

# Net-Zero Directives and Drivers

Natalie Cristo

**W**ith climate change at the forefront of the public eye, governments, states, cities, and businesses are stepping up to enact net-zero initiatives. These initiatives come in many shapes and sizes, but merely setting net-zero goals is not enough to achieve net zero. Entities must also implement innovative technologies, policies, and sustainable practices to ensure success.

Although some net-zero goals lack enforceability, existing net-zero programs require significant changes to operations. Companies and governments should establish clear goals and plans for how they will achieve them. Doing so will ensure constituents are aware of their commitment to such goals. Achieving net zero also requires active participation and compliance from all sectors of the economy.

## Why Net Zero?

Earth goes through various geologic cycles that impact its temperatures, such as changes in the eccentricity of its orbital path around the sun, the tilt of its axis, and variations in its obliquity. Changes in temperature caused by earth cycles occur on thousands to million-year time scales. Typically, rapidly changing temperatures such as those currently witnessed occur only after geologic events such as volcanic eruptions or asteroid impacts. Scientists understand that an elevated level of certain gases that trap radiation and heat is causing the planet's atmosphere to warm, coining the term "greenhouse gases" (GHGs).

According to the Intergovernmental Panel on Climate Change (IPCC), elevated GHG emissions contribute to global warming, air pollution, ocean acidification, increased incidence of forest fires, sea level rise, drought, and other natural catastrophes that harm public health, social equity, and the environment. IPCC, Synthesis Report of the IPCC Sixth Assessment Report (AR6), Longer Report (Mar. 2023). GHG

emissions are causing fluctuations in the earth's temperatures at a rate it has never before seen in human history. The current temperature change is human driven, which we know based on isotopic geochemistry and paleoclimatology, where scientists measure stable isotopes in ice and rock core samples and compare the current composition of the earth's atmosphere to periods of warming and cooling throughout the planet's history found in the core samples. See, e.g., NOAA, Nat'l Ctrs. for Env't Info., *Climate Change in the Context of Paleoclimate: Studying the World Before Thermometers Provides a Better Understanding of Future Climate Concerns* (Dec. 5, 2022).

Elevated levels of GHGs including carbon dioxide and methane are caused by human activities, such as the combustion of fossil fuels, and types of agriculture using fertilizer and raising livestock. GHG emissions by economic sector include transportation (27%) (57% light-duty vehicles, 26% medium- and heavy-duty vehicles, and the remaining 17% aircraft, rail, ships, and boats), electricity (25%), industry (24%), agriculture (11%), commercial business (7%), and residential homes (6%). These industries combined are today's most significant contributors to anthropogenic emissions. U.S. Env't Prot. Agency (EPA), Sources of Greenhouse Gas Emissions (based on Total U.S. Greenhouse Gas Emissions by Economic Sector in 2021) (Apr. 28, 2023).

Net zero is the reduction of GHG emissions in combination with the capture of emissions from the atmosphere to create a net-neutral output. In other words, we reach net zero when the amount of GHGs we add to the atmosphere is no more than the amount of GHGs taken away. Net zero is typically calculated based on the full life-cycle analysis of an activity or product, taking into account all emissions from the transportation, materials, and land use required for the activity or product, and then subtracting any documented reductions in those emissions and taking into account any amount of captured carbon

credits purchased. Some governments have tried to restrict the number of GHGs that are released into the atmosphere by imposing emissions limits on different economic sectors. Yet this alone is not enough to prevent elevated earth temperatures and has forced parties to resort to the concept of net zero, where emissions reductions can be coupled with GHG capture and trading.

This article discusses various net-zero initiatives and how those differ, compare, and stand out from others. It also touches on changes necessary to reach net-zero goals. Governments and businesses often fail to properly inform the public about net-zero initiatives that are taking place within their organizations. As of May 2023, 130 countries, 249 cities, and 919 companies have made a net-zero commitment. New Climate Inst., Net Zero Tracker. However, the public is not well informed that these goals are in place, nor are they aware of what needs to happen to meet these goals. Net-zero policies can have far-reaching implications and require a significant overhaul of existing practices and creation of new ones in order for us to reach net zero.

## International Agreements

Net zero initially started as a pledge. Countries, cities, and companies pledged to be “net zero” by reducing a certain amount of their emissions by a certain date. Some of those initial pledges have transformed into mandates. Achieving net zero requires rapid legal and policy changes and will also require many changes to corporate operations and management.

The 1997 Kyoto Protocol laid the initial groundwork for net zero. It imposed concrete emissions-reduction targets on developing countries that were parties to the agreement. One of its provisions allowed parties to trade emissions permits. Accordingly, parties were able to emit excess GHGs as long as they were reduced elsewhere. In 2015, 194 countries agreed to the Paris Climate Accord Agreement that committed them to achieve a GHG emissions balance, or net-zero emissions, by limiting sources of and increasing the absorption of GHGs. The Paris Climate Agreement prevents the global average temperature from exceeding 2°C (35.6°F) from pre-Industrial Revolution temperatures by balancing GHG emissions.

A common critique of the Paris Climate Agreement is that the Nationally Determined Contributions are nonbinding. Parties to the Agreement file their Nationally Determined Contributions every four years to demonstrate their progress towards the Agreement’s goals, but there is no clear enforcement mechanism for failing to reach those goals. Currently, 132 countries have a net-zero commitment, but only about 10 countries have enacted legally binding net-zero legislation, which includes some of the world’s largest emitters: the European Union at large, Japan, Canada, and the United Kingdom. Binding provisions include mandatory emissions reporting and judicial review.

The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) is another international agreement that requires airline operators to report their emissions from international flights and offset some of the emissions based on a historical level of emissions. Unlike the pledges discussed

above, it adopts standards for airlines to develop innovative technology to make international travel more efficient and allows them to use a global carbon market for airplane operators, based on carbon capture and trading, to reach their emission reduction goals. Each signatory to the agreement is responsible for implementing the provisions domestically.

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The United States has adopted the CORSIA Monitoring, Reporting, and Verification (MRV) Program through a voluntary program implemented by the Federal Aviation Administration (FAA). Through this program, U.S. air carriers and commercial and general aviation operators submit certain airplane carbon dioxide (CO<sub>2</sub>) emission data to the FAA to enable the United States to establish uniformity with the CORSIA Standards and Recommended Practices. According to the FAA, “[t]he U.S. supported the decision to adopt the CORSIA [standards] based on the understanding that CORSIA is the exclusive market-based measure applying to international aviation, and that CORSIA will ensure fair and reciprocal commercial competition by avoiding a patchwork of the country- or regionally-based regulatory measures that are inconsistently applied, bureaucratically costly, and economically damaging.” 84 Fed. Reg. 9412, 9412 (Mar. 14, 2019). However, the FAA cautioned that “continued U.S. support for CORSIA assumes a high level of participation by other countries, particularly by countries with significant aviation activity, as well as a final CORSIA package that is acceptable to, and implementable by, the United States.” *Id.*

## Federal Policies and Incentives

Like the Paris Climate Agreement, most federal climate legislation lack enforcement mechanisms. Some countries have enacted policies that help reach net-zero goals but that are not explicitly net-zero legislation, such as a carbon tax. A carbon tax is not a formal net-zero requirement, but it disincentivizes companies to emit GHGs by imposing a tax typically applicable to industrial emitters of fossil fuels based on the amount and relative carbon content of the fuels used.

In 2021, after the United States rejoined the Paris Climate Agreement, the U.S. Executive Office of the President together with the U.S. Department of State published the Long-Term Strategy of the United States, Pathways to Net-Zero Greenhouse Gas Emissions by 2050, which details how the United States can reach its Nationally Determined Contribution to reduce net GHG emissions 50 to 52% below 2005 levels by 2030 and its ultimate goal of a fully net-zero economy by 2050. It anticipates that the United States will reach this goal by decarbonizing

electricity, switching to clean fuels, cutting energy waste, reducing methane emissions, and utilizing carbon sequestration to offset the sectors that are difficult to decarbonize such as aviation and other transportation sectors.

Critics question how the United States will meet this goal, especially considering that, like the international initiatives, there is no enforceable framework. The United States has enacted some enforcement-related policies that apply to small vehicle emissions, but its primary tactic for achieving its goals calls for the carrot, not the stick, model.

For example, the Inflation Reduction Act of 2022 is arguably the most impactful climate change legislation ever enacted in U.S. history. It invests hundreds of billions of dollars in incentives for renewable and electric technology deployment, ecosystem recovery, and local ecosystem recovery.

Additionally, following the holding in *Massachusetts v. EPA*, 549 U.S. 497 (2007), the U.S. signed into law the Energy Independence and Security Act of 2007, which increased fuel economy standards for new passenger vehicles and established the Corporate Average Fuel Economy credit trading standards that include financial penalties against auto manufacturers failing to meet the requirements for their vehicle fleets. In 2021, the EPA enacted emission standards for passenger cars and some trucks. However, California is credited with paving the way for vehicle emissions controls nationwide because there is a carve-out in the Clean Air Act that allows California's regulations to go above and beyond federal emissions reduction requirements, and other jurisdictions are permitted to adopt California's standards.

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The Renewable Fuel Standard (RFS) program requires the EPA to annually issue by regulatory decree a renewable fuels mandate indicating a renewable fuel volume that regulated parties in the fuel sector must meet. Renewable fuel means a fuel produced from renewable biomass, fuel used to replace or reduce the number of fossil fuels present in transportation fuel, heating oil, or jet fuel and has life-cycle greenhouse gas emissions that are at least 20% less than the baseline life-cycle greenhouse gas emissions. 42 U.S.C. § 7545(o)(1). A renewable identification number (RIN) is a serial number assigned to a batch of renewable fuel to track its production, use, and trade and to prove a party's compliance with the RFS. The EPA has implemented many federal rules and standards to oversee the RIN market. Recently, EPA proposed a rule that would expand the RFS program to allow certain electric vehicles to qualify for

RINs that would then be tradable on the RIN market—incentivizing electric vehicle production.

The SEC's Climate Disclosure rule requires certain publicly traded companies to provide an accounting of their GHG emissions that is made available to the public. Other U.S. rules and regulations create incentives for reducing or capturing emissions. For example, section 45Q of the U.S. Internal Revenue Code provides a tax credit for CO<sub>2</sub> storage.

While most of these provisions do not require companies and governments to reach net-zero goals, they encourage practices that ultimately reduce emissions or encourage carbon credit capture and trading.

### State and Local Policies

Recognizing many of the problems with the nonbinding international net-zero pledges, local-level commitments to net zero are likely more effective. Many states and cities set targets similar to those of the federal government to incentivize constituents to meet net-zero goals. For example, Senate Bill 16 in the Colorado Legislature commits the state to a 100% net-zero target by 2050. Like many of the laws discussed already, critics point out that the bill lacks clear mandates and enforcement mechanisms, but it does facilitate large insurance companies operating in Colorado to better assess climate risk, expedite new infrastructure construction, encourage the development of carbon sequestration, and direct annual reporting on climate-related risks in its pension portfolio. Denver specifically has a goal of 100% emissions reduction by 2040.

Similarly, 14 U.S. cities have committed to halving their emissions within a decade through the C40 Climate Leadership Group. C40 is a group of 96 cities around the world that represent one-twelfth of the world's population and one-fourth of the global economy.

But not all net-zero incentives are traditional net-zero programs. For example, many states have renewable portfolio standards (RPS) requiring certain regulated entities, commonly utilities, to source a certain amount of their electricity from renewable sources. Renewable energy certificates (RECs) are used to represent renewable generation and use and satisfy an entity's RPS requirements. A REC is a tradable, nontangible energy commodity representing the environmental, social, and intangible attributes of the electricity produced from one megawatt-hour (MWh) of renewable energy generation. Colorado, for example, recently passed new legislation requiring that 100% of electricity be sourced from renewable generation by 2040. Colorado allows the use of RECs to comply with renewable energy credit requirements. Qualifying renewable energy resources in Colorado include solar, wind, geothermal, biomass, certain hydroelectric resources, and emissions-neutral coal-mine methane.

Three states have adopted or proposed zero-emission vehicle mandates, with California recently adopting its Advanced Clean Cars II regulations. The regulation requires that all new cars, trucks, and SUVs sold in California after 2035 are zero-emission vehicles. The California regulation relies on advanced vehicle technologies, including battery-electric, hydrogen fuel cell electric, and plug-in hybrid electric vehicles, to meet air

quality and climate change emissions standards. The regulations support the governor's 2020 Executive Order N-79-20, which requires all new passenger vehicles sold in California to reach zero emissions by 2035. According to the California Air Resources Board's FAQs, even when considering emissions from the power plant supplying the electricity to charge the vehicles, electric vehicles are cleaner than gas cars. In California, 45% of electricity is currently generated from fossil fuels, and a gas car would need to attain 134 mpg to match the total life-cycle emissions of an electric vehicle. Over the next decade, electric vehicles are expected to add only a small amount of electricity demand to California's grid. In 2030, 5.4 million light-duty electric vehicles and 193,000 medium- and heavy-duty electric vehicles will account for only about 4% of the total system electric load during peak hours (4–9 pm). Today's smaller electric vehicle population accounts for less than 1% during the same peak period in 2022. California Air Resources Board, Advanced Clean Cars Program Fact Sheet.

While RECs, RINs, and electric vehicle mandates are not explicitly net-zero initiatives, their frameworks provide some of the only enforceable legal frameworks that can help drive the United States towards its net-zero goals, if done properly.

It is unclear whether state- and local-level policies aiming to completely reduce emissions would employ negative emission technologies and market-based measures such as carbon capture and carbon credit trading, or solely reduce GHG emissions without utilizing net-zero processes. At this point, jurisdictions would need to employ net-zero goals to reach their GHG emission reduction (or neutralization) targets because sectors such as aviation and shipping exist that cannot yet reach complete decarbonization. Municipalities with these policies need to provide education with clearer guidelines regarding the actions required to meet their reduction goals. Cities should first prioritize reducing their emissions from the economic markets discussed above, following which they can employ carbon reduction technologies and utilize carbon markets. Enforceable statewide programs do exist that can help states achieve emission reduction and net-zero goals.

## Private Sector Drivers

Because many net-zero provisions lack enforcement mechanisms, entities, especially in the private sector, may struggle to justify their transition to net zero. Private industries must consider the opinions of their stakeholders, board members, and their bottom line. Unless a private company has an inherent interest in enacting net-zero policies, these policies require significant investment and technological innovation. Nonetheless, in the long run, net-zero policies can help reduce fuel and energy costs, and costs of externalities that companies commonly overlook such as natural disaster relief and employee health care costs. Many private companies are cutting their emissions and, even more, are planning to reach their net-zero goals by purchasing carbon credits. Typically, a combination of economic, legal, and public interest drivers spur private-sector innovation. The same applies to net-zero innovation.

While the private sector faces unique hurdles for meeting net-zero goals such as appeasing shareholders, they have

the potential to have the greatest impact because their action is almost entirely voluntary and often drives technological and other private sector advances by achieving the best technology in the most efficient and economical ways to satisfy shareholders and their bottom line.

Net-zero initiatives may also include “carbon trading” of carbon credits because there are sectors of the economy that are hard to decarbonize.

The private sector has immense potential to have a vast net-zero impact, and while government regulation can drive private sector change, to meet net-zero goals requires the private sector to go above and beyond existing governmental regulation. A significant portion of emissions come from the private sector, and a number of major companies are already taking steps to achieve net zero. Private industry benefits from net-zero initiatives because it often forces companies to consider how to become more efficient, reduce waste throughout operations, and source renewables that can potentially be less costly than fossil energy. Additionally, more stakeholders and customers are demanding that corporations be more “green.” As an example, according to a survey from McKinsey & Co., 66% of all respondents and 75% of millennial respondents say that they consider sustainability when they make a luxury fashion purchase. McKinsey Company, *The State of Fashion 2020*.

Net-zero initiatives may also include “carbon trading” of carbon credits because there are sectors of the economy that are hard to decarbonize. Carbon credits typically are measured in tons of carbon dioxide reduced or removed from the atmosphere. Companies commonly buy and sell carbon credits to help them reach their carbon reduction goals. In their carbon emission accounting, they will subtract from their emissions output the number of carbon credits they purchase, and those selling the credits are required to retire the credits so they cannot be sold more than once. Currently, the carbon market is largely unregulated and is mainly driven by the freedom of contract and private industry interest. California is the only state in the country with a carbon trading program. In most net-zero programs, carbon trading is one resource that entities can use to offset their existing emissions.

From 2021 to 2023, the number of the world's 2,000 largest publicly traded companies with net-zero commitments increased by 10% with nearly one-third now having published net-zero emissions targets. Their focus is reducing their carbon emissions where they can, and when they cannot reduce emissions, investing in carbon-negative technologies and carbon

credits. The nuances differ between companies' policies, but most provide a credible strategy to meet reduction targets. If the SEC's climate disclosure rules are finalized, that will provide the population with a way to judge how a publicly traded company is doing in reaching its climate reduction goals.

## Public and Private Sector Policies Propagate Net-Zero Goals

Researchers believe that achieving net zero is technologically and economically feasible. However, reaching net-zero targets requires an economy-wide approach. Companies need to build new renewable energy projects. Utilities need to build new electricity infrastructure. Industry should employ carbon capture and sequestration processes and technologies.

Governmental oversight can help drive the growing private sector push to net zero, and private sector net-zero policies

are required to meet net-zero goals. One of the greatest criticisms of existing governmental net-zero oversight is that it is often not binding. To reach net-zero goals requires a combination of both carrot and stick governmental oversight, and more education and transparency about private sector initiatives to drive public choice. Currently, because many net-zero policies are not legally binding, parties might not feel that it is necessary to inform their stakeholders or constituents about the goals, and, consequently, these "goals" are not as stringently pursued. Nonetheless, with further public education and governmental oversight, these goals could have far-reaching economic, public health, environmental, and social justice impacts. 

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*Ms. Cristo is an associate at Holland & Hart LLP in Denver, Colorado. She may be reached at [npcristo@hollandhart.com](mailto:npcristo@hollandhart.com).*