"> <li>• Structure incentives in such a way that favors less developed, more costly, technology over the established pathways, to help get new projects off the ground. This can be through sub-targets like e-fuel in the ReFuelEU plan or basing incentives on lifecycle emissions reductions.</li> </ul>
<b>SAF mandates</b>	<ul style="list-style-type: none"> <li>• Implement sustainable aviation fuel mandates to create a level playing field for airlines operating in the region.</li> </ul>
<b>Biogas policy</b>	<ul style="list-style-type: none"> <li>• Broaden policy scope to include biogas applications beyond road transport in order to increase the potential market and emissions reductions.</li> </ul>
<b>CCUS</b>	
<b>Policy carrots and sticks</b>	<ul style="list-style-type: none"> <li>• To incentivize build out, carbon pricing must be implemented, ensuring minimal concessions like free allocation, or operational subsidies should be introduced, such as a contracts-for-difference program.</li> <li>• More clarity needs to be issued regarding available tax credits. Lack of guidance inhibits investment decisions.</li> </ul>
<b>Standards and regulations</b>	<ul style="list-style-type: none"> <li>• Define clear standards to address issues like developers' or owners' legal obligations and monitoring responsibilities.</li> <li>• Set rules on rights for CO2 storage and injection ensuring that they do not conflict with existing land ownership and mining rights.</li> <li>• Implement standards to address issues such as storage rights, legal responsibilities of CCS developers or owners, monitoring responsibilities of developers at storage sites.</li> </ul>

Source: BloombergNEF. Note: CCUS refers to carbon capture, utilization and storage.

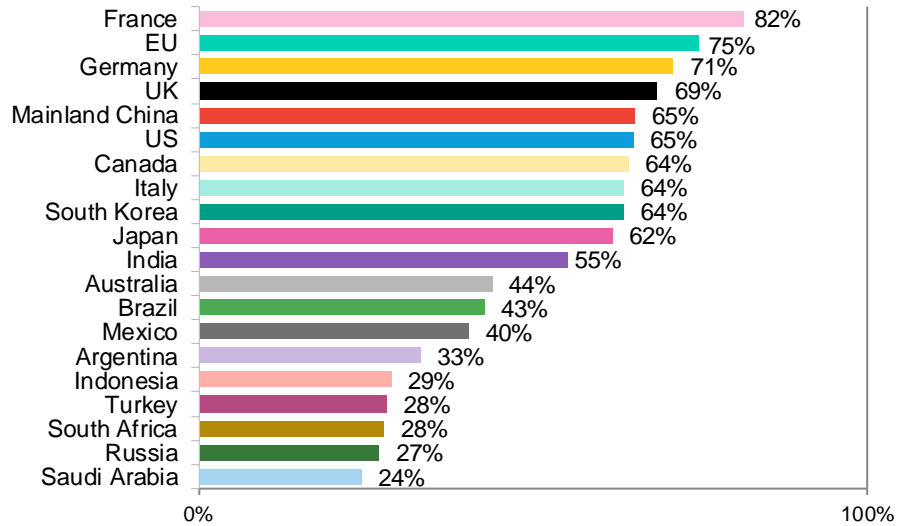
The five leading markets have introduced a mix of demand- and supply-side incentives, helping to achieve the biggest EV share of sales

### Road transport – a three-tier race

- The G-20 can be split into three broad groupings: the five leading markets, other members of the OECD and non-OECD members. The five leading markets saw less growth than other members in terms of electric vehicle sales in 2023. But they began last year at a much higher base, meaning EVs accounted for a quarter of all passenger car sales on average.
- Generous purchase subsidies helped top scorer France achieve the biggest increase in sales in 2023 out of the five leaders. In contrast, Germany saw a dip at the end of the year, after the government abruptly ended its purchase subsidies a year earlier than planned.
- Supply-side mandates are also important and have been implemented or planned in all of the five EV leaders. While mainland China ended market-wide purchase subsidies in 2022, its New Energy Vehicle credit system, as well as increasingly attractive economics, helped it reach the largest share of EV sales in 2023.
- The UK's zero-emissions vehicle mandate starts this year, but it lost points after the government delayed its deadline for phasing out the sale of vehicles with an internal combustion engine. In addition, the EU agreed more ambitious CO2 targets for automakers last year, effectively banning the sale of ICE vehicles from 2025.



**Figure 4: Road transport sector scores in BNEF's 2024 G-20 Zero-Carbon Policy Scoreboard**



Source: BloombergNEF.

Australia saw the biggest increase among scores for transport policy due to increased EV sales and progress on its new Vehicle Efficiency Standard.

- The second group – comprising other members of the OECD – have made some progress but need more and better policy support. The US spent much of 2023 waiting for guidance on the generous new incentives introduced under the IRA. This did not help buoy its EV share of sales relative to the five leading markets. The latest IRA rules on “foreign entities of concern” will likely reduce the number of automakers eligible for the tax credit.
- Australia has boosted its transport score by 14 percentage points, with the third-biggest percentage increase in EV sales of all the G-20 last year. In addition, the government is making progress on the new Vehicle Efficiency Standard, which would require EV sales to increase sevenfold by 2030.
- The third group comprises non-OECD members of the G-20. Some of these markets are starting to introduce some EV policy support and indeed increase EV deployment: India doubled sales of electric passenger cars in 2023, while Brazil, Russia and South Africa achieved growth of more than 100%. However, electric models still only account for a fraction of new passenger car sales in these markets, with an average of 1.3% in 2023.

**Table 4: G-20 road transport policy – short-to-medium-term recommendations**

Area	Recommendation
<b>Electric vehicles</b>	<ul style="list-style-type: none"> <li>• Make fuel economy standards and/or tailpipe CO2 emissions standards, including for commercial vehicles, stricter and based on a longer timeframe than current rules.</li> <li>• Consider electrification mandates for fleets, including those of governments and transport operators.</li> <li>• At the municipal level, tighten regulations for vehicles entering urban areas.</li> <li>• Target additional consumer subsidies for low-priced EVs with smaller batteries to tap the full range of buyers, and promote the purchase of second-hand EVs. Any remaining EV subsidies should come with price caps that decline over time.</li> <li>• Consider bonus-malus type policies, where EV purchase subsidies (“bonus”) are financed by the income from the “malus” (like a carbon tax on the purchase of the most polluting vehicles) part of the system.</li> <li>• Set a phase-out date for sales of new internal combustion vehicles no later than 2035, across all segments. These targets need to be backed by legislation and supported by concrete policy measures with interim targets.</li> </ul>

Area	Recommendation
<b>Charging infrastructure</b>	<ul style="list-style-type: none"> <li>Support for charging infrastructure needs to be expanded dramatically, including for remote and otherwise under-served locations. Governments should also review cost recovery mechanisms for grid upgrades and grid connections to enable more charging points, and consider if these can be included in the rate base of relevant grid operators in a given area. Dense public charging networks can help reduce the EV range consumers feel they need, which will in turn reduce pressure on battery raw material suppliers.</li> <li>Extensive investment will be needed in high-powered charging for trucking fleets, including local grid network reinforcements. Governments should fast track grid connection and permitting processes for these facilities wherever possible. In some cases, reductions in peak demand charges may be needed.</li> </ul>

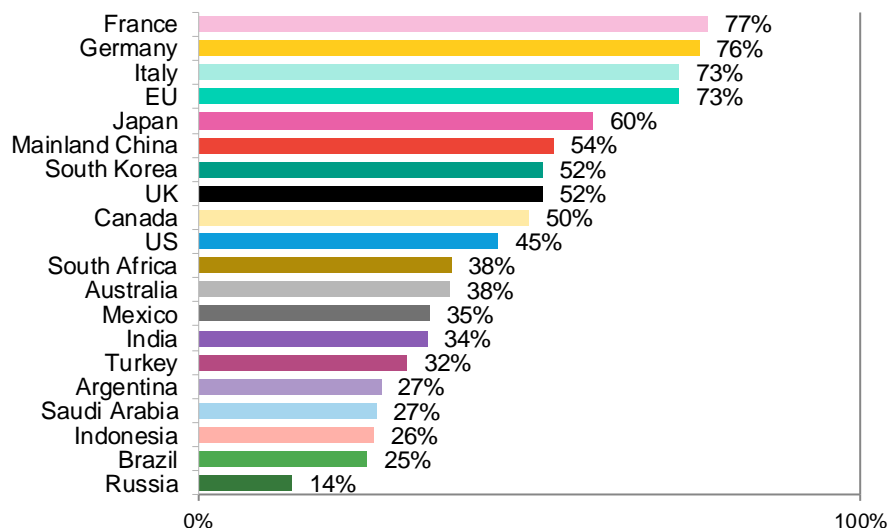
Source: BloombergNEF

EU member states scored highest for buildings policy thanks to continued regulatory support, new measures like the forthcoming second emissions trading scheme and increased effectiveness of incentives for low-carbon heating technologies.

### Buildings – actionable and fast-acting policies are needed

- Overall, 11 of the G-20 economies improved their score for low-carbon buildings policy compared with last year. Given that just under 7% of G-20 emissions in 2020 came from buildings, governments and policymakers must urgently design actionable policies that can deliver results effectively and fast.
- EU member states sit atop the ranking for policy to decarbonize buildings thanks to continued regulatory support, new measures like the forthcoming second emissions trading scheme that includes the building sector, and increased effectiveness of incentives for low-carbon heating technologies (Figure 5).
- With a year-on-year score increase of 8 percentage points, Italy has recorded the largest jump of any G-20 member. This was mainly because its buildings policies are starting to have an impact on emissions and energy consumption, as well as heat-pump sales.
- Canada also substantially improved its score thanks to policies at the federal and local level. Some provinces and territories are also signaling a shift away from fossil fuels and increasing efforts in energy efficiency.

Figure 5: Buildings sector scores in BNEF’s 2024 G-20 Zero-Carbon Policy Scoreboard



Source: BloombergNEF

- The UK may have increased heat-pump sales in 2023. But again it lost points for pushing back a deadline in this case the date of both oil- and gas-fired boiler bans and the enforcement of more restrictive conditions on energy performance certificates.

- Russia has stayed in last place and dropped an additional 2 percentage points. This is almost half the score of its nearest contenders, Brazil and Indonesia, and is all the more concerning given Russia’s cold climate.

Table 5: G-20 buildings policy– short-to-medium-term recommendations

Area	Recommendation
<b>Policy sticks and carrots</b>	<ul style="list-style-type: none"> <li>• Impose ‘sticks’ on fossil-fuel heating systems and inefficient properties. These policies can be implemented in conjunction with ‘carrots’ for heat pumps and refurbishment that may be more politically acceptable.</li> </ul>
<b>Energy efficiency</b>	<ul style="list-style-type: none"> <li>• Do not neglect energy efficiency measures, which can complement low-carbon heating subsidies and speed up emissions reductions. Helping consumers access financing – with a blend of approaches reflecting different customer needs – can improve adoption of energy efficiency measures.</li> </ul>
<b>Appropriate budgets</b>	<ul style="list-style-type: none"> <li>• Allocate sufficient funding to low-carbon building subsidy support to drive real change. This is especially important in markets where low-carbon heating is uneconomic compared to fossil-fuel systems, and where carbon taxes are not in place.</li> <li>• At the same time, when designing low-carbon heat subsidies, avoid creating market distortions through overly generous measures.</li> </ul>
<b>Comprehensive and innovative policies</b>	<ul style="list-style-type: none"> <li>• Do not hesitate to implement innovative policies, and be willing to design new policies addressing gaps. For example, a policy like the UK’s proposed Clean Heat Market Mechanism could be a soft alternative to gas boiler bans, while passing more responsibility for driving the transition to manufacturers and retailers.</li> </ul>

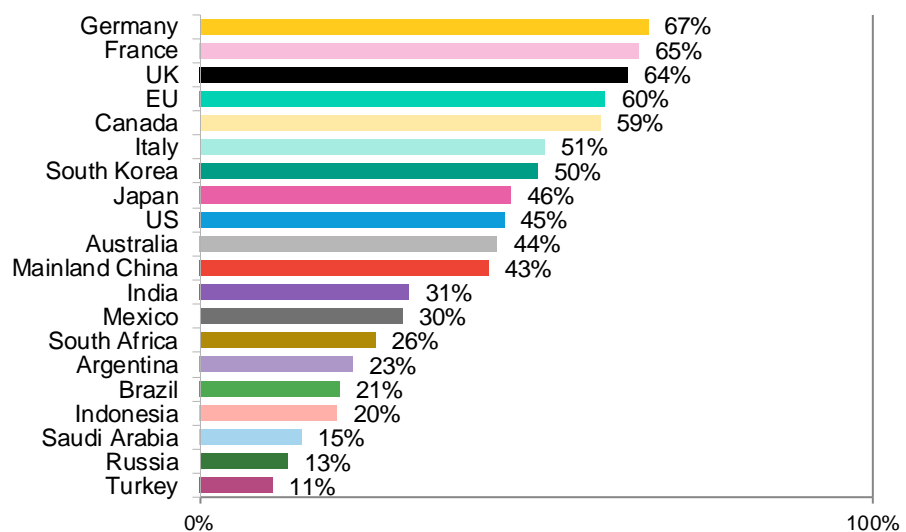
Source: BloombergNEF.

### Industry – existing policies not enough for net zero

- Industry will not reach net zero by 2050 with existing policies. G-20 markets that do offer support for industry, either directly or through subsidies for enabling technologies like hydrogen, carbon capture and clean power, are resting on their laurels and waiting for private investment to roll in. But net-zero targets and carbon prices are not yet strong enough to make a business case for green materials.

Industry will not reach net zero by 2050 with existing policies. With most governments focusing on subsidies, there is a lack of demand-side incentives.

Figure 6: Industry scores in BNEF’s 2024 G-20 Zero-Carbon Policy Scoreboard



Source: BloombergNEF

- EU nations continue to top the list for low-carbon industry policy, thanks to the bloc’s carbon market and incentives for clean fuels like hydrogen (Figure 6). However, carbon pricing will

While the IRA should make the US the cheapest place in the world to produce green materials, project announcements have been slow to materialize.

- only become a true forcing mechanism for industry as the handing out of free emissions allowances phases out over 2026-2034. Germany’s landmark carbon contract-for-difference program is one of the first policies that directly subsidizes low-carbon materials production, rather than enabling technologies.
- Australia swapped places with mainland China to rise to 10<sup>th</sup> place, having announced reforms to the Safeguard Mechanism, its carbon pricing program for industrial emitters. Historically this emissions trading scheme has spurred little decarbonization.
- The largest score increase came from Canada, which has significant announced support for enabling technologies. This includes yet-to-be finalized crucial tax credits for hydrogen and carbon capture and storage, and a federal carbon pricing program for the oil and gas industry.
- While the IRA should make the US the cheapest place in the world to produce green materials, project announcements have been slow to materialize. Low-carbon production is still more expensive than unabated, even with credits, and many projects are waiting for competitive capital expenditure grants and guidance on tax credits to be announced.

Table 6: G-20 industry policy – short-to-medium-term recommendations

Area	Recommendation
<b>Goals and targets</b>	<ul style="list-style-type: none"> <li>• Set emissions reduction requirements for major industries.</li> <li>• Provide information on technology pathways, including planned support mechanisms.</li> <li>• Create funding programs for commercial deployment of early-stage technologies.</li> </ul>
<b>Green material standards</b>	<ul style="list-style-type: none"> <li>• Perform detailed emissions accounting for existing industrial producers.</li> <li>• Set an aggressive emissions standard for ‘green’ materials that ratchets up to reach net zero by the target date.</li> </ul>
<b>Carbon pricing</b>	<ul style="list-style-type: none"> <li>• Include industrial emitters in existing pricing schemes.</li> <li>• Remove free allocation, unambitious baselines, tax-free allowances and other concessions.</li> <li>• Set carbon border tariffs to protect low-carbon domestic producers.</li> </ul>
<b>Subsidies and contracts for difference</b>	<ul style="list-style-type: none"> <li>• Introduce subsidies for enabling technologies, such as hydrogen, carbon capture and clean power.</li> <li>• Subsidize low-carbon materials directly through a price premium, contract for difference, or production tax credit.</li> </ul>
<b>Demand-side policies</b>	<ul style="list-style-type: none"> <li>• Commit to green public procurement</li> <li>• Leverage building codes and product certifications to encourage private sector demand</li> </ul>

Source: BloombergNEF

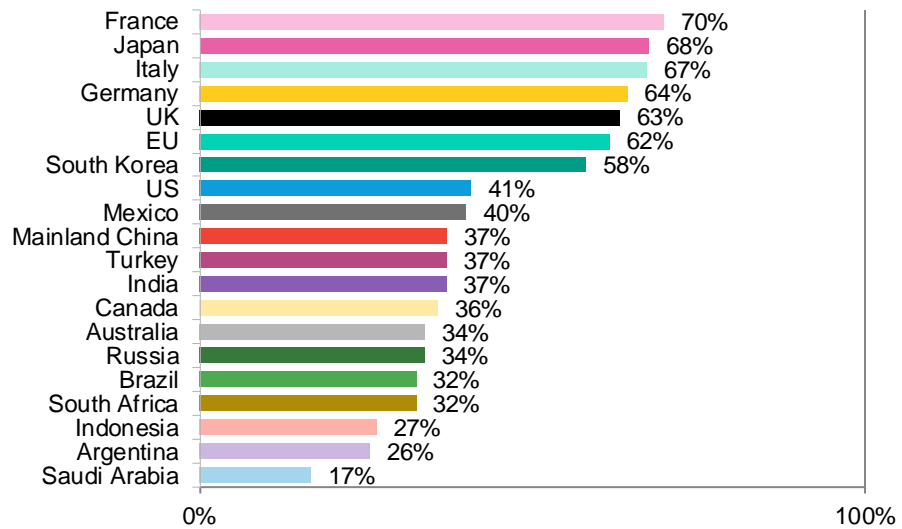
Having climbed four places in the ranking, France has come out on top after it implemented new waste reduction and circular economy mandates

Circular economy – a leading group far ahead of the rest

- The seven markets with a circular economy score over 50% – France, Japan, Italy, Germany, the UK, EU and South Korea – have pioneered early waste-reduction policies such as extended producer responsibility schemes that force companies generating waste to pay for its recycling upfront. Most of these markets are also smaller in size, with limited space for landfill, and are therefore implementing ambitious regulation to increase the circulation of materials through recycling, like the EU’s proposed recycled-content mandates.
- Having climbed four places in the ranking, France has come out on top after it implemented new waste reduction and circular economy mandates (Figure 7). This includes an ambitious law banning plastic packaging on most fruit and vegetables, and rules on recyclability information for consumers.

- Japan and South Korea are the only Asian G-20 markets that are grouped among the leaders. Programs that charge households based on the volume and type of waste have proved effective in both countries. Japan takes second place in the 2024 ranking after it implemented a law to incentivize companies to transition toward a circular business model.

Figure 7: Circular economy scores in BNEF’s 2024 G-20 Zero-Carbon Policy Scoreboard



Source: BloombergNEF

Many of the other G-20 members have policies that are either not as comprehensive or not as stringent as those in the higher-scoring markets. In some cases, implementation remains weak or is lagging.

- The remaining G-20 members have a score below 50%. Many of them have policies that are either not as comprehensive or not as stringent as those in the higher-scoring markets. In some cases, implementation remains weak or is lagging.
- Single-use plastic regulations have become mainstream as governments face growing pressure to deal with mounting plastic waste. For example, in 2023, Canada introduced stricter single-use plastic bans, while India’s prohibition of single-use plastics helped the country climb four places in the ranking. However, some of these markets have implemented such regulations but failed to enforce them.
- In a number of G-20 members, circular economy policy is devolved to subnational governments, resulting in a diverse picture across the country. For example, US states in the northeast and on the West Coast tend to have the most support, especially bans on single-use plastics, EPR schemes and recycling regulations.

Table 7: G-20 circular economy policy – short-to-medium-term recommendations

Area	Recommendation
<b>Design and manufacturing</b>	<ul style="list-style-type: none"> <li>• Devise circular economy strategies that take account of local factors like level of waste management infrastructure, types and volumes of waste generated, and consumer behaviors.</li> <li>• Promote environmentally friendly product design with ‘end-of-life’ as a key metric, and set standards to keep materials in circulation for longer.</li> <li>• Apply bans or taxes on specific materials that are difficult to recycle (such as plastic bags) and have sustainable alternatives.</li> <li>• Incentivize industry collaboration to develop innovative design using sustainable materials such as compostable and bio-based options.</li> <li>• Encourage circular business models, such as leasing models and repair options for apparel, electronics and types of equipment.</li> </ul>

<b>Reduce and reuse</b>	<ul style="list-style-type: none"> <li>• Set targets to limit the amount of overall waste generated. Landfill taxes and bans can minimize material leakage from the supply chain.</li> <li>• Apply bans and taxes on materials that are hard to recycle or commonly mismanaged.</li> <li>• Incentivize reusable or refillable options for packaging.</li> </ul>
<b>Recover and recycle</b>	<ul style="list-style-type: none"> <li>• Set recycling rate targets by specific materials. Implement mandates for recycled content in products and packaging through taxes, to drive domestic demand for recycling.</li> <li>• Implement extended producer responsibility (EPR) programs to ensure producers, distributors and importers are held responsible for the end-of-life treatment of the waste.</li> <li>• Create deposit-return schemes for specific materials or packaging types that can be recycled.</li> <li>• Direct investment specifically toward bottlenecks across the value chain, such as sorting, collection or recycling capacity.</li> </ul>

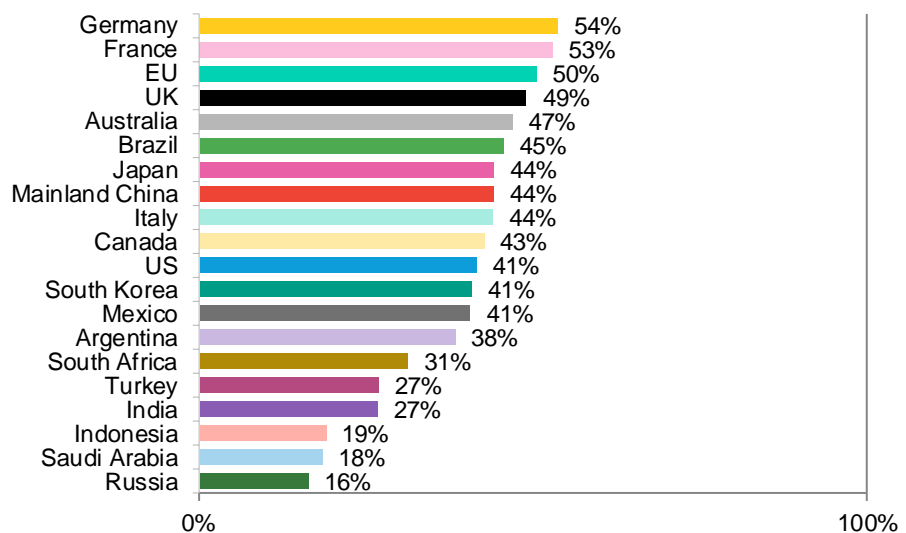
Source: BloombergNEF. Note: For details on specific policy mechanisms see: *Circular Economy: Global Policy Trends (web | terminal)*.

The agriculture sector has the lowest average score across the G-20 at 39% – slightly below the results for 2023

### Agriculture – a laggard for effective low-carbon policy

- Most G-20 governments have yet to implement effective policy support to promote low-carbon agriculture practices and technologies. As a result, the sector has the lowest average score across the group at 39% – 0.5 percentage points below the results for 2023.
- The top four – Germany, France, the EU and UK – have retained their position. However, Germany, France and the UK have seen their score decrease this year, while the EU as a whole and Italy, which remains in ninth place, failed to improve their performance.
- On paper, these governments have implemented more dedicated policies to promote low-carbon agriculture, especially through recent reforms. EU member states and the UK also have some of the most stringent regulations, which are awarded more points in this assessment than financial support because they are meant to force change, rather than simply incentivize it.
- However, these G-20 markets have weakened the impact of these measures considerably in the last year due to policy uncertainty. In the case of the UK, this relates to participation in funding programs, while governments in the EU have wavered and, in some cases, backtracked on targets and regulations.

Figure 8: Agriculture sector scores in BNEF’s 2024 G-20 Zero-Carbon Policy Scoreboard



Source: BloombergNEF

- Australia has climbed the most places. It has one of the most comprehensive suites of funding programs targeted at low-carbon agriculture, and – unlike some G-20 economies – it has dedicated financial incentives to cut emissions from livestock, which accounted for 63% of the total for agriculture.
- In addition, Australia is one of the few G-20 members with a carbon offsets program open to agricultural projects. Following an independent review, the government is seeking to make the scheme more robust, while reforms to its compliance carbon market should increase demand for credits. However, it lacks specific mandates on low-carbon agriculture and has yet to release its plan to reach net zero in the agriculture and land sector.
- While it only rose one place in the ranking, Mexico achieved the biggest increase in score – up 5 percentage points. It has relatively few low-carbon funding programs, but the government has expanded its flagship ‘Sowing Life’ scheme, which gives funding and other support to small-scale farmers who undertake agroforestry projects.
- Mexico is one of the few G-20 members with a market-wide carbon price on the agricultural sector, subject to some concessions. The government is also devising a new national carbon offset mechanism, which will be open to agriculture projects.
- In contrast, the US has fallen six places in the ranking. In general, it lacks low-carbon agriculture policy, though the IRA included \$20 billion in grants. The sector remains on shaky ground until the next Farm Bill is passed after it had to be extended in 2023. The upcoming election raises questions around a potential decrease in existing low-carbon funding.

**Table 8: G-20 agriculture policy – short-to-medium-term recommendations**

Area	Recommendation
<b>Targets and plans</b>	<ul style="list-style-type: none"> <li>• Devise a strategy focused on how to promote low-carbon agriculture, explaining the type and timeline for future policy support to tackle the biggest sources of agriculture emissions</li> </ul>
<b>Harmful subsidy phase-out</b>	<ul style="list-style-type: none"> <li>• Agree on a definition of ‘environmentally harmful subsidies’ for the agricultural sector and devise a plan to reform them to minimize market-distorting support and reuse the resources for low-carbon agriculture incentives</li> </ul>
<b>Policy carrots</b>	<ul style="list-style-type: none"> <li>• Introduce financial support explicitly targeted at cutting agricultural emissions to promote the development, deployment and maintenance of a wide range of technologies and practices</li> </ul>
<b>Policy sticks</b>	<ul style="list-style-type: none"> <li>• Require recipients of public agriculture support to fulfill environmental conditions and introduce financial incentives for low-carbon technologies and practices, especially to tackle livestock emissions.</li> </ul>

Source: BloombergNEF

# Section 1. Introduction

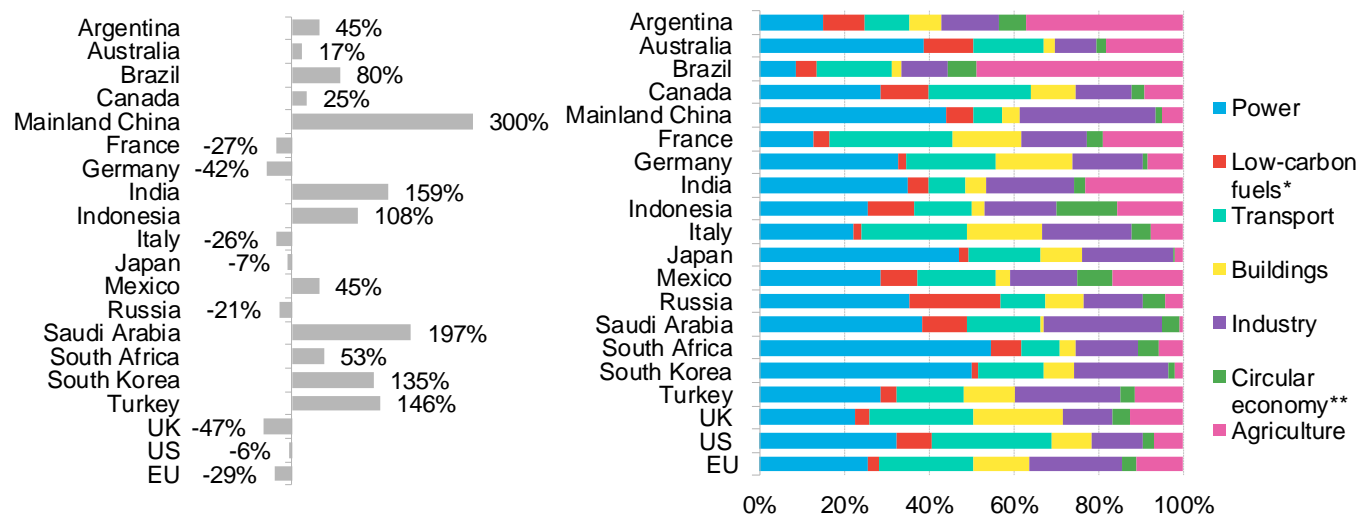
BNEF's Policy Scoreboard evaluates the quantity and quality of low-carbon measures implemented by the G-20, which account for around 75% of global greenhouse gas emissions.

At the 2015 United Nations climate summit in Paris, governments agreed to limit global warming to “well below 2C above pre-industrial levels, pursuing efforts” to stick to a 1.5C pathway. At last year’s gathering in Dubai, known as COP28, those same governments concluded the first stocktake of global progress toward the Paris Agreement’s goals.<sup>2</sup> The results were not an easy read: “much more ambition in action and support is needed in implementing domestic mitigation measures and setting more ambitious targets...to realize existing and emerging opportunities”.

All the G-20 markets have committed to reach net-zero emissions by mid-century, or have a target under discussion. BNEF’s Policy Scoreboard evaluates the quantity and quality of low-carbon measures implemented by the members of this group, which together account for around 75% of global greenhouse gas emissions.

Progress in addressing emissions across the G-20 has diverged over the last few decades (Figure 9). The parties included in the ‘Annex I’ list of the UN Framework Convention on Climate Change<sup>3</sup> increased their greenhouse gas emissions<sup>4</sup> by 9% over 1990-2020. They would have averaged a 10% reduction if Turkey, which has requested to leave the Annex I group, were excluded. In contrast, non-Annex I parties saw a mean rise of 125% across that period.

**Figure 9: G-20 members’ greenhouse gas emissions, excluding land use, land-use change and forestry**  
Change over 1990-2020      By sector share in 2020



Source: World Resources Institute ClimateWatch, European Environment Agency. Note: \*Represents fugitive emissions and other fuel combustion. \*\*From waste sector.

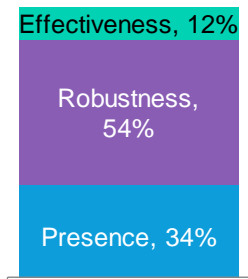
2 For BNEF’s assessment of progress made at COP28, see *UN Climate Talks: Was the 28th Time the Charm? Not So Much* ([web](#) | [terminal](#)).

3 The Annex I parties in the G-20 are Australia, Canada, the EU, Russia, Turkey, the UK and US.

4 Unless stated otherwise, emissions data excludes land use, land-use change and forestry.



**Figure 10: Policy Scoreboard metric categories, by weighting**



Source: BloombergNEF

Each G-20 member is scored out of 100% based on more than 130 metrics, which can be broken down into three categories: presence, effectiveness and robustness.

The G-20 members also differ in terms of their breakdown of economy-wide emissions, potentially affecting their policy priorities. The power system accounts for the biggest share of greenhouse gas output for most of the 20 markets. This is a key reason why governments have often focused first on decarbonizing the electricity mix. Other reasons have been that the sector comprises a limited set of emission sources and the greater availability and increasing cost-competitiveness of clean technologies.

However, developed and developing economies often differ when it comes to other areas of the economy. Transport is a bigger emitter for Annex I parties, as is the buildings sector – not least because these regions tend to have colder climates. In contrast, non-Annex I parties release more greenhouse gases from industry, waste and agriculture.

Each G-20 member is scored out of 100% based on more than 130 metrics, which can be broken down into three categories: presence, effectiveness and robustness (Figure 10). The ‘presence’ metrics focus on what types of policy have been implemented in each sector – such as renewable energy auctions to decarbonize the electricity mix or purchase subsidies to promote electric vehicles. The types of policy needed to spur climate action change as markets mature. To reflect this, policy types are weighted differently depending on their sophistication and level of ambition or stringency. Broadly speaking, policies forcing a change – in other words, ‘sticks’ such as mandates or carbon pricing schemes – are weighted higher than ‘carrots’ like feed-in tariffs or grant and loan programs.

Simply introducing a certain type of policy is not necessarily enough to drive decarbonization. These programs must be designed carefully through transparent processes and, if changes are necessary, should be implemented with advance warning and should not result in a retroactive reduction in support. Targets and regulations should be tough enough to spur change but not too ambitious so as to be unrealistic. A market needs government support in a given sector targeted at a range of technologies and solutions, using a range of policy types. The Scoreboard takes these factors into account through the ‘robustness’ metrics.

The final category comprises quantitative metrics assessing the ‘effectiveness’ of the policies in place. For example, the Scoreboard considers whether a market has increased the share of renewable power generation or EV sales in recent years, or if it has decreased volumes of municipal solid waste or the share of fossil fuels used for industrial heat.

The assessment of France, Germany and Italy incorporates policies implemented at the national and EU level. The EU scores for the presence and robustness metrics are a weighted average of the six biggest member states by GDP: Germany, France, Italy, Spain, the Netherlands and Poland. In aggregate, these markets account for 70% of the bloc’s greenhouse gas emissions. The EU scores for the effectiveness metrics are for the bloc as a whole.

For the US and Canada, climate action is driven by both federal and subnational governments. As such, their scores are a weighted average of the scores for their states and provinces, as well as any relevant federal-level policies. The weighted average is calculated based on emissions for the latest year available.

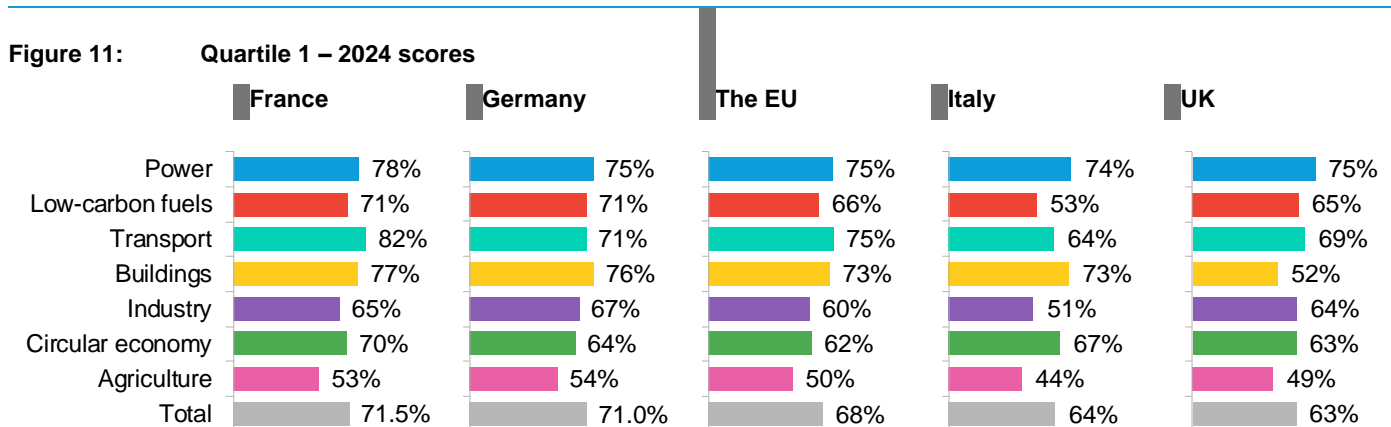
To take account of the varying emissions breakdowns across the G-20, each member’s total score comprises an average of each sector’s points weighted by the sector’s share of emissions in that economy. The weighting means that, for example, South Africa’s score for the power sector makes a bigger contribution to its total score compared with France, which has a higher weighting for transport.

## Section 2. Overview of G-20 members

In general, developed economies have implemented more and better low-carbon support than emerging markets, based on this year’s Policy Scoreboard. Members of the Organisation for Economic Co-operation and Development, or OECD, have an average total score of 57%, compared with 37% for non-OECD economies.

The large emerging markets, as well as the OECD members that are running behind, will need to bring more support to the table to limit global warming to 1.5C. In particular, accounting for 43% of global emissions, the BRICs – Brazil, Russia, India, mainland China and South Africa – have an average policy score of 42%.

### 2.1. Quartile 1



Source: BloombergNEF. Note: Each member’s total score is weighted by each sector’s share of the member’s greenhouse gas emissions. Scores for France, Germany and Italy as a whole include EU-level and local policies. The scores for the EU take account of both bloc-level policies and those in individual member states.

#### France, Germany, the EU and Italy

France snatches the top spot in this year’s assessment, as it kept its score relatively stable but last year’s number one – Germany – loses 3 percentage points.

France snatches the top spot from Germany in this year’s assessment – but only by 0.5 percentage points. This is mainly because Germany loses 3 percentage points since last year, having scrapped or weakened some policies and raised uncertainty among consumers and industry by announcing unexpected changes, while France keeps its score stable. As Germany accounts for the biggest share of EU emissions, the bloc’s total score also falls this year, by 1 percentage point.

France achieves the highest scores for power, transport, buildings and circular economy, thanks to policies that are starting to bear fruit on the ground. Germany still ranks first for policies to decarbonize industry and agriculture. Italy continues to lag behind France and Germany, and has dropped 1 percentage point since last year. Italy has often implemented the same number and

type of low-carbon policies as France and Germany, but in some cases it is awarded fewer points for the robustness and effectiveness of these measures. This can be because the incentives and regulations are less impactful, or because slower implementation means that they take longer to have an effect.

### Power

The EU and member states still have some of the G-20's best policy frameworks for clean power, with ambitious renewables targets and incentives.

The EU and member states still have some of the G-20's best policy frameworks for clean power, with ambitious renewables targets and incentives; some have also committed to phase out coal-fired electricity generation. They each lose a few points in this year's assessment primarily due to the decline in the European carbon price in the last six months, making the policy less effective at driving emissions abatement. However, even with the recent decline, the EU carbon price is well above other G-20 carbon taxes and markets. France also loses points after delaying its coal phase-out by three years to 2027.

France and Germany already have a significant share of clean technologies in the generation mix, at 88% and 53% in 2022, respectively. But Italy lags behind on renewables additions, with a clean power share of 36% in 2022. One of the main barriers to deployment in many European countries has been the slow process for granting permits and grid access, although policymakers are taking steps to remedy this.

### Low-carbon fuels and CCUS

Germany stays in second place to the US for low-carbon fuels and carbon capture, utilization and storage (CCUS) policies. But France achieves a bigger increase in score than Germany.

Germany stays in second place to the US for low-carbon fuels and carbon capture, utilization and storage (CCUS) policies. But France achieves a bigger increase in score than Germany: its new CCUS roadmap has bolstered its project pipeline considerably, and it has bold targets for biofuels from waste or non-crop feedstocks. The market has especially improved its clean hydrogen policy, with some \$9.7 billion of funding available, although this pales in comparison with Germany's potential \$27 billion of support. Germany also scores points for the first demand-side carbon contract-for-difference (CfD) scheme in the world. This program subsidizes the difference between clean hydrogen costs and natural gas prices plus any carbon levies.

The EU and its member states also score points for the high carbon price relative to other G-20 schemes, together with increased funding for clean hydrogen projects, including the new auction program. The EU also has some of the strongest demand-side incentives for clean H<sub>2</sub> and biofuels in the world as part of the latest version of the Renewable Energy Directive and separate regulations on aviation and shipping. That said, member states may need to implement additional financial incentives to realize these goals. These policies have helped the EU score points for operational and planned production of green and blue hydrogen, and its pipeline of CCUS projects.

### Transport

With a 41% jump in EV sales from 2022 to 2023, France increased EV sales by 41% in 2023, thanks to a set of generous incentives and EU-level regulations.

France, Germany and the EU as a whole are world-leading markets for electric vehicles. With a 41% jump in EV sales from 2022 to 2023, France had the biggest year-on-year increase out of these three economies, thanks to a set of generous incentives. As a result, 27% of all passenger car sales in France last year were EVs. Germany also had a sizeable EV share of sales (25% in 2023), but it sees the biggest decrease in overall transport policy score – 9 percentage points. This was primarily due to increased uncertainty for automakers and consumers after the government announced unexpectedly that the purchase subsidy program would end a year earlier than planned. EV sales in Germany fell 14% in 2023.

With a 9% EV share of new passenger car sales in 2023, Italy, which introduced purchase subsidies only in 2022, comes in last place in this quartile for EV deployment. It does however score points, together with France and Germany, for the EU-level CO2 emission performance standards for vehicles, requiring automakers to meet annual targets. Tougher goals were agreed in 2023, including a 100% CO2 reduction target for new car sales by 2035 – effectively banning the sales of vehicles with an internal combustion engine, or ICE.

### Buildings and industry

France, Germany and Italy all increased their scores for the buildings sector, as did the EU as a whole. Taking a combined carrot-and-stick approach to policymaking, these measures are starting to have an impact. Italy in particular records the largest increase in buildings score out of all the G-20 – at 8 percentage points – having reduced emissions and energy consumption and increased use of renewables over 2017-2021. Heat-pump adoption is also strong in Italy, although France, which has some of the bloc's most effective low-carbon heat incentives, and the EU as a whole each had more sales per capita in 2023. In terms of policy sticks, the EU has made progress on passing ground-breaking regulations on buildings emissions and energy efficiency, and approved the new emissions trading scheme on road transport and buildings. France has banned oil and gas heating systems in new homes and is discussing whether to include gas boiler replacements in the current housing stock. Germany agreed in 2023 to require a minimum of 65% renewable energy in heating supply for new buildings.

### Industry

EU members continue to top the list for industrial decarbonization policies, in large part due to the EU Emissions Trading System (EU ETS) and incentives for clean fuels like hydrogen. Carbon pricing will only become an effective driver of industrial decarbonization when free allocation of permits is phased out. This is due to happen over eight years, between 2026 and 2034, with the implementation of the Carbon Border Adjustment Mechanism (CBAM). If the phase-out proceeds on schedule, it could make coal-fired production of steel, one of the EU's top-emitting sectors, uncompetitive with greener options by 2030. Low-carbon processes for cement will remain more expensive until 2050. While there is less concrete policy for carbon capture and storage (CCS), there are signs that mandates for CO2 storage could spur EU members to create subsidies similar to the US's 45Q tax credit.

### Circular economy

The three EU member states in this quartile and the bloc as a whole are also leaders for circular economy policy, with an established history of waste-reduction measures such as extended producer responsibility (EPR) schemes that force companies generating waste to pay for its recycling upfront. France jumps four places in the ranking this year, pioneering substantial circular economy measures including its Anti-Waste Law for a Circular Economy and rules on packaging information for consumers. It aims to phase out single-use plastic packaging by 2040, eliminate waste and encourage reuse, and it has an ambitious new law banning plastic packaging on most fruit and vegetables.

### Agriculture

The top four G-20 members retain their position for low-carbon agriculture policy. However, Germany and France see their score decrease this year, while the EU as a whole and Italy, which remains in ninth place, fail to improve their performance.

Taking a combined carrot-and-stick approach to policymaking, the EU member states are starting to see the impact.

Carbon pricing will only become an effective driver of industrial decarbonization when free allocation of permits is phased out.

France jumps four places in the ranking this year, pioneering substantial circular economy measures.

On paper, these governments have implemented more dedicated policies to promote low-carbon agriculture, especially through the latest phase of the EU's Common Agricultural Policy, which began in 2023. Sustainable solutions garner a larger share of overall agricultural support compared with other G-20 economies, and the EU member states also have some of the most stringent low-carbon agriculture regulations.

France and Germany decrease their score for agriculture, principally due to prolonged policy uncertainty and weakened regulations.

However, these G-20 members have weakened the impact of these measures considerably in the last year by increasing uncertainty and, in some cases, backtracking on targets and regulations.

### The UK

The UK rounds out the top five, keeping its total score steady from last year at 60%. Its biggest increase is 5 percentage points for clean power: the UK's emissions-trading scheme has the second-highest prices in the G-20, and the auction program has been mostly effective at procuring renewables capacity. As a result, clean technologies provided 56% of power generation in 2022. Its policy for developing new grid-service products and other incentives have enabled battery storage to grow at the gigawatt scale.

The UK also boosts its score for low-carbon fuels and CCUS, with a potential \$3.9 billion in subsidies available for clean hydrogen. Its hydrogen (H<sub>2</sub>) CfD program is underway, and it is drafting laws to regulate H<sub>2</sub> transport and storage infrastructure, together with a blending mandate for sustainable aviation fuel. The government increased the CCUS budget and made progress on its hub strategy.

The UK loses 4 percentage points for road transport policy. A key factor was the government's announcement in September 2023 that it was pushing back the deadline of its phase-out target for new ICE vehicle sales by five years, to 2035. While anticipated technology cost declines suggest that the delay will not have a substantive impact on EV sales, such abrupt changes undermine automakers' and consumers' confidence. However, the UK scores points for the Zero-Emission Vehicle Mandate, which puts annual targets on manufacturers' sales.

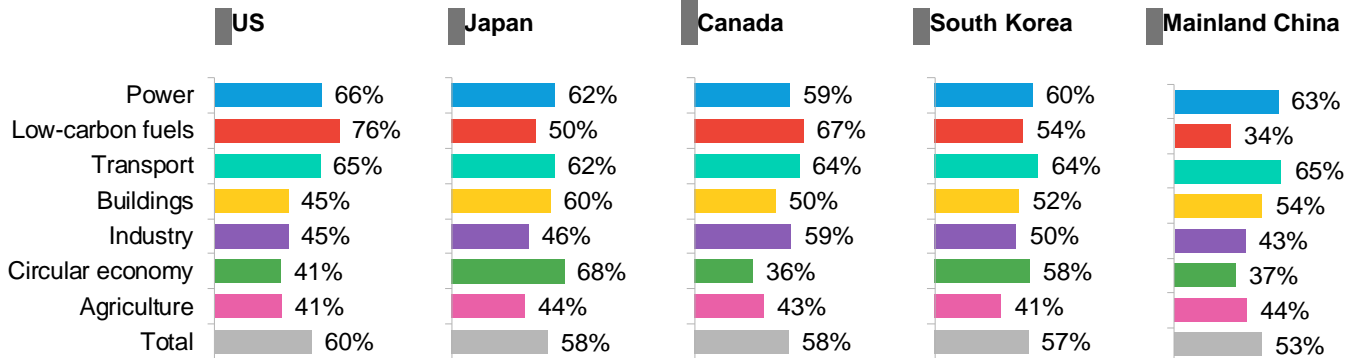
The UK loses points for policies targeted at transport, buildings and agriculture, largely for weakening target deadlines and regulations.

Its score for buildings rises 2 percentage points: the government increased funding, and greenhouse gas emissions have declined. However, the UK still lags other European markets on heat-pump adoption due to insufficient funding, low consumer awareness and a limited base of qualified installations. The market also loses points for pushing back the date of both boiler bans and enforcement of more restrictive conditions on energy performance certificates. These developments exacerbate the already elevated levels of policy uncertainty, after several years of unexpected changes and cutbacks to low-carbon heat support.

The UK loses 2 percentage points on agriculture policy. Like the EU member states, on paper, the UK has significant support to promote low-carbon agriculture, predominantly through the Environmental Land Management (ELM) schemes. The government has also taken steps to improve these programs in the last year, with new and increased payments. However, the ELM schemes have been criticized for continuing changes and delays. This has increased uncertainty in the market, prompting concerns that the new support would be scrapped and deterring farmers from signing up.

2.2. Quartile 2

Figure 12: Quartile 2 – 2024 scores



Source: BloombergNEF. Note: Each member’s total score is weighted by each sector’s share of the member’s greenhouse gas emissions. Scores for Canada and the US include federal and state- or province-level policies.

Unlike other G-20 members, the US achieves its highest score for policies to promote low-carbon fuels and CCUS, although delayed guidance has hindered companies from taking final investment decisions on projects.

US

Unlike other G-20 members, the US achieves its highest score for policies to promote low-carbon fuels and CCUS. A key reason has been the 2022 Inflation Reduction Act (IRA), which included hundreds of billions of dollars for the energy sector. Due to its new tax credit for clean hydrogen and other funding, the US ranks top globally for potential subsidies for H2 projects. Long a world leader in biofuel markets— thanks to both the federal Renewable Fuel Standard and state-level policies – the US is also taking steps to promote biofuels produced from non-crop or waste feedstocks, including a new tax credit for sustainable aviation fuel. In addition, the US has strengthened its position for CCUS in the last year, building off the momentum from the 45Q tax credits under the IRA.

However, consumers and industry spent much of the last year waiting for the final rules on these policies to be issued. These delays have prevented projects from making announcements and reaching final investment decisions. The EV sector has also been affected, as the tough new rules that were released last year could reduce the number of automakers that can claim the EV tax credit. As a result, the US only saw a 50% increase in EV sales – 1 percentage point higher than the 2022 growth rate. With a 9.4% EV share of sales in 2023, the US remains well behind the leading markets. Buildout of public charging connectors has also been slow.

In the power sector, renewables and energy storage remain heavily subsidized through tax credits, which helped the US increase renewables capacity by 41% over 2018-2022. The US also cut coal-fired generating capacity by 17% over the same period. One of the biggest barriers to renewables deployment is the complex and lengthy processes for securing permits and grid access, together with trade barriers for solar equipment.

Some policies tend to be set at the state or even city level, resulting in a patchwork. States in the northeast (such as New York and Rhode Island) and on the West Coast (like California) tend to have the most circular –economy support, especially bans on single-use plastics, extended producer responsibility schemes and recycling regulations. Energy-efficiency policies for buildings are also often rolled out at the state level, resulting in significant differences in the enforcement of energy performance standards and bans on fossil-fuel boilers. There is some federal support: for example, the Clean Energy Tax Credit for Consumers covers 30% of the purchase cost of heat

pumps and has enabled heat pumps to become even more attractive. Even without subsidies, heat pumps are already cheaper over their lifetime than gas and oil boilers in many states and on average across the US. That said, high upfront costs are still a barrier.

In contrast, the US falls six places in the G-20 ranking for agriculture policy. In general, it lacks support mechanisms promoting sustainable practices and technologies, although the IRA has increased available funding for climate mitigation projects. The sector remains on shaky ground until the next Farm Bill is passed after it had to be extended in 2023. The US also loses points for lack of progress on reducing fertilizer use and increasing the share of agriculture energy use from fossil fuels.

## Japan

Japan's top score is for circular economy. Like South Korea, Japan charges households for the volume and type of waste, and it also introduced a new regulation in 2023 spurring companies to transition toward a more circular business model. Higher recycling and recovery rates set these two markets apart from the other members of the G-20, thanks to long-running programs of public education and widely available recycling infrastructure. As a result, Japan further reduced municipal solid waste over 2017-2021 and has the lowest per-capita waste volumes of the G-7.

While Japan's power score is its second-highest, the score has fallen 3 percentage points this year, mainly because renewables build has slowed.

While Japan's power score is its second-highest, the score has fallen 3 percentage points this year, mainly because renewables build has slowed since the solar feed-in tariff boom. It has made progress on procuring new offshore wind capacity through its auction program and implementing support for energy storage projects. That said, Japan and Turkey are the only Annex I parties with coal-power projects planned. Japan also launched its first national carbon market in April 2023, but it will only implement mandatory participation in a less-than-ambitious 10 years. Its existing carbon tax remains too low to be a significant decarbonization driver.

In transport, EV sales rose 55% in 2023 but only accounted for 3.8% of all passenger vehicle sales, compared with 18% at the global level. It also lags behind on public charging connector installations. However, Japan's long-running subsidy program helped it achieved the most per-capita heat pump sales in 2023 out of the G-20, and the second-highest number of heat pump sales by absolute volume. Taking account of government subsidies, heat pumps are now cheaper across a lifetime than gas heating. As a result, Japan continues to cut energy consumption and use of fossil fuels for buildings.

Japan's hydrogen targets appear unfeasible without more significant support.

Japan moved its target to develop green steelmaking to 2040 from 2045 and doubled the subsidies available to \$3 billion. Approved in 2023, its Green Transformation plan contains measures to increase energy efficiency and aims to foster supply chains for hydrogen, which could benefit steelmakers. But Japan loses the most points out of the G-20 for policies to promote low-carbon fuels and CCUS. It did make some progress, issuing an updated hydrogen strategy in 2023 and offering the third-most funding for H2 projects, after the US and the EU. On CCUS, a 2050 roadmap was released in 2023, and legislators are considering a bill that would for the first time determine operators' rights and regulatory framework. However, its hydrogen targets appear unfeasible without more significant support, and it has a relatively sparse pipeline for new hydrogen production capacity. In addition, biofuels and biogas production growth has faltered in recent years, and a flat rate for the government's ethanol blending mandate for the next five years is unlikely to give this sector the push it needs.

Canada is one of the few G-20 members to be taking concrete steps toward ending fossil-fuel support from government and state-owned companies.

Its highest score is for low-carbon fuels and CCUS, with proposed funding and planned investment tax credits.

Last year South Korea became the second economy in the world to release a strategy for plant-based food and it issued a plan to cut livestock emissions.

## Canada

Canada is one of the few G-20 members to be taking concrete steps toward ending fossil-fuel support from government and state-owned companies, including releasing guidelines on how to define inefficient fossil-fuel subsidies. This should help prevent investment in long-lived emissions-intensive assets and over-production and -consumption of fossil fuels.

The market relies on federal and province-level policies to drive power-system decarbonization, including carbon taxes and markets. The federal CO<sub>2</sub> price is the third-highest in the G-20, after the EU and the UK, although some exemptions for oil-fired heating were granted last year. In addition, industries enjoy generous emission baselines.

In any case, abundant hydro resources have helped Canada achieve a significant share of clean technologies in the generation mix – at 81% in 2022. But it also means that Canada only raised renewables capacity (excluding hydropower plants over 50 megawatts) by 20% between 2018 and 2020 – less than the global average increase. Other factors were the renewables moratorium and regulatory review in Canada's biggest-emitting province, Alberta. The market increased installed energy storage capacity by 70% over 2018-2022 and cut coal-fired capacity by 43% over the same period, ahead of its phase-out deadline of 2030. The federal government has also rolled out funding to help some provinces meet that deadline.

Its highest score is for low-carbon fuels and CCUS: the government has proposed significant funding for clean hydrogen projects, and the forthcoming investment tax credits for H<sub>2</sub> and CCUS are due to be launched in the spring 2024 budget. The Clean Fuel Regulation began in 2023, complementing the new schemes in Quebec and British Columbia.

Canada also substantially improves its score for policies to decarbonize buildings, posting a seven-percentage-point increase, thanks to developments at the federal and local levels. Some provinces and territories, such as Quebec and Alberta, are implementing tougher buildings performance standards and boiler bans. While such a fragmented approach is less efficient than a federal regulation, local measures are complemented by increased federal support for heat pumps. In addition, Canada as a whole cut buildings energy consumption by 1.1% over 2017-2021 and reduced use of fossil fuels in the sector by 2.4% over the same period. However, it will need to continue to improve policy support to further reduce its per-capita energy use, which is the highest across the G-20 economies.

## South Korea

South Korea is the second-ranking G-20 member in Asia, achieving its highest scores on power and transport policy. It has implemented some improvements to its carbon market, though most participants still receive a sizeable share of permits for free. South Korea also has a new energy storage target, alongside other subsidies, though growth in installations has been modest. Coal remains a key component of its power mix, but build of new capacity has slowed.

In addition, South Korea's green steel plan involves replacing blast furnaces with hydrogen-based production, aligning with the government's aggressive H<sub>2</sub> strategy. It has an increasingly ambitious biofuel blending mandate and is running tests for adopting marine biofuel and sustainable aviation fuel. Policymakers are also discussing a new CCUS bill and proposed a CO<sub>2</sub> storage goal for 2030.

In agriculture, last year South Korea became the second economy in the world to release a strategy to foster the development of the plant-based food industry, and in January 2024 it issued a plan to cut livestock emissions. Having reduced financial incentives in the last year, the



government will likely have to ramp up support to meet its targets. One source of funding would come from reducing its substantial environmentally harmful agriculture subsidies.

### Mainland China

Mainland China remains a world leader for electrified transport deployment thanks to supply-side mandates, other incentives and improving economics.

Mainland China performs best on transport policy, with power a close second. The market remains a world leader for electrified transport deployment, with electric vehicles accounting for 27% of passenger car sales in 2023 – the biggest share of all the G-20 members. Economy-wide purchase subsidies have ended principally because EVs are competitive with vehicles with an internal combustion engine. Instead of restrictions on ICE vehicles, tax incentives and supply-side mandates continue to drive EV sales. In addition, policymakers are focusing on charging infrastructure and testing vehicle-to-grid applications.

Mainland China remains an attractive market for renewables deployment, retaining its top spot in the global ranking for wind and solar build in 2023. It also achieved its energy storage target two years early and is making progress on liberalizing its power markets. However, it loses some points for unambitious renewable portfolio standards and low carbon prices, which provide little drive toward decarbonization. Covering only the power sector, mainland China’s CO2 market is the biggest in terms of greenhouse gas emissions covered, and could well grow if policymakers expand the program to some industrial sectors, as planned.

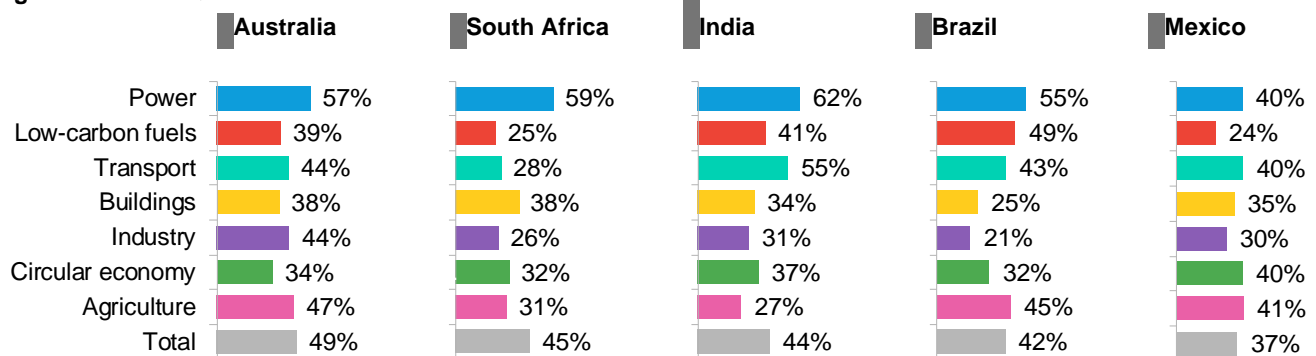
Mainland China sees its biggest increase in score for industry, with an expansive set of targets and plans.

Mainland China sees its biggest increase in score for industry, with an expansive set of targets and plans aimed at the heaviest-emitting sectors, like steel, aluminum and petrochemicals. The market also made progress on reducing industrial energy use and emissions relative to output. With regard to low-carbon fuels, policymakers issued new subsidies for hydrogen production and electrolyzer manufacturing, helping the market maintain its sizeable share of global operational and planned H2 production capacity. It is also the largest consumer of biogas, predominantly for residential applications like cooking. However, the latest strategy is to promote biogas for producing electricity and gas to inject into the grid. Policymakers have proposed bold energy-efficiency regulations for heating and cooling systems in buildings. Mainland China has also reduced buildings emissions and use of fossil fuels. It has relatively little policy support to promote a circular economy, and municipal solid waste generation and waste emissions are on the rise.

## 2.3. Quartile 3

Figure 13:

Quartile 3 - 2024 scores



Source: BloombergNEF. Note: Each member’s total score is weighted by each sector’s share of the member’s greenhouse gas emissions.

Australia's highest score was again for power but it is starting to improve policy support for road transport, industry and agriculture.

## Australia

Australia's highest-scoring sector remains power: it has continued to build renewable generating capacity, achieving a 126% increase over 2018-2022. Federal and state-level incentives have enabled Australia to more than double energy storage and pumped hydro capacity between 2020 and 2022. That said, renewables and nuclear remain a relatively small share of total generation compared with other OECD members in the G-20, and Australia has relatively little flexible capacity relative to its total for wind and solar. Australia achieved the third-biggest increase out of the G-20 for EV sales in 2023, helping it to achieve the biggest rise in its transport policy score – up 14 percentage points. However, it lags the leading markets for its EV share of all passenger car sales, primarily due to a lack of federal support. The government is making progress on implementing a crediting scheme for automakers known as the New Vehicle Efficiency Standard.

Australia also performs better on industry policy, with a key reason being the announced reforms to the compliance carbon market for heavy emitters. In particular, the government intends to tighten the emissions baselines of the Safeguard Mechanism, to get industry to stay on track to reach net zero by 2050. Historically lax baselines have driven little decarbonization. These reforms should also increase demand from Australia's domestic offset program, which the government is seeking to make more robust.

The market climbs the more places in the agriculture policy ranking than any other G-20 member, to reach fifth position. It has one of the most comprehensive suites of funding programs targeted at low-carbon agriculture, and – unlike some G-20 economies – it has dedicated financial incentives to cut emissions from livestock, which accounted for 63% of total agricultural emissions. However, it lacks specific mandates on low-carbon agriculture and has yet to release its plan to reach net zero in the agriculture and land sector. In addition, emission intensity for meat production continues to rise, with beef alone climbing 20% over 2019-2021 based on data from the Food and Agriculture Organization.

## South Africa

South Africa achieves its biggest increase in score – 10 percentage points – for its power-sector policies. Its main mechanism for procuring clean power capacity remains the auction program, with the seventh round for 5 gigawatts (GW) launched in December 2023. This scheme has enabled the market to more than double renewable generating capacity over 2018-2022. Small-scale renewables deployment is also on the rise, after regulatory changes allowed private generators to add their own solar for local self-consumption, or sell it through the grid. Tax breaks for small-scale solar installations are also available. These policies, and enthusiasm among South Africa's business owners and residential power users for power without blackouts, is driving adoption of residential and commercial solar.

South Africa increased its score for power policies after regulatory changes and ongoing load shedding spurred a surge in small-scale solar adoption.

This is also increasing deployment of flexible capacity to mitigate increasing variable power generation. In 2023, South Africa held an auction round for 513 megawatts (MW) of battery storage. The next two rounds, for 615MW each, are planned. This will help the government to realize the goals of its latest energy strategy, known as the Integrated Resource Plan, which was released in January 2024. This document expects wind and solar capacity to reach 27GW by 2030 and 53GW by 2040 – up from 11GW in 2022. These figures are low compared with BNEF's forecasts, especially on the solar side, as the Plan simply doubles the previous target for new gas capacity. The Plan also envisages battery storage capacity will reach 4GW by 2030 and 10GW by 2040.

More than half of South Africa's greenhouse gas emissions are produced by the power system, making the electricity sector a priority for decarbonization. However, the biggest challenge will be how to accelerate a just transition away from coal, which accounted for 83% of power generation in 2022.

## India

With a 36-percentage point gap between its highest- and lowest-scoring sectors, India has made significant progress in some areas like power but lags considerably in others such as industry and agriculture.

With a 36-percentage point gap between its highest- and lowest-scoring sectors, India has made significant progress in some areas but lags considerably in others. The score for clean power has increased by 3 percentage points, making it India's highest-scoring sector. The market has run successful rounds of clean energy auctions, which now include innovative "round-the-clock" projects with energy storage. The share of clean electricity in India's generation mix rose to 21.9% in 2022, and additions of new coal-fired generating capacity have slowed. However, India loses points for policy predictability, as it has a history of not always implementing policies as stringently as planned and announcing unexpected changes. Recent examples have included announcements relating to the non-tariff solar module import barrier in the form of the Approved List of Models and Manufacturers.

The market's biggest increase in score is for low-carbon fuels and CCUS. It has introduced more support for clean hydrogen, holding the first auctions for green H<sub>2</sub> production and electrolyzer manufacturing. It is also one of the few G-20 markets to implement measures to build domestic demand for green fuels. While it has little support for CCUS, India remains one of the world's biggest biogas markets, and the government introduced a blending mandate in 2023 for biogas in compressed natural gas.

India also performs better on transport policies: India doubled EV sales in 2023, partly due to government subsidies. As a result, electric passenger cars reached 2.3% of all vehicle sales – up from 1.7% in 2022. It has also seen growth in public charging deployment and the government continues to promote domestic EV manufacturing through the \$3.5 billion Production Linked Incentive. India is making progress on implementing a carbon market, which will first be voluntary. The government plans to set emissions reduction targets for some industrial sectors before the carbon market becomes mandatory in 2025. India's ban on single-use plastics pushes it up six places in the G-20 ranking for circular economy policy.

## Brazil

Brazil's highest score is for power: it has the cleanest generation mix of the G-20 due to its large hydropower and wind capacity and, more recently, increased solar build through the generous net metering program. Its sizeable hydropower resources also reduce the need for energy storage installations and hold down its emissions intensity for sectors like aluminum.

However, its biggest increase in score is for transport policy: tax incentives, local support and consumer behavior enabled Brazil to achieve the second-biggest increase in EV sales in 2023 out of the G-20. The forthcoming electrification mobility plan should reduce some of the uncertainty around the government's strategy for EVs versus other options, notably biofuels. Brazil remains a world leader for on-road biofuel production and consumption, with the highest ethanol blend in gasoline globally. The market is uniquely able to consume pure or high blends of ethanol, as its passenger vehicle fleet is predominantly flex-fuel vehicles, promoted by the government through tax incentives for the past two decades .

Brazil achieves its highest place in the G-20 ranking for agriculture policy. Since Luiz Inácio Lula da Silva became president in 2023, the government has focused more on sustainability and

Tax incentives, local support and consumer behavior enabled Brazil to achieve the second-biggest increase in EV sales in 2023 out of the G-20.

environmental protection in the sector, as well as on supporting small-scale producers. The government has rolled out more funding for its low-carbon agriculture program, while abundant biomass feedstock has meant that Brazil uses relatively low volumes of fossil fuels to produce energy for the sector. It seems unlikely, however, that agriculture will be included in Brazil's forthcoming regulated carbon market, with a key barrier being emissions data.

**Mexico**

Mexico has some low-carbon policy support in each sector, but it is either insufficient or ineffective at driving decarbonization.

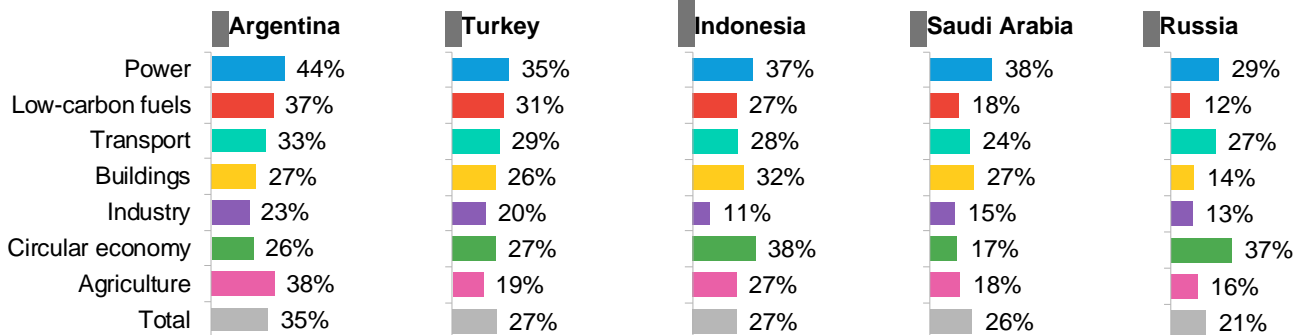
Mexico has some low-carbon policy support in each sector, but it is either insufficient or ineffective at driving decarbonization. The administration of President Andres Manuel Lopez Obrador has focused on fossil fuels and increasing state control of the energy sector. While renewable generating capacity more than doubled over 2018-2022, new project development activity has stalled due to elevated risk and rising regulatory and bureaucratic challenges. In addition to an increasing number of regional carbon taxes, Mexico has a federal CO2 tax, although concessions to companies and a low rate limit its effectiveness. Mexico also has a pilot emissions-trading market, which was due to become fully operational in 2023, although this start date was pushed back by at least a year.

The government released a National Electric Mobility Strategy in 2023, containing bold EV targets. Together with a 94% increase in electric passenger car sales, this helps Mexico raise its transport policy score by 7 percentage points. The biggest barrier for the government's new targets will be insufficient subsidies to rival competition from cheaper used cars imported from the US, as well as limited charging infrastructure.

Mexico has relatively few funding programs to promote low-carbon agriculture technologies and practices. The flagship 'Sowing Life' scheme provides financial and other support to small-scale farmers who undertake agroforestry projects, although this has been criticized for encouraging deforestation. Still, Mexico has reduced emissions released per unit of meat production and fertilizer use.

**2.4. Quartile 4**

Figure 14: Quartile 4 – 2024 scores



Source: BloombergNEF. Note: Each member's total score is weighted by each sector's share of the member's greenhouse gas emissions.

Like the other Latin American economies in the G-20, Argentina's highest score was for power policy.

## Argentina

Like the other Latin American economies in the G-20, Argentina's highest score was for power policy. Renewable generating capacity expanded 1.5 times between 2018 and 2022, helping clean power technologies account for 41% of the electricity mix in the last year of the period. However, the economic crisis and lack of transmission infrastructure have hindered new projects from obtaining financing to the extent that no new wind capacity and just four small new solar assets came online in 2023. The lack of transmission infrastructure has been another barrier to renewables deployment.

As for other sectors, Argentina has no direct incentives for EVs, which has constrained deployment. Electric passenger vehicles accounted for well under 1% of all sales. The government published a new efficiency plan that includes an effort to unify energy efficiency and performance labeling, together with new targets for smart-meter deployment. Argentina already has a relatively low rate of buildings energy consumption per capita. It has little unified circular economy policy, as this tends to be devolved to local governments. This is proving less than effective in practice, as municipal solid waste generation is on the rise.

## Indonesia

Indonesia improves its score for power policy by 2 percentage points this year. The government launched a regulated emissions-trading scheme in 2023 covering coal power plants over a certain size. It also published the investment and policy plan for Indonesia's Just Energy Transition Partnership, including guidelines for power-sector emissions and renewables deployment. The economy still has the biggest coal-power pipeline out of the G-20, having increased such capacity by a third over 2018-2022.

Indonesia achieved its biggest rise in score for low-carbon fuels and CCUS, in particular a bold biofuel blending mandate and new CCUS regulations.

Indonesia achieved its biggest rise in score for low-carbon fuels and CCUS – jumping 4 percentage points from last year. The government finalized its hydrogen strategy in 2023, though it did not include information on concrete incentives, and the targets are unlikely to be feasible. However it has made more progress on CCUS and biofuels, and it now has one of the highest biodiesel blends in the world. The blend rate rose in August 2023, and further planned increases should be achievable. Indonesia also became one of the first economies in Asia to introduce CCUS regulations – its first project began construction in November 2023 – and it is finalizing a regulation to allow cross-border carbon storage as well as enabling industries outside of oil and gas to store carbon.

Despite the sector's sizeable contribution to Indonesia's emissions, there is relatively little policy directed at promoting low-carbon agriculture.

## Turkey

Turkey has relatively little policy support to achieve its new, more ambitious emissions target for 2030..

Turkey submitted an updated NDC in 2023, including a bolder 2030 emissions target. It also pledged in 2021 to reach net zero by 2053. However, it has relatively little low-carbon policy support. Instead, the government has tended to prioritize energy independence, for example by seeking to exploit domestic fossil-fuel resources (mainly coal). As a result, state-owned enterprises increased their expenditure on fossil fuels 15 times between 2017 and 2021. Most of this investment was directed at coal, specifically mining companies and the state electricity utility. In 2021, Turkey provided four times as much support to fossil fuels as it did in 2017 – the second-largest increase among the G-20 economies, after Mexico.

Turkey loses 6 percentage points for its policies to decarbonize the power system, which accounts for the biggest (28%) share of emissions. It has procured 7.7GW of renewables capacity through auctions, but the last round was in 2022. Currently the main driver for solar is the commercial rooftop segment, thanks to a net-metering scheme and an abundance of large rooftops. As a result, total renewables build has slowed, and it is one of the few OECD members in the G-20 with plans to add more coal-fired capacity.

With its planned carbon market, Turkey hopes to mitigate the impact of the EU's new carbon border tariff.

Turkey has been discussing a carbon-pricing scheme for some time and has accelerated discussions with a view to introducing a policy that could reduce its exposure to the EU's Carbon Border Adjustment Mechanism. In line with its latest NDC, Turkey intends to launch a compliance emissions-trading program this or next year with a pilot phase, which could last until 2027. In contrast to most existing carbon markets, the Turkish government intends to increase the emissions cap each year until 2038, when it plans to reach peak economy-wide emissions.

### Saudi Arabia

Saudi Arabia continues to provide considerable public support for coal, oil, gas and fossil-fuel power. Its 2021 total – \$83 billion – is the second-highest out of the G-20 (after mainland China), but this figure is likely an underestimate due to data availability issues. As a result, it provides the most fossil-fuel support per capita – \$2,309 in 2021. While half of this figure comprises subsidies on retail energy prices, a further 47% is composed of investment by state-owned oil and gas companies.

Having seen emissions climb by a fifth in the decade to 2020, Saudi Arabia will need to considerably improve policy support to realize its net-zero target for 2060.

Having seen emissions climb by a fifth in the decade to 2020, Saudi Arabia will need to considerably improve policy support to realize its net-zero target for 2060. This target only covers greenhouse gas released domestically, meaning it can meet this goal and still continue exporting oil and gas. Saudi Arabia's highest score is for power policy, largely thanks to its renewables auction program, which has procured 3.8GW of capacity. Nonetheless, less than 1% of electricity was generated from clean technologies in 2022. Its target for 40GW of solar by 2030 could be feasible, given the potential for the rooftop segment and the government's ability to drive large-scale tenders.

Saudi Arabia shows no sign of introducing a mandatory carbon price, but it is taking an increasingly active role in the voluntary market. It has little clean energy support outside the power sector. In transport, it has an EV deployment target and relatively lax fuel economy standards. It has an energy efficiency plan and energy performance standards for new build. A hydrogen strategy is in the works. In particular, Saudi lacks low-carbon incentives targeted at industry, which accounts for the second-biggest share of the market's emissions (28% in 2020).

### Russia

Russia received the lowest score out of the G-20 for its low-carbon policy, placing in the bottom two members for all sectors except circular economy.

Russia received the lowest score out of the G-20 for its low-carbon policy, placing in the bottom two members for all sectors except circular economy. Like others in the last quartile for total score, Russia provides considerable public fossil-fuel support, which rose 25% over 2017-2021. This mainly comprises tax breaks for oil and gas companies and expenditure by state-owned enterprises.

Russia's biggest decrease in score – 4 percentage points – was for policies targeted at the power system, which is responsible for 35% of the market's emissions. On paper, it has a renewables auction program, but the last round was held in 2021. In total, 1.8GW of new renewables generating capacity came online over 2021-22, excluding hydropower plants over 50MW. Over the same period, Russia added 10GW of new oil- and gas-fired power plants.

Russia has CCUS and hydrogen strategies, and in October 2023 it announced funding for projects to develop H2 production, transport or storage technologies. Its highest score was for circular economy policy. It has introduced some measures like an extended producer responsibility scheme and packaging targets. The government has also expressed an intention to ban single-use plastic products. However, these measures tend to be unambitious, and enforcement is patchy.

Otherwise it has few low-carbon incentives except targets. Even though buildings account for around 12% of Russia's emissions, the government has introduced only weak energy efficiency plans and standards. As a result, it increased energy consumption for buildings by 15% over 2017-2021 and has the third-highest per-capita total, after Canada and the US.

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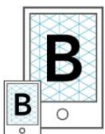
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