

5 MOBILITY

Digitalization in the energy sector in Chile

- Transportation for Personal Use
- Public Transport
- Transport Cargo
- Shared Mobility

This class includes those mobility applications that have incorporated digital technologies in some of their processes. Incorporation of mobility is important as transportation and electromobility are closely associated with energy.

Application presence by country

Uses/Applications	Germany	Finland	Japan	China	USA	UK	Sweden	France	South Korea	Singapore
Transportation for Personal Use	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Public Transport	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Transport Cargo	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Shared Mobility	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Application potential by sector

Uses & Applications	Transportation	Industry	Buildings	Electricity Generation	Finance	Public Sector	Main type of energie
Transportation for Personal Use	Yes	Yes	Yes	Yes	Yes	Yes	Fossil fuels and electricity
Public Transport	Yes	Yes	Yes	Yes	Yes	Yes	Fossil fuels and electricity
Transport Cargo	Yes	Yes	Yes	Yes	Yes	Yes	Fossil fuels and electricity
Shared Mobility	Yes	Yes	Yes	Yes	Yes	Yes	Fossil fuels and electricity

Enabling Technologies

Technologies	Load monitor	In home display	Smart thermostat	Smart light	Smart plug/switch	Smart appliance	Hub	Smart meters	AMR/AMI	V2G	EV/PHEV	IED (relays, SCADA,...)	PMU	WAMS	Smart Sensors	Sensor and actuator LAN/HAN/WAN	Cloud	5G	Machine learning	Data mining	Nature inspire	ANN	Multi-agent systems	Clustering	NLP	Digital twin	Autonomous vehicle	Blockchain	Actuators	3D printers	
Uses & Applications	Smart home & Smart building							Smart grid							IoT & IoE				Big data, machine learning & AI								Physical action				
Transportation for Personal Use																															
Public Transport																															
Transport Cargo																															
Shared Mobility																															



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5.1 Transportation for personal use

Related to the incorporation of digital technologies and electricity in transport for personal use (vehicles, bicycles, motorcycles, scooters, among others).

Common examples



The Korean New Deal determines that by 2025 there will be 1,130,000 electric cars and 200,000 hydrogen fuel cell cars circulating throughout the country.

Opportunities



It may increase the overall customer satisfaction in urban areas by reducing traffic time.



Reduce de emissions of GHG.



Safer for people as it reduces the probability of accidents with autonomous vehicles and advanced driving assistance systems (ADAS).



Revenues for users of personal electric vehicles from participating in the complementary service market.

Information, infrastructure and regulation requirement

It's necessary the development of charging points infrastructure to incentive the use of electric vehicles.

Barriers



Infrastructure: low market penetration of vehicles equipped with connected vehicle's technology.



Economic: the cost of incorporating V2X technology in vehicles is still high (around US \$1500 to US \$2000 per unit as of 2020).



Regulation: lack of regulation that imposes the mandatory incorporation of wireless connectivity in vehicles, to enable the use of road safety applications based on vehicle-to-everything (V2X) communications.



Others: lack of consensus about the technology to be massively adopted by vehicle manufacturers.

Application synergies

Electric vehicles may participate in **DSM (2.1)** program in order to charge the vehicle in certain hours and get revenues for it.

Personal transport will be beneficiated by **Smart traffic (7.2)** and **Smart parking (7.6)**.



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Transportation for personal use



International real application



The Toyota Mirai is a mid-size hydrogen fuel cell vehicle (FCV) manufactured by Toyota, and represents one of the first FCV vehicles to be mass produced and sold commercially. Under the United States Environmental Protection Agency (EPA) cycle, the 2016 model year Mirai has a total range of 502 km (312 mi) on a full tank making the Mirai the most fuel-efficient hydrogen fuel cell vehicle rated by the EPA, and the one with the longest range.

Examples of international goals



The “Road to Zero” strategy establish that the goal is that all new cars have to be electric by 2040, even though there is pressure to meet it by 2030.



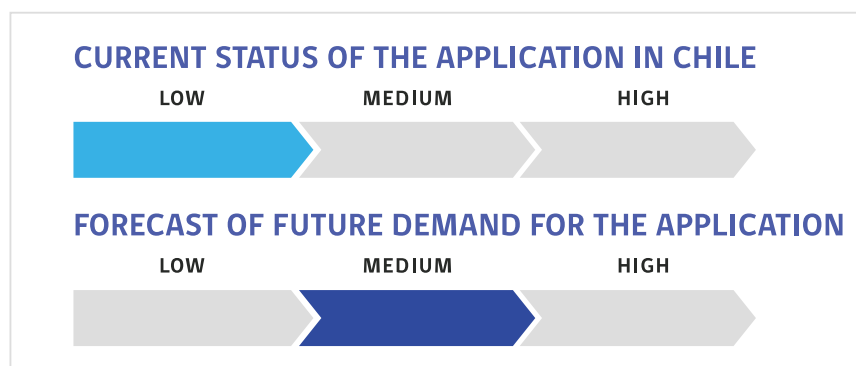
The French National Assembly passed the long-time coming Mobility Orientation Law that proclaims a ban on sales of passenger cars and light commercial vehicles running on fossil fuels (petrol, diesel, natural gas, etc.) by 2040, and to outlaw these vehicles from the roads by 2050.

National key partners and resources



Public policies recommendations to Chile

- ▶ A major reform of the legal framework that supports the operation of private transportation, including civil and penal responsibilities that involve not only the owner of a vehicle but also the car manufacturer that programs and maintains the “virtual” drivers in every car.




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5.2 Public transport

In this context, the application refers to the incorporation of digital technologies and electricity in public transport in all its forms (bus, airline, train, ferry, among others).






Common examples

 The European Commission and the German federal government have promoted an electrification plan for the transport system whose joint financing reaches 1,850 million euros until 2031. This injection of money will not only allow the purchase of new electric and hybrid trains and buses, but also for the creation of charging infrastructure throughout the country and the reconstruction of the railway system.

 The British government has launched a program that authorities can apply to become the UK's first fully electric bus city. The winning area had up to £ 50 million to help pay for a new fleet of electric buses, reduce emissions and clean the air in their community.

 There is a government initiative that aims to improve public transport connections in rural areas of the country. The law also proposes that there would be comprehensive access to information on transport solutions, schedules and rates, both in the city and in the countryside. Also, it is proposed that employers pay their staff a bonus for using more sustainable transportation methods. This initiative even incorporates the legal framework for the integration of autonomous buses.

Opportunities

-  Improve the experience and increase use of public transport.
-  Optimize the energy use of public transport.
-  Lower emissions.
-  Better fiscalization.
-  Know travel times more precisely.

Information, infrastructure and regulation requirement

- ▷ Infrastructure needed to have a charging network.
- ▷ There must be regulations that incentive the use of public transport.

Barriers

-  **Others:** interoperability and standardization issues.



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Application synergies

Public transport will be benefited by **Smart fleet management (7.8)** and **Smart traffic (7.2)**.

International real application



France is integrating new AI tools into security cameras in the Paris metro system to check whether passengers are wearing face masks. The software began a three-month trial in the central Chatelet-Les Halles station of Paris this week. The goal is not to identify or punish individuals who don't wear masks, but to generate anonymous statistical data that will help authorities anticipate future outbreaks of COVID-19.

Examples of international goals

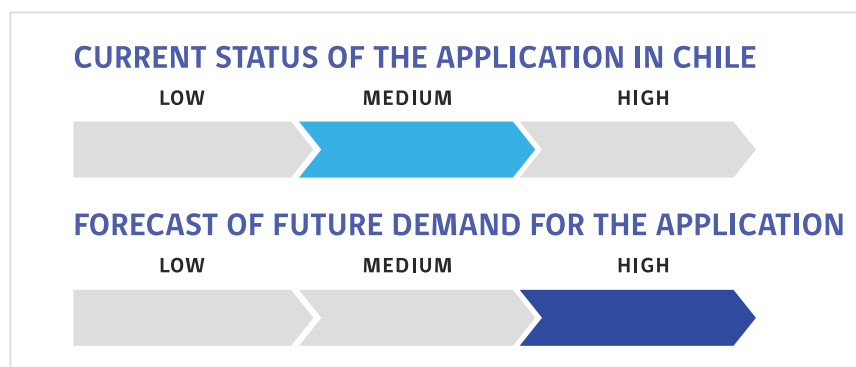
- ▶ No specific targets were found

National key partners and resources



Public policies recommendations to Chile

- ▶ Regulation must promote transport modes and applications that benefits society.



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5.3 Transport cargo

It refers to the incorporation of digital technologies and electricity in the commercial transport systems of goods or products.

Common examples



For cargo transportation to mature in the USA, new market strategies are required in electromobility, considering the participation of several players, such as owners of cargo infrastructure or mobility providers (for example, providers of cargo transportation services).

Opportunities/ What problem is solving



Operational cost reduction.



Improving safety for vehicles, pedestrians, and other vulnerable road users



Significant reduction in GHG emissions.

Information, infrastructure and regulation requirement

- ▶ Infrastructure needed for the creation of a transport network that allow cooperation with the smart grid

Barriers



Economic: high cost of vehicles with these technologies.

Application synergies

- ▶ Considering that freight transport can be scheduled, the intelligent transport network can be combined with the smart grid so that users know when it is convenient to carry out transport or recharge their vehicles. ([Energy storage \(2.2\)](#) and [DR \(2.1\)](#)).



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Federal Ministry for Economic Affairs and Energy

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International real application

Volvo Trucks has signed a landmark agreement with Brønnøy Kalk AS in Norway to provide its first commercial autonomous solution transporting limestone from an open pit mine to a nearby port. The solution consists of limestone being transported by six autonomous Volvo FH trucks on a five kilometer stretch through tunnels between the mine itself and the crusher⁷.



⁷ "Volvo Trucks provides autonomous transport solution to Brønnøy Kalk AS", November 20, 2018. Available on <https://www.volvogroup.com/en-en/news/2018/nov/news-3126261.html>

Examples of international goals



The smart city Sweden program establishes that in order to meet the goal of zero use of fossil fuels in mobility it's necessary to achieve a greater charging capacity of electric vehicles, for which projects of wireless electric roads are being developed (useful for transporting loads in long distances).



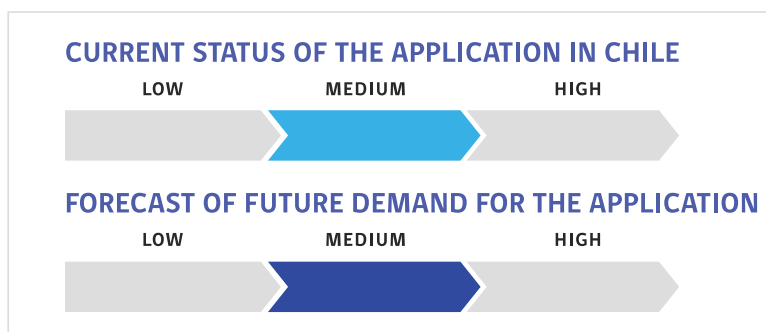
The goal is that vehicles have zero emissions by the year 2040. The UK is currently working on this objective but there are gaps to meet it, some of them are the development of high-performance batteries and charging infrastructure.

National key partners and resources



Public policies recommendations to Chile

- ▶ There must be a regulatory adjustment so that the VPPs can participate in the energy market as they are generators that cannot be regulated under the same parameters as conventional generation.



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5.4 Shared mobility

Shared mobility refers to the shared use of electric or non-electric means of transport (vehicles, bicycles, among others), according to the needs of the users.

Common examples



In Germany, the number of people using carsharing has grown rapidly in recent years. As of January 2018, there were 2,110,000 customers registered with 165 car-sharing providers in 677 different German cities and communities.



Shared mobility is considered in UK's "Future of Mobility: Urban Strategy". Currently the adoption of shared mobility alternatives is growing. The number of car club members across the UK increased almost eight-fold between 2007 and 2017, to nearly 250,000 members.

Opportunities

- Reducing car ownership.
- Reducing gas emissions.
- New Business models.

Information, infrastructure and regulation requirement

► Infrastructure to have bike and scooter centrals.

Barriers

- Infrastructure:** the need to connect vehicles and users to the internet.
- Economic:** high cost of implementing microcontrollers to bicycles or scooters.
- Regulation:** laws and regulations associated with the entity responsible for the vehicle, insurance, technical reviews, etc. must be defined.
- Others:** there might be mistrust for this service.

Application synergies

► Shared mobility will be benefited by **Smart fleet management (7.8)** and **Smart traffic (7.2)**.



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International real application

Nextbike is the first and biggest German bike rental and is operating in more than 60 German cities and 25 countries worldwide. It gives the possibility to pay for km or a monthly plan⁸.

⁸ Nextbike. Available on <https://www.nextbike.de/en/>



Examples of international goals

No specific targets were found.

National key partners and resources



Public policies recommendations to Chile

- ▶ Flexible regulatory framework, which allows the implementation of shared mobility and the implementation of associated enabling technologies (autonomous vehicle, V2G, EV, among others).

