Evolution of transport fuels

The role of alternative fuels on the path to sustainability

Executive summary

Transitioning to alternative fuels in the transportation industry

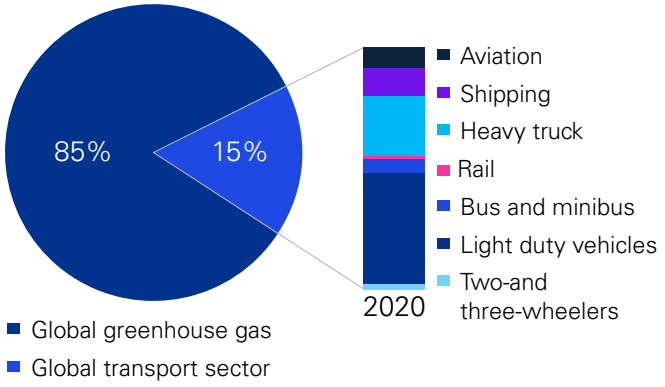
With the global transport sector contributing approximately 15 percent of all greenhouse gas (GHG) emissions,[1] and over 91 percent of its energy needs still met by gasoline and diesel,[2] a transformative shift to alternative fuels has become an urgent necessity.

Even with progress in electrifying passenger cars, the transport sector remains heavily dependent on conventional fuels. The shift to alternative fuels faces several obstacles: differing levels of technology readiness, inadequate infrastructure, higher costs than traditional fuels, and regulatory and market uncertainties. Nevertheless, a variety of transitional and alternative fuel options such as natural gas, biofuels, and synthetic fuels are available. Organizations that embrace these fuels early can benefit from first-mover advantages, government incentives, and improved sustainability profiles.

This report is specifically designed for transportation industry leaders and stakeholders, providing them with actionable insights on alternative fuels and a detailed analysis of readiness and adoption potential across road transport, aviation, and maritime shipping. By leveraging the insights and recommendations within, organizations can navigate the complexities of this transition, mitigate associated risks, and seize emerging market opportunities in the evolving energy landscape.

Explore the findings and strategic guidance in this report to position your organization at the forefront of the alternative fuels' revolution.

Breakdown of global CO_2 emissions from transport by subsector



Source: EDGAR — Emissions Database for Global Atmospheric Research,"CO2 emissions of all world countries" (2022).

International Energy Agency (IEA), "Global CO2 emissions from transport by subsector, 2000–2030" (November 4, 2021).

[1] EDGAR — Emissions Database for Global Atmospheric Research, "CO2 emissions of all world countries" (2022).

[2] International Energy Agency, "Transport" (May 16, 2024).

Key findings

Sector	Adoption readiness	Challenges	Opportunities
Road transport	**High readiness:** Natural gas, LPG, and biofuels (first-generation HVO and renewable diesel) **Emerging alternatives:** Methanol and Dimethyl Ether (DME)	• High production costs • Limited infrastructure • Regulatory uncertainties • E-fuels (renewable pathways) face readiness and cost challenges	• Immediate emission reductions with biofuels and natural gas • Competitive edge and preparation for stricter regulations
Aviation	**Promising:** Sustainable Aviation Fuel (SAF) and synthetic fuels (PtL)	• High costs and scalability issues • Supply chain and feedstock sustainability concerns • Regulatory readiness for e-fuels (renewable pathways)	• Position airlines as sustainability leaders • Meet regulatory demands through investment and collaboration
Maritime shipping	**High readiness:** Natural gas (CNG and LNG) **Promising alternatives:** Methanol and ammonia	• High initial investment costs • Infrastructure modifications needed • Safety concerns	• Significant emission reductions and operational cost savings • Leverage regulatory incentives for early adopters

Strategic actions for transport leaders

Without timely action, organizations risk facing stranded assets, increased regulatory penalties, and diminished market competitiveness. Conversely, early adopters can capitalize on substantial benefits, including enhanced sustainability profiles, access to government incentives, and a stronger market position. Here are key strategic actions to consider:

- **Conduct a comprehensive analysis:** Assess regional fuel supply chains and regulatory frameworks to identify viable alternative fuels tailored to specific operations.
- **Develop a differentiated strategy:** Leverage organizational strengths and clearly define how to maintain competitive advantages in the evolving fuel landscape.
- **Build and test business cases:** Develop detailed total cost of ownership models and test market assumptions to ensure sound investment decisions.
- **Forge strategic alliances:** Collaborate with technology providers, research institutions, and industry stakeholders to accelerate the development and deployment of alternative fuels.
- **Leverage regulatory Opportunities:** Take advantage of emerging policies and regulations designed to support the adoption of new fuels, thereby staying ahead of market changes and regulatory deadlines.

How this is connected to what we do

As a global leader in professional services, KPMG firms can provide valuable assistance in navigating the alternative fuel landscape. Here are some ways KPMG professionals can support your organization:

- **Decarbonization pathways:** Strategic foresight and operational value in the decarbonization journey, from emissions measurement to implementation.
- **Energy transition advisory:** Development of strategies to replace traditional power sources with renewable energy, including regulatory strategy and hydrogen project advisory.
- **Low carbon fuels consulting:** Broad support with tested tools and methodologies for navigating regulatory changes and capturing opportunities in the low carbon fuels sector.
- **Sustainable supply chain and procurement:** Positioning sustainable supply chain and procurement at the core of operational strategy to reduce environmental footprints.
- **Tax and legal services:** Navigating complex tax incentives, grants, and environmental taxes. Assessing carbon trading implications and managing compliance risks to optimize funding and cost management.
- **Workforce transition and strategy transformation:** Aligning decarbonization goals with enterprise strategy and providing end-to-end transformation support.
- **Deal advisory:** Offering deal valuation, M&A support, and post-merger integration to help manage investments and achieve strategic objectives in the context of the energy transition.

Explore the findings and strategic guidance in this report to position your organization at the forefront of the alternative fuels' revolution. Visit kpmg.com/alternativefuels to get started.

Contact us to learn more about how our professionals can assist your organization in navigating the alternative fuels landscape and seize opportunities from the energy transition.

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