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A Wood viewpoint:

Accelerating zero-emission mobility

Creating the ultimate road map for
decarbonising vehicle fleets



What's driving fleet decarbonisation?

As the world acts to systematically reduce the consumption of fossil fuels on the journey to a net-zero future, a major revamp of urban mobility will serve as a catalyst to unlock sustainable communities. When it comes to reducing emissions, zero-emission mobility can be a gamechanger for creating thriving cities with enhanced transportation solutions. This transformation is becoming more attainable through environment-focused policies, increasingly progressive mindsets, advancing technology and favourable economics.

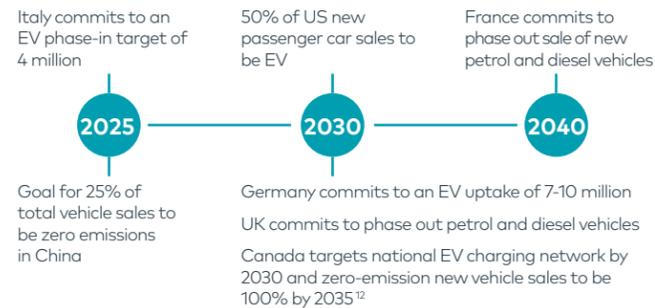
Policy advancements and increased funding

Across North America and Europe, many countries are acting by proposing policies and spending plans to make net-zero ambitions a reality. The European Commission's European Structural and Investment Fund earmarked €39 billion for the move to low-emission mobility.¹ While, the United States has proposed spending \$5 billion to advance zero-emission school buses and an additional \$7.5 billion to build a nationwide network of electric vehicle chargers.²

Carbon reduction commitments

The transportation sector contributes 25% of global GHG emissions with cars, trucks and buses accounting for nearly 75% of these emissions.³ The adoption of zero-emission fleets provide a tangible step towards bold decarbonisation commitments, and advance UN Sustainable Development Goal 11.6 to improve air quality and the environmental impact of urban mobility.

Electric vehicle commitments



Social demands

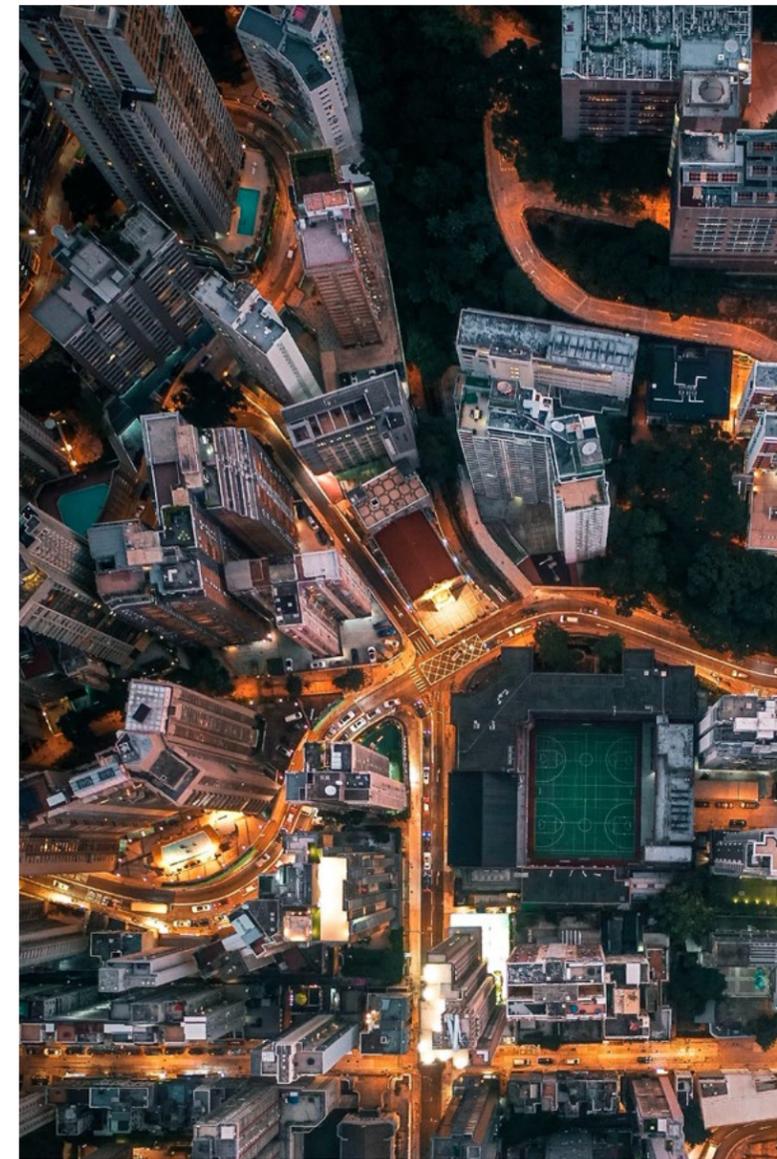
Sustainability is a value that's changing consumer demands towards more environmentally conscious choices. Strong grassroots movements and climate activists are calling on cities and organisations to be more accountable for their impact on the environment and driving the shift from fossil-fuel vehicles. There is increased demand in rising urban populations for zero-emission vehicles to add transport capacity without the increase of air and noise pollution, providing quieter streets for residents and environmentally friendly transit.

Technology innovations

Technology advancements in battery chemistry, vehicle engineering, and hydrogen fuel cell design are making zero-emission transportation a more attractive option. Continuous developments in electric vehicle technology and demand for larger ranged low-emission vehicles are expected to grow the market 26.8% by 2030.⁸ Car manufacturers and battery producers are addressing range anxiety with improved performance from hydrogen fuel cell technology to deliver extended range for full load heavy-duty trucks⁹, and battery technology elevation for better resiliency in cold weather climates.¹⁰

Economics

The total cost of ownership for heavy-duty electric vehicles are reaching parity with their diesel-powered counterparts.¹¹ Additionally, the infrastructure required for the EV and E-bus transition including sub-stations, transformers, grid connections, and energy storage are identical to those needed for the greater energy transition. Investment firms, assets owners, utilities, and OEMs will see increased economic benefit by planning for the charging infrastructure required for the next 20 years and looking beyond the transportation infrastructure needed for the electric vehicle transition over the next five years.



Sources

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At Wood, we have the solutions to accelerate zero-emission fleet adoption

With many factors and trade-offs at play, it is important to give a wide consideration to the opportunities and risks of battery and hydrogen fuel cell EVs within the local context of fleet owners who adopt them.

We apply five concepts as a framework for unlocking the best solution for zero-emission fleet adoption.

Infrastructure

What infrastructure modifications will I need to make for charging and fuelling of vehicles?

Successful adoption of zero-emission fleets relies on secure, cost-effective, and reliable energy. Charging and fuelling infrastructure must support vehicle range, operating requirements, and be feasible to implement on the topography of surrounding land. Partnerships with local utilities, landowners and governments are beneficial to help identify existing electrical networks and fuelling infrastructure that can be leveraged, along with space for hydrogen reformation, storage and fuelling locations. To enable a sustainable planning approach, a comprehensive understanding of options for energy generation, transmission or production, storage and charging, and fuelling locations, as well as costs to procure equipment and construct new infrastructure must be weighed against space constraints, disruption to the environment, and long-term climate benefits.

Environment

How do I benchmark my emissions profile and plan for a successful zero-emission transition?

While no greenhouse gases are directly emitted from battery or hydrogen fuel cell EVs, they run on electricity or use hydrogen produced from fossil fuels in many parts of the world. A carbon accounting analysis to gain a full understanding of upstream through downstream lifecycle emissions helps to set targets and lay the foundation for transitioning to renewable energy sources considering costs and measuring progress along the way. Ultimately, the end-goal of zero-emission mobility is to design a clean system using renewable energy sources and eliminate embodied carbon emissions in all stages.

Fleet

What vehicle specification and components do I require to deliver a reliable service?

Once fleet owners decide to deploy battery or hydrogen fuel cell EVs, they must be strategic in deciding the type of vehicle to use, specifications to meet range requirements, and how many vehicles are required. Modeling of service demands, route topography, driving patterns, passenger ridership, HVAC loads and weather conditions will help to answer these questions. In the case of battery EVs, chargers must match the vehicle's charging configuration and on-board system of plug-in ports, rooftop charging bars for pantograph charging options, and chassis-mounted power receivers for inductive charging. With the average life of a battery being five years, plans for maintaining, replacing and sustainably disposing of them should be factored into fleet maintenance programs.

Facility

What facility modifications do I need to make to support zero-emission vehicles?

Transitioning to a zero-emission fleet requires a comprehensive understanding of facility modifications, tools, equipment, and associated costs. Facilities expansion is often required to accommodate charging and fuelling stations that can reliably power vehicles overnight. Backup power generation systems such as onsite substations or transformers for battery EVs and onsite storage for battery and hydrogen fuel cell EVs will impact already constrained vehicle depots. Fleet owners require a partner that can help design a space and according to building codes, as well as develop new operations and maintenance procedures.

People

How do I bridge skills gaps with zero-emissions vehicles to support day-to-day operations?

The move to zero-emission vehicles will fundamentally change today's auto maintenance and service sector. While zero-emission vehicles often require less maintenance than conventional vehicles, the skills and training to support this changing landscape and maintain a high-quality service will be required. Considerations include acquiring new tools, repairing and replacing battery and hydrogen fuel cell EV powertrains, understanding new levels of wear on vehicle brakes and tires, maintaining enroute and depot fuelling and charging infrastructure, and training staff to operate the vehicles. Fleet owners will need to understand the skills gaps and additional the costs required to adapt to these new dynamics.



Whether your goal is to meet net-zero targets or accelerate adoption, a digital tool, Wood's ZeroEmissionSim™ helps to baseline your emissions, understand all factors and costs impacting your operations, develop and test infinite options, and provide you with the insight today to start advancing your transition tomorrow.

For more information or to demo visit:
Wood's ZeroEmissionSim
Wood (woodplc.com)

Your ultimate route to zero

Wood is collaborating with an array of pioneering fleet operators to advance adoption of zero-emission vehicles and chart a path forward to the optimal route to net zero. With a host of possibilities for fleet adoption, Wood helps paint a full picture for fleet adoption when converting entirely new or partial fleets to battery or hydrogen fuel cell power. Using Wood's ZeroEmissionSim application and leveraging our transportation specialists, clients gain insights into fleet range, vehicle operating requirements, route scenarios, cost impacts, power demands and charging or refuelling requirements to meet ambitious net-zero goals and transition with confidence.

Performed a 360-degree total cost of ownership analysis, simulating charging location options and identifying grants to support a Canadian municipality to reduce transportation related carbon emissions by 50% and become the first in the country to electrify street sweeping operations that provide 11 hours of continuous and quiet operations.

Identifying the optimal pilot deployment to transition an entire city bus network to battery electric buses by simulating multiple options for routes, fleet infrastructure, charging setup, charging profiles, energy required, and service completion rates, as well as testing worst case scenarios for power outages and extreme temperatures for the first 60 buses in the fleet.

Helping a North American mid-sized city transition their 120-diesel bus fleet to battery electric powered buses over the next 15 years to reduce greenhouse gas emissions by 80%, starting with specialised transit for people with disabilities.

Optimising the location, design, installation, and deployment of EV charging points in Cambridgeshire, United Kingdom.

Identifying total cost of ownership of a full-sized pickup truck for a Canadian public fleet operator, comparing gasoline, hybrid, and electric versions.

Leveraging our tenured experience in the production and automation of internal combustion engine vehicles to accelerate our longtime and new clients on manufacturing EVs.

Working with Advanced Biofuel Solutions and the University College London to design a production line that generates high purity bio-hydrogen to meet demand for fuel cell electric vehicles.

Assisting with deployment standards and an implementation plan to electrify 4,000 school and transit buses in British Columbia.

Helping the City of York reduce congestion, emissions and journey times while improving the reliability of the transportation network.

Generating more from your investment

Innovative business models to move electricity and people at the same time will drive down costs further with the opportunity for a single investment to cover both transport and energy transition needs.

New technologies will provide EV operators with the opportunity to generate revenue and reduce the need for future investments in substations and grid stability services by:

- Giving energy back to grid when EVs are connected and not needed for driving
- Absorbing power out of grid when required to balance load
- Providing frequency support at a distribution level to further uptake of roof top solar

Are you ready for what's possible?

The transformative shift toward zero-emission powered vehicles is within reach for cities, governments, and industries

- Demo Wood's ZeroEmissionSim today and connect with our experts
- Let our specialists analyze your findings based on your distinct EV needs
- Together, let's develop a roadmap for your future fleet system to keep you driving forward towards your ESG goals

Contact us:

To find out more about how Wood can unlock solutions for your zero-emission mobility challenges, **please connect with us.**



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Wood. Powered by possible

The need for change has never been greater. In our industries, in the way we treat our planet, and in how we live.

To challenge the status quo, we must be brave – it's having the courage to forge new answers. We're more than 40,000 inquisitive minds, on a quest to unlock solutions to the world's most critical challenges, across all of energy and the built environment.

United by our mission to create a sustainable future as the world evolves to a cleaner planet. Our bold spirit drives us to lead the charge, our actions transform challenges into solutions, and our curiosity keeps us pushing, innovating, making the impossible... possible.

Because we understand the time for talk is over. Because the world needs new answers to old challenges. Because at Wood, we are future ready, now.

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