INTESA SANPAOLO
INNOVATION CENTER

INDUSTRY TRENDS REPORT

SUSTAINABLE URBAN MOBILITY

FROST & SULLIVAN

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EXECUTIVE SUMMARY

Cites account for 70% of global greenhouse gas emissions annually and, within this, transport contributes about one third.

Pollution is very closely correlated to high private vehicle use and a reluctance to take public transport so the successful ***management of traffic congestion*** is key to efforts to move to developing "smarter" and more sustainable urban areas.

In parallel to managing traffic congestion, the ***reduction of exhaust emissions*** stemming from private, commercial and public vehicles will also be vital and necessitates the introduce alternatives to conventional internal combustion engines.

With uptake driven by congestion and pollution, **shared mobility** solutions form part of the "solution" and could account for 29% of the modal mix in Europe by 2050.

In the short term, market participants will be focused on expanding geographically and developing purpose-built vehicles while, in the medium term, activity will be centered on electrifying fleets and rolling-out apps and, in the long term, artificial intelligence is expected to generate efficiencies and autonomous mobility will also gain importance.

Overall, ***ride-hailing*** is and will remain the largest shared mobility segment in Europe with the business model moving steadily from pre-book to on-demand. From a low base, ***demand responsive transport*** on the other hand is the most rapidly growing solution with bus operators leveraging data to improve efficiency and reduce emissions.

Micro cars offer an alternative and sometimes complementary means of tackling cities' emissions and are being adopted by the likes of Uber or Lyft.

In absolute terms, Japan is the largest micro mobility market with the top 10 models accounting for 806,377 vehicle sales in 2022 but Europe has a strong and growing base of micro car vendors which includes established automakers such as Citroen and microcar specialists like Ligier both of which are French.

In addition to their environmental credentials, uptake of micro cars is being driven by their cost-effectiveness, maneuverability and ease-of-use. They are also applicable across multiple segments including enabling ***passenger*** mobility, serving ***commercial*** purposes and acting as ***utility*** vehicles. Increasingly, vendors are introducing electric micro cars as a response to expanding low- or emission-free zones in many cities and other urban areas.

Population growth and environmental concerns are driving the need for urban transport solutions which are not just shared or small but also smart.

Overall, the global **intelligent mobility** systems market is valued at $27.5b and expanding at 5.3% annually to reach $35.6b by 2025. It leverages wireless ***communication technologies*** with strong connectivity and low latency and emerging ***sensor technologies***

to analyze traffic related data from various sources, including vehicle-to-vehicle and vehicle-to-infrastructure sources, to provide decision support.

Moving forwards, artificial intelligence, big data and cloud computing have the potential to enhance the impact of intelligent transportation systems. Together, they will facilitate the efficient use of traffic data in urban transport planning, investments and operations, offering a range of tangible benefits in terms of efficiency and governance.

In the long run, changes to the way that mobility operates and the vehicles that are used will need to be matched by a switch to emerging, green powertrains.

Fuel cells offer one option with more than 200 **hydrogen buses** currently active in Europe and 1,600 more purchased by OEMs, fleets and city authorities. There is a strong case for their use in urban transit vehicles which have a moderate payload and typically make only short hops and uptake is being boosted as cost parity with diesel becomes a possibility.

In Europe, there is a range of government-funded hydrogen research and demonstration projects while, in parallel, innovation is also being driven by direct market participants which includes ***diversified automakers*** and ***bus pure players***. Further afield, China is at the forefront of hydrogen and fuel cell technology with its fourteenth 5-year energy policy setting a framework for large-scale adoption.

This report examines the contribution that each of these complementary approaches – shared, small, smart and hydrogen-powered forms of transportation – can make to managing traffic, reducing exhaust and therefore lowering pollution as well as overall in contributing towards the shift to sustainable mobility in a peri-urban and city context.

INTRODUCTION

Cites account for 70% of global greenhouse gas (GHG) pollution and, within this, transport contributes about one third.

Pollution is very closely correlated to congestion with the vehicles on London's streets typically emitting 8,000 tons of CO2 daily as a result of traffic jams while drivers in Chicago lose 104 hours to gridlock and motorists in Paris waste up to 140 hours annually.

Congestion typically stems from high private vehicle use and a reluctance to take public transport for long commutes.

Successful ***traffic congestion*** management is therefore key to boosting cities' resilience and productivity as well as improving the quality of life of their citizens and plays a pivotal role in the overall move to developing smart and more sustainable urban areas.

Its effective implementation relies on policy- and technology-led interventions from the public and private sector to resolve traffic issues through temporary and/ or permanent measures which smooth the flow of goods and people.

OEMs are notably producing light-weight, efficient and fuel-saving vehicles which will inspire owners and users to change the modes of transport that they use as well as, perhaps more importantly, the way in which they use them.

Overall, traffic congestion and therefore urban pollution will be "solved" by the development and deployment of forms of transport that are:

- *Fewer,* via **shared mobility**
- *Smaller,* such as **micro cars**
- *Smarter,* like **intelligent mobility**

In parallel to managing traffic congestion, it will be necessary to reduce the ***exhaust emissions*** of private, commercial and public vehicles and to introduce alternatives to ICE powertrains including electric and, in the longer term, hydrogen.

Hydrogen buses currently account for less than 0.01% of energy consumption in the transport sector globally but they have the potential to be a gamechanger with a network structure that is similar to that for conventional vehicles but a value chain that is radically different.

Public authorities as well as direct and indirect mobility market participants are expected to be active in addressing some of the current challenges around production, storage and distribution and in driving hydrogen forwards.

This report examines the contribution that each of these complementary approaches – shared, small, smart and hydrogen-powered forms of transportation – can make to managing traffic, reducing exhaust and therefore lowering pollution as well as overall in contributing towards the shift to sustainable mobility in an urban city context.

Source: Frost & Sullivan

SYMONE

COMPANY **OVERVIEW**

Industry Segment:

Hydrogen buses

Brief Description:

Symone is developing green hydrogen-powered buses to transport passengers and their vehicles at the same time.

Maturity:

Under development

Multimedia:

https://www.youtube.com/watch?v=u-Fmau5TZIE

COMPANY **STRUCTURE**

FOUNDED: **2021**

COUNTRY: **FRANCE**

OF EMPLOYEES: **2-10**

TOTAL FUNDING: **€0.35M**

REVENUES: **N.A.**

PRODUCT **OVERVIEW**

Technology Focus

- The Symone bus has been designed to carry passengers like a standard bus and, at the same time, also their cars and/or motorcycles. The bus will host up to 18 passengers in the double-decker carriage, five cars on the roof and some motorcycles in the rear, depending on their size.
- Symone's solution allows for the loading of vehicles on board in approximately 10-15 minutes.
- Symone's bus will be powered by green hydrogen produced from renewable energy sources.

Main competitive advantage

Symone is developing a hydrogen-powered bus to transport both vehicles and passengers. The double-decker bus enables comfortable long-distance travel while allowing for the transportation of various types of vehicles, from cars to motorcycles, to destination. The bus will be hydrogen-powered, allowing to reduce the carbon footprint of transportation while reducing the traffic on highways. The Symone's bus will provide a high standard service, comparable to the first class of modern trains.

Value Proposition

- The company aims at making long journeys more comfortable by enabling the transportation of both passengers and their automobiles.
- Symone is committed to reducing the carbon footprint related to long trips. Symone aims at reducing CO2 emissions by up to 550 tons per year using hydrogen buses.
- The objective is to offer a partly innovative service that allows travellers to save costs and potentially reduce traffic on highways. Symone's solution enables savings on tolls, fuel, vehicle wear and maintenance.

Source: Frost & Sullivan, SYMONE

PRINCIPAL ABBREVIATIONS

ABS	*Anti-lock Braking System*
AI	*Artificial Intelligence*
API	*Application Programming Interface*
B	*Billion*
B2B	*Business to Business*
B2G	*Business to Government*
BEV	*Battery Electric Vehicle*
CACC	*Cooperative Adaptive Cruise Control*
CC	*Cubic Centimeter*
CO2	*Carbon Dioxide*
CPU	*Central Processing Unit*
CSO	*Carsharing Operators*
DRT	*Demand Responsive Transport*
DSRC	*Dedicated Short-range Communication*
EU	*European Union*
EV	*Electric Vehicle*
FC	*Fuel Cell*
FCEV	*Fuel Cell Electric Vehicle*
FIR	*Far Infrared*
Gbit/s	*Gigabyte per second*
GH2	*Gaseous Hydrogen*
GHG	*Greenhouse Gas*
GHz	*Gigahertz*
GMV	*Gross Market Value*
GNSS	*Global Navigation Satellite System*
GPS	*Global Positioning System*
H2	*Hydrogen*
HEV	*Hydrogen Electric Vehicle*
HRS	*Hydrogen Refueling System*
HSA	*Hill Start Assist*
ICE	*Internal Combustion Engine*
IPO	*Initial Public Offering*
ITS	*Intelligent Transportation System*
KG	*Kilogram*
KM/H	*Kilometers per Hour*
KW	*Kilowatt*
LH2	*Liquified Hydrogen*
LIDAR	*Light Detection and Ranging*
LSV	*Low-speed Vehicle*
M	*Million*
M&A	*Mergers and Acquisitions*
MaaS	*Mobility as a Service*
ML	*Machine Learning*
NEV	*Neighborhood Electric Vehicle*
NFC	*Near-field Communication*
OEM	*Original Equipment Mnafucaturer*
P2P	*Peer to Peer*
PHV	*Private Hire Vehicle*
RFID	*Radio Frequency Identification*
SaaS	*Software as a Service*
SPAC	*Special Purpose Acquisition Company*
TCO	*Total Cost of Ownership*
TNC	*Transport Network Company*
UK	*United Kingdom*
V2I	*Vehicle to Infrastructure*
V2V	*Vehicle to Vehicle*

Source: Frost & Sullivan

ABOUT INTESA SANPAOLO INNOVATION CENTER:

Intesa Sanpaolo Innovation Center is the company of Intesa Sanpaolo Group dedicated to innovation: it explores and learns new business and research models and acts as a stimulus and engine for the new economy in Italy. The company invests in applied research projects and high potential start-ups, to foster the competitiveness of the Group and its customers and accelerate the development of the circular economy in Italy.

Based in the Turin skyscraper designed by Renzo Piano, with its national and international network of hubs and laboratories, the Innovation Center is an enabler of relations with other stakeholders of the innovation ecosystem - such as tech companies, start-ups, incubators, research centres and universities - and a promoter of new forms of entrepreneurship in accessing venture capital. Intesa Sanpaolo Innovation Center focuses mainly on circular economy, development of the most promising start-ups, venture capital investments of the management company Neva SGR and applied research

For further detail on Intesa Sanpaolo Innovation Center products and services, please contact

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ABOUT FROST & SULLIVAN:

For over five decades, Frost & Sullivan has become world-renowned for its role in helping investors, corporate leaders and governments navigate economic changes and identify disruptive technologies, Mega Trends, new business models and companies to action, resulting in a continuous flow of growth opportunities to drive future success.

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