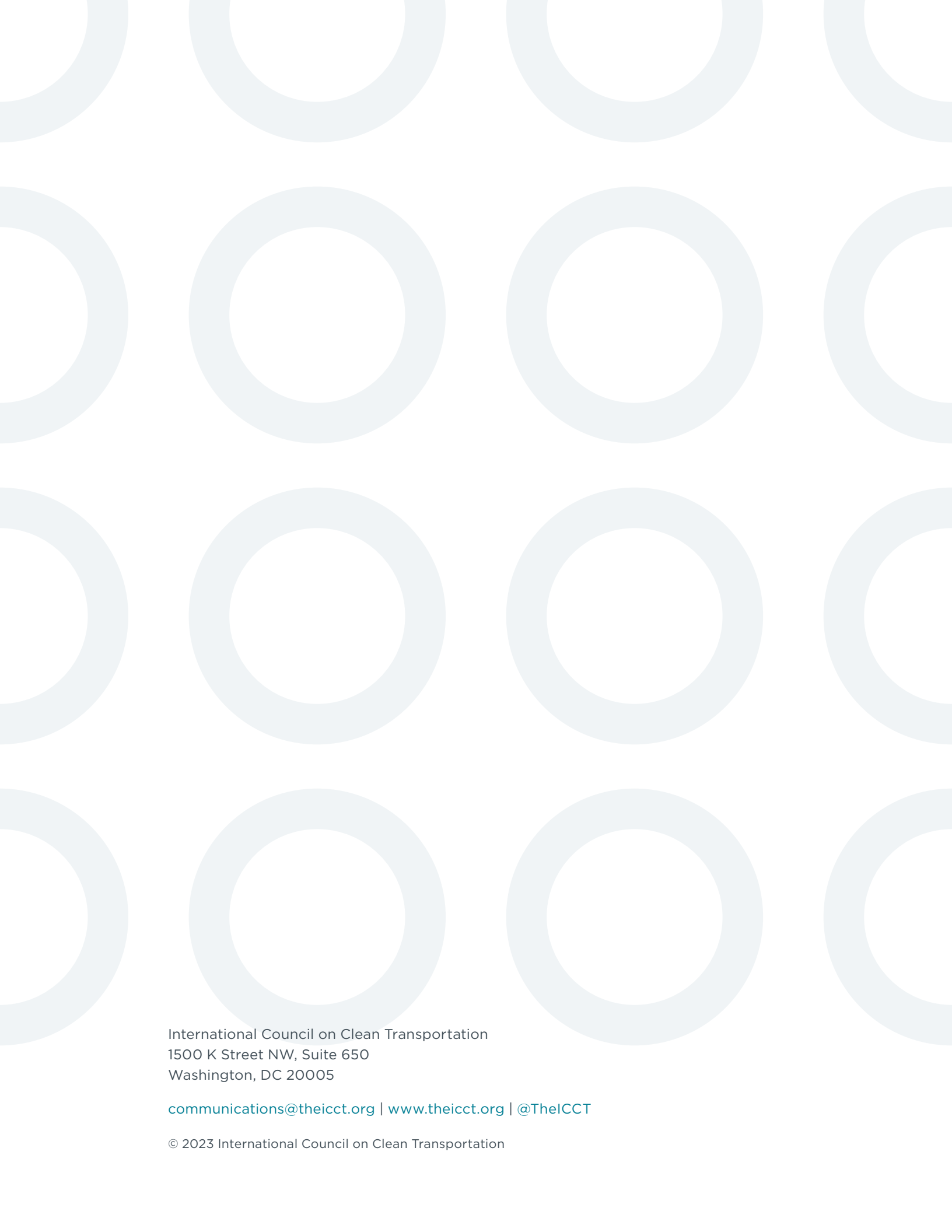




icct

THE INTERNATIONAL COUNCIL
ON CLEAN TRANSPORTATION

ANNUAL REPORT **2021**



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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.

In the last five years alone, we have worked successfully with regulators and lawmakers around the world and have played a significant role in 48 distinct regulations and policies.

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.

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.

IMPACT

Presence in
10
countries

261
research papers
and blog posts
published

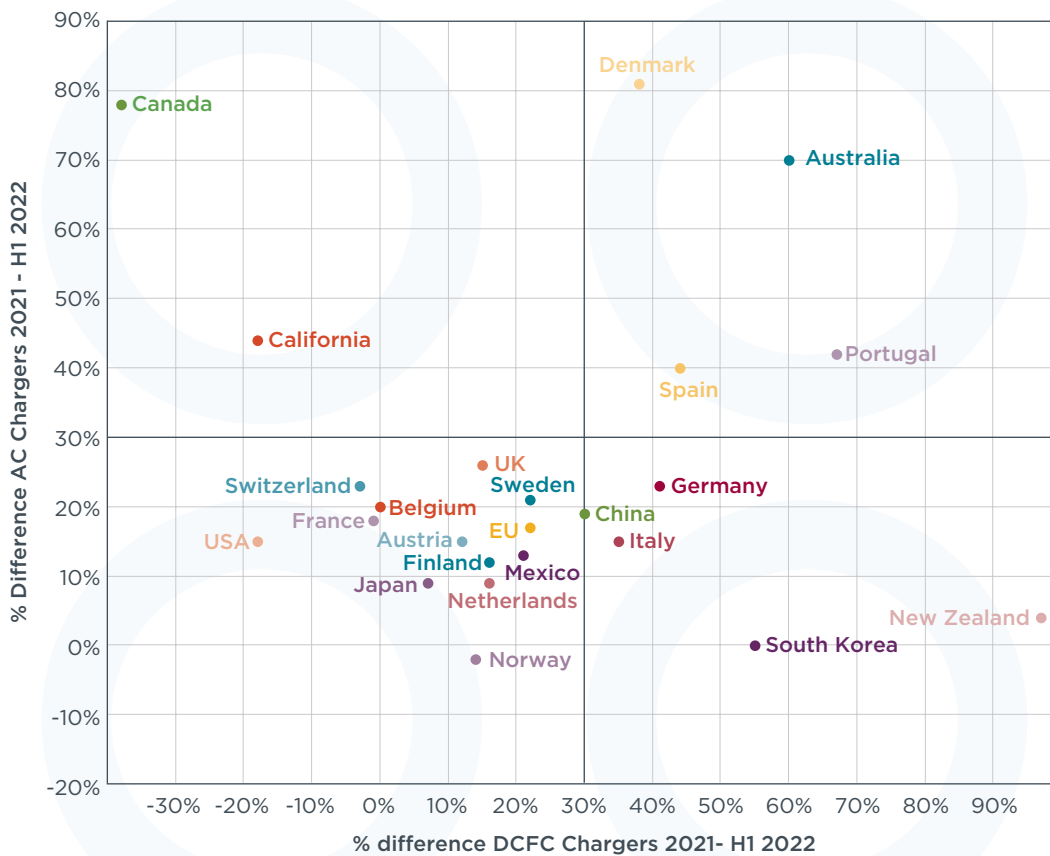


Figure: Growth in normal (AC) and fast (DCFC) chargers, 2020-2021

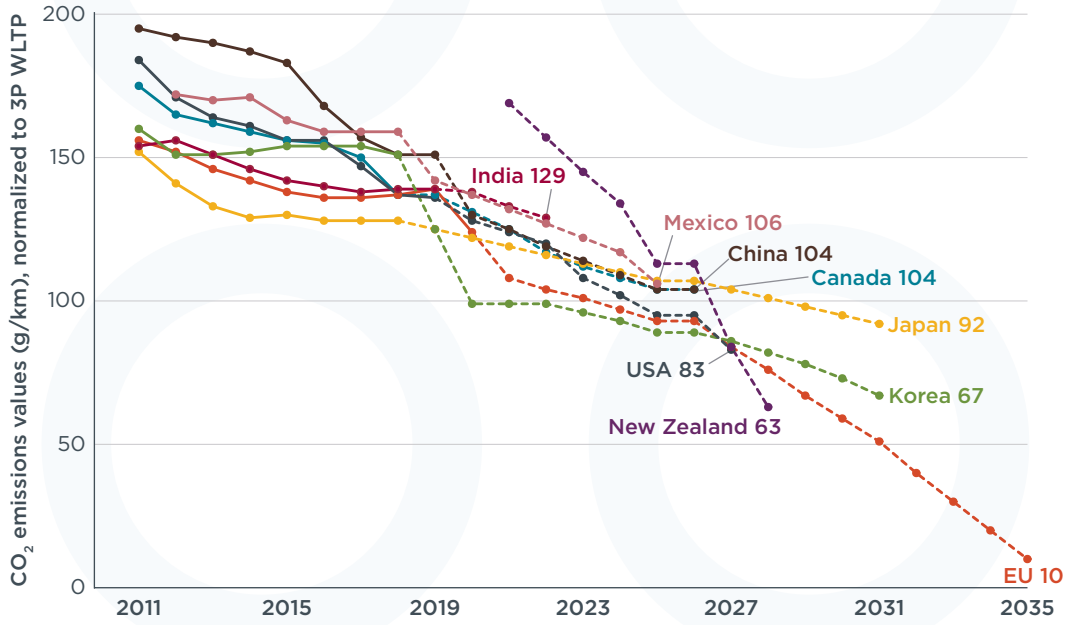


Figure: Historical and projected GHG and fuel efficiency standards for passenger cars

24

webinars
and events
organized

55

videos
produced

19%

growth
in Twitter
followers

57%

growth in
LinkedIn
followers

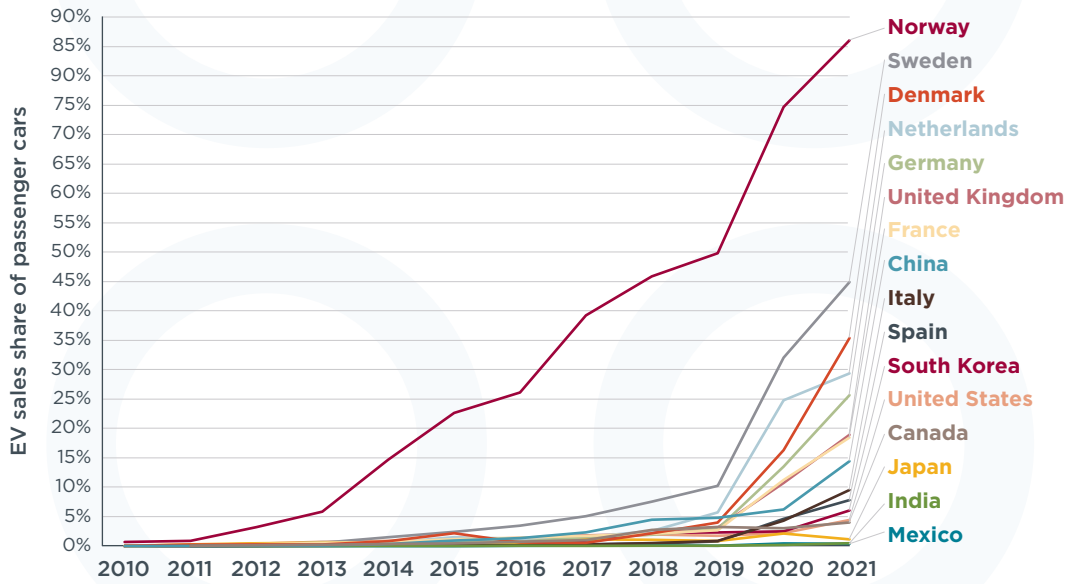


Figure: Electric vehicle passenger car sales share, 2010-2021

1,458,446
website page
views

3,800
newsletter
subscribers

29%
growth in
WeChat
followers

Mentioned in
506
press articles
across globe



ICCT HIGHLIGHTS BY REGION

NORTH AMERICA

In 2021, researchers at the ICCT aided governments in assessing policies to address emissions from combustion engine vehicles and to accelerate the transition to zero-emission vehicles.

Researchers assessed the benefits of adopting California's medium- and heavy-duty vehicle regulations under Clean Air Act section 177 in 13 states and the District of Columbia. Estimates of annual avoided NO_x reductions in 2050 in each location ranged from 220 tons to 17,110 tons per year.

In addition to conducting research on the charging infrastructure required to support the electric passenger car fleet at the city, state, and national level, researchers performed a study estimating the number of chargers and hydrogen fueling stations to support the transition to a zero-emission heavy-duty fleet. The study concluded that by 2050, 2.5 million charging points and 6,900 hydrogen fueling stations will be required to support a fleet of 2.4 million zero-emission tractor-trailers.



CHARGING UP AMERICA: ASSESSING THE GROWING NEED FOR U.S. CHARGING INFRASTRUCTURE THROUGH 2030

In light of the Biden Administration’s target of a 50% of electric vehicle sale share in the United States by 2030, researchers at the ICCT assessed the charging infrastructure needs through 2030 and the associated cost. The study found that to support a stock of 26 million electric vehicles in the United States in 2030, public and workplace charging will need to grow from approximately 216,000 chargers in 2020 to 2.4 million by 2030, including 1.3 million workplace, 900,000 public Level 2, and 180,000 direct current fast chargers.

Although most electric vehicle charging is expected to be performed with home chargers, the study concluded an investment of \$28 billion will be needed for public and workplaces chargers between 2021 and 2030. Lower-income communities will need persistent investments, amounting to about 30% of chargers and charging investments through 2030, to ensure equitable infrastructure access.

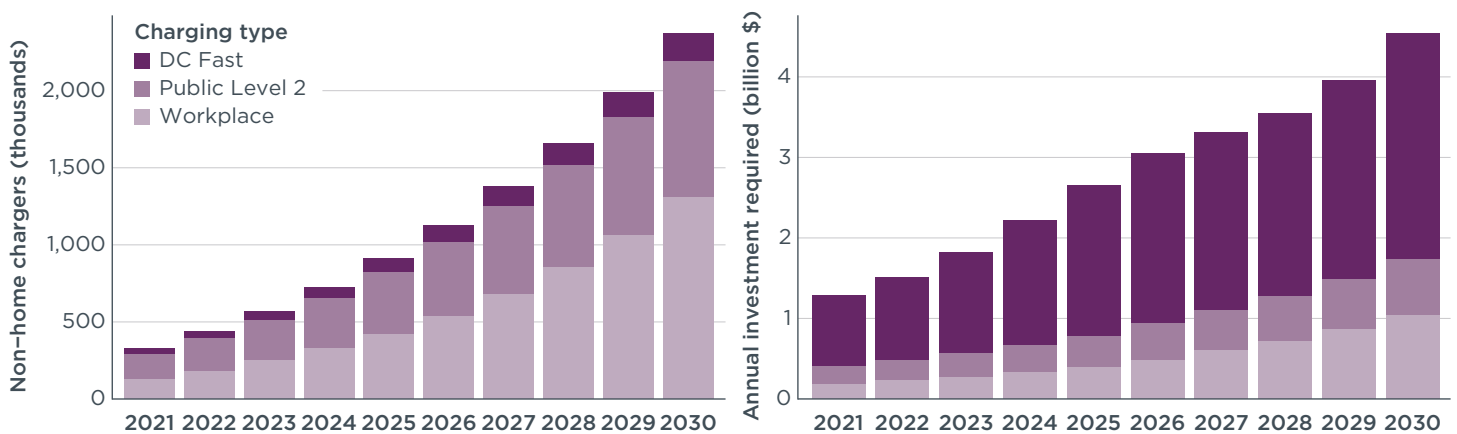


Figure: Charging infrastructure (left) and the associated investment (right) needed to support U.S. electric vehicle market through 2030.

(Source: *Charging up America: Assessing the growing need for U.S. charging infrastructure through 2030*, <https://theicct.org/publication/charging-up-america-assessing-the-growing-need-for-u-s-charging-infrastructure-through-2030/>)

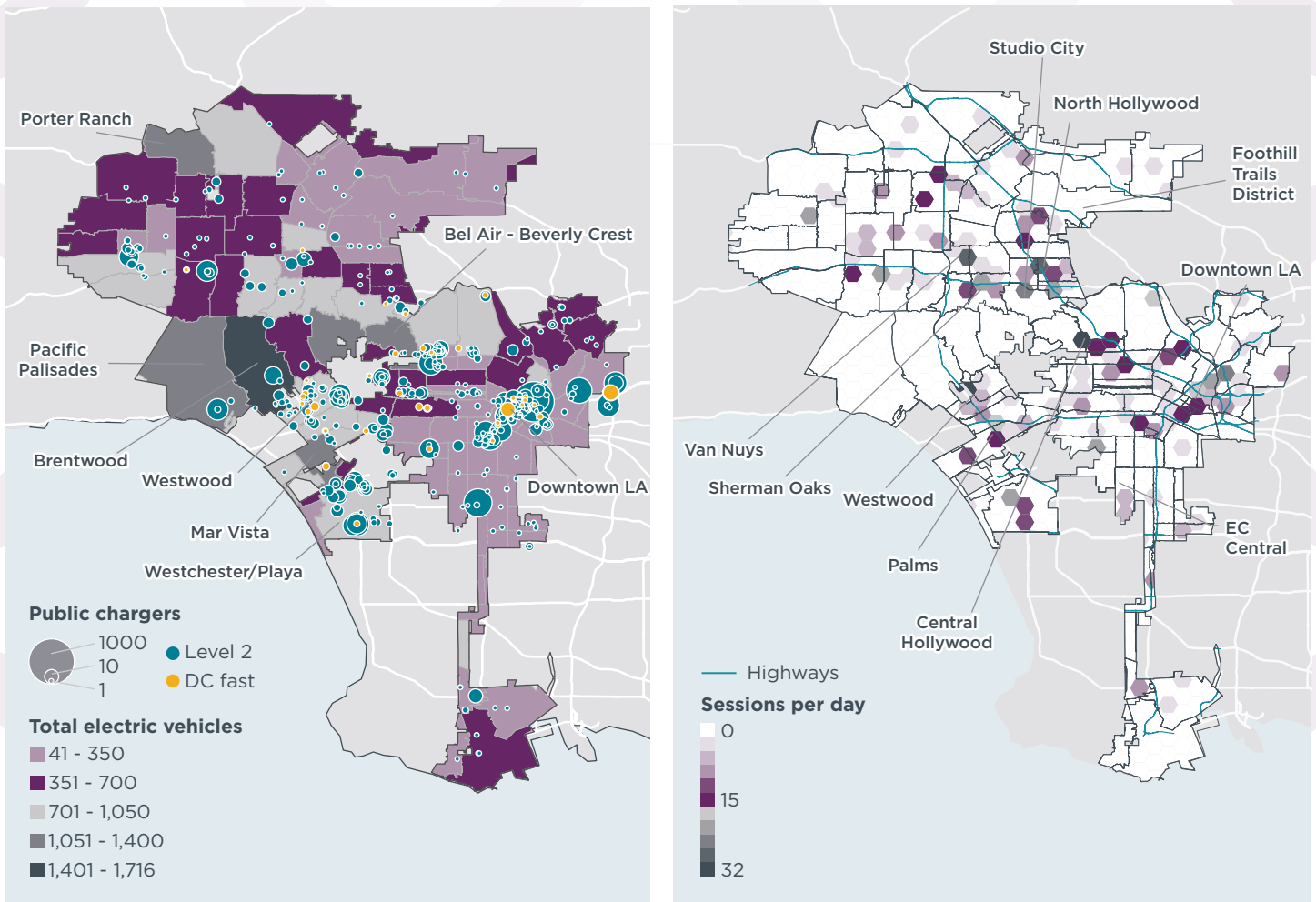


Figure: Los Angeles cumulative electric vehicle registrations through 2018 and public charging locations through 2019 (left) and charging sessions per day (right)

(Source: *Los Angeles electric vehicle charging infrastructure needs and implications for zero-emission area planning*, <https://theicct.org/publication/los-angeles-electric-vehicle-charging-infrastructure-needs-and-implications-for-zero-emission-area-planning/>)

PUBLICATIONS OF NOTE

Power play: Evaluating the U.S. position in the global electric vehicle transition (briefing)
<https://theicct.org/publication/power-play-evaluating-the-u-s-position-in-the-global-electric-vehicle-transition/>

Low-cost carriers and U.S. aviation emissions growth, 2005 to 2019 (white paper)
<https://theicct.org/publication/low-cost-carriers-and-u-s-aviation-emissions-growth-2005-to-2019/>

Air quality impacts of biodiesel in the United States (white paper)
<https://theicct.org/publication/air-quality-impacts-of-biodiesel-in-the-united-states/>

When might lower-income drivers benefit from electric vehicles? Quantifying the economic equity implications of electric vehicle adoption (working paper)
<https://theicct.org/publication/when-might-lower-income-drivers-benefit-from-electric-vehicles-quantifying-the-economic-equity-implications-of-electric-vehicle-adoption/>

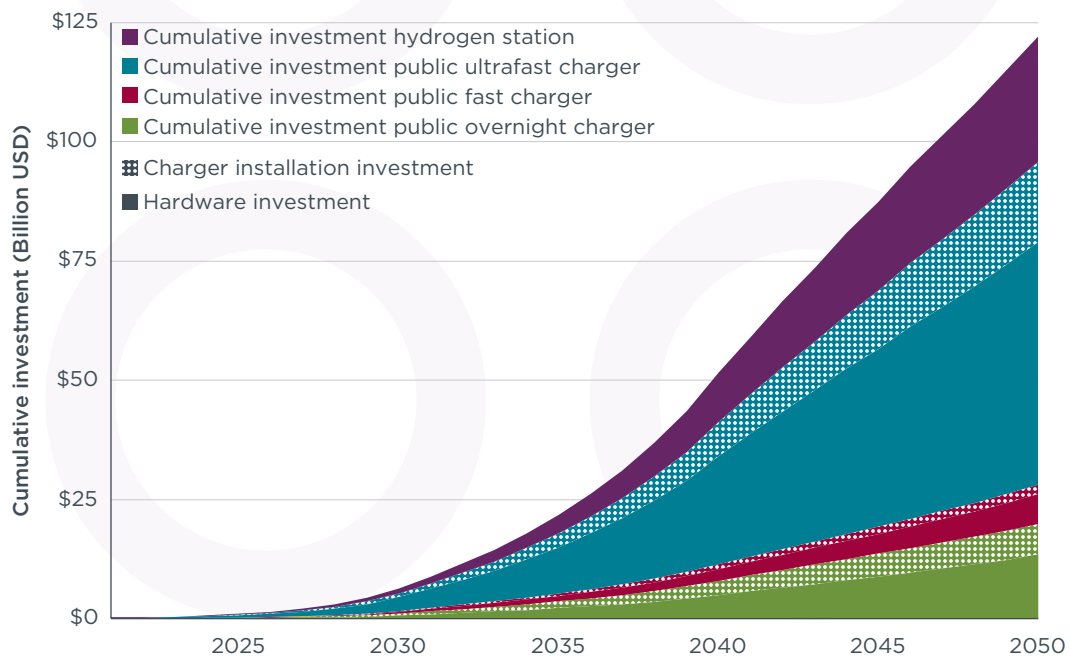


Figure: Cumulative investment needed to provide publicly accessible infrastructure to support the U.S. zero-emission tractor-trailer fleet, by infrastructure and expenditure type, from 2020 to 2050

(Source: *Infrastructure to support a 100% zero-emission tractor-trailer fleet in the United States by 2040*, <https://theicct.org/publication/infrastructure-to-support-a-100-zero-emission-tractor-trailer-fleet-in-the-united-states-by-2040/>)



To what extent delivery-related emissions increased last year owing to the boom in e-commerce is difficult to quantify. “Anecdotally, we know [delivery-related emissions] have really exploded...” said Ben Sharpe, senior researcher and Canada lead for the International Council on Clean Transportation (ICCT), an independent non-profit research organization. What is clear, he added, is that there’s no real way for Canada to meet its climate goals without aggressively looking to electrify the transportation sector—something we have so far failed to do.

“Out for delivery: Electric vans are coming to fuel e-commerce without the guilt,” The Globe and Mail, <https://www.theglobeandmail.com/drive/technology/article-out-for-delivery-electric-vans-are-coming-to-fuel-e-commerce-without/>

LATIN AMERICA

Chile stepped up to strong leadership in clean transportation when the Ministry of Energy promulgated the country's first Energy Efficiency Law in February. The law sets fuel consumption standards for light, medium, and heavy vehicles. It also authorizes the Ministry to set standards for interoperability of charging infrastructure, to ensure that a diverse set of electric vehicles with different charger types are accommodated. And the law declares boldly that hydrogen is an official fuel and source of energy; Chile, with an abundance of renewable energy, expects to become a leader in the supply of green hydrogen, which is made using renewable energy and is exceptionally climate friendly. Meanwhile, Colombia set its own ambitious goal, of achieving carbon neutrality by 2050, through its Climate Action Law.

ICCT's involvement as a key partner in the Zero Emission Bus Rapid-deployment Accelerator (ZEBRA) program was extended and deepened in 2021 with an additional grant of \$815,000 USD. At the COP26 climate meetings in November 2021, the ZEBRA partnership announced a \$1 billion collection of funds, managed by a network of 10 investors brought together by ZEBRA, to deliver zero-emission buses in Latin America. In addition, a group of bus manufacturers and distributors committed at the COP to make zero-emission buses commercially available in Latin America.

ZEBRA operates strategically to advance the adoption of e-buses on the continent, with three main thrusts: convince city leaders that e-buses are technologically viable and cost-effective, show manufacturers that a market for e-buses exists and is growing, and persuade investors that e-bus projects offer an attractive return on investment. The approach is paying off: Electric buses are in operation or on order in Brazil, México, Perú, Ecuador, Uruguay, and Costa Rica. The leaders are Chile and Colombia, with a total of more than 2000 electric buses on order or on the streets by the end of 2021. And the city of Bogotá has bookended its commitment to electric vehicles by prohibiting the purchase of fossil-fueled buses starting in 2022.

In addition to electrification, the region is pursuing eco-driving programs for road-based freight. Argentina, Brazil, Chile, Costa Rica, Mexico, and Peru all have active eco-driving programs.

FREIGHT IN BRAZIL: AN ASSESSMENT AND OUTLOOK FOR IMPROVING ENVIRONMENTAL PERFORMANCE

ICCT researchers undertook an exploratory survey of the truck market in Brazil to evaluate possible obstacles and opportunities for the application of a green freight system. Voluntary green freight programs can provide support for the design of policies such as fuel efficiency standards, especially with regard to the possibility of making data available. The assessment suggested key lessons that could be applied in the creation of a green freight program. These include the identification of a methodology to quantify emissions to help companies reach greenhouse gas reduction targets, the importance of pilot programs in informing the establishment of larger, more comprehensive programs, and the use of eco-driving programs to improve the energy efficiency of trucks.

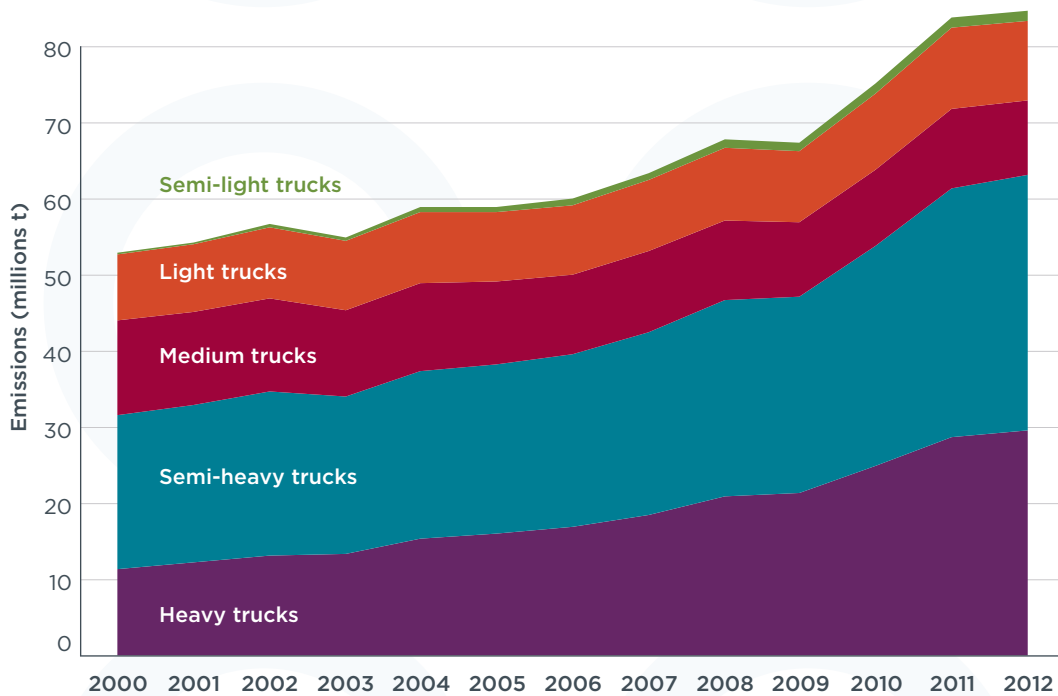


Figure: CO₂e emissions in 2012, by truck category in Brazil

(Source: *Freight in Brazil: An assessment and outlook for improving environmental performance*, <https://theicct.org/publication/freight-in-brazil-an-assessment-and-outlook-for-improving-environmental-performance/>)

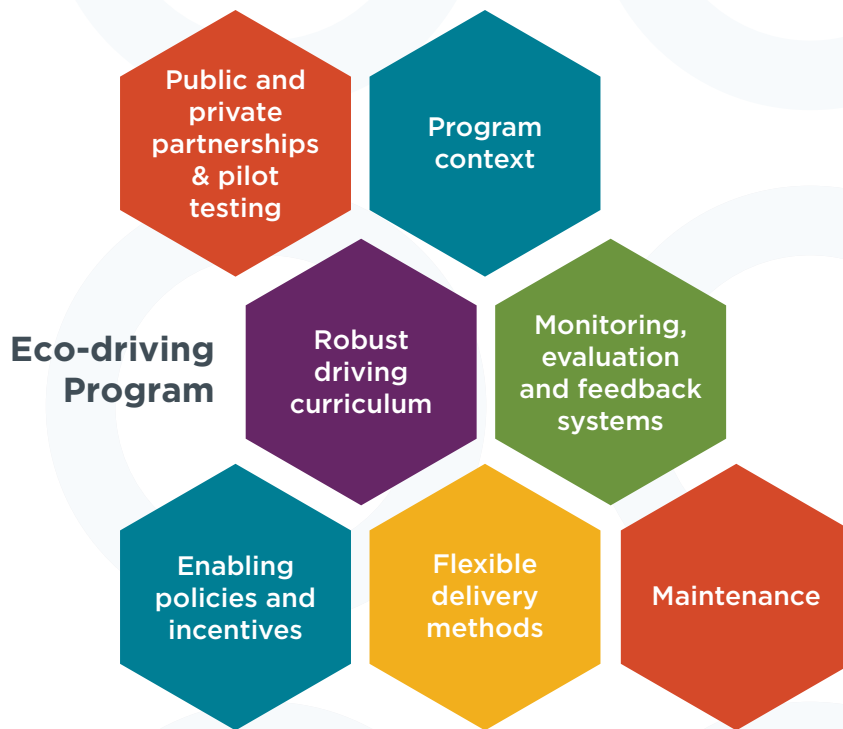


Figure: Components of a gold standard eco-driving program

(Source: *Truck eco-driving programs: Current status in Latin America and international best practices*, <https://theicct.org/publication/truck-eco-driving-programs-current-status-in-latin-america-and-international-best-practices/>)



An ICCT study shows that RenovaBio’s strategies to ensure sustainability are not enough to mitigate the indirect pressures that the demand for biofuels can generate. “If we don’t look at the expansion of soy that could be impacting deforestation—which represents 44% of CO2 emissions in Brazil—I think we will be ignoring a very serious problem”, says Carmen Araujo [ICCT Brazil Managing Director].

“Programa RenovaBio apresenta fragilidades na expansão de biocombustíveis,” eCycle, <https://www.ecycle.com.br/programa-renovabio-apresenta-fragilidades-na-expansao-de-biocombustiveis/>

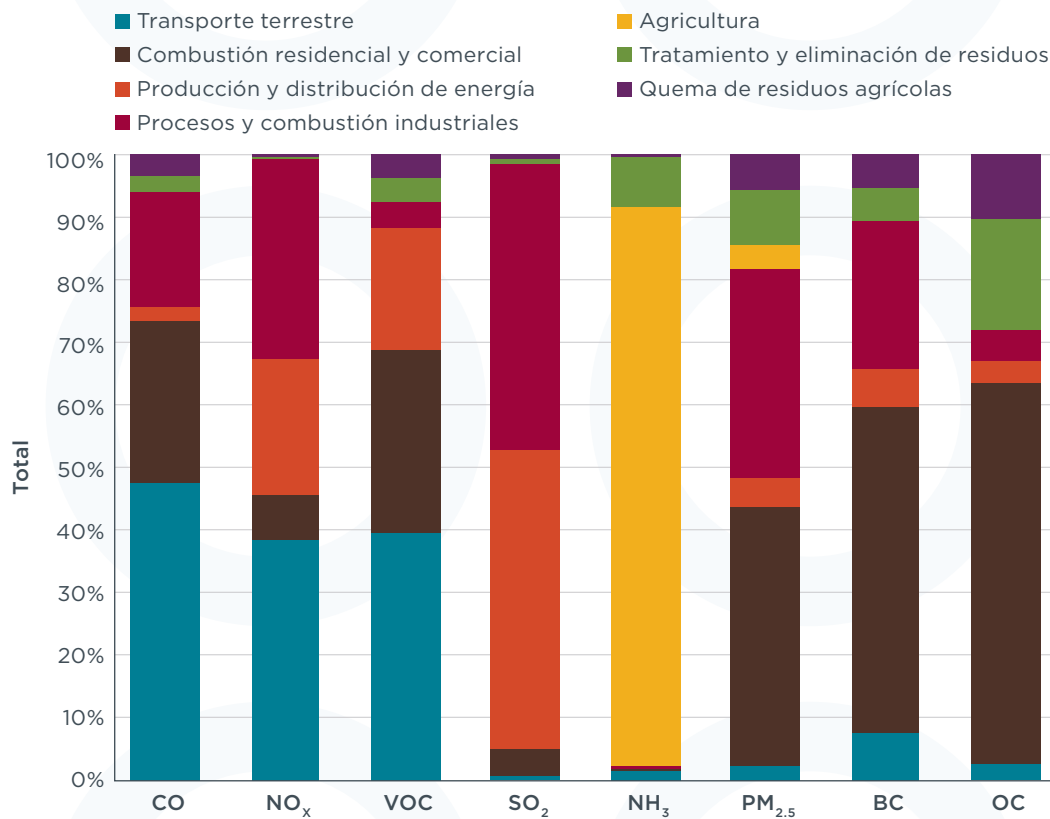


Figure: Emisiones sectoriales en 2035 por contaminante en el caso control

(Source: *Beneficios en calidad del aire y salud por la mejora de normas de emisiones para vehículos y combustibles en México*, <https://theicct.org/publication/beneficios-en-calidad-del-aire-y-salud-por-la-mejora-de-normas-de-emisiones-para-vehiculos-y-combustibles-en-mexico/>)

PUBLICATIONS OF NOTE

Programas de eco-conducción de camiones: Estado actual en América Latina y mejores prácticas internacionales (report)

<https://theicct.org/publication/programas-de-eco-conduccion-de-camiones-estado-actual-en-america-latina-y-mejores-practicas-internacionales/>

Beneficios en calidad del aire y salud por la mejora de normas de emisiones para vehículos y combustibles en México (working paper)

<https://theicct.org/publication/beneficios-en-calidad-del-aire-y-salud-por-la-mejora-de-normas-de-emisiones-para-vehiculos-y-combustibles-en-mexico/>

Truck eco-driving programs: Current status in Latin America and international best practices (report)

<https://theicct.org/publication/truck-eco-driving-programs-current-status-in-latin-america-and-international-best-practices/>

EUROPE

The European Climate Law requires that all EU Member States be climate neutral by 2050. Because transport is responsible for a large share of greenhouse gas emission, it is important to decarbonize the sector as quickly as possible. In 2021, a large share of ICCT research and analysis was focused on informing the next iteration of standards for passenger cars and vans, in addition to the proposed review of the heavy-duty vehicle standards. Researchers recommended the stringency of the 2030 fleet-average CO₂ targets for cars and vans should be set at a minimum reduction of 70%, relative to the 2020/21 baseline, and that interim targets should be set in the preceding years. In addition, they suggested a target for all new cars and vans to have zero tailpipe emissions should be introduced by 2035 at the latest.

Fuels researchers also assessed proposed changes to the Renewable Energy Directive and the ReFuel EU proposal to determine the possible greenhouse gas savings. The research recommended that all food and feed-based feedstocks should be excluded from credits under the regulations and the GHG reduction target should be lowered accordingly to avoid increased production of biofuel crops with high associated land use change emissions.



HOW MANUFACTURERS ARE POSITIONED FOR ZERO-EMISSION COMMERCIAL TRUCKS AND BUSES IN EUROPE

Governments have begun to make long-term commitments to phase out of internal combustion engine medium- and heavy-duty trucks. ICCT researchers analyzed manufacturers' market readiness to develop and deploy zero-emission commercial trucks and buses to meet these upcoming commitments in Europe. They found that new registrations of zero-emission heavy-duty vehicles were 1% in Europe in 2020, and close to 90% of cumulative zero-emission HDV sales between 2010 and 2020 were buses. However, zero-emission truck sales are on the rise, making up 40% of total new zero-emission heavy-duty registrations in 2020. With the continuous increase in model availability, steady improvement in battery and fuel cell technology, and the expected reduction in price of battery and fuel cell units, the share of zero-emission heavy-duty vehicles on the road is expected to increase significantly in the coming decade.

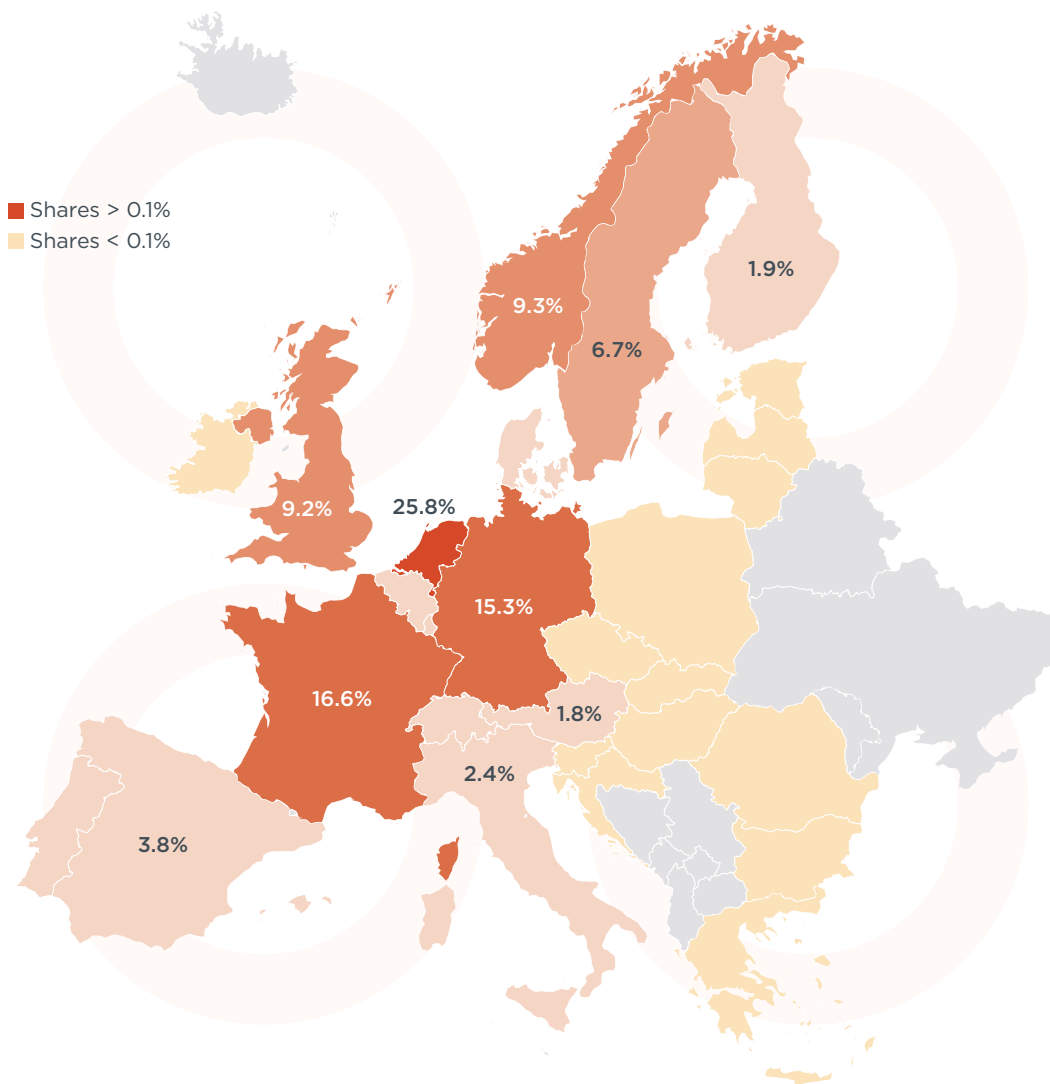


Figure: Sales distribution of zero-emission buses in Europe from 2016 to 2020.

(Source: *Race to zero: How manufacturers are positioned for zero-emission commercial trucks and buses in Europe*, <https://theicct.org/publication/race-to-zero-ze-hdv-eu-dec21/>)

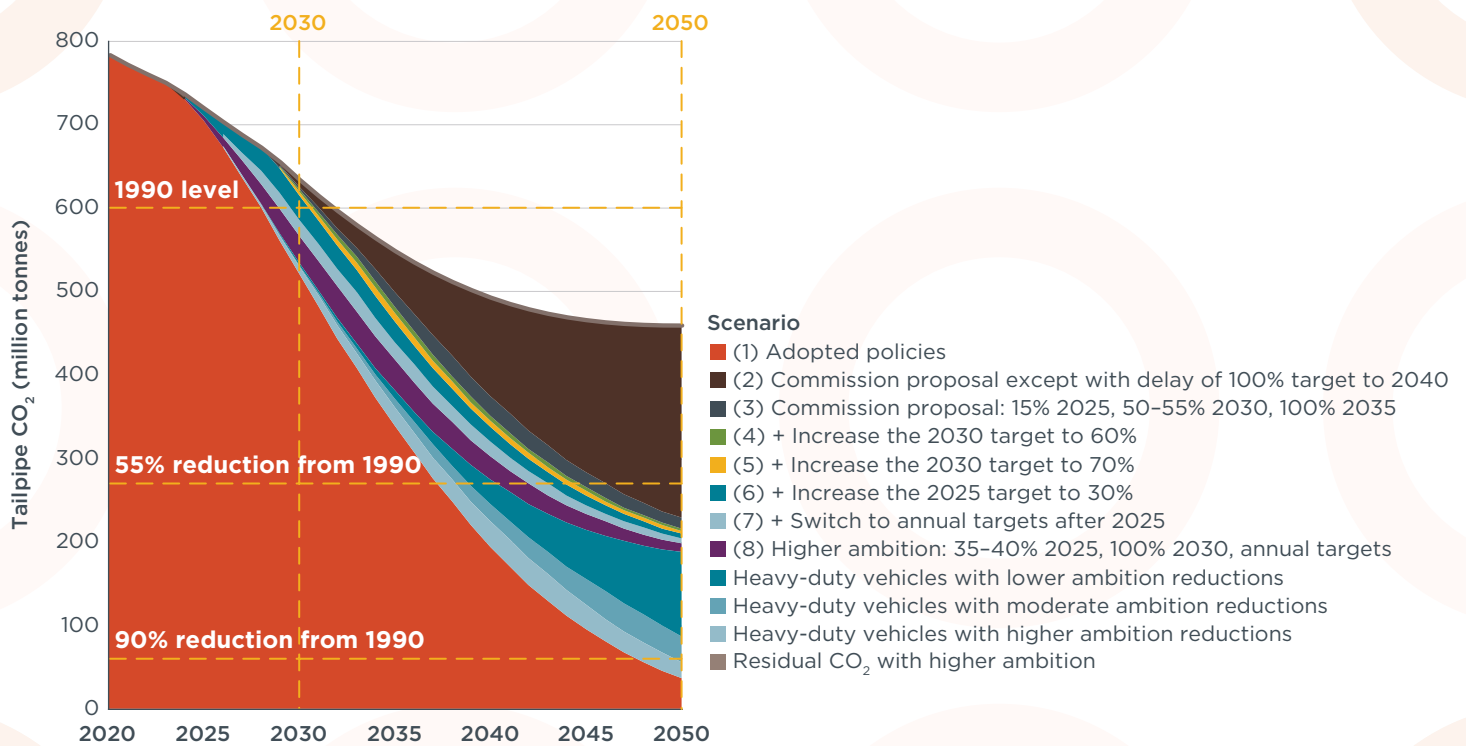


Figure: Combined road transport tailpipe CO₂ emissions in Europe between 2020 and 2050 by policy scenario.

(Source: *Fit for 55: A review and evaluation of the European Commission proposal for amending the CO₂ targets for new cars and vans*, <https://theicct.org/>)



Both [electrification and combustion engine optimization] are feasible options for hitting CO₂ targets, but only one offers the prospect of lowering the price of cars—and that’s batteries. “For reducing CO₂ emissions of the combustion engine, high investments into vehicle technologies are necessary,” Peter Mock, ICCT’s Berlin-based managing director, said. “These investments do not result in a lower cost for consumers over time.”

Politico Morning Mobility

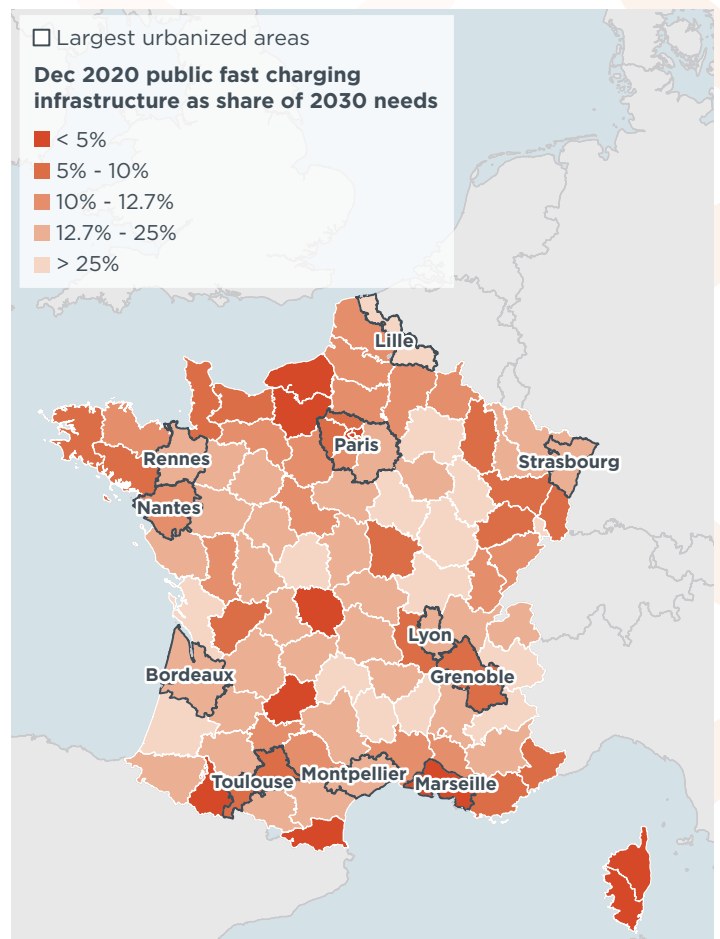
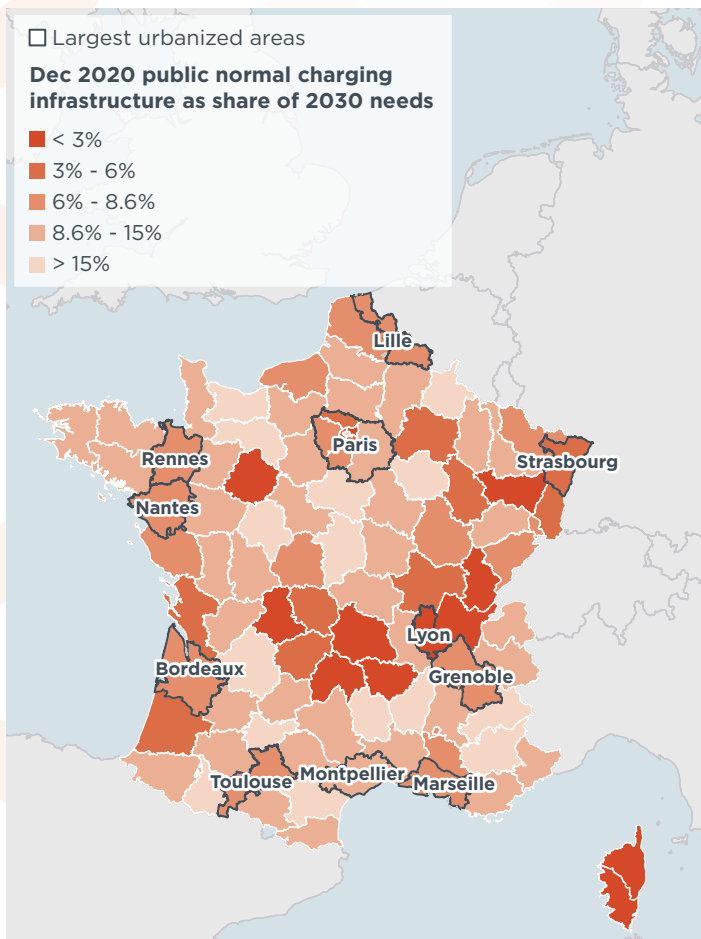


Figure: Percentage of public normal (left) and fast (right) 2030 charging needs in place in France through 2020

(Source: *Charging infrastructure to support the electric mobility transition in France*, <https://theicct.org/publication/charging-infrastructure-to-support-the-electric-mobility-transition-%e2%80%afin-france%e2%80%af/>)

PUBLICATIONS OF NOTE

Beyond major cities: Analysis of electric passenger car uptake in European rural regions (working paper)

<https://theicct.org/publication/beyond-major-cities-analysis-of-electric-passenger-car-uptake-in-european-rural-regions/>

Pathways to decarbonization: The European passenger car market, 2021–2035 (white paper)

<https://theicct.org/publication/pathways-to-decarbonization-the-european-passenger-car-market-2021-2035/>

Quantifying the long-term air quality and health benefits from Euro 7/VII standards in Europe (briefing)

<https://theicct.org/publication/quantifying-the-long-term-air-quality-and-health-benefits-from-euro-7-vii-standards-in-europe/>

Life-cycle greenhouse gas emissions of biomethane and hydrogen pathways in the European Union (white paper)

<https://theicct.org/publication/life-cycle-greenhouse-gas-emissions-of-biomethane-and-hydrogen-pathways-in-the-european-union/>

CHINA

Approximately 3.5 million electric vehicles were sold in China in 2021, representing 51% of the world's total. This accelerated growth is the result of targeted policy efforts at the national and local level. However, emission standards for fossil fuel vehicles are still vital for addressing air pollution and climate change. ICCT researchers assessed the certified fuel consumption of heavy-duty vehicles under the first three iterations of China's emissions standards. The assessment found that the actual improvement in fuel consumption across the fleet as a result of Stage 3 standards will likely be less than the tightening of the standards suggests. The authors recommend ensuring that Stage 4 standards are stringent enough to fully exploit cost-effective emissions control technology in order to improve the competitiveness of Chinese manufacturers in international markets.

Researchers also analyzes the operational profiles of Chinese coastal ferries and their energy demand to evaluate the feasibility of repowering the fleet with battery-electric technology. The study found that current battery technologies can already satisfy most application scenarios for China's coastal fleet because most ferry legs in coastal China are shorter than 200 km. Battery technology improvements would help electrify other more difficult segments of the existing ferry operations, namely larger roll on/roll off passenger ferries deployed on longer routes.

OPPORTUNITIES AND PATHWAYS TO DECARBONIZE CHINA'S TRANSPORTATION SECTOR

China has pledged to reach peak economy-wide CO₂ emissions by 2030 and to reach carbon neutrality by 2060. To help inform policy planning, researchers at the ICCT assessed the potential for reducing climate pollutants from advanced policy packages compared with currently adopted policies for China's transportation sector. The study found that transportation-related climate pollutant emissions in China would grow rapidly without further mitigation actions. However, high-ambition policy measures can potentially reduce climate pollutant emissions from transport by more than 10% at the end of the 14th Five Year Plan compared with the 2020 level, and by 70%-80% in 2050. To reach this target, the researchers suggested the country should set direct emission standards for vehicles, implement zero-emission vehicle requirements for various transportation segments, and consider the establishment of zero-emission zones.

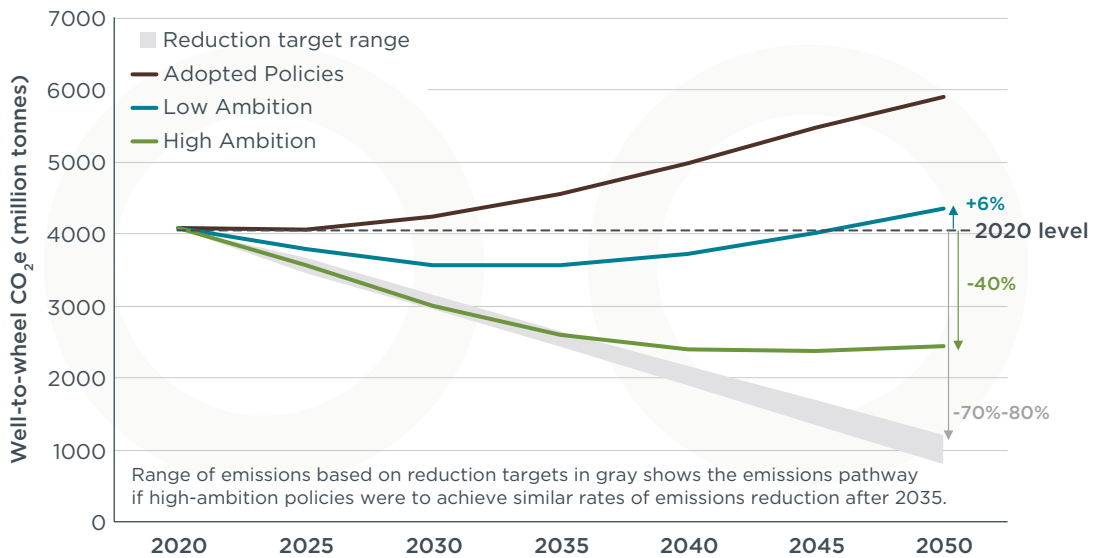


Figure: Well-to-wheel climate pollutant (CO₂e) emissions (GWP20) under adopted, low ambition, and high ambition policies, and recommended reduction targets in China, 2020–2050

(Source: *Opportunities and pathways to decarbonize China's transportation sector during the fourteenth Five-Year Plan period and beyond*, <https://theicct.org/publication/opportunities-and-pathways-to-decarbonize-chinas-transportation-sector-during-the-fourteenth-five-year-plan-period-and-beyond/>)

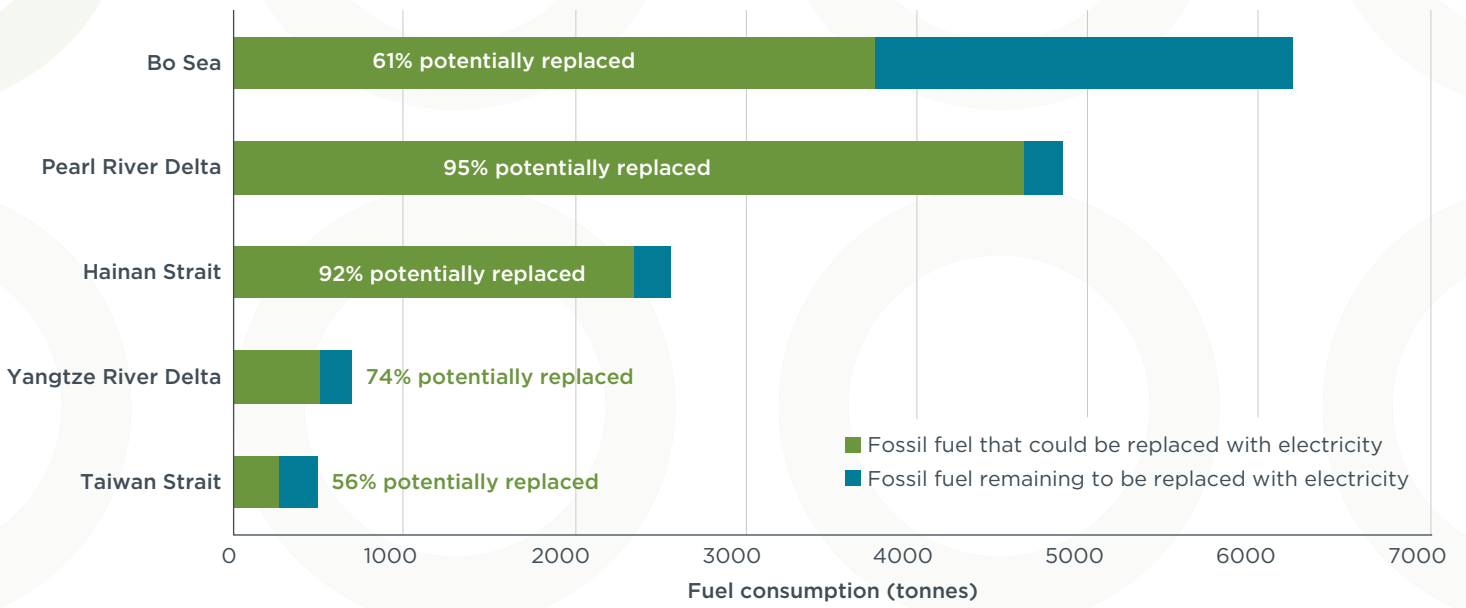


Figure: Percentage of fossil fuel potentially replaced with electricity by key coastal economic zone in China

(Source: *Repowering Chinese coastal ferries with battery-electric technology*, <https://theicct.org/publication/repowering-chinese-coastal-ferries-with-battery-electric-technology/>)



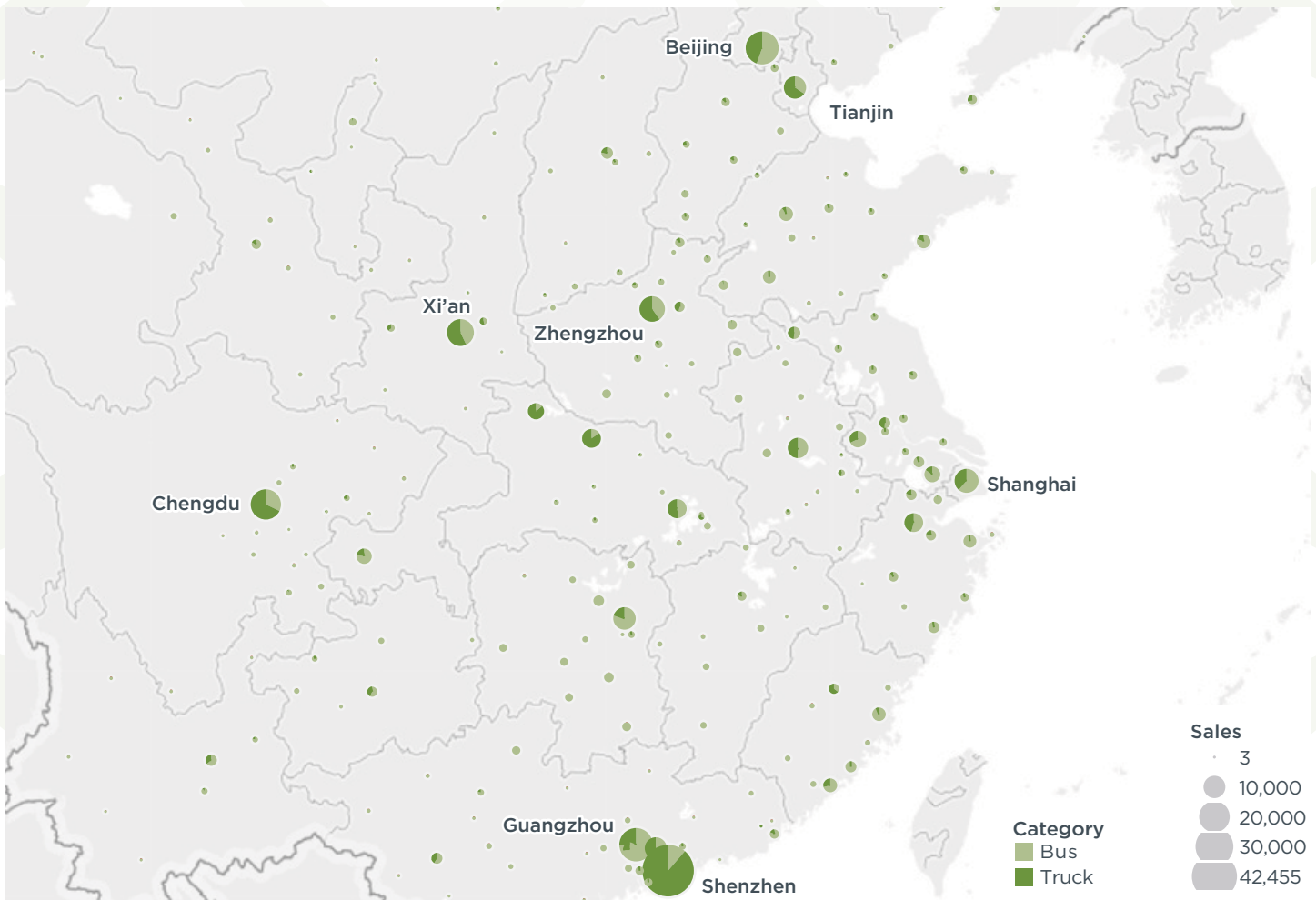


Figure: Heavy-duty new energy vehicle sales by city from 2017 to 2019 in China

(Source: Race to zero: How manufacturers are positioned for zero-emission commercial trucks and buses in China, <https://theicct.org/publication/race-to-zero-how-manufacturers-are-positioned-for-zero-emission-commercial-trucks-and-buses-in-china/>)

PUBLICATIONS OF NOTE

Driving a green future: A retrospective review of China's electric vehicle development and outlook for the future (report)

<https://theicct.org/publication/driving-a-green-future-a-retrospective-review-of-chinas-electric-vehicle-development-and-outlook-for-the-future/>

Evaluating electric vehicle costs and benefits in China in the 2020-2035 time frame (white paper)

<https://theicct.org/publication/evaluating-electric-vehicle-costs-and-benefits-in-china-in-the-2020-2035-time-frame/>

Total cost of ownership for heavy trucks in China: Battery electric, fuel cell, and diesel trucks (white paper)

<https://theicct.org/publication/total-cost-of-ownership-for-heavy-trucks-in-china-battery-electric-fuel-cell-and-diesel-trucks/>

INDIA

While India was on track to exceed its Paris Agreement commitments in 2021, there is still room for the country to improve upon its existing policy framework. Researchers at the ICCT undertook a series of assessments of the fuel consumption of a variety of vehicle classes, including passenger cars, light commercial vehicles, and two-wheelers, to inform future standards and policymaking. The assessment of passenger cars found that the industry needs to reduce fuel consumption by approximately 3.5% each year to achieve the 2022-2023 compliance targets. However, the study determines that the actual, real-world decrease will almost certainly be lower, as manufacturers are likely to expand their use of super credits and flexibility mechanisms.

Researchers also measured the real-world emissions performance of a Bharat Stage VI truck and bus to assess how they compare to emissions captured under regulatory testing. The study determined that a significant amount of NO_x emissions was generated under conditions that are not currently included when evaluating these vehicle types for compliance. The findings suggest that, in order to better reflect emissions during real-world driving, the power threshold during compliance testing should be lowered and all cold-start emissions should be included.



FUEL CONSUMPTION REDUCTION TECHNOLOGIES FOR THE TWO-WHEELER FLEET IN INDIA

The two-wheeler market in India consumes more gasoline than all other forms of on-road transport combined, but this vehicle segment is not subject to fuel consumption standards. Researchers at the ICCT assessed the technology potential and cost for improving the fuel efficiency of internal combustion engine two-wheelers. The researchers found that even the most fuel-efficient segment of the two-wheeler fleet, small motorcycles, has the potential to further reduce fuel consumption up to 42% using ICE technologies alone. Moreover, setting a fleet average target of 20.5 gCO₂/km in 2030 could achieve fuel consumption reductions of 50% in the two-wheeler fleet and a cost-effective penetration of 62% electric two-wheelers.

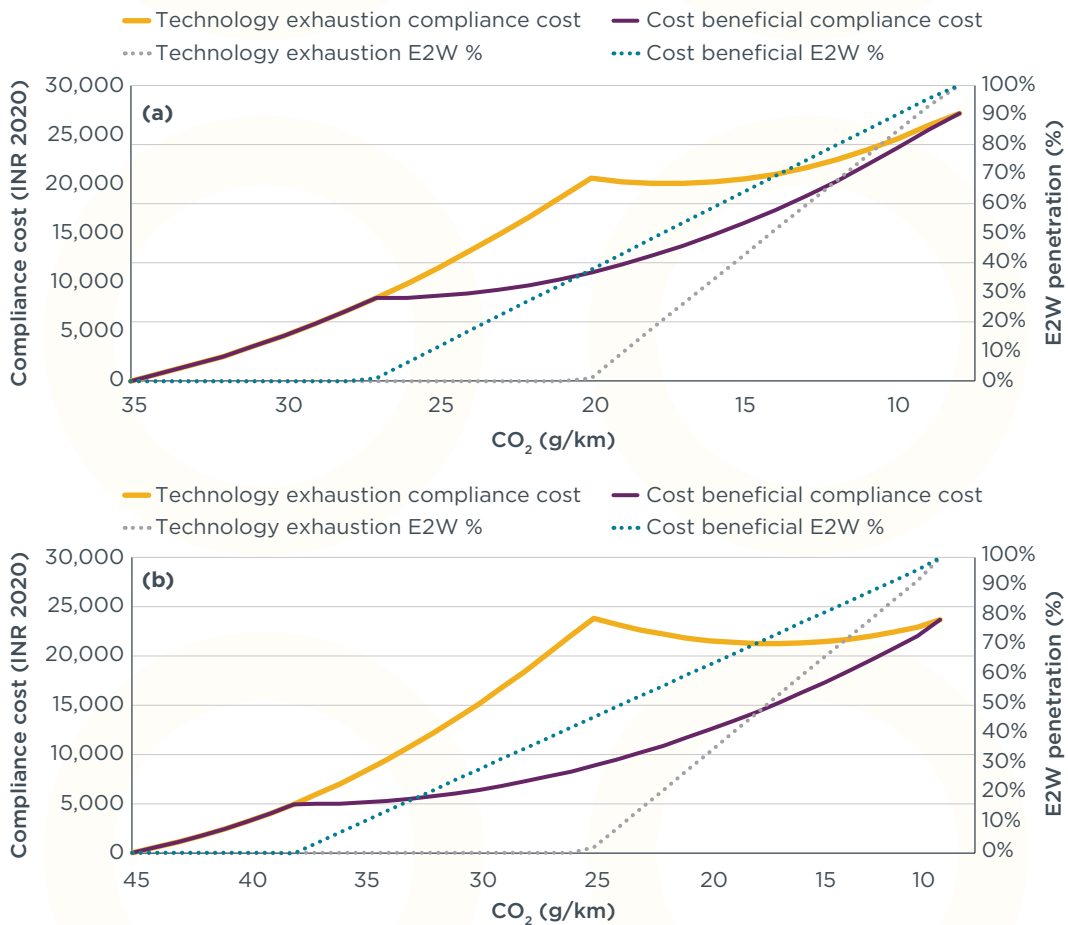


Figure: Compliance cost curves plotted for the ICE technology packages and the E2W package for (a) small motorcycle and (b) scooter in the year 2025 in India

(Source: *Fuel consumption reduction technologies for the two-wheeler fleet in India*, <https://theicct.org/publication/fuel-consumption-reduction-technologies-for-the-two-wheeler-fleet-in-india/>)

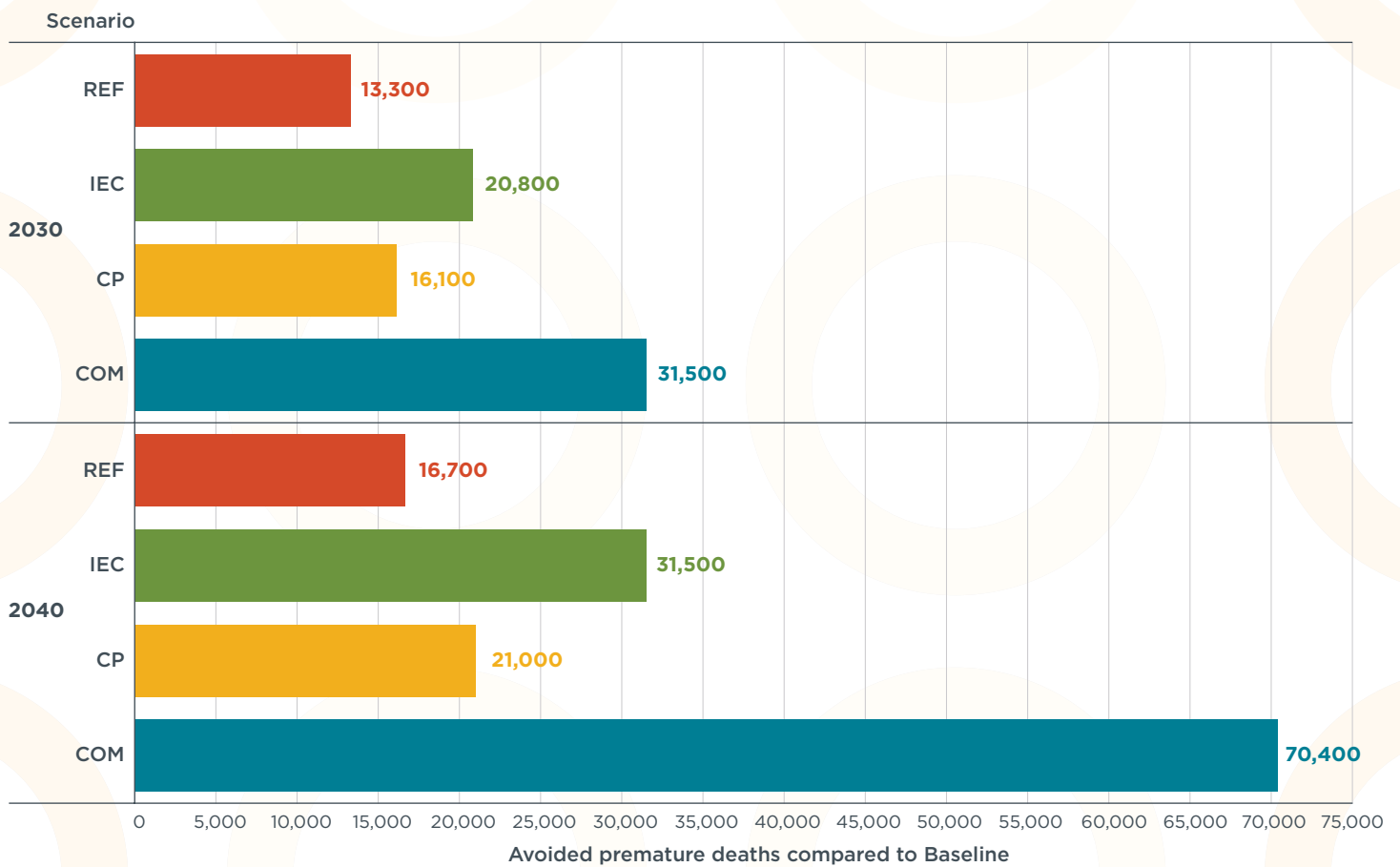


Figure: Avoided premature deaths due to air pollution compared to baseline in 2030 and 2040 under a reference, improved emissions control, coal phase out, and combined scenarios

(Source: *Understanding the air quality and health impacts of large-scale vehicle electrification in India*, <https://theicct.org/publication/understanding-the-air-quality-and-health-impacts-of-large-scale-vehicle-electrification-in-india/>)



Josh Miller, manager of the Modeling Center at the International Council on Clean Transportation, told The Climate 202 that “India’s signing of the Glasgow declaration is significant, since it is the fourth largest vehicle market worldwide, and carbon dioxide emissions from road transport in India could more than double by 2050 without further policy action.”

“COP26 draft agreement calls on countries to phase out coal, fossil fuels,” *Washington Post*, <https://www.washingtonpost.com/politics/2021/11/10/cop26-draft-agreement-calls-countries-phase-out-coal-fossil-fuels/>

Personal use total cost of ownership (TCO) for two-wheelers in 2021 in Delhi

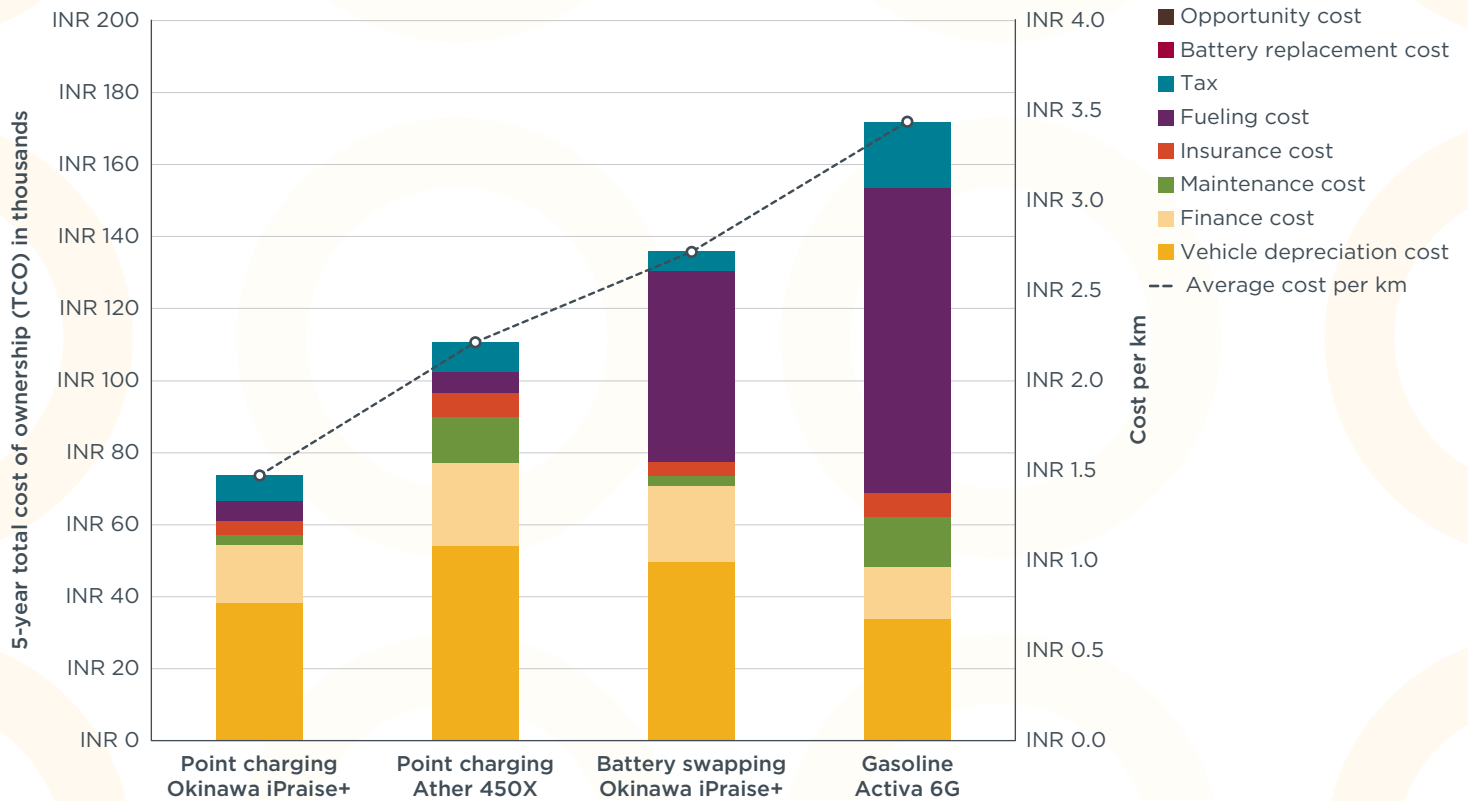


Figure: Five-year total cost of ownership of selected two-wheelers in personal use in Delhi

(Source: *Cost comparison of battery swapping, point charging, and ICE two-wheelers in India*, <https://theicct.org/publication/cost-comparison-of-battery-swapping-point-charging-and-ice-two-wheelers-in-india/>)

PUBLICATIONS OF NOTE

Fuel consumption from light commercial vehicles in India, fiscal years 2019-20 and 2020-21 (working paper)
<https://theicct.org/publication/fuel-consumption-from-light-commercial-vehicles-in-india-fiscal-years-2019-20-and-2020-21/>

Understanding the emissions impacts of large-scale vehicle electrification in India (working paper)
<https://theicct.org/publication/understanding-the-emissions-impacts-of-large-scale-vehicle-electrification-in-india/>

Techno-economic analysis of cellulosic ethanol in India using agricultural residues (white paper)
<https://theicct.org/publication/techno-economic-analysis-of-cellulosic-ethanol-in-india-using-agricultural-residues/>

ASIA

The use of biofuels has been a central strategy of decarbonizing transport in Asia, in addition to being a prominent industry in the region. Researchers at the ICCT evaluated the potential for Indonesia to diversify its biofuel industry by using waste oils and fats as feedstock to produce biodiesel and renewable diesel. The authors assessed the likely availability of inedible animal fats, waste fish oil, sludge palm oil, and tall oil in Indonesia and found waste biodiesel can provide almost 60% of Indonesia's B30 volumetric blending target.

In addition, researchers assessed ongoing efforts to promote electromobility in Indonesia and held a three-day workshop to discuss strategies to accelerate electric vehicle uptake. Suggestions originating from the workshop included improved coordination on commitments to electrification targets, the development of regulatory and fiscal policies to spur demand for electric vehicles, and collaboration with cities to develop electrification strategies.



AIR QUALITY IMPACTS OF PALM BIODIESEL IN INDONESIA

As Indonesia moves toward more advanced vehicle emission standards, lower sulfur limits in fuel, and palm biodiesel expansion, it is important to understand the impact that increasing palm biodiesel blending rates is likely to have on vehicle emissions. Researchers at the ICCT analyzed the effects of biodiesel blending on nitrogen oxides (NO_x), hydrocarbons, carbon monoxide, and particulate matter emissions in Indonesia. The results show that blending palm biodiesel in diesel fuel increases NO_x emissions, and these effects are especially pronounced with low-sulfur diesel fuel and common rail injection systems. In addition, they found that modern injection systems and fuels diminish the expected reductions of particulate matter, CO, and HC from biodiesel compared to diesel fuel.

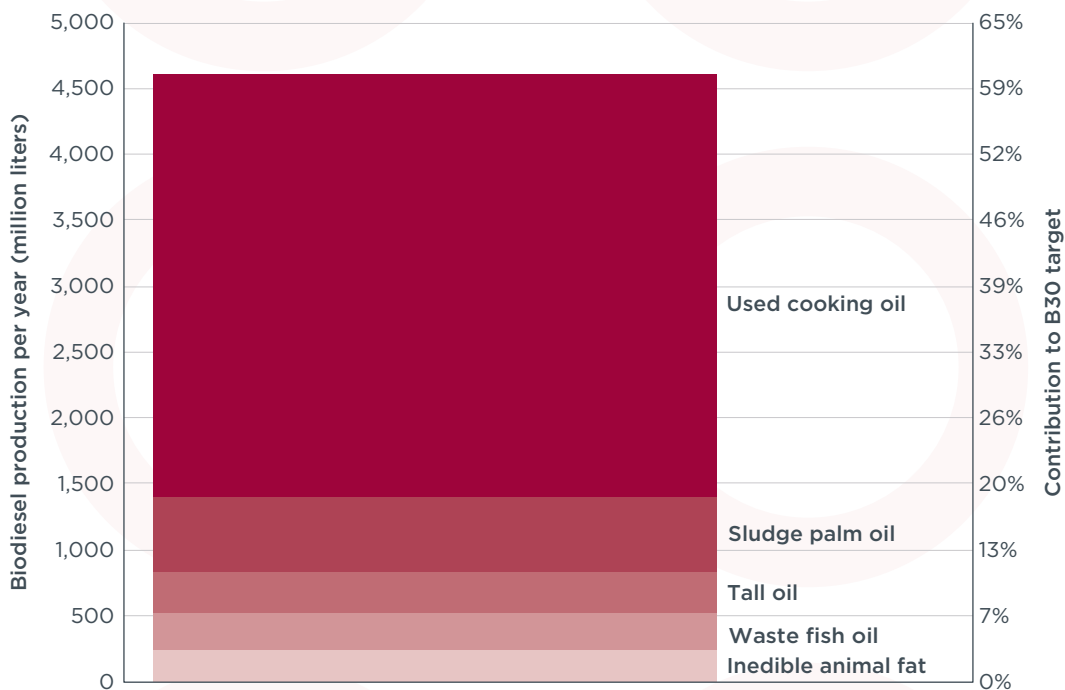


Figure: Annual biodiesel production from full availability of five waste feedstocks and their contributions to Indonesia's B30 blending target.

(Source: *Opportunities for waste fats and oils as feedstocks for biodiesel and renewable diesel in Indonesia*, <https://theicct.org/publication/opportunities-for-waste-fats-and-oils-as-feedstocks-for-biodiesel-and-renewable-diesel-in-indonesia/>)

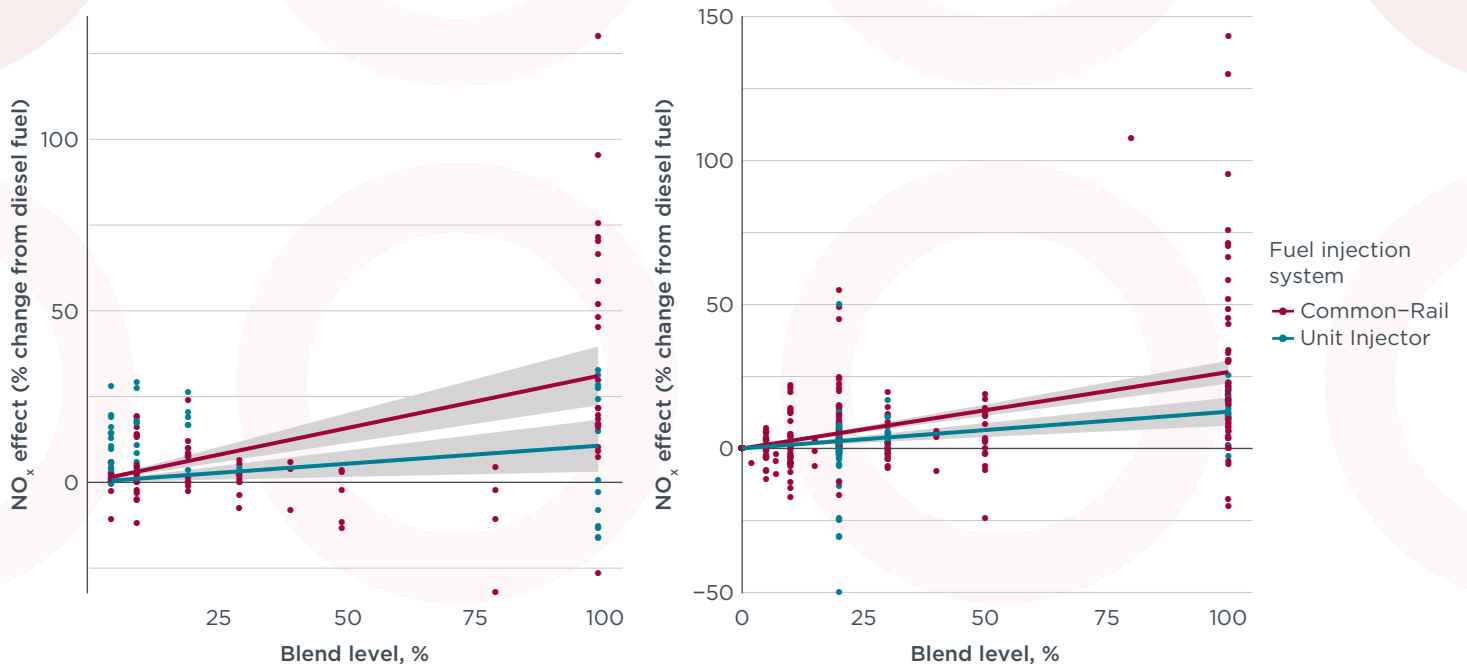


Figure: Left: Biodiesel NO_x effect by fuel injection system (palm). Right: Biodiesel NO_x effect by fuel injection system for low-sulfur diesel only (all data).

(Source: *Air quality impacts of palm biodiesel in Indonesia*, <https://theicct.org/publication/air-quality-impacts-of-palm-biodiesel-in-indonesia/>)



Researcher from the International Council on Clean Transportation Tenny Kristiana said, Indonesia has abundant raw materials to produce cellulosic ethanol... “Based on a study conducted by ICCT, with 30 million tons of palm oil biomass being unused every year. Then 2 billion cellulosic ethanol can be produced per year or equivalent to 4 percent of oil demand per year in 2019,” said Kristiana.

“Bioenergi dari Limbah Pertanian Bisa Mulai Dikembangkan, Bahan Baku Melimpah,” *SindoNews*, <https://ekbis.sindonews.com/read/359638/34/bioenergi-dari-limbah-pertanian-bisa-mulai-dikembangkan-bahan-baku-melimpah-1615302204>

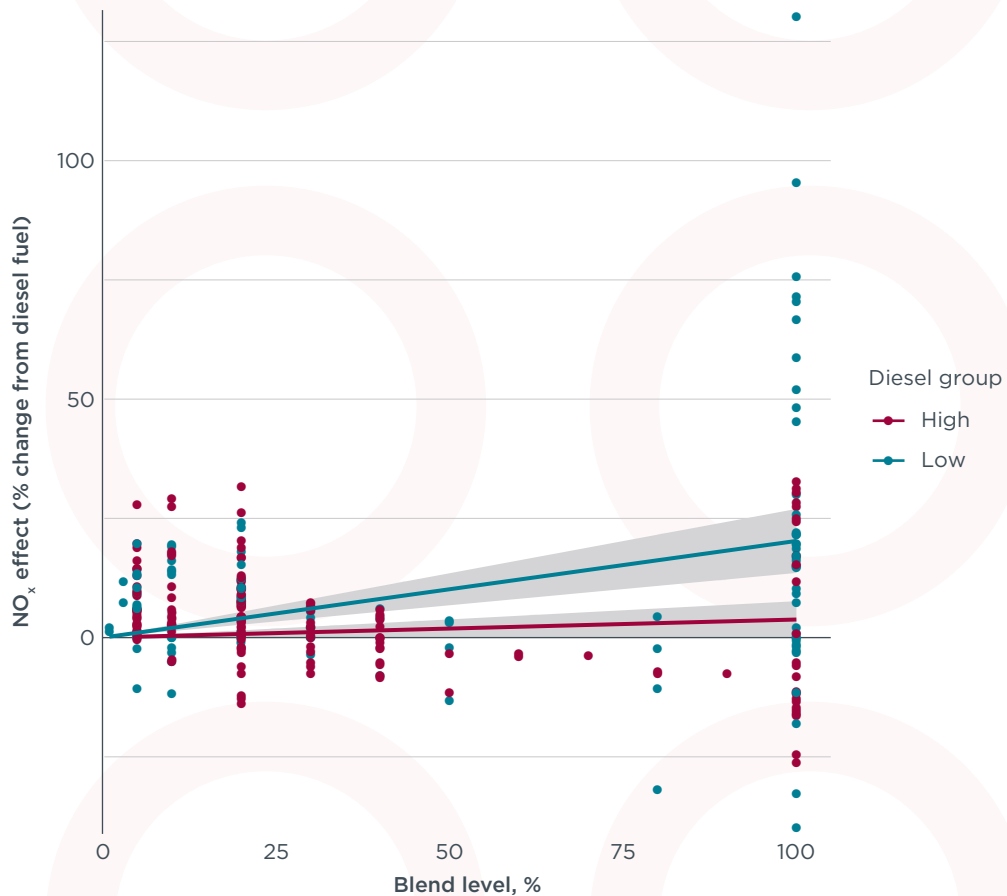


Figure: Biodiesel NO_x effect grouped by palm diesel blend level

(Source: *Air quality impacts of palm biodiesel in Indonesia*, <https://theicct.org/publication/air-quality-impacts-of-palm-biodiesel-in-indonesia/>)

PUBLICATIONS OF NOTE

Compatibility of methanol fuel blends with gasoline vehicles and engines in Indonesia (white paper)
<https://theicct.org/publication/methanol-indonesia-eng-dec21/>

Indonesia transport electrification strategy (working paper)
<https://theicct.org/publication/indonesia-transport-electrification-strategy%e2%80%af/>

Opportunities for waste fats and oils as feedstocks for biodiesel and renewable diesel in Indonesia (white paper)
<https://theicct.org/publication/opportunities-for-waste-fats-and-oils-as-feedstocks-for-biodiesel-and-renewable-diesel-in-indonesia/>

GLOBAL

Emissions from the marine and aviation sectors have a global impact. In 2021, ICCT researchers assessed the life cycle greenhouse gas emissions attributed to sustainable aviation fuels to help identify how an effective policy could identify and support fuels that can deliver deep greenhouse (GHG) reductions. The analysis found wide variations in the climate impacts across different sustainable aviation fuel feedstocks and conversion technologies, illustrating that simply displacing petroleum jet fuel with any alternative jet fuel will be insufficient to drive deep decarbonization in aviation.

Researchers also studied global washwater discharges from ships that utilize scrubbers to comply with the International Maritime Organization's 2020 global fuel sulfur limit. This washwater is more acidic than the surrounding seawater and contains polycyclic aromatic hydrocarbons, particulate matter, nitrites, and heavy metals. The analysis found that approximately 80% of scrubber discharges occur within 200 nautical miles of shore, with hot spots in heavily trafficked regions such as the Baltic Sea, North Sea, Mediterranean Sea, the Strait of Malacca, and the Caribbean Sea. Moreover, scrubber discharges were also found to occur in IMO-designated sensitive areas such as the Great Barrier Reef.



AIR QUALITY AND HEALTH IMPACTS OF HEAVY-DUTY VEHICLES IN G20 ECONOMIES

On-road diesel vehicles are a leading contributor to air pollution and the associated disease burdens. In addition to the negative impact on air quality and public health, black carbon from diesel engine exhaust produces significant near-term climate warming. In 2021, researchers at the ICCT quantified the benefits of policies for reducing air pollutant emissions from heavy-duty vehicles in the G20 economies. The analysis found that expanded implementation of world-class standards in G20 economies in the 2023–2025 timeframe would reduce NO_x emissions by 45%–85% over the next two decades. Next-generation standards could reduce NO_x levels by 60%–95% from 2020 levels in 2040 and avoid more than \$5 trillion of health damages over the next three decades.

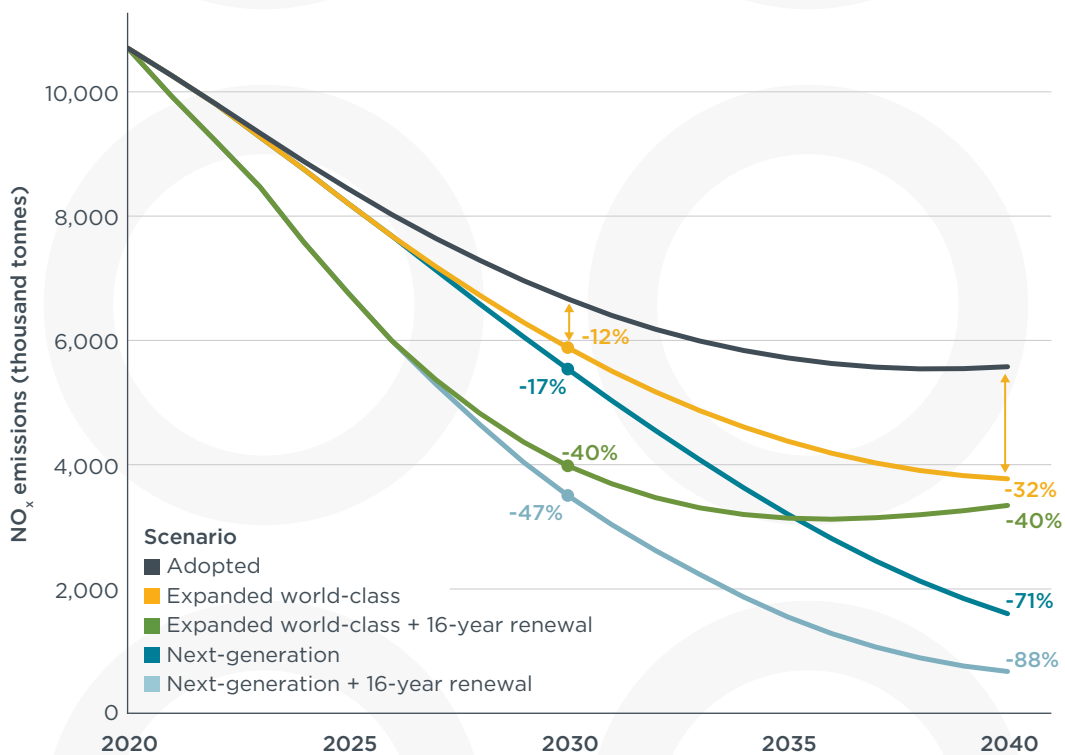
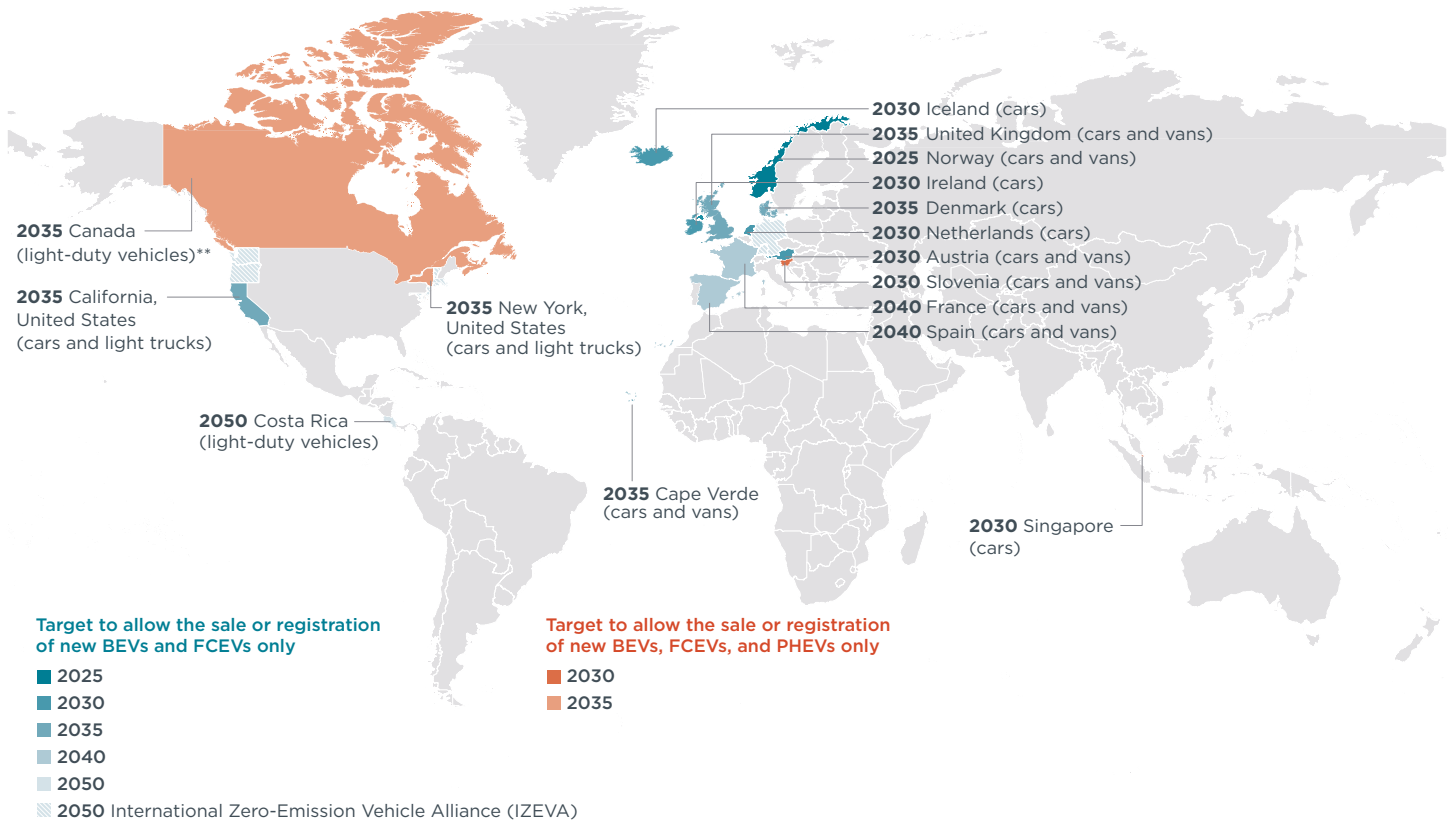


Figure: Projected NO_x emissions from diesel heavy-duty vehicles under different policy scenarios from 2020 to 2040 in G20 economies.

(Source: *Air quality and health impacts of heavy-duty vehicles in G20 economies*, <https://theicct.org/publication/air-quality-and-health-impacts-of-heavy-duty-vehicles-in-g20-economies/>)

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 2021)



* 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.

Figure: Government targets to 100% phase out the sale or registration of new ICE cars, status through September 2021

(Source: *Global passenger car market share of countries planning to phase out new sales of internal combustion engine vehicles*, <https://theicc.org/publication/global-passenger-car-market-share-of-countries-planning-to-phase-out-new-sales-of-internal-combustion-engine-vehicles/>)



“Currently, the global shipping sector is not on track to meet even its initial greenhouse gas strategy goals,” [ICCT researcher Bryan] Comer says. “There’s an opportunity now to start using cleaner fuels,” he says. “But right now, what’s missing is that there’s ... no regulations at the global scale that would incentivize that change.”

“Maritime shipping causes more greenhouse gases than airlines,” Yale Climate Connections, <https://yaleclimateconnections.org/2021/08/maritime-shipping-causes-more-greenhouse-gases-than-airlines/>

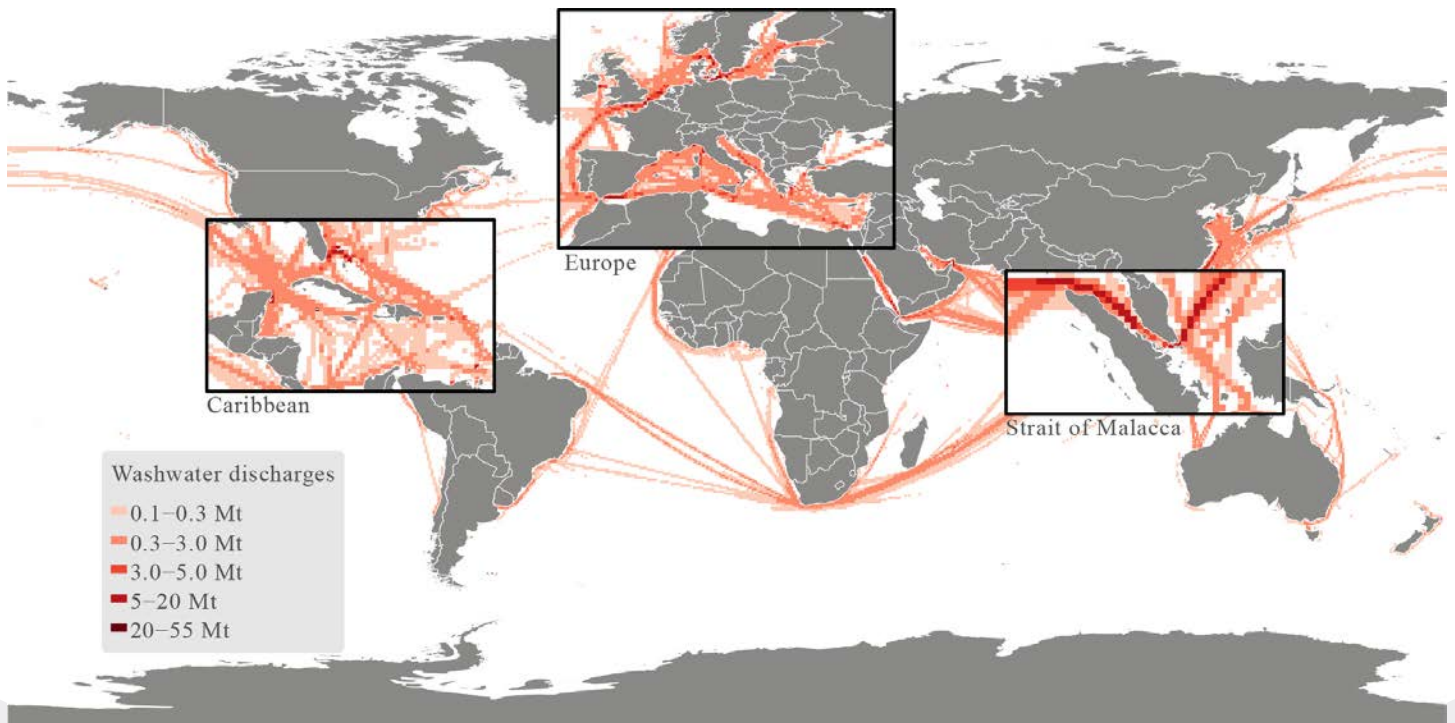


Figure: Global scrubber washwater discharges distribution and the sites with the largest washwater hot spots

(Source: *Global scrubber washwater discharges under IMO's 2020 fuel sulfur limit*, <https://theicct.org/publication/global-scrubber-washwater-discharges-under-imos-2020-fuel-sulfur-limit/>)

PUBLICATIONS OF NOTE

Update on the global transition to electric vehicles through 2020 (briefing)
<https://theicct.org/publication/update-on-the-global-transition-to-electric-vehicles-through-2020/>

Update on government targets for phasing out new sales of internal combustion engine passenger cars (briefing)
<https://theicct.org/publication/update-on-government-targets-for-phasing-out-new-sales-of-internal-combustion-engine-passenger-cars/>

Assessing the sustainability implications of alternative aviation fuels (working paper)
<https://theicct.org/publication/assessing-the-sustainability-implications-of-alternative-aviation-fuels/>

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

Climate Imperative Foundation

ClimateWorks Foundation

European Climate Foundation

European Commission

FIA Foundation

Heising-Simons Foundation

Norwegian Agency for Development Cooperation (NORAD)

P4G

Packard Foundation

Pisces Foundation

Quadrature Climate Foundation

Rockefeller Brothers Fund

Sequoia Climate Foundation

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

	2021	2020
Current assets		
Cash and cash equivalents	\$ 9,363,952	\$ 8,420,840
Promise to give, net	754,805	1,173,678
Accounts receivable, net	75,358	627,666
Unbilled receivables	672,497	515,749
Prepaid expenses	273,311	150,861
Deposit	40,436	30,492
Property and equipment, net	<u>507,205</u>	<u>335,175</u>
Total assets	<u>\$ 11,687,564</u>	<u>\$ 11,254,461</u>
Liabilities and net assets		
Liabilities:		
Accounts payable and accrued expenses	\$ 1,244,032	\$ 1,226,039
Refundable advances	450,061	1,371,031
Deferred rent	566,325	562,241
Total liabilities	<u>2,260,418</u>	<u>3,159,311</u>
Net assets (deficit):		
Without donor restrictions	(1,332,167)	316,285
With donor restrictions	<u>10,759,313</u>	<u>7,778,865</u>
Total net assets	<u>9,427,146</u>	<u>8,095,150</u>
Total liabilities and net assets	<u>\$ 11,687,564</u>	<u>\$ 11,254,461</u>

Consolidated Statements of Activities

Year Ended December 31, 2021

	Without Donor Restrictions	With Donor Restrictions	Total
Revenue and support:			
Grants and contributions	\$ 708,257	\$ 15,701,762	\$ 16,410,019
Contract income	1,253,769	-	1,253,769
Consulting income	476,900	-	476,900
Interest income, net	2,494	-	2,494
Other income	75,368	-	75,368
Net assets released from restrictions	<u>12,721,314</u>	<u>(12,721,314)</u>	<u>-</u>
Total revenue and support	<u>15,238,102</u>	<u>2,980,448</u>	<u>18,218,550</u>
Expenses:			
Program services	14,247,307	-	14,247,307
Supporting services:			
Management and general	1,544,828	-	1,544,828
Communications	688,690	-	688,690
Development	405,729	-	405,729
Total expenses	<u>16,886,554</u>	<u>-</u>	<u>16,886,554</u>
Change in assets	<u>(1,648,452)</u>	<u>2,980,448</u>	<u>1,331,996</u>
Net assets (deficit):			
Beginning	<u>316,285</u>	<u>7,778,865</u>	<u>8,095,150</u>
Ending	<u>\$ (1,332,167)</u>	<u>\$ 10,759,313</u>	<u>\$ 9,427,146</u>



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ON CLEAN TRANSPORTATION

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