

The race to net zero

The role of carbon pricing in global decarbonization

Natalia Luna

Senior Thematic Investment Analyst
Responsible Investment

Roger Wilkinson

Head of EMEA Equity and
Responsible Investment Research

Can the race to “net-zero” emissions help us respond to climate change in a meaningful way? We examine how the race got started, where things stand now, and the role of carbon pricing in the process.

The starting line: The Paris Agreement

In 2015, nearly 200 nations gathered at COP21 in Paris to discuss how all nations could work together to reduce global greenhouse gas (GHG) emissions. They agreed on a goal to limit global warming to below 2 degrees Celsius — preferably to 1.5 degrees — compared to pre-industrial levels. A subsequent in-depth report by the Intergovernmental Panel on Climate Change (IPCC) concluded that a 1.5-degree cap was needed to avoid the most catastrophic effects of climate change. Achieving this goal would require reaching net-zero GHG emissions by 2050. The agreement, which was formally signed by 195 nations (including the U.S. and China) in 2016, came to be known as the Paris Agreement.

What is “net zero”?

Net zero refers to the balance between the greenhouse gases we produce and the greenhouse gases we remove from the atmosphere. We reach net zero when the amount we add is equal to or less than the amount we remove or mitigate.

Unfortunately, the goal set by the Paris Agreement started to look very unrealistic when President Trump withdrew the U.S. from the Agreement in 2017. In addition, China, perhaps the largest and fastest-growing economy in the world, had still not formally committed goals to lowering its emissions. Since China and the U.S. are responsible for about 45% of all global CO₂ emissions, reaching the 2050 goal had started to look highly unlikely. In 2020, all this began to change. In September, China committed to reaching net-zero emissions before 2060. And in November, then President-elect Joe Biden recommitted the U.S. to reaching net-zero by 2050. More recently, China also launched a national emissions trading system that creates the world’s largest carbon market while doubling the share of global CO₂ emissions covered under such programs. As a result of these developments, countries representing 70% of global CO₂ emissions are now committed to net zero at some time around the middle of this century.

New momentum

With the U.N. Global Summit (COP26) scheduled for November, 2021 is set to be a year of further commitments by nations to lower carbon emissions. At the Summit, nations will review their progress toward interim CO₂ reduction targets in 2030, which is less than a decade away. In addition, massive green spending plans have already been developed by the U.S. and European governments, which are designed to accelerate the decarbonization process. These include the proposed \$2.4 trillion infrastructure plan in the U.S. and the €2 trillion Green Deal in the EU. With interim targets in place and national governments committing resources to meeting these targets, the race to net-zero 2050 is no longer a distant dream. The responsibilities and impacts are here today.

What will it take to achieve net zero?

Achieving net zero will require immediate and coordinated global action. More specifically, according to a recent report by Morgan Stanley, worldwide emissions must be reduced by 23 gigatons (GtCO₂) by 2030 — fully half of today's levels in less than 10 years. Looking further out to 2050, emissions must then be cut by roughly 90% of their current levels. The rest of the reduction will be achieved through carbon offsets.

Region/country	Global emissions	Net-zero target year	Interim emissions reduction targets			
			Target	Year	Baseline	Implied annual change*
U.K.	1%	2050	-78%	2035	1990	-5.5%
EU	8%	2050	-55%	2030	1990	-4.0%
U.S.	15%	2050	-50%	2030	2005	-4.8%
Japan	3%	2050	-46%	2030	2013	-4.0%
Canada	2%	2050	-40%	2030	2005	-4.5%
China	30%	2060	Peak emissions	2030	2005	NA
India	7%	NA	-33% (intensity)	2030	2005	NA

Source: Columbia Threadneedle Investments, Morgan Stanley.

*Morgan Stanley estimates. Implied annual change from 2018–2030.

These goals imply annual target emission reductions of between 4% and 5%, starting right now. To put this in context, during the global COVID lockdown in 2020, global CO₂ emissions fell by roughly 5.5%. Therefore, to achieve the long-term target, annual reductions would need to continue at that level every year, with worldwide economies presumably operating at full speed.

Achieving net zero targets will require radical decarbonization across the economy, particularly in the industries that currently generate the most global CO2 emissions.

Source	Global CO2 emissions
Power	38%
Transport	24%
Industry	23%
Buildings	9%

Source: International Energy Agency (IEA), "Energy Technology Perspectives 2020".

The International Energy Agency (IEA) [Net Zero Roadmap](#) estimates that these industries will each be expected to reduce their emissions by 90% by 2050. Of these, decarbonizing the power sector is the obvious low-hanging fruit and will be the first one to decarbonize — but even there, dramatic and consistent cuts in emissions will transform business operations, investment and long-term planning.

Four forces driving us toward net zero

At Columbia Threadneedle, we use a consistent framework for understanding and evaluating progress toward mitigating climate change, which is based on a comprehensive analysis of the four main forces that are driving the world to achieve net zero.

The primary force is countries setting individual climate targets and policies. But consumers also play a key role. New expectations and changes in behavior are creating higher demand for sustainable products produced by companies with sustainable business and operating models. This is also influencing the corporate world, which is increasingly making net-zero pledges. At the same time, the investment industry is exploring ways to decarbonize investment portfolios.



Taken together, these four forces are a powerful influence and play a critical role in the transition to net zero.

Where are we on the path to decarbonization?

Let's take a closer look at how we apply this framework to understanding the pathways to decarbonization.

► Countries

The progress to date in reducing carbon emissions differs considerably by country, which will influence each nation's decarbonization path in terms of speed, efforts and policies.

In the EU and U.K., for example, CO₂ emissions have fallen between 20% and 40% since hitting their peak in 1990. In the U.S., emissions have fallen 13% since hitting their peak in 2005. So, while the EU and U.K. have made significant progress toward reducing CO₂ emissions, the U.S. and China will require larger efforts and faster decarbonizing of their economies to achieve their carbon-reduction goals.

► Corporations and the investment industry

There is growing momentum for carbon reduction across all industries as more and more corporations set net-zero targets and make net-zero pledges, albeit with varying levels of urgency, aggressiveness and credibility.

Governments, investors and consumers are bringing pressure on companies to make meaningful commitments. For example, governments are exerting pressure through carbon taxing and carbon pricing schemes — and investment funds may start divesting holdings in the worst carbon emitters in both absolute and relative terms. And they are beginning to act — the Net Zero Asset Managers Initiative has 128 signatories with \$43 trillion in assets under management, as of July 31, 2021, all committed to investing principles aligned with net-zero goals.

► Consumers

Climate awareness is also growing among the buying public. Many are deciding not to buy products and services with large carbon footprints. According to a recent survey conducted by Yale University, more than half of Americans support taking action on climate change. The IEA estimates that behavior changes (in modes of transport, eating habits, etc.) will be an integral part of the effort to reach net zero, contributing to a decline of up to 6% of global emissions by 2030.

Carbon pricing: An essential tool to achieving net zero

Changes in policy and business and consumer behavior, however, won't be enough on their own. Carbon pricing is viewed as an essential tool in decarbonization and a key component in achieving CO₂ emission reductions in line with the Paris Agreement goals. Carbon pricing is currently being applied in more countries around the world, and carbon prices are rising. Despite that progress, current prices remain too low to reach decarbonization in line with the Paris Agreement.

In our view, carbon compliance markets are the most effective framework for incentivizing — and realizing — emissions reduction.

There are three avenues to price carbon: carbon taxes, carbon compliance markets, and voluntary carbon markets or offsets. Carbon taxes set a direct price on carbon by defining a tax rate based on carbon emissions or carbon content. Carbon compliance markets are based on a cap-and-trade model where total emissions are capped and this cap is reduced over time, pushing for lower emissions. Voluntary carbon offsets are purchased by companies to negate

emissions that are difficult to eliminate. These offsets, however, vary in quality and efficacy, and are not yet considered a rigorous option. In our view, carbon compliance markets are the most effective framework for incentivizing — and realizing — emissions reduction.

The IEA, IMF and World Bank, among others, estimate that a carbon price ranging between \$75 and \$100 per ton of CO₂ is needed to achieve the Paris Agreement's goals. It's expected that regulatory developments will continue to push carbon prices higher and faster, especially in the EU. Higher carbon prices will impact carbon-intensive sectors' profitability as well as help accelerate investments in clean technologies — becoming a financially material issue for investors to consider.

Global carbon markets — fragmented and varying in impact

Currently, there is not a uniform and global carbon market. There are 64 carbon pricing initiatives globally that cover 22% of global CO₂ emissions, the biggest one being the EU Emissions Trading System (ETS). As a result, there is a large disparity in carbon prices worldwide, with the highest prices in the EU (over €55, compared to about €20 a year ago). Regulations to tighten and harmonize carbon markets will be crucial to getting worldwide prices up to where they need to be to help achieve net zero.

The IEA has estimated that \$5 trillion per year investment will be required to decarbonize the most polluted sectors by 2050. Not surprisingly, the most CO₂ intensive sectors — power, transport and heavy industry — are the most exposed to carbon pricing. However, the level of investment, as well as the carbon price deemed as necessary to provide an economic incentive to more sustainable alternatives, differs by sector.

For example, in the power sector, a carbon price between \$25/ton and \$75/ton CO₂, and annual investments around \$2 trillion, are estimated to be needed to effectively decarbonize the sector. The estimated carbon price in the transport sector is between \$50/ton CO₂ and \$100/ton CO₂ for heavy vehicles and between \$115/ton CO₂ and \$300/ton CO₂ for aviation and shipping, with between \$800 billion and \$1 trillion in total investments needed annually for effective decarbonization. And the estimated carbon price in the heavy industry ranges between \$70/ton CO₂ and \$200/ton CO₂, with between \$1 trillion and \$1.5 trillion in investments needed annually to meet decarbonization goals.

These differences stem from the readiness and costs of the technologies required to decarbonize each industry. For example, to decarbonize the power sector, the main option, renewables, is already available, costs have come down and the policy environment is generally supportive. This makes the necessary carbon price to accelerate the power sector's decarbonization process relatively lower than that needed in the heavy industry, where the technologies required to decarbonize the sector — such as carbon capture and storage (CCS) — are not yet commercially available and remain very expensive. Therefore, to push significant investments in decarbonization technologies in the heavy industry, a higher level of carbon prices will be required.

Magnitude of the decarbonization process, from least to most difficult

Sector	Global emissions	Estimated needed carbon price	Estimated investments (per year)	Pathways for decarbonization
Power	38%	<ul style="list-style-type: none"> ▪ \$25-\$75 	<ul style="list-style-type: none"> ▪ \$1.5 trillion-\$2 trillion 	<ul style="list-style-type: none"> ▪ Renewable ▪ Electrification grid ▪ Electricity storage ▪ CCS
Transport	24%	<ul style="list-style-type: none"> ▪ \$50-\$100 (cars, heavy vehicles) ▪ \$115-\$300 (aviation, shipping) 	<ul style="list-style-type: none"> ▪ \$500 billion-\$800 billion 	<ul style="list-style-type: none"> ▪ Electric vehicles ▪ Hydrogen ▪ Biofuels
Heavy industry <ul style="list-style-type: none"> ▪ Steel (8% global emissions) ▪ Cement (7% global emissions) 	23%	<ul style="list-style-type: none"> ▪ \$70-\$200 	<ul style="list-style-type: none"> ▪ \$600 billion-\$900 billion 	<ul style="list-style-type: none"> ▪ Energy material efficiency ▪ Electrification furnace ▪ CCS ▪ Hydrogen

Source: International Renewable Energy Agency (IRENA), "World Energy Transitions Outlook 2021".

The time to act is now

After appearing to stall over the past few years, the race to net-zero 2050 is back on again. This race will impact companies and industries all over the world — beginning today and continuing in earnest over the next few decades.

It will also affect the investment industry as more asset managers commit to net-zero investing and more clients seek to decarbonize their investments. Clients are increasingly making net-zero pledges for 2050, as well as in the interim, and asking us how they can decarbonize their portfolios to achieve these commitments.

The decarbonization of investments will depend on which asset classes are in play, as well as considerations around regional and sector diversification. Now is the time to think about how you can engage with those looking for smart ways to decarbonize their investment portfolios.

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