



**icct**

THE INTERNATIONAL COUNCIL  
ON CLEAN TRANSPORTATION

ANNUAL REPORT **2022**

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# ABOUT US

Global demand for transportation is surging, and with it, inexorably, carbon emissions—not to mention other forms of air pollution.

Transforming the technologies and systems that move people and goods around the world is an urgent imperative.

The International Council on Clean Transportation (ICCT) is an independent nonprofit organization founded in 2001 to provide first-rate, unbiased research and technical and scientific analysis to environmental regulators.

Together, these efforts are projected to result in billions of tons of carbon dioxide reductions and prevent thousands of premature deaths over the next decade and beyond. More information can be found on our website at [www.theicct.org](http://www.theicct.org).

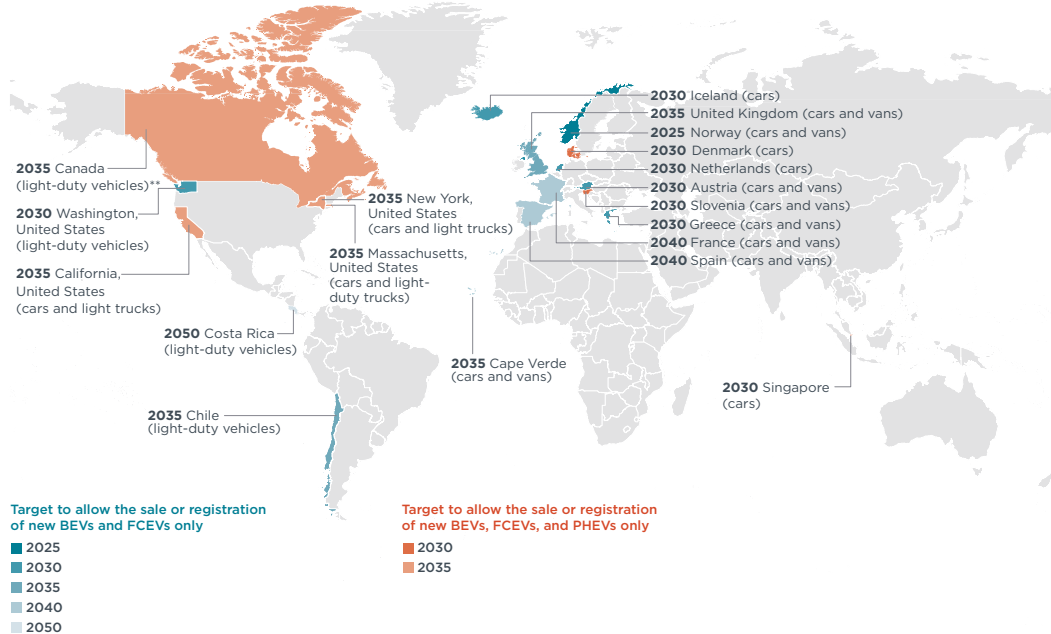
## MISSION

The International Council on Clean Transportation is an independent nonprofit organization founded to provide first-rate, unbiased research and technical and scientific analysis to environmental regulators. Our mission is to improve the environmental performance and energy efficiency of road, marine, and air transportation, in order to benefit public health and mitigate climate change.

# ICCT HIGHLIGHTS

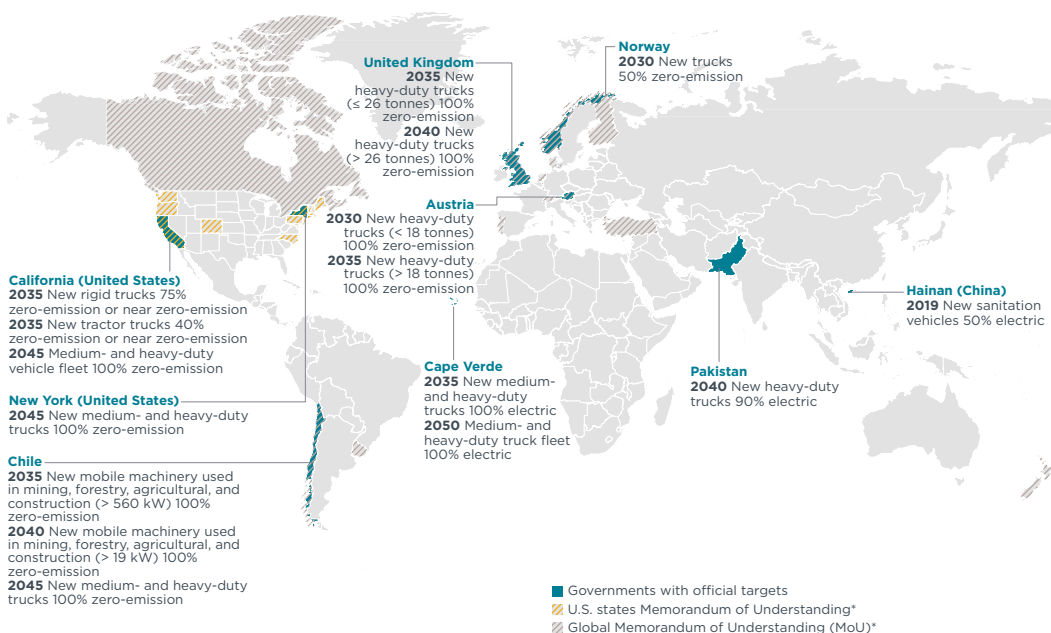
**Figures:** Governments with targets for phasing out sales of internal combustion vehicles: (<https://theicct.org/phase-out-map-hdv/>; <https://theicct.org/phase-out-map-ldv/>)

Governments with official targets to 100% phase out sales or registrations of new internal combustion engine light-duty vehicles (passenger cars and vans/light trucks) by a certain date\* (Status: Through September 2022)



\* Includes countries, states, and provinces that have set targets to only allow the sale or registration of new battery electric vehicles (BEVs), fuel cell electric vehicles (FCEVs), and plug-in hybrid electric vehicles (PHEVs). Countries such as Japan with pledges that include hybrid electric vehicles (HEVs) and mild hybrid electric vehicles (MHEVs) are excluded as these vehicles are non plug-in hybrids.  
\*\* The Canadian province of British Columbia has set its 2040 target into binding regulation; the Canadian province of Québec has also set a target for 2035.

Governments with targets toward phasing out sales of internal combustion engine trucks by a certain date (Status: Through September 2022)

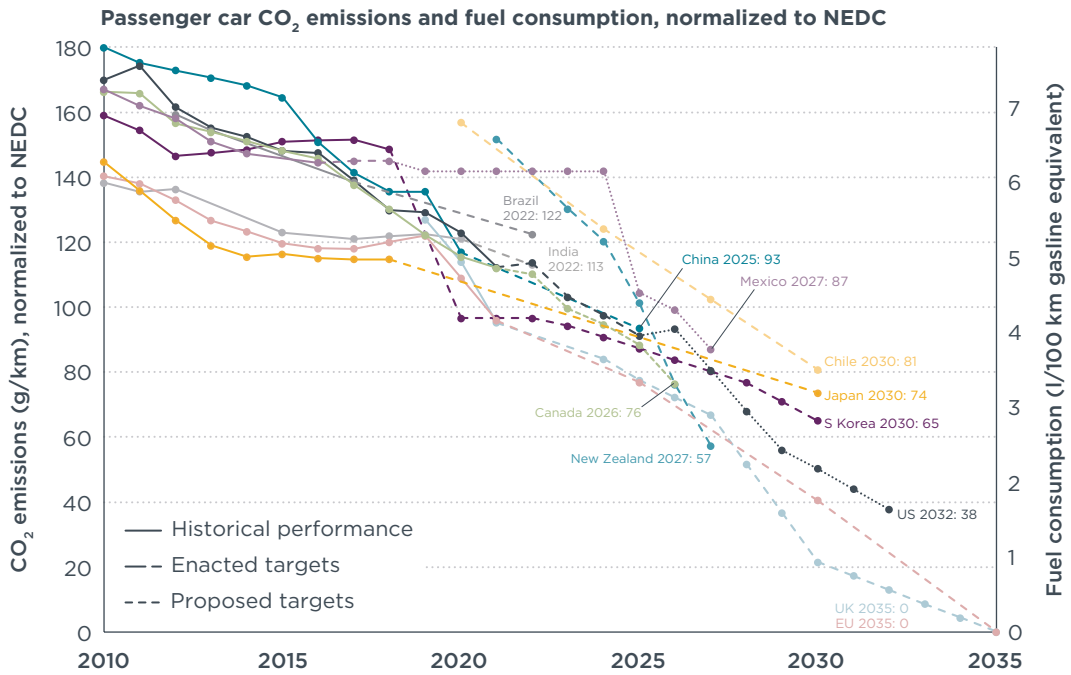


U.S. states Memorandum of Understanding (MoU)  
California, Colorado, Connecticut, Hawaii, Maine, Maryland, Massachusetts, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Rhode Island, Vermont and Washington and the District of Columbia  
2030 New medium- and heavy-duty vehicles 30% zero-emission  
2050 New medium- and heavy-duty vehicles 100% zero-emission

Global Memorandum of Understanding (MoU)  
Austria, Canada, Chile, Denmark, Finland, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Scotland, Switzerland, Turkey, United Kingdom, Uruguay, Wales  
2030 New medium- and heavy-duty vehicles 30% zero-emission  
2040 New medium- and heavy-duty vehicles 100% zero-emission

Note: Governments with an at least 40% new truck sales target.  
\* Not necessarily yet reflected in an official national/state policy document such as a climate or transport strategy/plan, in a law, or in a similar framework.

**Figure:** Passenger car emissions and fuel consumption (<https://theicct.org/pv-fuel-economy/>)



Note: U.S. 2026 target is adjusted in proposed standards for 2027 and later vehicles to reflect differences in various credits between the current rule and the proposal; UK fleet-average targets estimated based on non-ZEV CO<sub>2</sub> emissions and ZEV mandate.



# ICCT HIGHLIGHTS BY REGION

# ASIA

Due to its status as one of the largest combined emerging economies in the world, fuel consumption in Southeast Asia has more than doubled in the past decade. ICCT projections show that without a strong shift towards transport decarbonization in Southeast Asia, the region would reach the level of India's annual GHG emissions from transport by 2050. ICCT provides technical assistance in accelerating the deployment of electric buses in cities as well as supporting a transition to soot-free heavy-duty emission standards. ICCT currently plays a role in advancing light-duty and 2- and 3-wheelers fuel efficiency regulations in Indonesia, Vietnam, and Thailand, among others. ICCT's fuels team is particularly active in Indonesia, where a strong focus has been placed on sustainably sourced biofuel sources such as cellulosic ethanol.

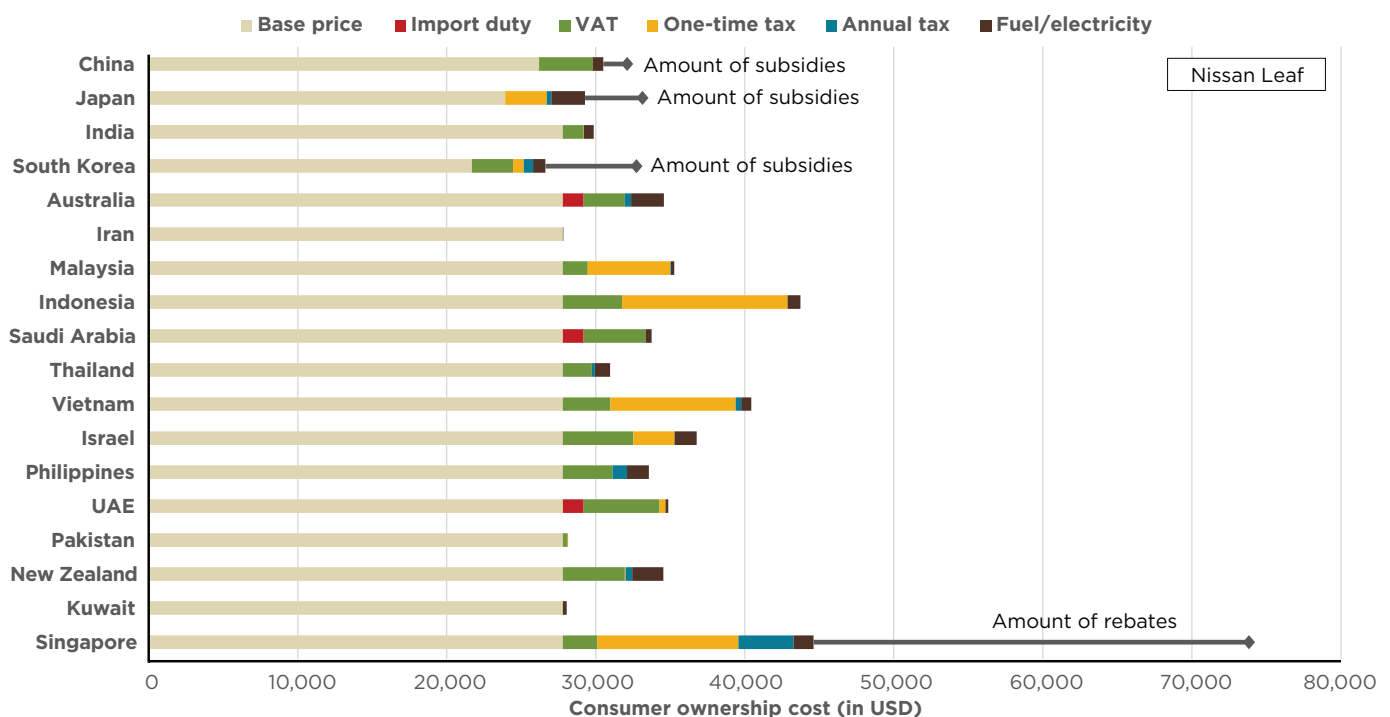
In 2022, ICCT researchers studied electric vehicle deployment in the region, including the development of electric two- and three-wheeler transport, fuel efficiency standards, and the potential volumes of sustainable fuels that could be produced from waste oils.



# THE POTENTIAL OF TAXATION POLICIES TO DRIVE LOW-EMISSION VEHICLE PURCHASES

ICCT researchers assessed national-level taxation and subsidy policies for passenger vehicles across 18 Asian and Asia-Pacific countries and compared the consumer ownership costs of a gasoline, a hybrid electric, and a battery electric vehicle. The countries analyzed account for 99% of all passenger vehicle sales in Asia and the Asia-Pacific. The authors found that reductions in one-time taxes carry the greatest potential for creating benefits for efficient vehicles and electric vehicles through tax policy. Additionally, the results showed that most countries, especially those with high taxation levels, would benefit from changing the current displacement- or weight-based taxes to a continuous fuel efficiency or CO<sub>2</sub>-based tax based on linear metrics, as this can successfully reduce the consumer ownership cost of more-efficient vehicles.

**Figure:** Six-year consumer ownership costs in 18 select markets.



(Source: Overview of Asian and Asia-Pacific passenger vehicle taxation policies and their potential to drive low-emission vehicle purchases, <https://theicct.org/publication/asia-vehicle-taxation-jan22/>)

## PUBLICATIONS OF NOTE:

Fuel efficiency standards to decarbonize Australia's light-duty vehicles (working paper)  
<https://theicct.org/publication/pv-australia-co2-standards-dec22/>

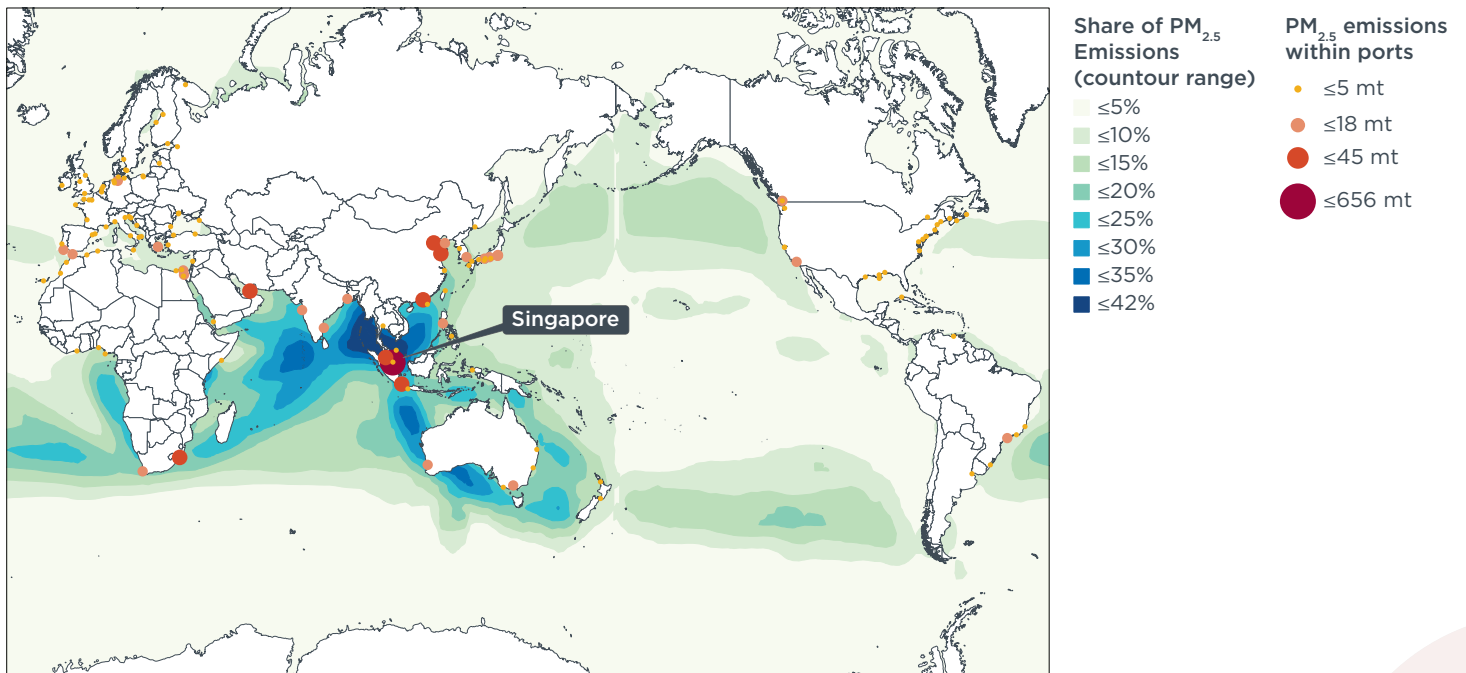
Zero-emission vehicle deployment: ASEAN markets (briefing)  
<https://theicct.org/publication/hvs-zev-deploy-asean-apr22/>

Using policy and regulation to pave the way for two-wheeler electrification in Vietnam (briefing)  
<https://theicct.org/publication/vietnam-asia-e2ws-lvs-mar22/>

An estimate of current collection and potential collection of used cooking oil from major Asian exporting countries (working paper)  
<https://theicct.org/publication/asia-fuels-waste-oil-estimates-feb22/>

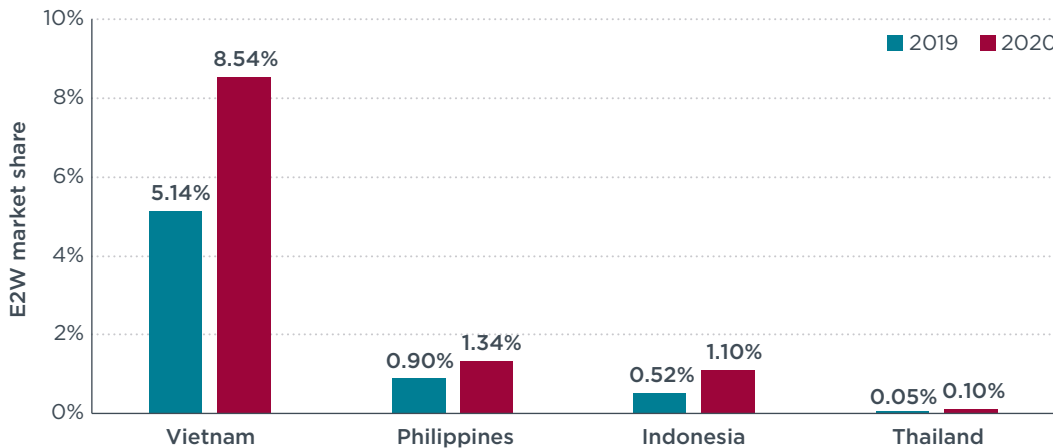


**Figure:** Share and mass of shipping PM<sub>2.5</sub> emitted by ships burning residual fuel sold in Singapore



(Source: *Exporting emissions: Marine fuel sales at the Port of Singapore*, <https://theicct.org/publication/marine-singapore-fuel-emissions-jul22/>)

**Figure:** Change in electric two-wheeler market share in key ASEAN countries in 2019 and 2020



(Source: *Promoting the development of electric vehicles in Vietnam*, <https://theicct.org/publication/asia-pacific-evs-promoting-development-evs-vietnam-dec22/>)

# CHINA

China is the largest market for new light- and heavy-duty vehicles. In addition, seven of the world's ten largest container ports are in China. The nation's industrial dynamism has also created some of the world's worst air-quality issues and made China the world's biggest carbon emitter. Policymakers have responded with stringent, innovative regulations, and China is moving into a leadership role in transport climate policy. The ICCT's China staff supports effective regulation of emissions in the transport sector and works to provide officials with sound, reliable technical and scientific data.

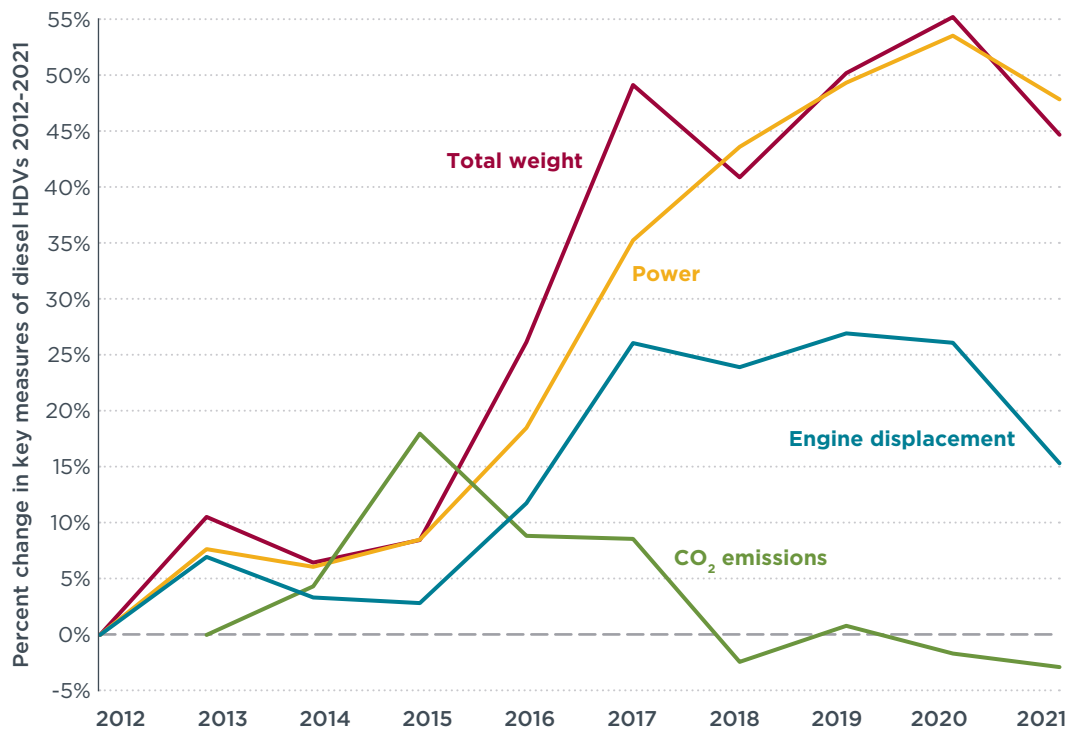
Research in China in 2022 included an analysis of policies in regions with high uptake of new energy vehicles, the use of low-carbon fuels in coastal shipping, and the potential of establishing low- and zero-emission construction zones in the country.



# THE EVOLUTION OF HEAVY-DUTY VEHICLES IN CHINA

Researchers at the ICCT evaluated the effectiveness of policies in curtailing emissions from heavy-duty vehicles over the 2012–2021 period to inform future regulations. The assessment found that integrated emissions control regulation for both pollutant and GHG emissions could be enacted to help guide development of heavy-duty vehicles. In addition, switching from the current fuel consumption standard to regulation of greenhouse gas emissions will cover more greenhouse gases such as  $N_2O$  and  $CH_4$  and allow the HDV industry to balance control of pollutants and GHG emissions under various technology combinations. The research also found that electrification is key to decarbonizing road transport in China, although clean diesel engine technologies, including improved fuel efficiency and performance, could still be encouraged.

**Figure:** Percent change in key measures of diesel HDVs, 2012–2021.



(Source: *The evolution of heavy-duty vehicles in China: A retrospective evaluation of CO<sub>2</sub> and pollutant emissions from 2012 to 2021*, <https://theicct.org/publication/china-hvs-ndc-tia-evolution-hdv-emissions-oct22/>)

**Figure:** Geographical distribution of the 30 leading cities and their new energy passenger car technology choices, 2021

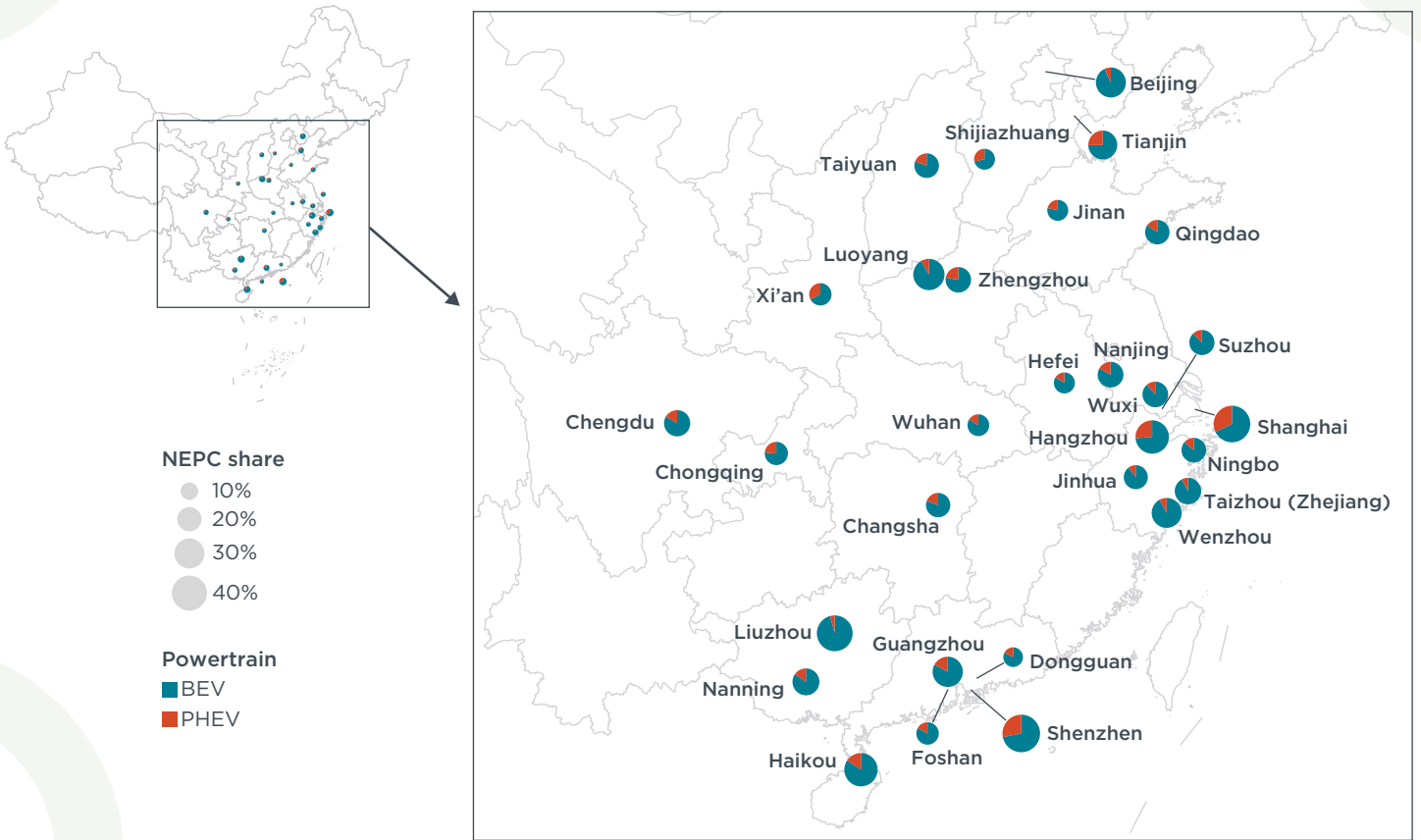
## PUBLICATIONS OF NOTE:

Recommendations for the next generation of China's heavy-duty vehicle emission standard based on testing of China VI vehicles (working paper)  
<https://theicct.org/publication/china-hdv-emissions-testing-oct22/>

Life-cycle analysis of greenhouse gas emissions of hydrogen, and recommendations for China (white paper)  
<https://theicct.org/publication/china-fuels-lca-ghgs-hydrogen-oct22/>

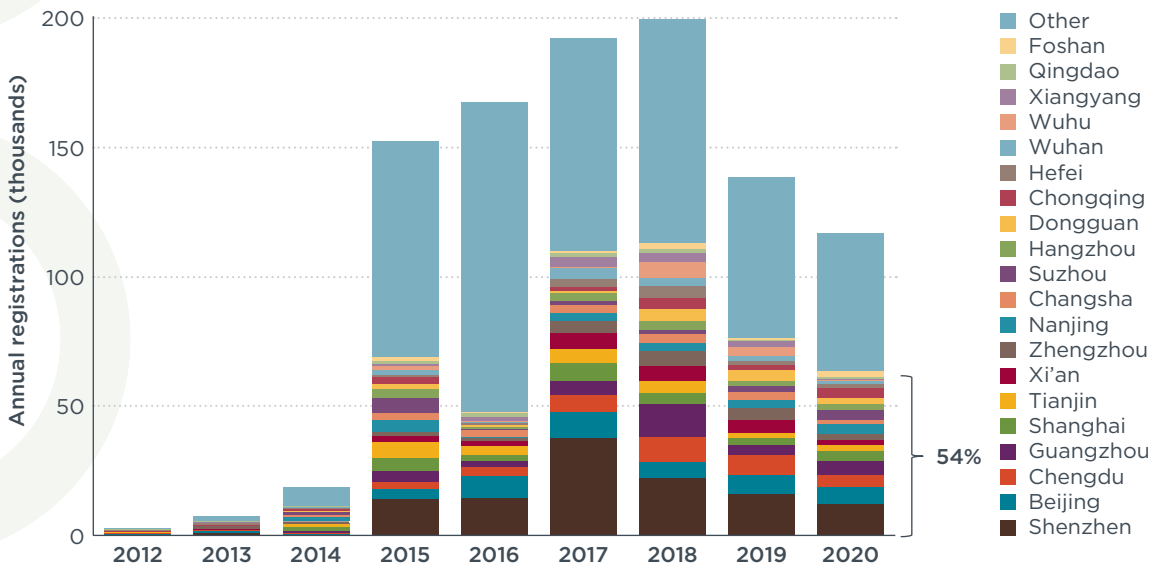
Assessment of leading new energy vehicle city markets in China and policy lessons (report)  
<https://theicct.org/publication/china-city-markets-new-energy-sep22/>

Decarbonizing China's coastal shipping: The role of fuel efficiency and low-carbon fuels (working paper)  
<https://theicct.org/publication/china-marine-decarbonizing-chinas-coastal-shipping-jun22/>



(Source: *Leading new energy vehicle city markets in China: A 2021 update*, <https://theicct.org/publication/ev-china-city-markets-2021-update-nov22/>)

**Figure:** Registration of new energy commercial vehicles in top cities, 2012–2020



(Source: *Assessment of leading new energy vehicle city markets in China and policy lessons*, <https://theicct.org/publication/china-city-markets-new-energy-sep22/>)

# EUROPE

Europe, the third-largest vehicle market in the world, is the home of giant automotive, aircraft, and shipbuilding industries. The European Union has been a leader in environmental policy, and it plays an indispensable and growing part in global climate change efforts. ICCT Europe played the central role in bringing to light the “emissions gap”—the discrepancy between official, type-approval values and real performance in everyday operation. ICCT research contributes to the technical foundations underlying the EU’s plans to regulate CO<sub>2</sub> emissions and reform legislation supporting low-carbon fuels in Europe.

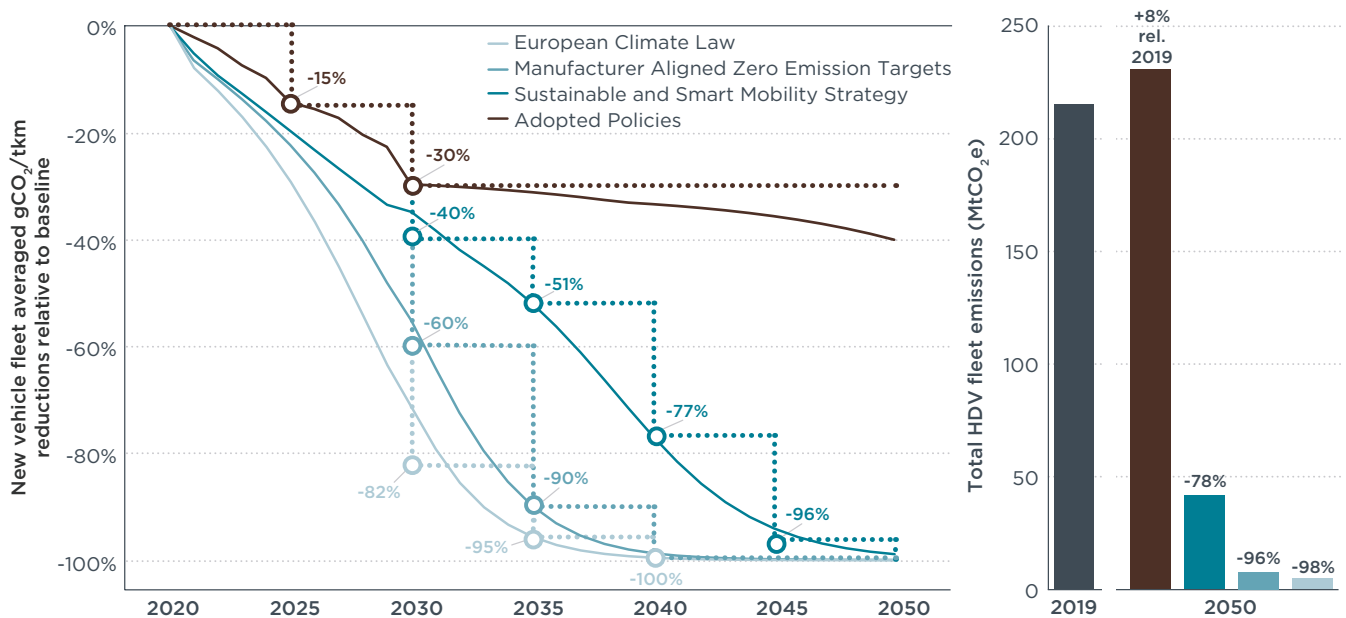
In 2022, ICCT researchers provided analysis to inform the next phase of emission standards for light- and heavy-duty vehicles, in addition to information on how regulatory definitions could better reflect the real-world emissions of alternative fuels. Researchers also assessed the adoption of electric vehicles and corresponding policy support across regions.



# CO<sub>2</sub> STANDARDS FOR TRUCKS AND BUSES IN EUROPE

ICCT researchers in Europe assessed the stringency of heavy-duty CO<sub>2</sub> standards required to contribute towards Europe's goal of climate neutrality by 2050. The analysis found that manufacturer commitments to increase the number of zero-emission heavy-duty vehicles would correspond to an emission reduction of 96% by 2050 relative to 2019—closely in line with the goal of the European Climate Law. To enshrining these manufacturer commitments in regulation, the study found that the European Commission should increase the heavy-duty CO<sub>2</sub> standard to a reduction of at least 60% in 2030, introduce a target of at least 90% for 2035, and introduce a phase-out date for new combustion-powered trucks and buses of no later than 2040.

**Figure:** New vehicle fleet averaged annual emissions reduction relative to 2020 and corresponding 5-year targets. The bars on the right denote the annual emissions reduction in heavy-duty vehicles in 2019 and by 2050.



(Source: *The CO<sub>2</sub> standards required for trucks and buses for Europe to meet its climate targets*, <https://theicct.org/publication/hdv-co2standards-recs-mar22/>)

## PUBLICATIONS OF NOTE

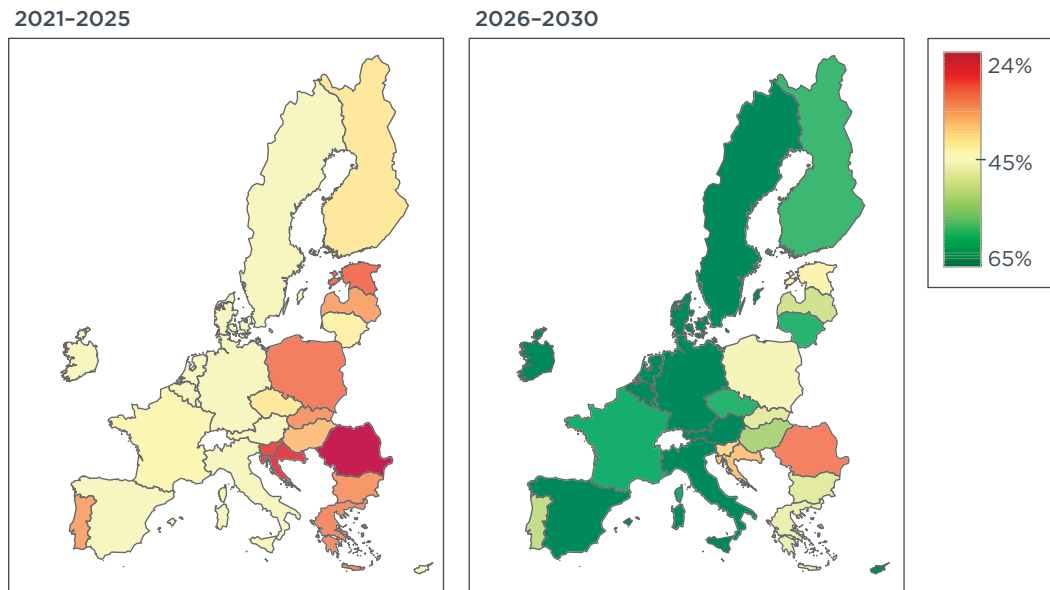
Gas definitions for the European Union: Setting thresholds to reduce life cycle greenhouse gas emissions (working paper) <https://theicct.org/publication/gas-definitions-thresholds-oct22/>

Real-world usage of plug-in hybrid vehicles in Europe: A 2022 update on fuel consumption, electric driving, and CO<sub>2</sub> emissions (white paper) <https://theicct.org/publication/real-world-phev-use-jun22/>

A review of the AFIR proposal: Public infrastructure needs to support the transition to a zero-emission truck fleet in the European Union (white paper) <https://theicct.org/publication/afir-eu-hdv-infrastructure-mar22/>

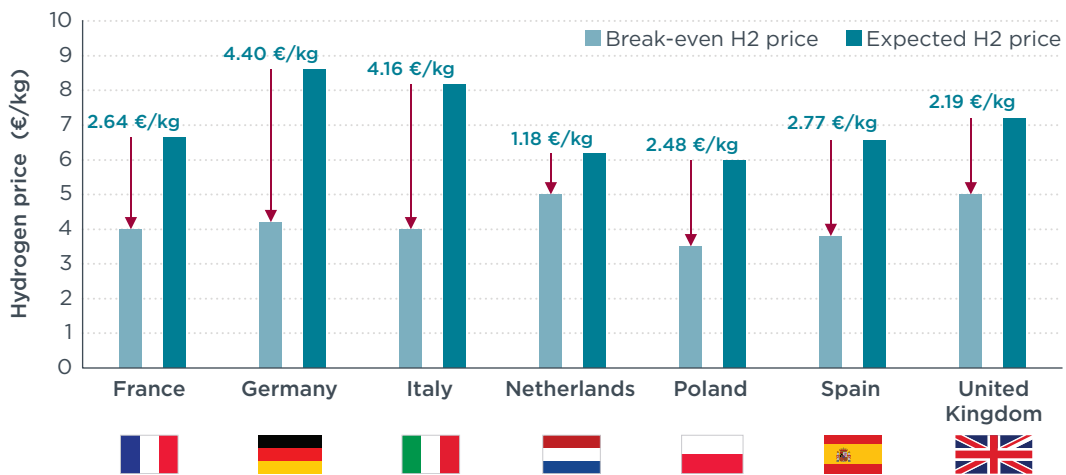
Battery electric vehicle access in Europe: A comparison of rural, intermediate, and urban regions (working paper) <https://theicct.org/publication/bev-access-europe-jun22/>

**Figure:** Targets for the public procurement of clean vehicles under the Clean Vehicles Directive by EU Member State



(Source: *The rapid deployment of zero-emission buses in Europe*, <https://theicct.org/publication/the-rapid-deployment-of-zero-emission-buses-in-europe/>)

**Figure:** Hydrogen fuel subsidy needed to achieve total cost of ownership parity between fuel cell electric trucks and diesel trucks by 2030, assuming onsite hydrogen production through renewable electrolysis



(Source: *Fuel-cell hydrogen long-haul trucks in Europe: A total cost of ownership analysis*, <https://theicct.org/publication/eu-hvs-fuels-evs-fuel-cell-hdvs-europe-sep22/>)

# INDIA

Air pollution, especially particulate matter, is a serious challenge in India, and transportation is a significant factor in the nation's air-quality problems. The country's vehicle fleet is expanding rapidly with sales reaching 21 million in 2016, and the number of vehicles on the road is expected to double to 200 million by 2030. In 2016, India adopted Euro 6/VI-equivalent standards to go into effect in 2020. The ICCT's India staff works with policymakers to further mitigate vehicular air pollution.

In 2022, ICCT researchers in India undertook studies on electrification of on-road and non-road vehicles, alternative fuels, and policies to decarbonize the transport sector.

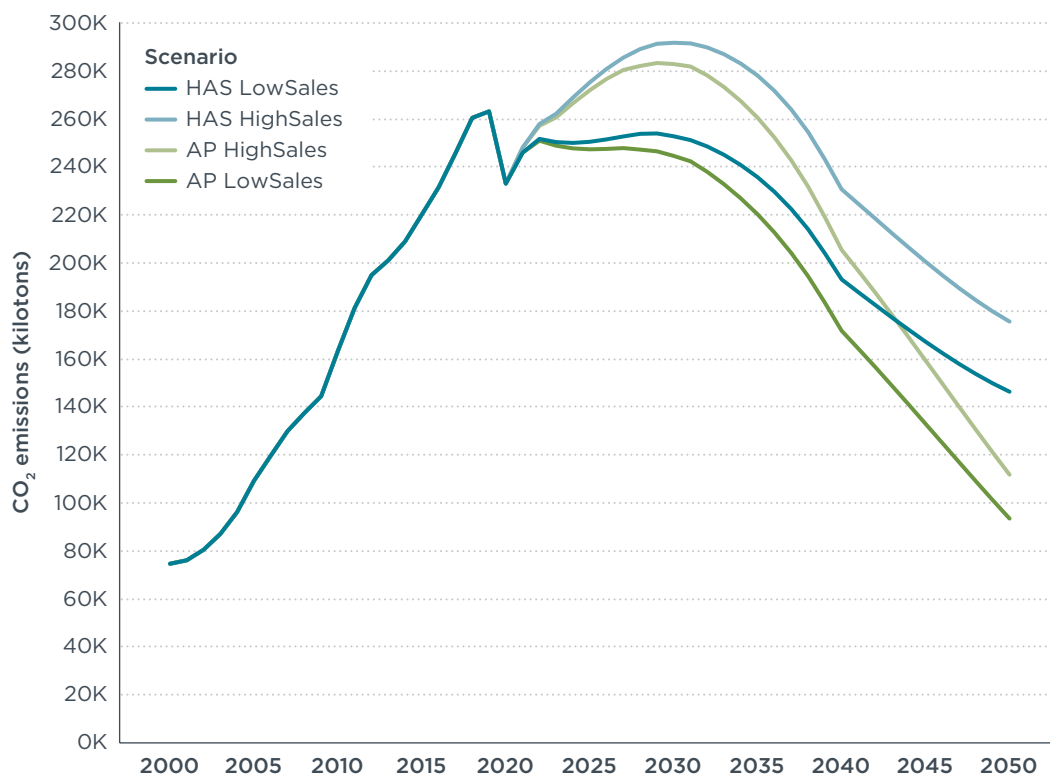




# DECARBONIZING INDIA'S ROAD TRANSPORT

ICCT researchers performed a meta-analysis of eight of India's key road transport energy and emissions models, comparing assumptions, energy use, and CO<sub>2</sub> emissions and considering the emission reductions that could be achieved by 2050 through policy efforts. The report found that, in a business-as-usual scenario without additional policy interventions, the models generally expect a 3-4 times rise in energy consumption and CO<sub>2</sub> emissions between 2020 and 2050. However, interventions like fuel efficiency improvements in combustion engine vehicles, vehicle electrification, and increased use of alternative fuels could help abate 45%-50% of cumulative CO<sub>2</sub> emissions between 2021 and 2050.

**Figure:** CO<sub>2</sub> emissions trajectory under alternate scenarios. (HAS: High Ambition Scenario; AP: Aggressive Policy scenario)



(Source: *Decarbonizing India's road transport: A meta-analysis of road transport emissions models*, <https://theicct.org/publication/decarbonizing-india-road-transport-may22/>)

## PUBLICATIONS OF NOTE:

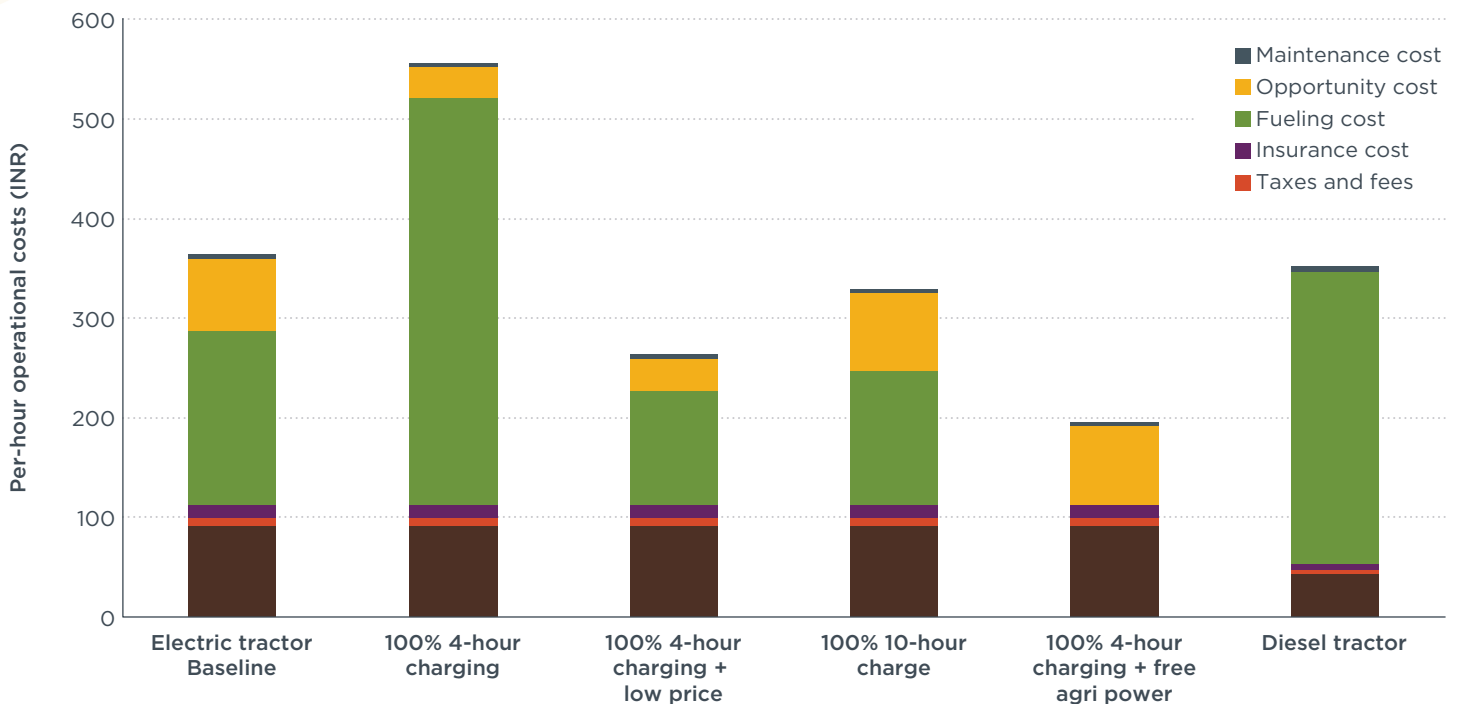
Incentives for electrifying agricultural tractors in India (working paper)  
<https://theicct.org/publication/india-hvs-evs-incentives-elec-tractors-india-oct22/>

The potential of 48V hybrids in India's light-duty vehicle market (white paper)  
<https://theicct.org/publication/india-ldv-48v-hybrids-jul22/>

Battery swapping for electric two-wheelers in India: Strategy hinterlands (report)  
<https://theicct.org/publication/india-ev-battery-swapping-may22/>

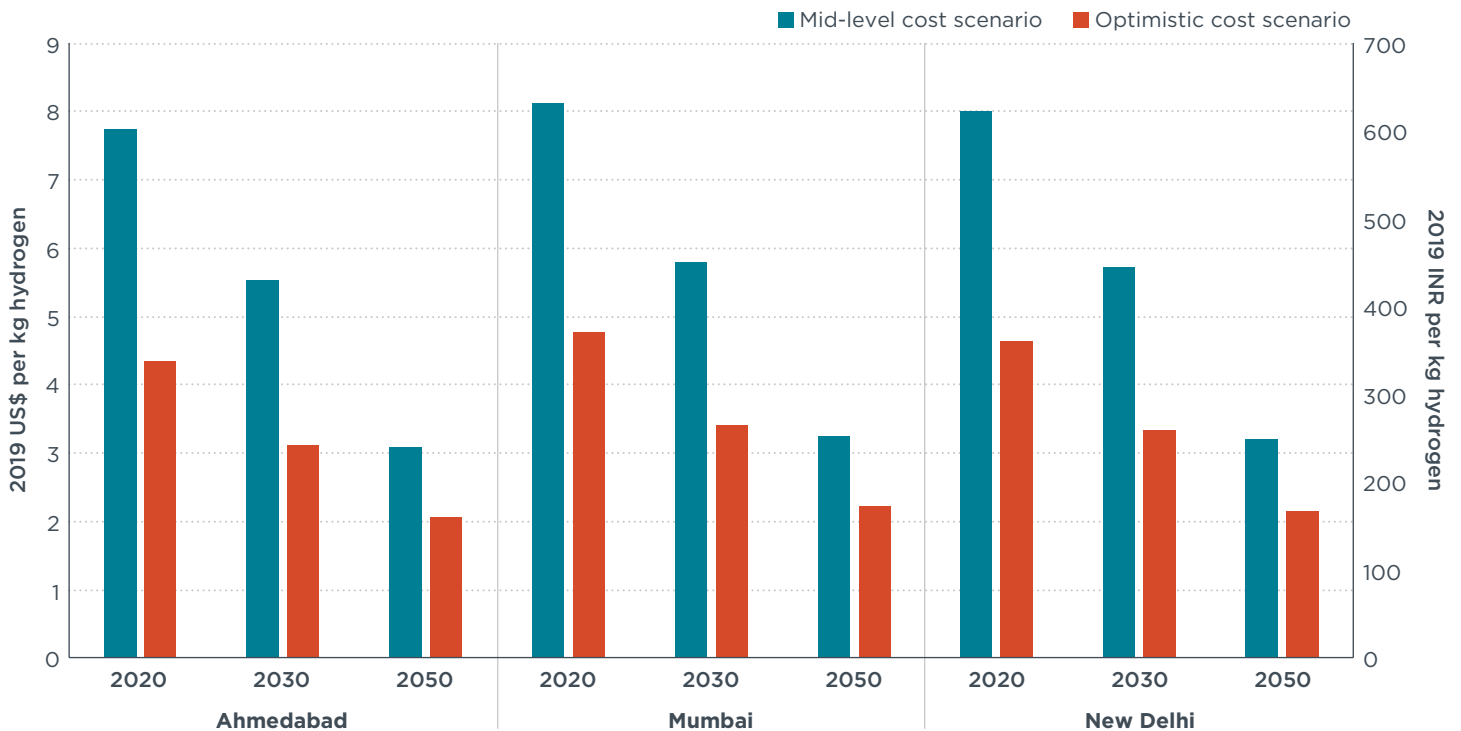
Hydrogen fuel for transport in India (working paper)  
<https://theicct.org/publication/india-fuel-hydrogen-cost-jan22/>

**Figure:** Comparison of per-hour total ownership costs of agricultural tractors by different charging patterns and power price



(Source: *Incentives for electrifying agricultural tractors in India*, <https://theicct.org/publication/india-hvs-evs-incentives-elec-tractors-india-oct22/>)

**Figure:** Comparison of the mid-level and optimistic costs of green hydrogen production



(Source: *Hydrogen fuel for transport in India*, <https://theicct.org/publication/india-fuel-hydrogen-cost-jan22/>)

# LATIN AMERICA

Brazil is the fourth-largest vehicle market in the world and an important factor in the global biofuels industry. ICCT supports Brazilian governmental agencies, filling technical gaps for more advanced vehicle emissions, fuel quality, and sustainable freight and mobility policies. Other countries in Latin America offer valuable insights into effective policymaking for smaller economies. In Argentina, Chile, and Colombia, ICCT research provides essential technical foundations for development of emissions and efficiency standards, incentives for ultra-clean buses, market-based approaches such as green freight programs, and innovative fiscal policies.

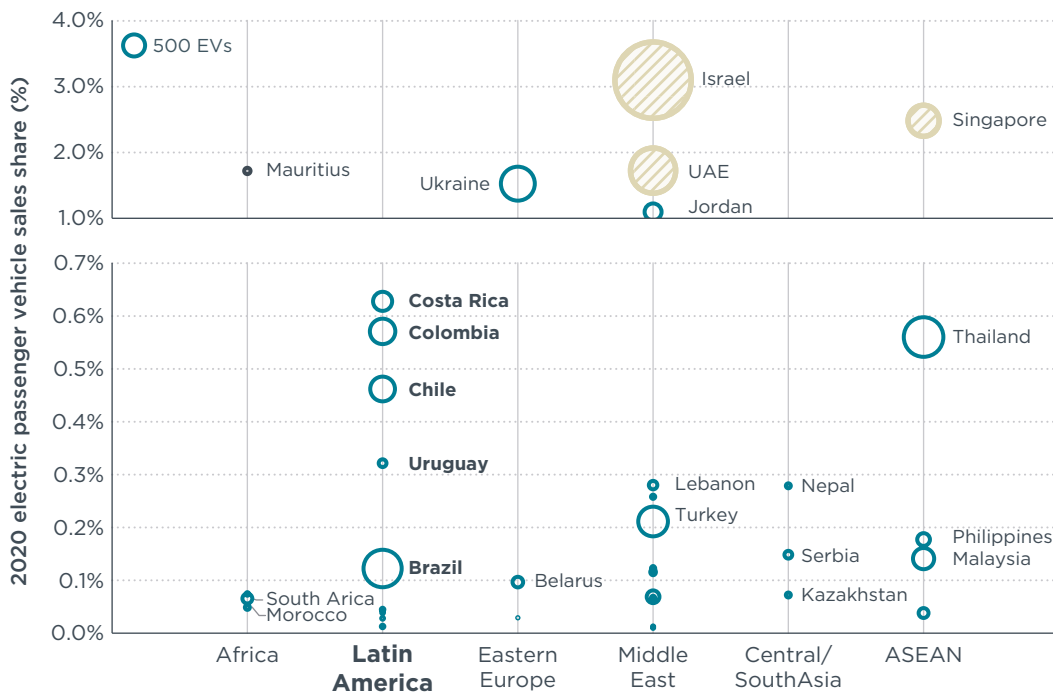
Research in 2022 which focused on Latin America involved a host of issues in various transport sectors, including shipping emissions, fuel and emission standards, and the transition to zero-emission light- and heavy-duty vehicles.



# ZERO-EMISSION VEHICLE DEPLOYMENT IN LATIN AMERICA

ICCT Researchers surveyed the status of zero-emission vehicle (ZEV) development in Latin American economies, focusing on the passenger car, truck, and bus sectors. The study found that EV adoption is underway in some Latin American markets for the passenger vehicle segment, but at an early stage, with Costa Rica, Colombia, and Chile reaching new electric vehicle sales shares of about 0.5%. However, buses and government fleets have made strides in electrification, with Chile and Colombia being home to the largest fleets of electric buses after China. The research suggests that Latin American markets would benefit from greater collaboration across many areas, including improving ZEV cost-competitiveness, developing a dense nationwide network of charging infrastructure, and replicating successful financing and business models for scaling ZEVs in fleets.

**Figure:** EV sales share for passenger cars in 2020



Note: Israel, UAE, and Singapore are high-income countries

(Source: Zero-emission vehicle deployment: Latin America, <https://theicct.org/publication/hvs-zev-deploy-latam-apr22/>)

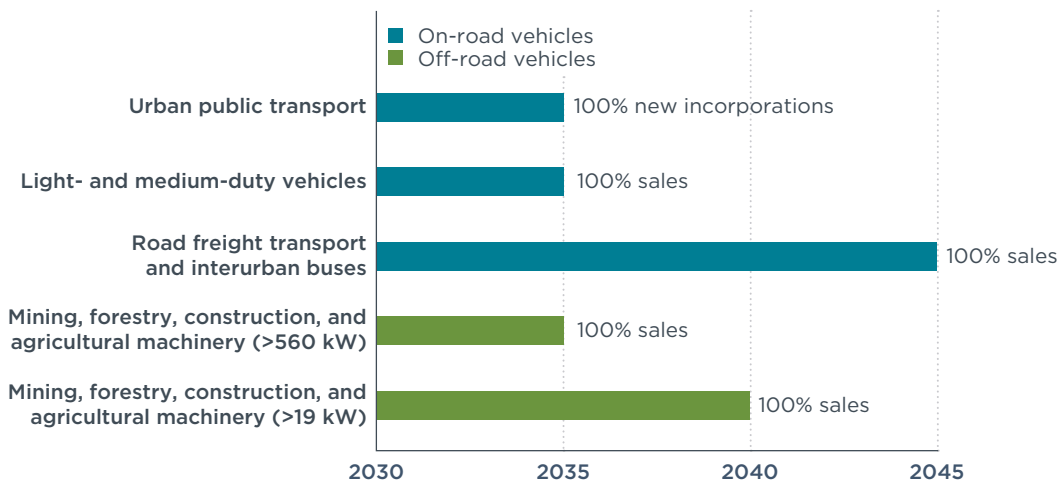
## PUBLICATIONS OF NOTE:

Proyecto de modificación de la norma mexicana de rendimiento de combustible para vehículos ligeros - NOM-163-SEMARNAT-ENER-SCFI-2013 (policy update)  
<https://theicct.org/publication/mexico-lvs-nom163-update-nov22/>

Fuel economy standards and zero-emission vehicle targets in Chile (policy update)  
<https://theicct.org/publication/lat-am-lvs-hvs-chile-en-aug22/>

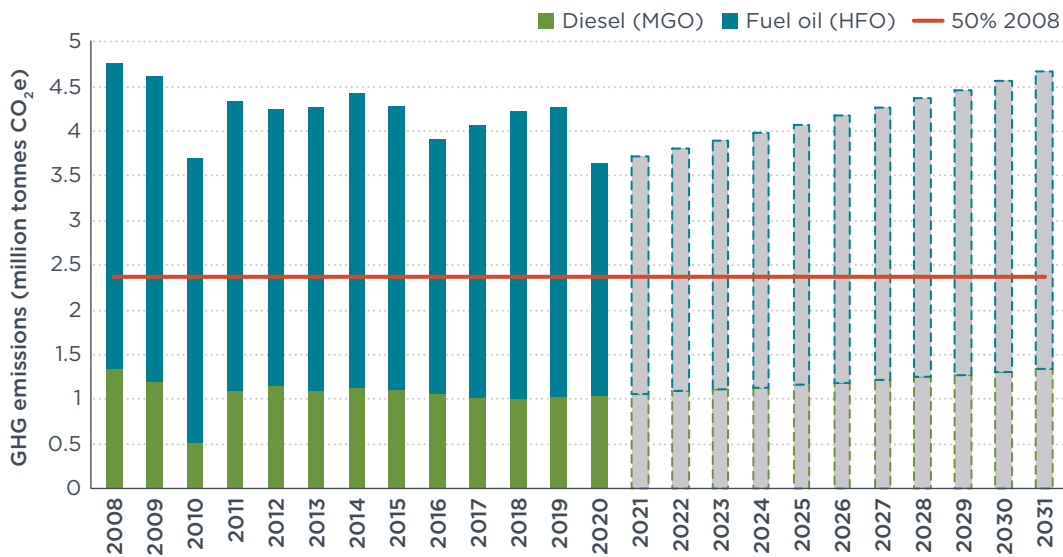
Brazilian coastal shipping: New prospects for growth with decarbonization (working paper)  
<https://theicct.org/publication/brazil-marine-brazil-coastal-shiping-new-prospects-growth-decarbonization-jul22/>

**Figure:** Sales targets for zero-emission vehicles in Chile, through its National Electromobility Strategy



(Source: Fuel economy standards and zero-emission vehicle targets In Chile, <https://theicct.org/publication/lat-am-lvs-hvs-chile-en-aug22/>)

**Figure:** Projected GHG emissions from cabotage in Brazil through 2031



(Source: Brazilian coastal shipping: New prospects for growth with decarbonization, <https://theicct.org/publication/brazil-marine-brazil-coastal-shipping-new-prospects-growth-decarbonization-jul22/>)

# NORTH AMERICA

The United States pioneered the regulation of vehicle air pollutant emissions and fuel economy in the 1960s and 1970s, and Canada has largely followed suit. Auto and parts makers have a long history of tightly integrated operations across the border. Regulators over the past half century have pushed manufacturers to design and build more-efficient cars and trucks and promote renewable and low-carbon fuels. ICCT staff engage with federal, state, provincial, and local governments to shape practical and cost-effective policies for clean vehicles and fuels and to defend and extend the public policy achievements of past decades.

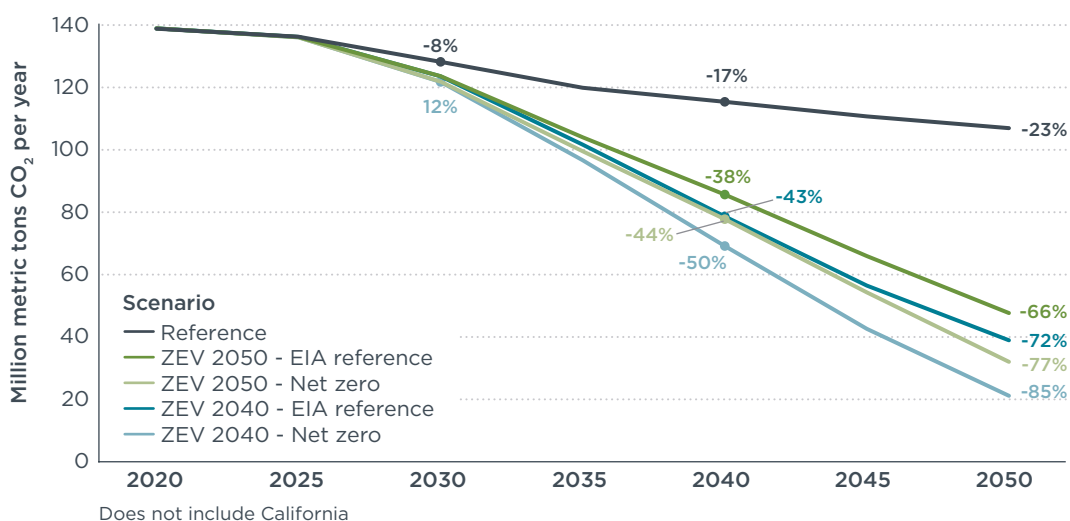
In 2022, ICCT research focusing on North America included studies on electric vehicle costs and benefits, charging infrastructure, and policies to support the transition to zero-emission cars and trucks.



# BENEFITS OF THE 2020 MULTI-STATE MEDIUM- AND HEAVY-DUTY ZERO-EMISSION VEHICLE MEMORANDUM OF UNDERSTANDING

A coalition of states and the District of Columbia signed a Memorandum of Understanding (MOU), sharing a goal of achieving at least 30% medium- and heavy-duty (M/HD) zero-emission vehicle sales by 2030 and 100% sales no later than 2050. ICCT researchers undertook a study to estimate the benefits of achieving the MOU sales targets in select states by following regulatory precedents set in California. They found that adoption of California's Advanced Clean Trucks rule in these states would lead to a decline of well-to-wheel CO<sub>2</sub> emissions 12% below 2020 levels. Achieving the 100% zero-emission medium- and heavy-duty sales goal by 2050 would deliver well-to-wheel CO<sub>2</sub> emissions that are 38% below 2020 levels by 2040. Emissions would further decline to 66% below 2020 levels by 2050, avoiding a cumulative 646 million metric tons of CO<sub>2</sub> emissions from 2020 to 2050.

**Figure:** Comparison of medium- and heavy-duty vehicle fuel lifecycle CO<sub>2</sub> emissions across scenarios. Data labels show the percent change compared to 2020.



(Source: *Benefits of the 2020 Multi-State Medium- and Heavy-Duty Zero-Emission Vehicle Memorandum of Understanding*, <https://theicct.org/publication/md-hd-mou-benefits-apr22/>)

## PUBLICATIONS OF NOTE

Assessment of light-duty electric vehicle costs and consumer benefits in the United States in the 2022-2035 time frame (white paper)  
<https://theicct.org/publication/ev-cost-benefits-2035-oct22/>

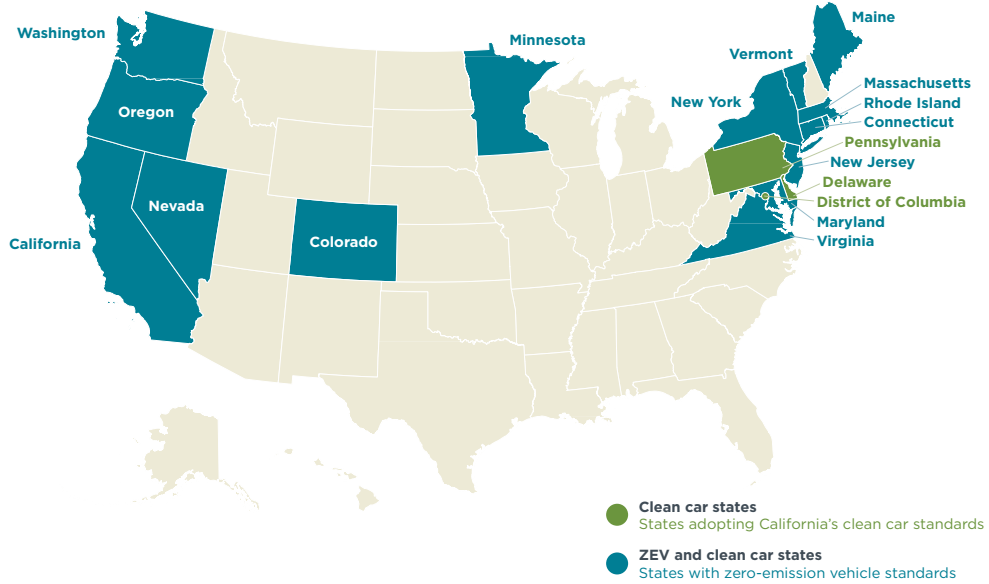
Canada's path to 100% zero-emission light-duty vehicle sales: Regulatory options and greenhouse gas impacts (working paper)  
<https://theicct.org/publication/can-zev-reg-options-jun22/>

Opportunities and risks for a national low-carbon fuel standard (white paper)  
<https://theicct.org/publication/low-carbon-fuels-us-mar22/>

Adapting U.S. heavy-duty vehicle emission standards to support a zero-emission commercial truck and bus fleet (briefing)  
<https://theicct.org/publication/us-hvs-standards-ze-fleet-feb22/>

**Figure:** States with zero-emission vehicle and clean car standards, February 2022.

## U.S. states with ZEV and clean car standards

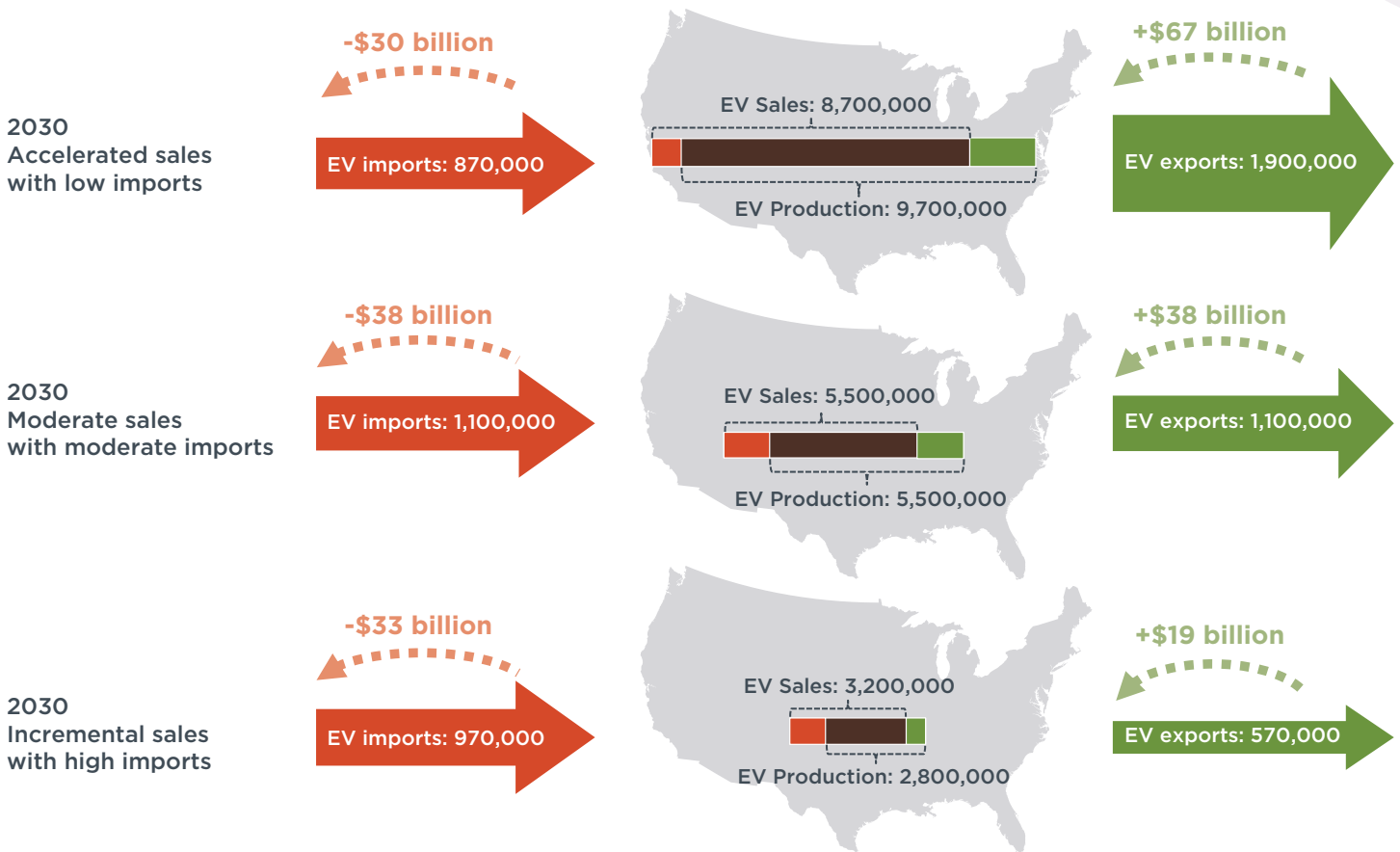


To meet clean air and pollution mitigation obligations, states are forging ahead on zero-emission vehicle (ZEV) standards and clean car standards. Seventeen states and the District of Columbia have adopted the California Low-Emission Vehicle regulations, fifteen of which have also adopted the California Zero-Emission Vehicle regulation. These standards go beyond those at the federal level and are the most stringent emissions standards and zero-emission vehicle sales requirements for light-duty vehicles in the United States.

(Source: <https://theicct.org/infographic-us-zev-and-clean-car-states-feb22/>)



**Figure:** U.S. electric vehicle market metric volumes and trade revenue, three scenarios, 2030



(Source: *Power play: Unlocking the potential for U.S. automotive trade with electric vehicles*, <https://theicct.org/publication/us-can-evs-power-play-unlock-potential-of-auto-trade-with-elec-vehicles-jun22/>)

# GLOBAL

While much of ICCT's work is focused on a regional level, some sectors—specifically aviation and marine—work across borders and require international collaboration to address greenhouse gas and pollutant emissions. ICCT researchers analyze the current state of emissions from aviation and marine and investigate the impact that new technologies or strategies could have on these sectors. In addition, researchers work with country and international governing regulatory bodies to help set policies and international standards the aviation and marine sectors.

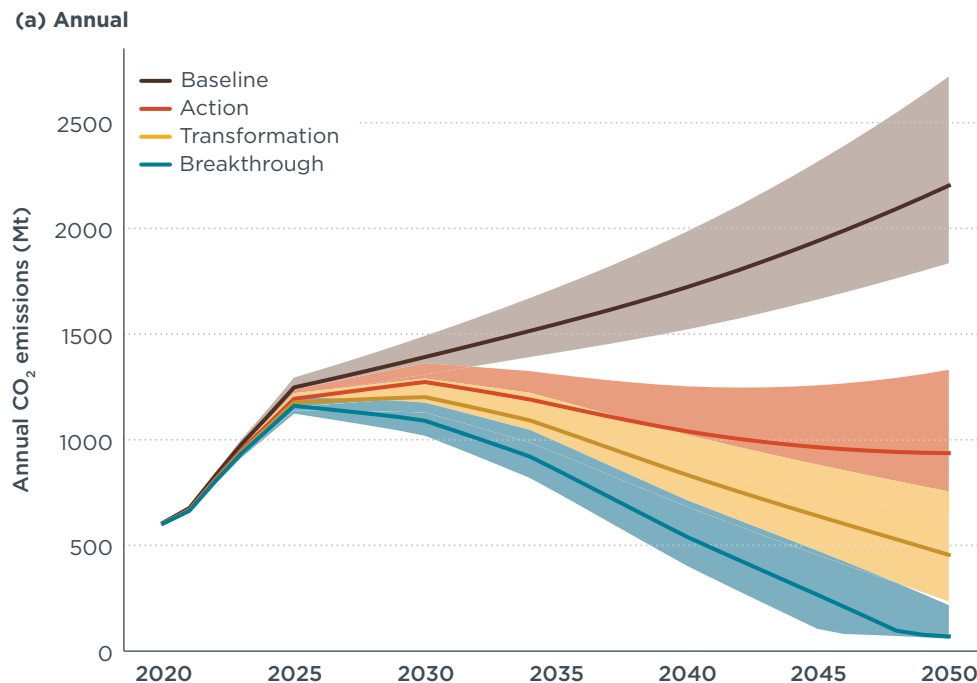
In 2022, ICCT researchers undertook studies on supersonic aircraft, the potential of replacing fossil fuels with hydrogen to power bulk carriers, and the impact of updating International Maritime Organization regulations to include all climate pollutants.



# ALIGNING AVIATION WITH THE PARIS AGREEMENT

Airlines and governments have committed to achieving net-zero emissions from aviation by mid-century. An ICCT report assessed the extent to which measures can reduce cumulative CO<sub>2</sub> emissions from global aviation to be in line with targets outlined in the Paris Climate Agreement to keep global warming under 1.5°C, 1.75°C, and 2°C. The study found that widespread investments in zero-carbon aircraft and fuels would cut aviation CO<sub>2</sub> emissions by more than 90% below 2019 levels in 2050, which is consistent with 1.75°C pathway under which aviation doesn't increase its share of a global carbon budget. Sustainable aviation fuels accounted for the largest share of CO<sub>2</sub> reduction potential, varying between 59% and 64% across the scenarios studied. Improvements in aircraft technical and operational efficiency could contribute an additional one-third of CO<sub>2</sub> mitigation. Zero-emission planes powered by hydrogen could account for up to 5% of emission reductions in 2050.

**Figure:** Global aviation CO<sub>2</sub> emissions by scenario and traffic forecast, 2020–2050



(Source: *Vision 2050: Aligning aviation with the Paris Agreement*, <https://theicct.org/publication/global-aviation-vision-2050-align-aviation-paris-jun22/>)

## PUBLICATIONS OF NOTE:

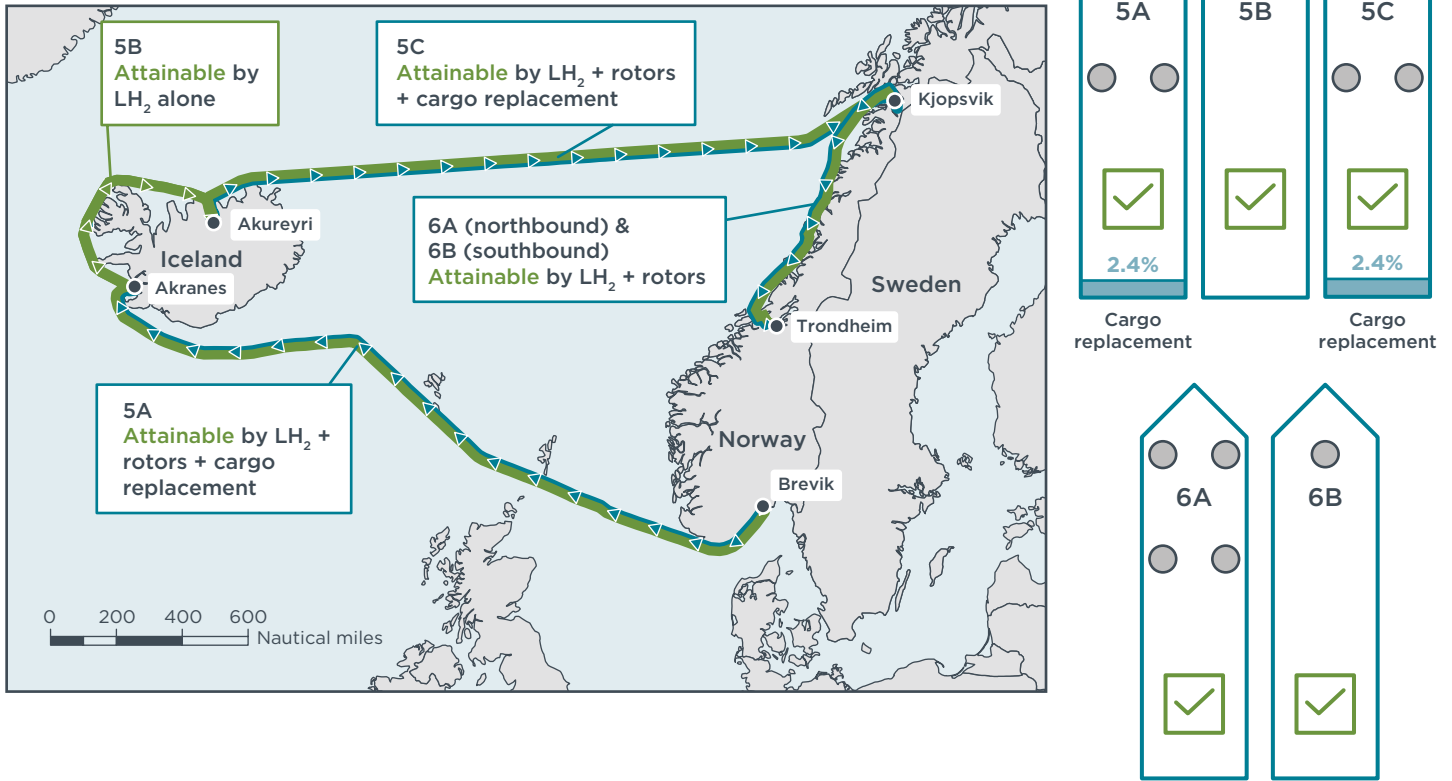
How updating IMO regulations can promote lower greenhouse gas emissions from ships (working paper)  
<https://theicct.org/publication/marine-imo-eedi-oct22/>

Performance analysis of regional electric aircraft (white paper)  
<https://theicct.org/publication/global-aviation-performance-analysis-regional-electric-aircraft-jul22/>

Environmental limits on supersonic aircraft in 2035 (working paper)  
<https://theicct.org/publication/aviation-global-supersonic-safs-feb22/>

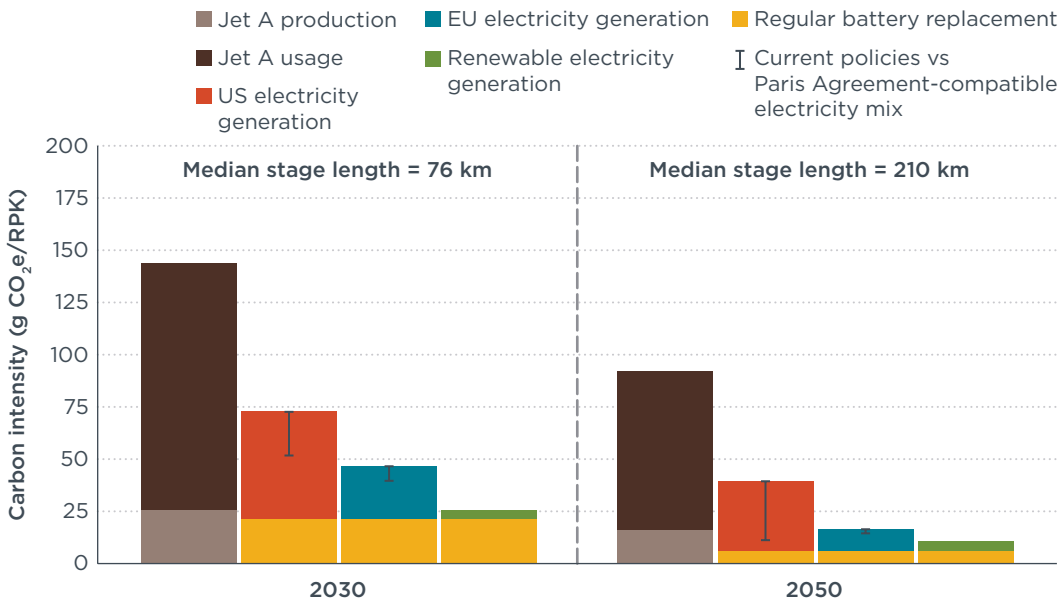
Decarbonizing bulk carriers with hydrogen fuel cells and wind-assisted propulsion:  
A modeled case study analysis (white paper)  
<https://theicct.org/publication/hydrogen-and-propulsion-ships-jan22/>

**Figure:** Summary of attainable routes for a 7,570 dwt bulk carrier using LH<sub>2</sub> fuel cells and rotor sails



(Source: *Decarbonizing bulk carriers with hydrogen fuel cells and wind-assisted propulsion: A modeled case study analysis*, <https://theicct.org/publication/hydrogen-and-propulsion-ships-jan22/>)

**Figure:** Well-to-wake GHG emissions of electric and fossil-fueled aircraft operations including battery replacement, 2030 and 2050



(Source: *Performance analysis of regional electric aircraft*, <https://theicct.org/publication/global-aviation-performance-analysis-regional-electric-aircraft-jul22/>)

# INTERNATIONAL PARTNERSHIPS

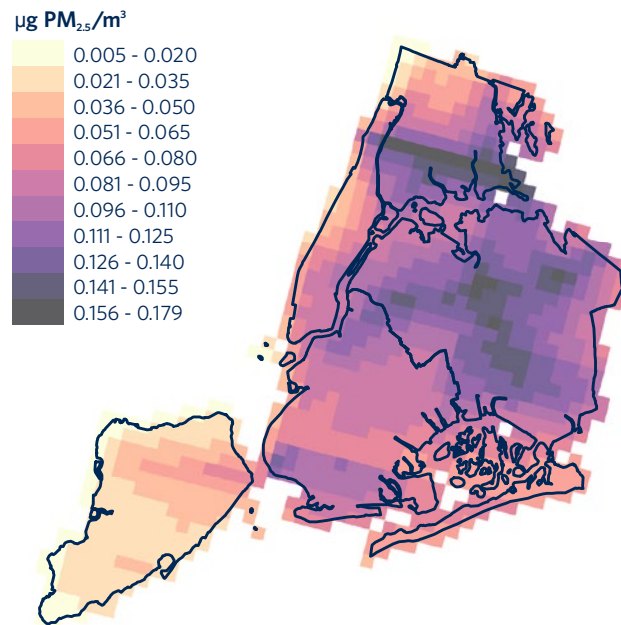
The scale of the challenge we face inspires our collaboration with like-minded organizations. The ICCT acts as an organizer of multiple organizations, including The Real Urban Emissions (TRUE) Initiative, the Zero Emission Bus Rapid-deployment Accelerator (ZEBRA), and the ZEV Transition Council (ZEVTC). In addition, ICCT participates in a host of other partnerships, including the Global Fuel Economy Initiative, the G20 Transport Task Group, and the Accelerating to Zero Coalition.

Research undertaken by ICCT on behalf of our international partnerships include studies of real-world emissions from transport in Warsaw to assist with the design of the city's planned low-emission zone, assessments of the performance and benefits of zero-emission buses in Santiago, Mexico City, and São Paulo, and a wholistic assessment of the global ZEV market, including the benefits of recent policy developments and opportunities and in emerging markets.

# AIR QUALITY AND HEALTH IMPACTS OF DIESEL TRUCK EMISSIONS IN NEW YORK CITY AND POLICY IMPLICATIONS

As part of the TRUE Initiative, ICCT researchers examined spatial patterns of air pollution from diesel trucks in New York City. The analysis found that pre-2007 engine model year trucks make up 6%–10% of the fleet but contribute 64%–83% of diesel truck tailpipe PM<sub>2.5</sub> emissions. Additionally, the research found that replacing an older, pre-2010 engine model year truck with a new diesel truck can reduce health impacts by 81% to 96%. The study also found that people of color living in the city are exposed to 5% more PM<sub>2.5</sub> from diesel trucks than average. Policies such as emissions-based access restrictions with targets for fully zero-emission operation can be focused on the environmental justice areas currently experiencing the largest health burdens to reduce this racial disparity.

**Figure:** Ambient PM<sub>2.5</sub> concentrations attributable to diesel truck tailpipe emissions within New York City.



(Source: *Air quality and health impacts of diesel truck emissions in New York City and policy implications*, <https://theicct.org/publication/true-diesel-trucks-nyc-apr22/>)

## PUBLICATIONS OF NOTE:

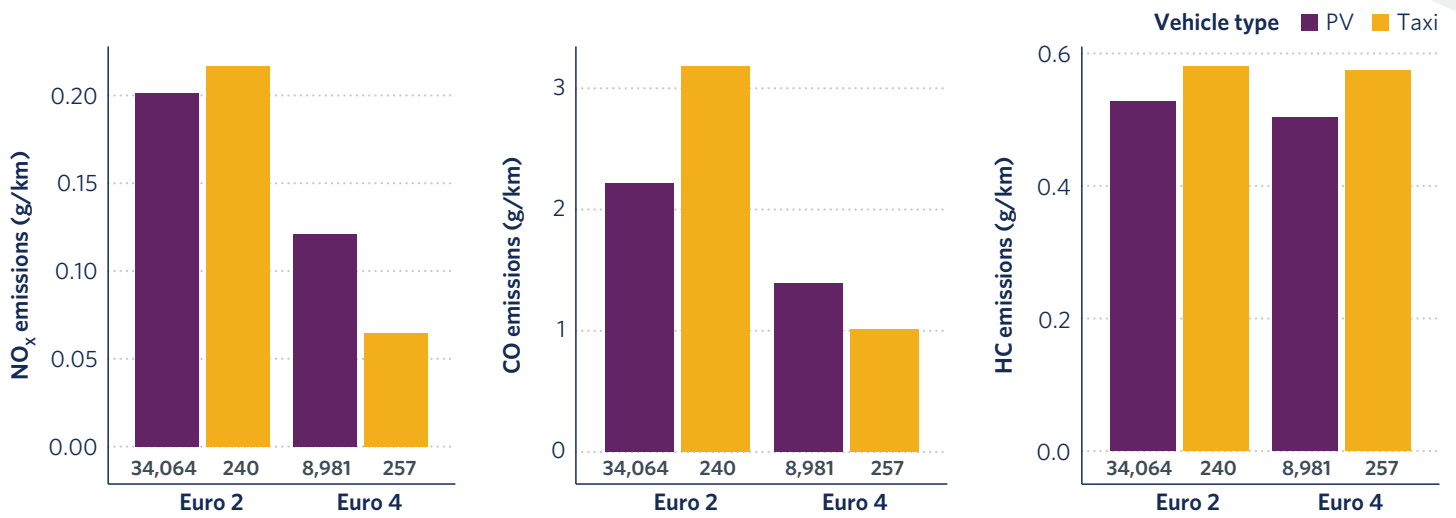
Decarbonizing road transport by 2050: Zero-emission pathways for passenger vehicles (ZEVTC publication)  
<https://theicct.org/publication/decarbonizing-road-transport-by-2050-zero-emission-pathways-for-passenger-vehicles/>

Evaluation of real-world vehicle emissions in Warsaw (TRUE publication)  
<https://theicct.org/publication/true-warsaw-emissions-apr22/>

Costo total de propiedad: Buses eléctricos en el nuevo modelo de negocios del transporte público de Santiago de Chile (ZEBRA publication)  
<https://theicct.org/publication/costo-total-de-propiedad-buses-electricos-en-el-nuevo-modelo-de-negocios-del-transporte-publico-de-santiago-de-chile/>

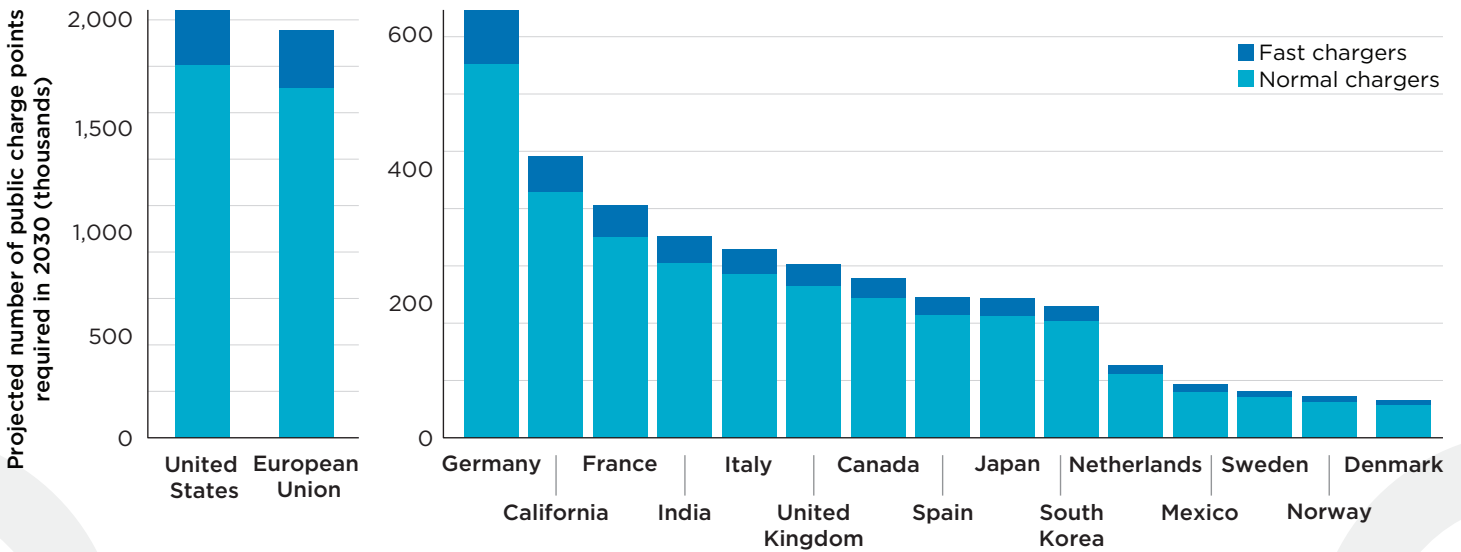
Measurement of real-world motor vehicle emissions in Jakarta (TRUE publication)  
<https://theicct.org/publication/true-jakarta-remote-sensing-nov22/>

**Figure:** Median NO<sub>x</sub>, CO, and HC emissions of gasoline passenger vehicles and taxis produced after 2013 in Jakarta.



(Source: *Measurement of real-world motor vehicle emissions in Jakarta*, <https://theicct.org/publication/true-jakarta-remote-sensing-nov22/>)

**Figure:** Projected number of public charge points needed for light-duty electric vehicles in 2030 for each ZEV Transition Council member



(Source: *Deploying charging infrastructure to support an accelerated transition to zero-emission vehicles*, <https://theicct.org/publication/deploying-charging-infrastructure-zevtc-sep22/>)

# TRANSATLANTIC TRANSPORTATION DECARBONIZATION SUMMIT

A transition to clean transportation for all markets is required to keep warming below 2 degrees. In major markets such as North America and Europe, the transition to clean transportation must be the fastest. In August of 2022, the ICCT and Agora Verkehrswende hosted the first Transatlantic Transportation Decarbonization Summit with the goal of bring together transportation leaders from these two continents in support of an accelerated transition.

The event combined a workshop's tools with a summit's influence. By facilitating deep conversations and relationship building, the Summit created an environment for sharing best practices and lessons learned. The invite-only, two-and-a-half-day event included 122 leaders and key decision makers from supranational, national, and subnational governments, along with their counterparts from across industry and non-governmental organizations. By design, the regional focus was Europe and North America, but invitees came from as far away as South Africa and Panamá.





# SUPPORTERS

The ICCT produces rigorous, fair, independent research and analysis to inform public policy and advance progress toward a cleaner global transportation system. We work under grants and contracts from numerous organizations in the private, public, and nonprofit sectors. But our work would not be possible without the vital contributions of a growing core group of funders whose generous support provides the foundation for all our efforts. Our recent funders include:

Aspen Global Change Institute  
Children's Investment Fund Foundation  
ClimateWorks Foundation  
European Climate Foundation  
European Commission  
FIA Foundation  
Heising-Simons Foundation  
Norwegian Agency for Development Cooperation (NORAD)  
P4G  
Packard Foundation  
Pisces Foundation  
Rockefeller Brothers Fund  
Skoll Foundation  
Umweltbundesamt (Federal Environmental Agency, Germany)  
United Nations Environment Programme  
The William and Flora Hewlett Foundation

# AUDITED FINANCIALS

## CONSOLIDATED STATEMENTS OF FINANCIAL POSITION

December 31

<b>CURRENT ASSETS</b>	<b>2022</b>	<b>2021</b>
Cash and cash equivalents	\$ 9,693,447	\$ 9,363,952
Promise to give, net	1,081,748	754,805
Accounts receivable, net	1,297,255	75,358
Unbilled receivables	451,810	672,497
Prepaid expenses	104,899	273,311
Right-of-use asset for finance leases, net	7,112	-
Deposit	37,217	40,436
Property and equipment, net	398,052	507,205
Right-of-use asset for operating leases, net	4,292,860	
<b>TOTAL ASSETS</b>	<u>\$ 17,364,400</u>	<u>\$ 11,687,564</u>
<b>LIABILITIES AND NET ASSETS</b>		
LIABILITIES:		
Accounts payable and accrued expenses	\$ 1,415,66	\$ 1,244,032
Refundable advances	403,962	450,061
Deferred rent	-	566,325
Lease liability for finance leases, net	7,112	-
Lease liability for operating leases, net	4,826,629	-
<b>TOTAL LIABILITIES</b>	<u>6,653,369</u>	<u>2,260,418</u>
NET ASSETS (deficit):		
Without donor restrictions	(555,439)	(1,332,167)
With donor restrictions	11,266,470	10,759,313
<b>Total net assets</b>	<u>10,711,031</u>	<u>9,427,146</u>
<b>TOTAL LIABILITIES AND NET ASSETS</b>	<u>\$ 17,364,400</u>	<u>\$ 11,687,564</u>

## CONSOLIDATED STATEMENTS OF ACTIVITIES

Year Ended December 31, 2022

	<b>Without Donor Restrictions</b>	<b>With Donor Restrictions</b>	<b>Total</b>
Revenue and support:			
Grants and contributions	\$ 2,352,108	\$ 17,341,065	\$ 19,693,173
Contract income	1,050,293	-	1,050,293
Consulting income	413,289	-	413,289
Interest income, net	54,795	-	54,795
Other income	113,401	-	113,401
Net assets released from restrictions	16,833,908	(16,833,908)	-
<b>Total revenue and support</b>	<u>20,817,794</u>	<u>507,157</u>	<u>21,324,951</u>
Expenses:			
Program services	16,745,922	-	16,745,922
Supporting services:			
Management and general	1,859,079	-	1,859,079
Communications	964,106	-	964,106
Development	471,959	-	471,959
<b>Total expenses</b>	<u>20,041,066</u>	<u>-</u>	<u>20,041,066</u>
<b>Change in assets</b>	776,728	507,157	1,283,885
Net assets (deficit)			
Beginning	(1,332,167)	10,759,313	9,427,146
Ending	<u>\$ (555,439)</u>	<u>\$ 11,266,470</u>	<u>\$ 10,711,031</u>



**icct**

THE INTERNATIONAL COUNCIL  
ON CLEAN TRANSPORTATION

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