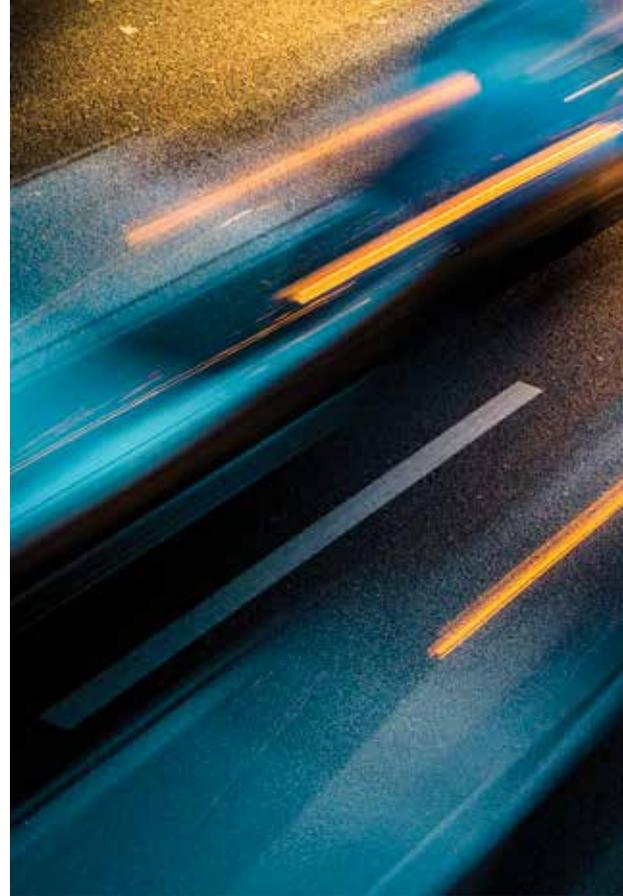


A GLOBAL ROADMAP FOR AUTOGAS

EXECUTIVE SUMMARY



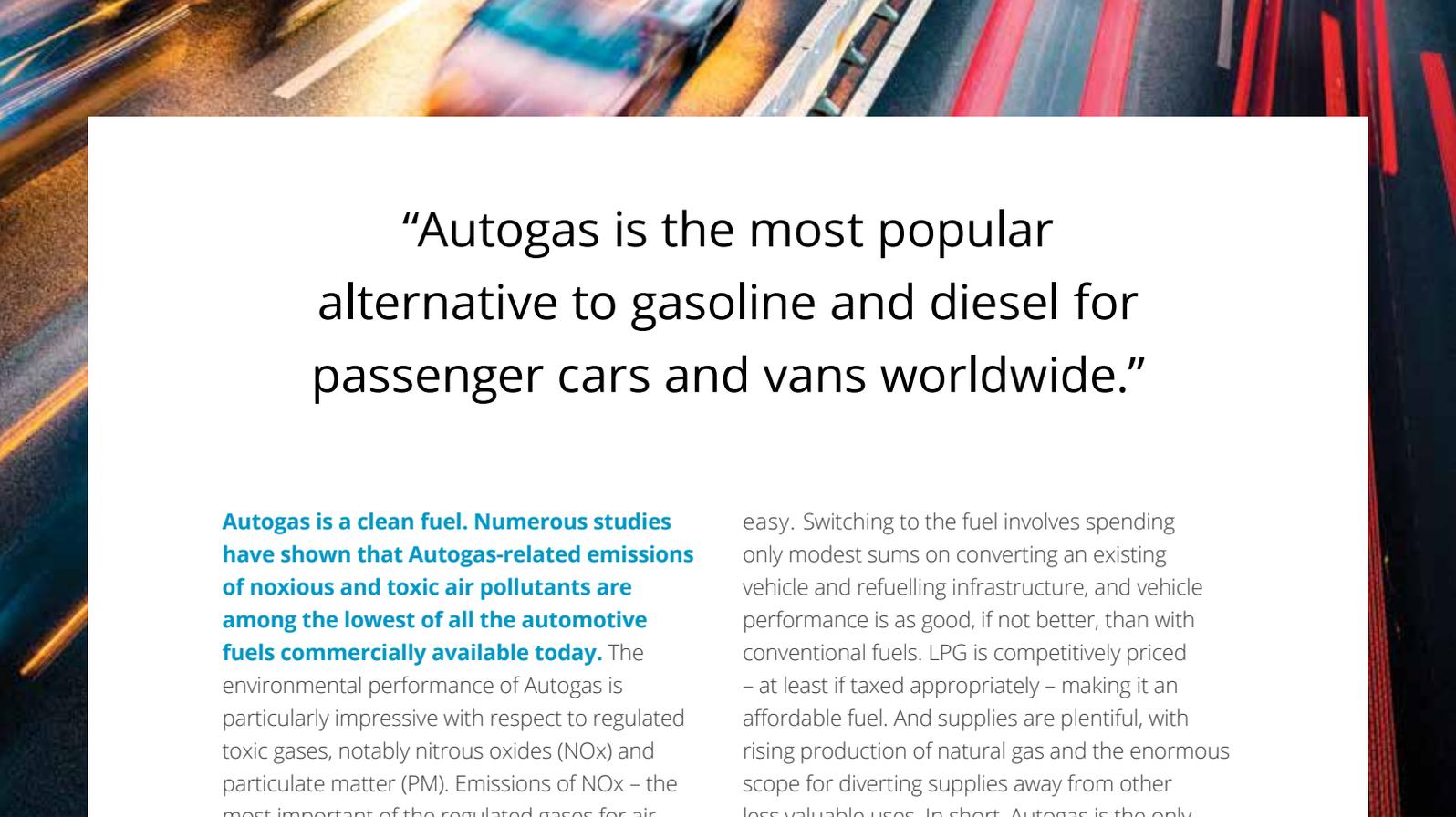
This report examines the global potential for Autogas – liquefied petroleum gas, or LPG, used as a transport fuel – in the vehicle fleet through to 2040.

It considers two scenarios: a baseline 'business-as-usual' case, where policy support for Autogas is assumed to remain at current levels, and a more bullish 'alternative scenario', where the Autogas sector enjoys stronger support from governments, vehicle manufacturers and the LPG industry. In the latter case, the number of Autogas vehicles triples and demand for the product doubles compared with current levels over the next 20 years or so. The associated social, economic and environmental benefits are estimated at over US\$54 billion.

The world is on the move: a growing population and an expanding economy are continuing to drive up demand for mobility – especially in Asia, Latin America and Africa. That means more vehicles (two- and three- wheelers, cars and trucks) and a need for more energy to run them. Rising mobility is a sign of greater prosperity and personal freedom, but it is also damaging our environment. The use of conventional gasoline and diesel for road transport is already the leading cause of outdoor air pollution – the leading threat to

public health – in most major cities and the second-biggest source of emissions of carbon-dioxide (CO₂) worldwide. Public awareness about the environmental and health effects of road transport – and pressure on the authorities to act – is growing by the day. The need to switch to Autogas, and other clean alternatives to conventional oil-based fuels, has never been more urgent.

Autogas is the most popular alternative to gasoline and diesel for passenger cars and vans worldwide. Demand for Autogas has been growing steadily in recent years, reaching around 27 million tonnes in 2017, and, in some countries, accounts for a significant share of the overall transport fuel market. There are now over 27 million Autogas vehicles in use around the world – almost four times more than in 2000. This has not happened by chance: a growing number of governments around the world actively encourage use of the fuel in recognition of its notable environmental benefits, as well as its inherent practical and cost advantages over conventional and other alternative fuels.



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Autogas is a clean fuel. Numerous studies have shown that Autogas-related emissions of noxious and toxic air pollutants are among the lowest of all the automotive fuels commercially available today. The

environmental performance of Autogas is particularly impressive with respect to regulated toxic gases, notably nitrous oxides (NO_x) and particulate matter (PM). Emissions of NO_x – the most important of the regulated gases for air quality – from Autogas are much lower than from gasoline and, especially, diesel. NO_x is a toxic air pollutant in its own right as well as the main cause of smog. PM emissions are negligible for Autogas and very low for gasoline vehicles, but remain a major problem for diesel vehicles. Concerns about the health impact of emissions of fine PM from diesel vehicles in particular have been rising in recent years, as more evidence of their impact on health comes to light. PM emissions from diesel vehicles are now known to cause cancer.

Autogas also outperforms gasoline and diesel for CO₂ emissions, an advantage that is set to grow as more and more LPG originates from natural gas processing plants, which emit less than oil refineries. As such, Autogas could

play an important role in mitigating greenhouse-gas emissions until such time as ultra-low or zero-emission vehicle technologies such as electric vehicles can be commercialised on a large scale. In this sense, fossil-based Autogas can be regarded as a “bridging fuel” in the transition to a clean, affordable and sustainable transport system. In the longer term, Autogas derived from bioLPG could play a major role.

In addition to its environmental credentials, Autogas holds a number of practical advantages over other fuels. Driving an Autogas car is safe and

easy. Switching to the fuel involves spending only modest sums on converting an existing vehicle and refuelling infrastructure, and vehicle performance is as good, if not better, than with conventional fuels. LPG is competitively priced – at least if taxed appropriately – making it an affordable fuel. And supplies are plentiful, with rising production of natural gas and the enormous scope for diverting supplies away from other less valuable uses. In short, Autogas is the only alternative fuel that delivers a wide range of benefits, including lower emissions, without having to compromise on vehicle performance and autonomy.

For all the advantages of Autogas, the prospects for continuing growth in demand depend critically on government policies.

Motorists will only switch to Autogas if it is cheaper at the pump than other fuels so that savings on running costs quickly repay the upfront cost of converting the vehicle. That means governments have to make sure that the fuel is taxed less than other, more polluting fuels. Financial incentives directed at the vehicle itself, such as grants or tax credits for converting to Autogas and other non-financial measures, can also boost the attractiveness of switching to Autogas.

Based on current policies, the global share of Autogas in the road-fuel market and the vehicle fleet is to stagnate.

In a Baseline Scenario, in which no change in national policies is assumed, global Autogas consumption is projected to continue to grow, reaching a peak of a little over 31 Mt in 2030 – about 18% higher than in 2017. But it then goes into gradual decline, dipping to just under 30 Mt in 2040. Globally, the Autogas fleet reaches a plateau of around 39 million by the end of the 2030s – 45% up on 2017.

The fleet continues to expand in all regions throughout the projection period except in Europe, where it goes into long-term decline after 2030. The share of Autogas in the global vehicle fleet remains broadly constant at 2% to 2030, but then declines gradually to 1.7% by 2040.

But a far more positive future for Autogas is possible. An Alternative Scenario assumes that the number of Autogas vehicles and their share of Autogas in the overall vehicle fleet reach twice the levels of those in the Baseline Scenario in each region by 2040. Global Autogas consumption continues to grow steadily in the Alternative Scenario, reaching 60 Mt by 2040 – well over twice the current level. The Autogas vehicle fleet grows even faster as fuel economy continues to improve throughout the projection period, reaching almost 80 million in 2040 – nearly three times the current size. Worldwide, Autogas vehicles make up 3.4% of the total fleet in 2040, compared with 1.7% in the Baseline Scenario and around 2% today.

Making this Alternative Scenario a reality would require relatively modest strengthening of incentive policies in most countries in addition to support from the Autogas industry, vehicle manufacturers and fuel-system equipment producers and installers. The results of econometric analysis show that the average payback period for switching from gasoline to Autogas would need to fall on average from 26 to 18 months, either by an increase in the tax on gasoline relative to Autogas or by the introduction of a grant or tax credit to cover part or all of the conversion cost. But the need for these measures would be alleviated or, in some cases, removed entirely by additional measures to discourage the use of diesel on health and environmental grounds, including higher taxes. Diesel, which competes most with Autogas in high-mileage vehicles, is often – perversely – taxed less in energy terms than Autogas at present. Other non-financial measures, such as exemptions for Autogas vehicles from driving restrictions in city centres for environmental reasons, could also help boost the attractiveness of Autogas.

Making the vision of tripling the number of Autogas vehicles between now and 2040 a reality would bring major socioeconomic benefits in the form of cleaner air, improved human health and reduced climate change.

By 2040, we estimate that it would lower global emissions of NO_x from LDVs by over 4% and those of PM_{2.5} by close to 5%, yielding social welfare gains, including savings on health costs and improved productivity, valued at almost US\$40 billion. World emissions of CO₂ on a well-to-wheels (WTW) basis would also be cut by a cumulative total of around 130 Mt over 2018-2040, yielding additional welfare gains of more than US\$15 billion. These gains would be complemented by the economic benefits enjoyed by end-users making the switch to Autogas. Motorists would enjoy lower fuel costs that quickly payback the upfront cost of converting their vehicle or buying a slightly more expensive OEM model. Additional economic benefits would also come from the additional jobs created in the Autogas installation sector.

These benefits will not be realised without concerted action by all stakeholders to tackle the barriers to market development.

Autogas suppliers themselves are committed to taking action, including reaching out to citizens to inform them of the potential of Autogas to keep people on the move while protecting the environment, strengthening ties with car manufacturers to develop engines that are more conducive to the use of Autogas, continuing to ensure that Autogas supply worldwide matches demand, expanding filling station networks and promoting the training and certification of Autogas kit installers. But the role of policy makers is crucial: transport and fuel tax policies need to ensure that Autogas is financially attractive to end users. Other private sector stakeholders, including energy producers and fuel system equipment manufacturers and installers, also need to play their part by investing in new vehicle technologies and bioLPG.

