



Urban Pathways

Factsheet

Compressed Natural Gas (CNG) or Liquefied Petroleum Gas (LPG) Taxis



**Wuppertal
Institut**

UN HABITAT
FOR A BETTER URBAN FUTURE

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The Urban Pathways project helps to deliver on the Paris Agreement and the NDCs in the context of the New Urban Agenda and the Sustainable Development Goals. It has established a facility in close cooperation with other organisations and networks active in this area to support national and local governments to develop action plans and concrete implementation measures to boost low-carbon urban development. This builds on UN-Habitat's role as "a focal point on sustainable urbanisation and human settlements including in the implementation and follow-up and review of the New Urban Agenda". The project develops national action plans and local implementation concepts in key emerging economies with a high mitigation potential. The local implementation concepts are being developed into bankable projects, focusing on the access to urban basic services to create a direct link between climate change mitigation and sustainable development goals.

The project follows a structured approach to boost Low Carbon Plans for urban mobility, energy and waste management services that deliver on the Paris Agreement and the New Urban Agenda. The project works on concrete steps towards a maximum impact with regards to the contribution of urban basic services (mobility, energy and waste management) in cities to global climate change mitigation efforts and sustainable and inclusive urban development. This project makes an active contribution to achieve global climate change targets to a 1.5°C stabilisation pathway by unlocking the global emission reduction potential of urban energy, transport and resource sectors. The project will contribute to a direct emission reduction in the pilot and outreach countries, which will trigger a longer term emission reduction with the aim to replicate this regionally and globally to make a substantial contribution to the overall emission reduction potential.

This project implements integrated urban services solutions as proposed in the New Urban Agenda providing access to jobs and public services in urban areas, contributing to equality and social coherence and deliver on the Paris Agreement and the Sustainable Development Goals. This is the first dedicated implementation action oriented project, led by UN-Habitat to deliver on inclusive, low-carbon urban services. Securing sustainability and multiplier effect, the project aims to leverage domestic and international funding for the implementation projects that will follow from this initiative.

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Project concept

Project aims

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In brief

A number of cities have introduced taxis that run on Compressed Natural Gas (CNG) or Liquefied Petroleum Gas (LPG) instead of conventional petrol or diesel, as they reduce air pollution and noise. However, the CO₂ benefits vary and emissions may be even higher than an efficient diesel powered vehicle.

Examples

In Delhi and Ahmedabad (India), air quality problems forced the city to convert taxis and auto rickshaws to run on CNG. As part of the process, Ahmedabad ensured that there was an adequate CNG supply and number of filling stations, and made conversion kits for vehicles available. In addition, the city offered financial incentives to rickshaw drivers along with soft loans (Tejas Ghate et al., 2013). Similarly, Madrid (Spain) has installed CNG/LPG refuelling stations and provided grants to taxi drivers to convert their vehicles. Italy and Poland have the highest market share of CNG vehicles in Europe, and are the most important markets for LPG vehicles. Germany and Spain have the most CNG vehicles.

Results

CNG/LPG vehicles are as reliable as conventional diesel vehicles. However, compared to a diesel engine, CNG/LPG engines must be larger to have the same power. New technologies have minimised previous problems with sparkplug leads and fuel regulators.

The newer the technology, the better the results of the fuel economy - which can be as much as 10%-15% lower than diesel. Although the maintenance costs for CNG/LPG vehicles can be higher, they will continuously improve with further research. Emission rates have shown to be significantly lower with CNG/LPG vehicles: carbon monoxide is 75% lower, nitrogen oxides 49% lower, hydrocarbons and non-methane hydrocarbons 4% lower, and carbon dioxide 7% lower (1).

In brief

Examples

Results

Technical and financial considerations

Favourable taxes can help sales of CNG/LPG vehicles. However, the effect will likely be short-lived, with sales returning to normal once the measures are removed. The costs of CNG/LPG vehicles also depend considerably on the models and price policies of the individual manufacturers (2).

The financial gain for customers depends heavily on future environmental policies and CO₂ emission targets. This is the case of the Euro 6 emission standard from 2015 onwards, where vehicles have to pass stricter exhaust emission (esp. nitrogen oxide, NO_x) controls, incurring possible additional costs for conventional diesel vehicles.

One technical consideration is the limited availability of fuelling station infrastructure, which is an inconvenience for drivers. Investing in better infrastructure is necessary to encourage CNG/LPG vehicles.

To foster the introduction of CNG/LPG in local taxi fleets, cities should consider a combination of different instruments, such as financial incentives for the vehicles/fuels (for example, in the form of subsidies, loans for vehicle conversion and tax rebates), providing sufficient refuelling stations, and restricting conventional taxis. Loans can help vehicles or fleet owners to bear the initial conversion cost of switching to CNG/LPG. Sufficient refuelling infrastructure is key for the measure's success; this can be installed through public-private partnerships to limit the cost to municipalities.

Policy/legislation

Germany, for example, subsidises CNG/LPG by not applying mineral oil tax to it. Studies show that CNG/LPG vehicles are cost-competitive when subject to energy tax benefits (3). Even though the German government is subsidising CNG/LPG vehicles, they currently account for only around 1% of vehicles in Germany, according to the German Federal Motor Transport Authority. Of LPG cars in use in Germany, most are conventional diesel cars converted to LPG, while newly produced cars are mainly CNG-powered. Experts predict that sales will decline after 2018 when subsidies are withdrawn. The competitiveness of CNG/LPG vehicles is reliant on extending the driving range of vehicles and improving fuelling station infrastructure (4).

Technical & financial considerations

Policy/legislation

Context

According to the WHO, Delhi is the most polluted city in the world, with an annual average PM2.5 level of 153µg/m³, 15 times the recommended average of 10µg/m³ (5). While there are many non-transport sources of this pollution (e.g. crop burning in surrounding areas, festival fireworks), transport, and particularly diesel vehicles, contributes up to 23% of this pollution (6).

While natural gas consumption in the Indian transport sector was around 2% in 2010, this is expected to increase in the future (7). Out of about 60,000 taxis in India's capital, Delhi, 27,000 still run on conventional diesel, which has been officially banned in the country since May 2016.

In action

In a bid to address smog and other problems, in 1998 India's Supreme Court ruled that commercial passenger vehicles must operate on CNG. The deadline for compliance had been extended several times, but the ruling was finally enforced from April 2016 (8).

Auto-rickshaws (three-wheeled small vehicles, also known as tuk-tuks), ran on either two-stroke petrol or diesel engines. In 2002, the Delhi municipal government banned diesel- or petrol-powered rickshaws (9). A 1997 Supreme Court decision capped their numbers at 55,000 (10), but that cap has since been increased by 45,000. The government of Delhi also subsidised a loan package, which allows taxi owners to convert their vehicles into CNG vehicles (11).

Results

Most Delhi auto-rickshaws are now CNG powered. The 55,000 auto-rickshaws was not enough to meet demand, and the use of private cars and car-taxis (often dieselpowered) has soared, with negative consequences for congestion, road safety and environmental factors, as CNG-powered rickshaws are smaller, lighter and cleaner (assuming the same engine type) than cars.

Case Study: Converting Delhi's autorickshaws to CNG (India)

In action

Results

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