The transportation of tomorrow will address climate change

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As the largest source of greenhouse gas (GHG) emissions in the United States, the transportation industry will play an enormous role in efforts to reduce emissions in the face of climate change. When releasing in November the administration's long-term climate-change strategy, which presents a vision of achieving the United States' goal of net-zero emissions economywide by no later than 2050, President Biden emphasized the role of electric vehicles (EVs) in attaining that goal.

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But it's not only the auto industry that will help drive change in the transportation arena. The aviation and shipping industries must embark upon similar, if not more rigorous, efforts at innovation and the application of cleaner technologies if the world is to reach a state of net-zero emissions.

Greening the auto industry

President Biden signed an executive order this summer stipulating that 50% of all new passenger cars and light trucks must be zero-emissions by 2030 and directing the Environmental Protection Agency (EPA) and the Secretary of Transportation to undertake rulemaking proceedings to build on the proposed tailpipe emission standards that are set to begin with the 2023 car model year.

The EPA's proposed rules are a rollback of Trump-era standards and are generally more in line with Obama-era standards, at least through 2026. However, they currently build in a degree of flexibility for automakers. The executive order picks up where the proposed rules leave off: directing federal agencies to propose increasingly stringent emissions and fuel-efficiency standards, starting in model year 2027, for all vehicles. Both the proposed rules and the executive order push the administration's overall goal of reducing GHG emissions and incentivizing a shift from vehicles with internal combustion engines to EVs.

The recently passed infrastructure bill earmarks $7.5 billion to build a national network for EV-charging stations in order to accelerate the adoption of EVs to reduce transportation emissions, facilitate long-distance travel by EV, and make EV charging more convenient for consumers. Along with the funds, the bill establishes a 25-member EV working group, which will be led by the secretaries of Transportation and Energy, to provide federal guidance and strategy for the development, adoption, and integration of EVs into the U.S. transportation and energy systems.

The bill also directs states to consider measures that would promote greater electrification of the transportation sector, including the establishment of rates that promote affordable and equitable EV-charging options, improvement of the customer experience associated with EV charging, acceleration of third-party investment in public EV charging, and recovery of the marginal costs of delivering electricity to EV and EV-charging infrastructure.

California is already leading the charge and trying to push the federal government to be more aggressive, with Governor Gavin Newsom's September 2020 mandate to eliminate the sale of new fossil-fuel–powered vehicles. Newsom directed state agencies to take concrete steps to phase out gas- and diesel-powered passenger cars and trucks and committed California to a goal of 100% zero emissions for new passenger cars and trucks by 2035.

Reaching jet zero

The aviation industry has cleverly coined the phrase "reaching jet zero" with respect to its efforts to address climate change. Aviation contributes 11% of transportation-related emissions in the United States, according to the White House. To address that figure, the Biden administration, within the context of its Climate Action Plan, has set a target year of 2050 for the aviation industry to reach net-zero emissions. This is a later deadline than that of other industries and reflects the unique challenges the aviation sector faces in reducing emissions.

With U.S. aviation emissions expected to rise significantly if unchecked, aviation companies are targeting the sale, lease, and

operation of more climate-friendly aircraft and greener airport infrastructure as ways to reduce emissions.

In the United Kingdom, emissions from international shipping and aviation respectively contribute 3% and 7% to total GHG emissions. There is motivation to move toward decarbonization in these industries, but it is very challenging. Aviation is forecast to become the second highest residual emitter in 2050 as other sectors reduce their emissions.

In 2020, the United Kingdom's was the first national aviation body to commit to reaching net-zero emissions by 2050. But the UK government took that a step further in June 2021 and set a target of 2040 to reach net-zero emissions for domestic flights. To achieve this goal, the UK government is focused on rapid development of technologies; it will also be looking at system efficiencies, sustainable aviation fuels, zero-emission flights, and consumer influence.

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In addition to government net-zero targets, European Union countries have set out specific criteria for companies to prove that they "do no harm" to the environment. The reporting is designed to provide a system for businesses to assess and report their environmental impacts as well as aid investors looking for sustainable activities and businesses.

The Aviation Working Group is a nonprofit legal entity composed of major aviation manufacturers, leasing companies, and financial institutions that contribute to the development of policies, laws, and regulations that facilitate advanced international aviation financing and leasing. To avoid conflicting national or regional standards in the regions where airlines fly, the Aviation Working Group has been aggressively lobbying the European Union to create a single international system for the classification of green-aircraft financing and leasing. International aviation accounts for 95% of all flights that originate in the United Kingdom.

The Aviation Working Group wants this system to be based on five principles: feasible-improvement standard, incentive standard, aircraft class differentiation standard, International Civil Aviation Organization–certification standard, and data-based self-reporting standard. It also has its own tool to measure carbon footprint.

Shipping it

For almost two decades, the International Maritime Organization's (IMO) Maritime Environment Protection Committee has explored the issue of greenhouse gas (GHG) emissions in the shipping sector, which generates 2.5% to 3.5% of global GHG emissions. In 2018, the IMO adopted an initial strategy to reduce GHG emissions from ships by 50% from 2008 levels by 2050. While that is modest in relation to other transportation sectors, it is still a challenge for this industry.

With some 90% of all goods moved by ships, scrapping and rebuilding cargo tankers while fixing the supply-chain issues isn't feasible. In 2020, only 17% of new ship orders (146 ships) included cleaner-fuel engines. The shipping industry is working on finding more environmentally friendly fuels, scrubbing fuel to reduce emissions, and retrofitting ocean ships. But each of the options comes with challenges.

First, the industry is wedded to heavy fuel oil that is carbon rich. Second, there is no real path to retrofitting ocean ships. The experiments with smaller ships powered by diesel electric or by electricity entirely have proven to be more expensive than the methods used in traditional shipping and are hampered by limited range and capacity. Hydrogen-fueled ships are viewed by some as a possibility, but they have yet to be put in place. Others are exploring nuclear power as an alternative fuel, although there remains opposition to nuclear power among certain environmental groups.

Recently, the global trade association for ship operators, the International Chamber of Shipping (ICS), proposed a global levy on carbon emissions from ships. Backed by Intercargo, the trade association for dry cargo shipowners, IMO would collect the funds in an "IMO Climate Fund," which could then be used to update infrastructure at ports that would be required to transition to alternative fuels. An R&D fund is also part of the proposal, and it would be used to fund the research and development of alternative zero-carbon fuels and propulsion systems.

The European Union's proposed expansion of its emissions trading scheme (ETS) to maritime transport is also incentivizing consideration of a global maritime carbon levy. The United States has not made public its views on a global maritime carbon levy, but it is committed to a net-zero emissions goal. Legislation has been reintroduced, and U.S. industry groups and port authorities are also pushing for the inclusion of funds for investment to support the decarbonization of the shipping industry in the now stalled reconciliation bill.

With international support for reaching net-zero emissions across the transportation sectors in the forms of set standards and target dates, federal funding, and potential penalties, there could be real movement in the coming years toward a more innovative and environmentally friendly "transportation of tomorrow."

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