SUMOSU

SUSTAINABLE MOBILITY SUPPORT STATIONS

URBAN RESILIENCE

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Urban Resilience S.L. is a research company with expertise in sustainable mobility, urban infrastructure, protection of the environment, policy development or improvement for local and regional governments, energy efficiency and renewable energy sources, circular economy and disruptive smart innovations.

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SUMOSU

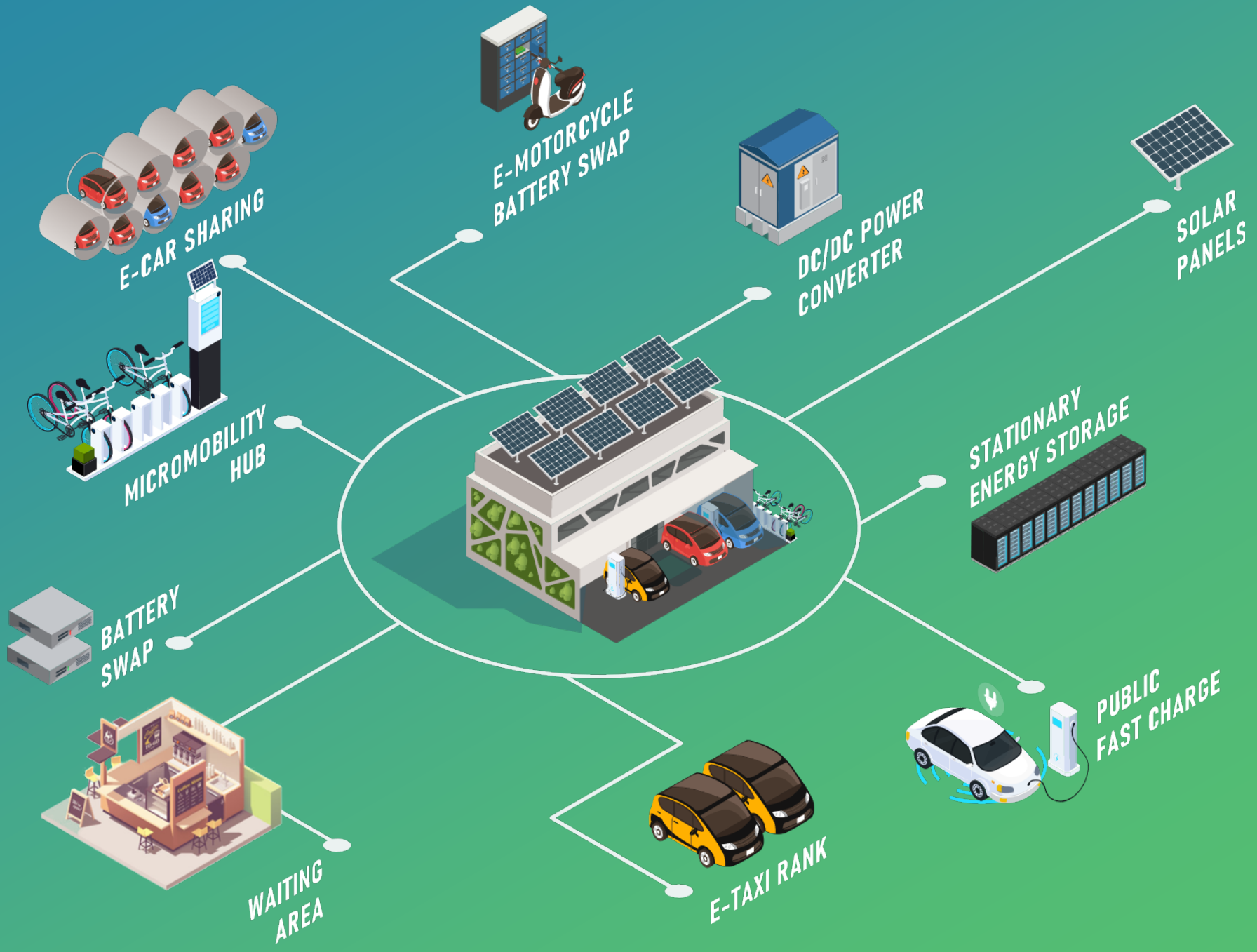
SUSTAINABLE MOBILITY SUPPORT STATIONS

SUMOSU Stations are **eMaaS Hubs** (electric Mobility as a Service Hubs) for urban centres. These **120 m² stations** bring together a variety of sustainable transport options in one identifiable, accessible place. But they are also a remarkable part within smart grids, as they work as nodes in a distributed network to transmit, distribute, and store energy.

The resulting solution is a unique opportunity for decision-makers to shape cities away from privately owned and lightly occupied cars and towards better air quality, less parking and congestion, and accelerated decarbonisation.

SUMOSU

SUSTAINABLE MOBILITY SUPPORT STATIONS



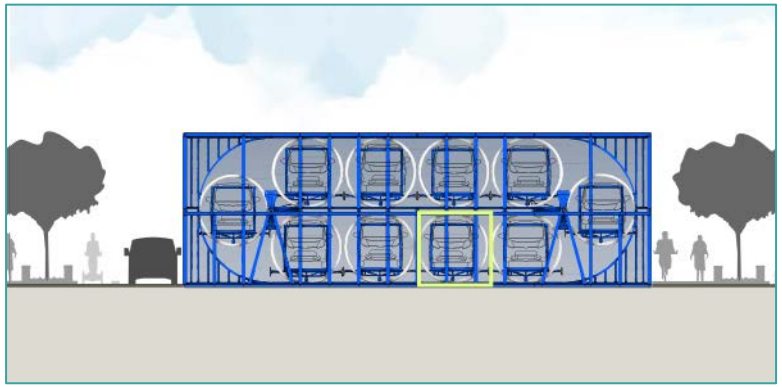
HOLISTIC APPROACH

SUMOSU Stations were designed taking a joint approach to distributed generation, electric vehicle charging systems and new mobility patterns, and used the particular strengths resulting from such synergies.

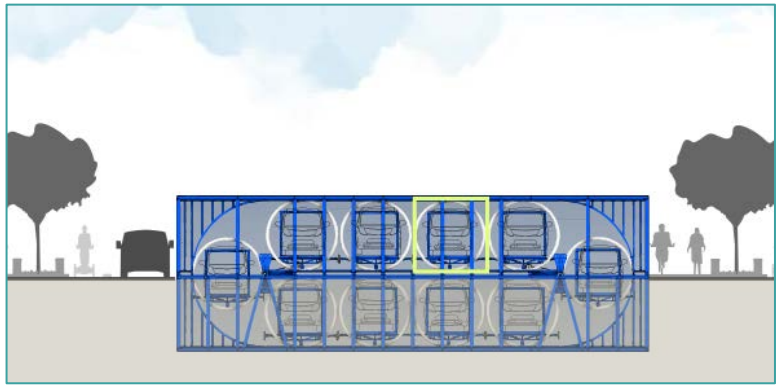
MODULAR DESIGN

All SUMOSU Stations are made to **standard measurements** and they are composed of modular elements that can be combined into different positions. This simplifies costs, design and planning for worldwide **replicability** as it is very easy to modify the structure to suit every landscape.

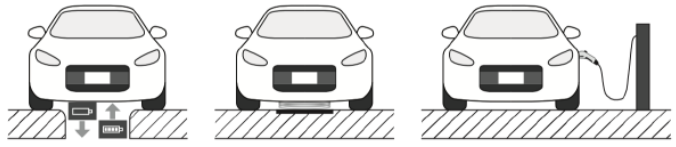
Full construction aboveground



Partially underground

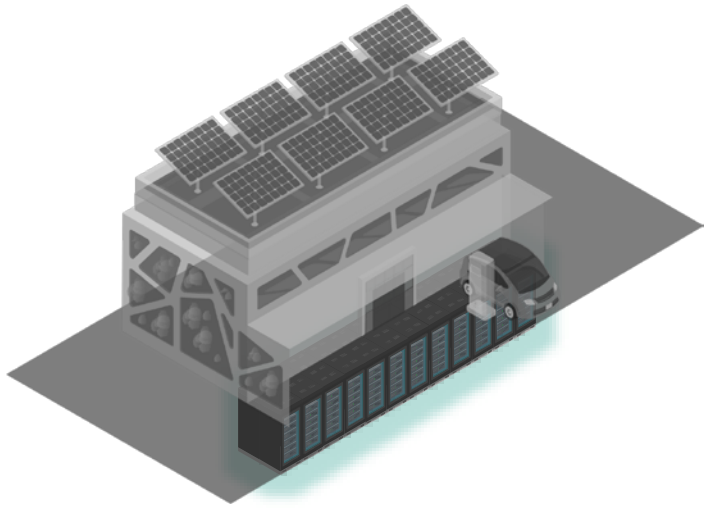


Adaptable to different charging methods:

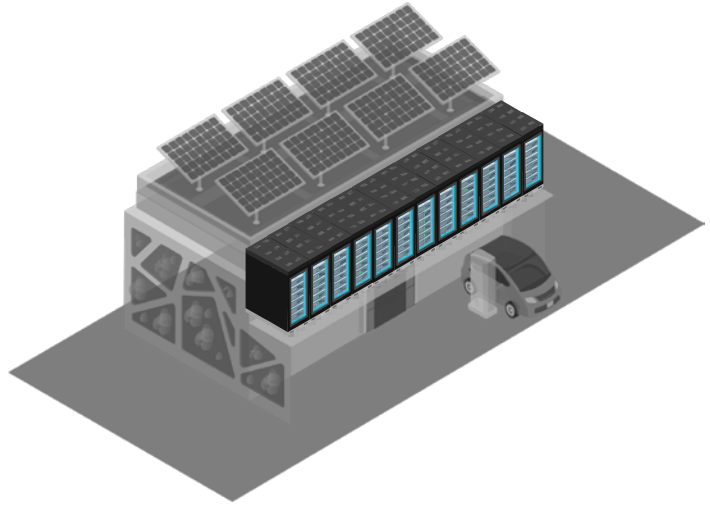


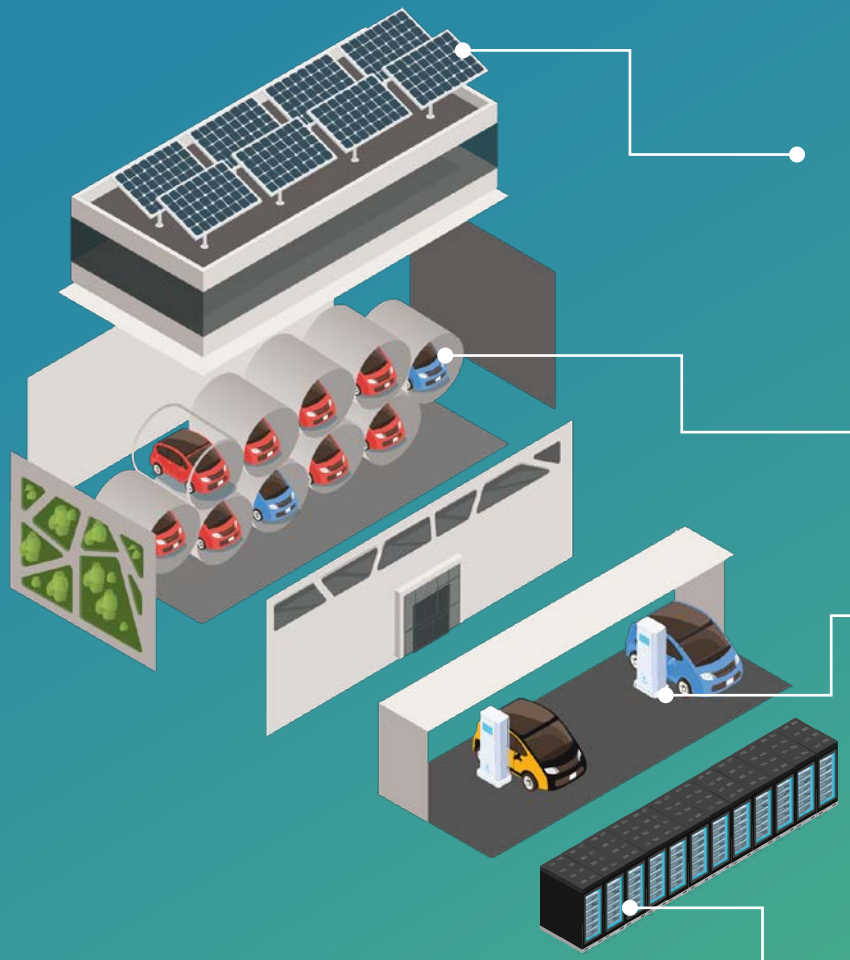
Battery swap Wireless inductive charging Plug-in charging

Underground battery



Overhead battery





Solar panels as roof cover for a complimentary power supply.

An automated rotary carousel for **parking and charging 10 carsharing vehicles**

Two DC fast chargers (50Kwh) serving **4 publicly available charging bays**

70m2 for a **stationary energy storage system**, reusing second-life EV batteries (30 units).

SUMOSU

SUSTAINABLE MOBILITY SUPPORT STATIONS

SPACE SAVING

A standard SUMOSU Station provides charge and parking space for a carsharing fleet of 10 city cars on two levels to maximize the number of parking spaces while minimizing land usage. An automated system to rotate cars is used in order to eliminate much of the space wasted in manoeuvre and access lanes.

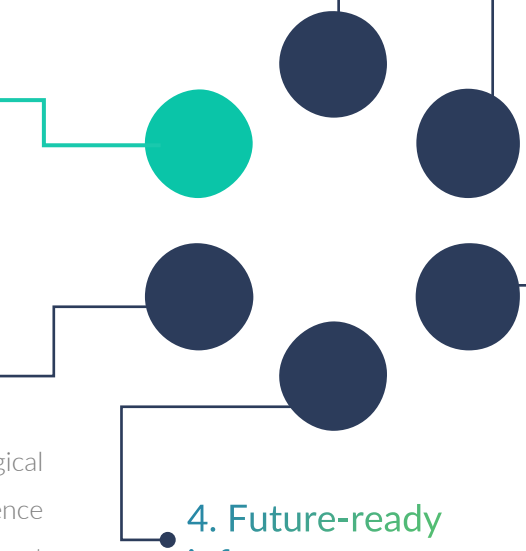
With land at a premium in our increasingly congested cities, this space-saving solution promises the same amount of parking offered in conventional car parks in **67% of the land area.**

Intelligent Integration

The energy and mobility sectors are closely interlinked and face many common challenges. An integrated approach was needed to maximise synergies and cross-fertilisation across these sectors.

SUMOSU is the perfect example of a solution that works across sectors such as energy, transport, infrastructure, and city governance.

SUMOSU
SUSTAINABLE MOBILITY SUPPORT STATIONS



1. e-Mobility Hub

SUMOSU Stations are a point in the transport network that integrate multiple types of electric transport, providing travellers with a realistic alternative to owning a car.

2. Energy management

SUMOSU Stations are a key element of future energy infrastructures to enable an efficient interaction with the grid, increase its safety and reliability and favor locally-based energy distribution and autonomy.

3. City Governance

These multi-service stations provide an opportunity for immediate implementation without risky investments nor public funding. This project enables a long-term cooperation between the public sector and market departments in order to achieve a win–win situation.

4. Future-ready infrastructure

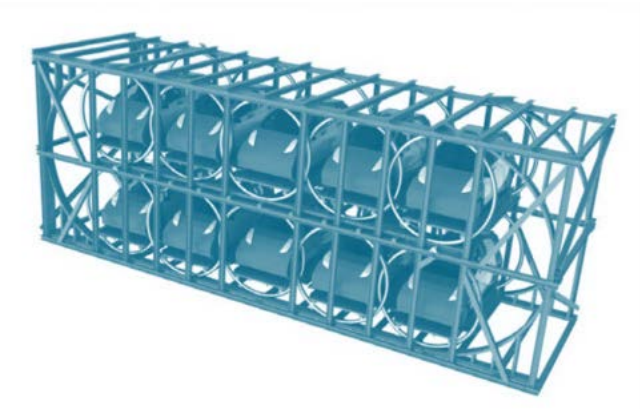
The stations are designed as upgradable modules to support increasing demand for EVs and increasing battery ranges, in addition to a future-proof design ready to adopt coming 5G and AVs technologies.

5. Social Impact

In addition to the technological impacts, SUMOSU can also influence society including environment quality, a proactive role of communities and recovery of their economies. These stations are designed to provide benefits beyond just EV charging.

1 e-Mobility Hub

A SUMOSU station is a place that, with a combination of multiple modes of e-mobility on demand, will make it easier for the user to replace car ownership; providing access to cars, scooters, taxis and bikes in a safe, comfortable, and accessible environment.



1 E-CARSHARING STATION

Each station has an automatic carousel parking system to safely park and charge e-carsharing fleets of city cars. This ensures that the customer can have confidence in highly available, charged and clean cars that are ready to go.

2 E-MOTORCYCLE BATTERY SWAP

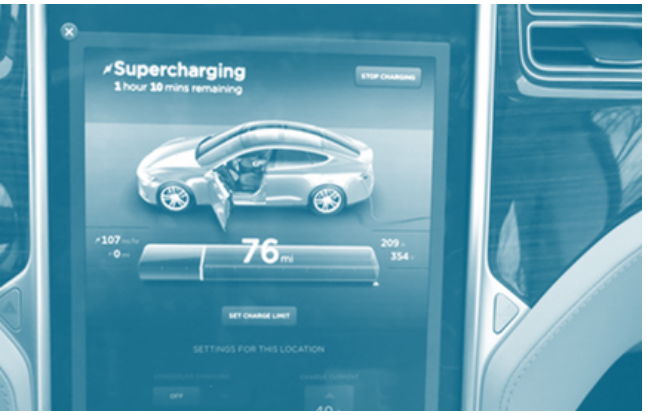
SUMOSU Stations are also equipped with ATM-like battery hubs deploying fully charged swappable batteries for e-motorcycles and scooters within a weatherproof and modular construction.

3 UNIVERSAL CHARGING FOR MICROMOBILITY

Battery powered multimodal micromobility hubs which are capable of securing and charging multiple types of micromobility vehicles (e-bikes, e-scooters, e-skateboards)

4 ELECTRIC TAXI RANKS

In the most appropriate locations to meet demand, stations will have appointed electric taxi ranks with access to the ultrafast charge units. Taxi drivers have a few opportunities for long charges, but so they will need available spaces for recharging vehicles in small doses several times throughout a day.



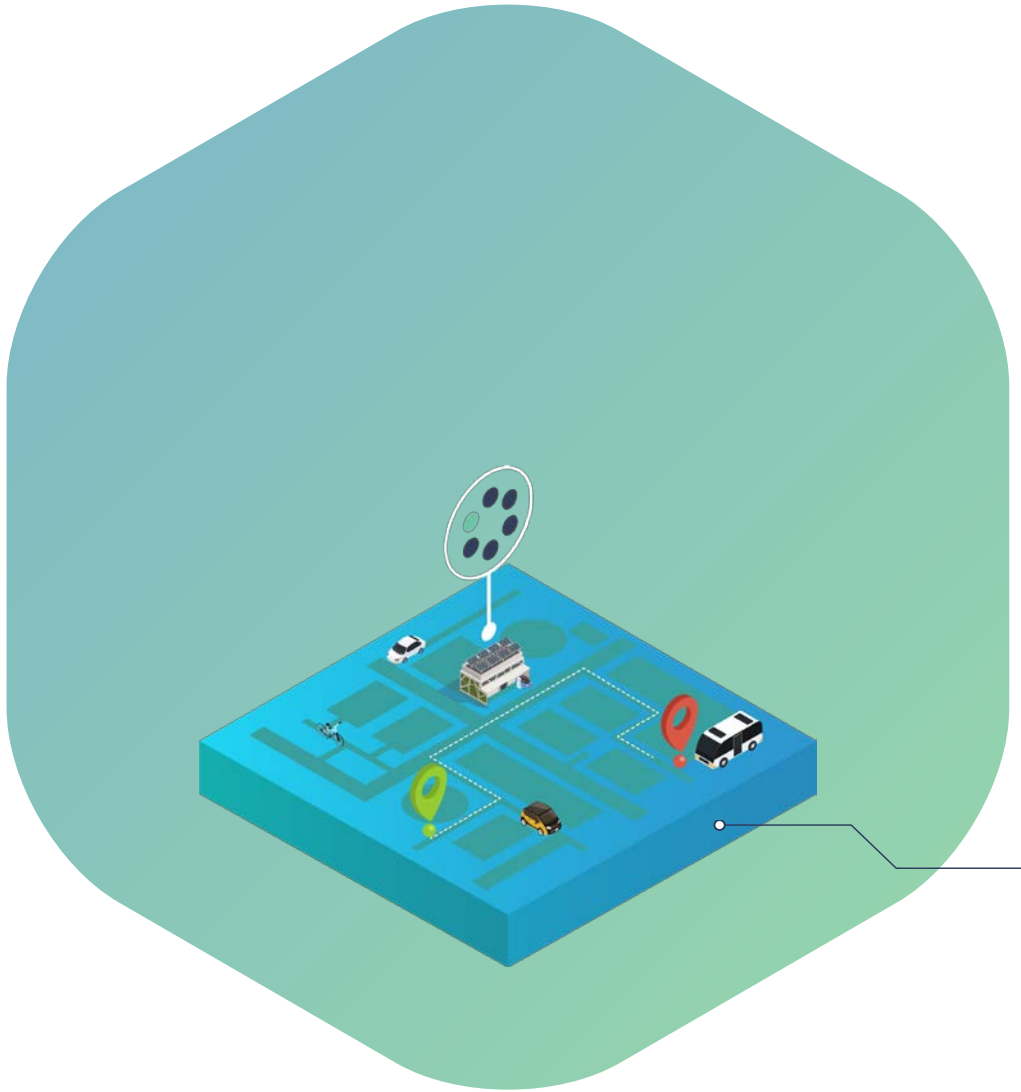
5 PUBLIC DC ULTRAFAST CHARGING POINT

Plug-in fast charge for all brands and size of cars requiring an occasional emergency charge. Wireless power transmitter pads could also be installed either on-ground or in-ground to equip the stations with an EV inductive charging system.

	Current publicly accessible fast charging points	SUMOSU SUSTAINABLE MOBILITY SUPPORT STATIONS
Installation costs	Trenching and repaving a long distance to lay electrical supply conduit for each charging point.	Station with **multiple outlets** from a single power supply.
Economic viability	Grant-dependent demonstrations and subsidized testers.	Part of a **larger business** model
Usage	Low usage rate with corresponding low profits. Sizeable and unpredictable loads.	**Multi-objective** optimal charging, private EV charging is just an add on.
Safety	Exposed to vandalism, severe weather conditions. Citizens directly in contact with high voltages	Controlled access to areas with dangerous voltages. Service is provided by **trained and authorized staff**
Maintenance	On-street charging points are more vulnerable and lack regular daily care.	Stations are **protected from possible collisions**. The automated parking system minors damages to the facility.
Energy management	Unbalanced and unpredictable high power demand can seriously impact the grid.	Reuses **2nd life batteries as stationary power unit**, stabilising electric grids with real-time energy balancing.
Space Usage	Take up valuable space in city centres, exempt from on-street parking fees despite long charging times.	Designed to minimize the area and volume required for parking cars and **dissuade the use of private cars** to curb congestion.

SUMOSU Stations are **key locations** within the **MOBILITY NETWORK.**

They contribute towards a **distributed system** of urban mobility management based on a **collaborative** and **intermodal** approach.



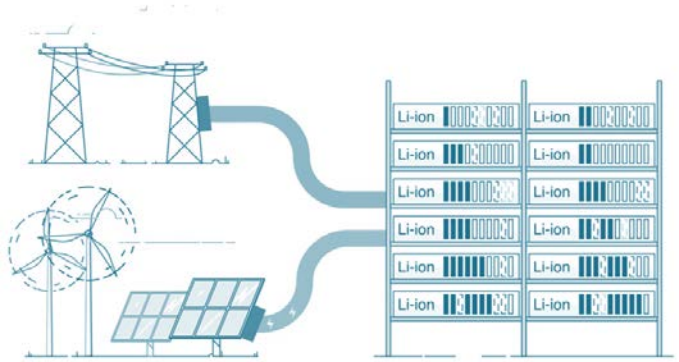
MOBILITY

The future of urban mobility is ***not*** car centric.

2 Energy Management

1 STATIONARY ENERGY STORAGE

SUMOSU Stations include a stationary power storage made of 2nd-life EV batteries. The lifecycle of a plug-in or electric vehicle battery does not end after the vehicle's operating life, they are still fully operational even after the service life guaranteed by the manufacturer. Cost-effective use in stationary operation is possible for at least an estimated ten years longer. Reusing the modules from electric cars in a battery storage doubles their economic value and contributes to a circular economy.

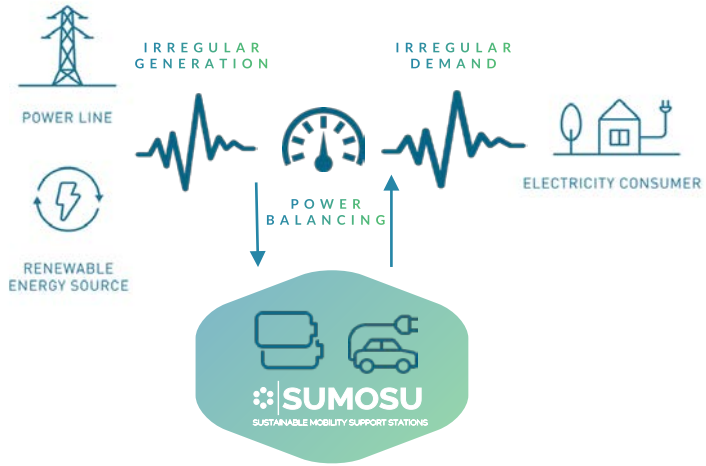


2 POWER CONVERTER

The charging stations enable low-loss coupling to other DC systems such as battery storage or additional charging units for micromobility. The integrated bidirectional AC-DC converter links the stationary batteries to the distribution grid and also facilitates the use of this battery pack as bidirectional storage units within future smart grids.

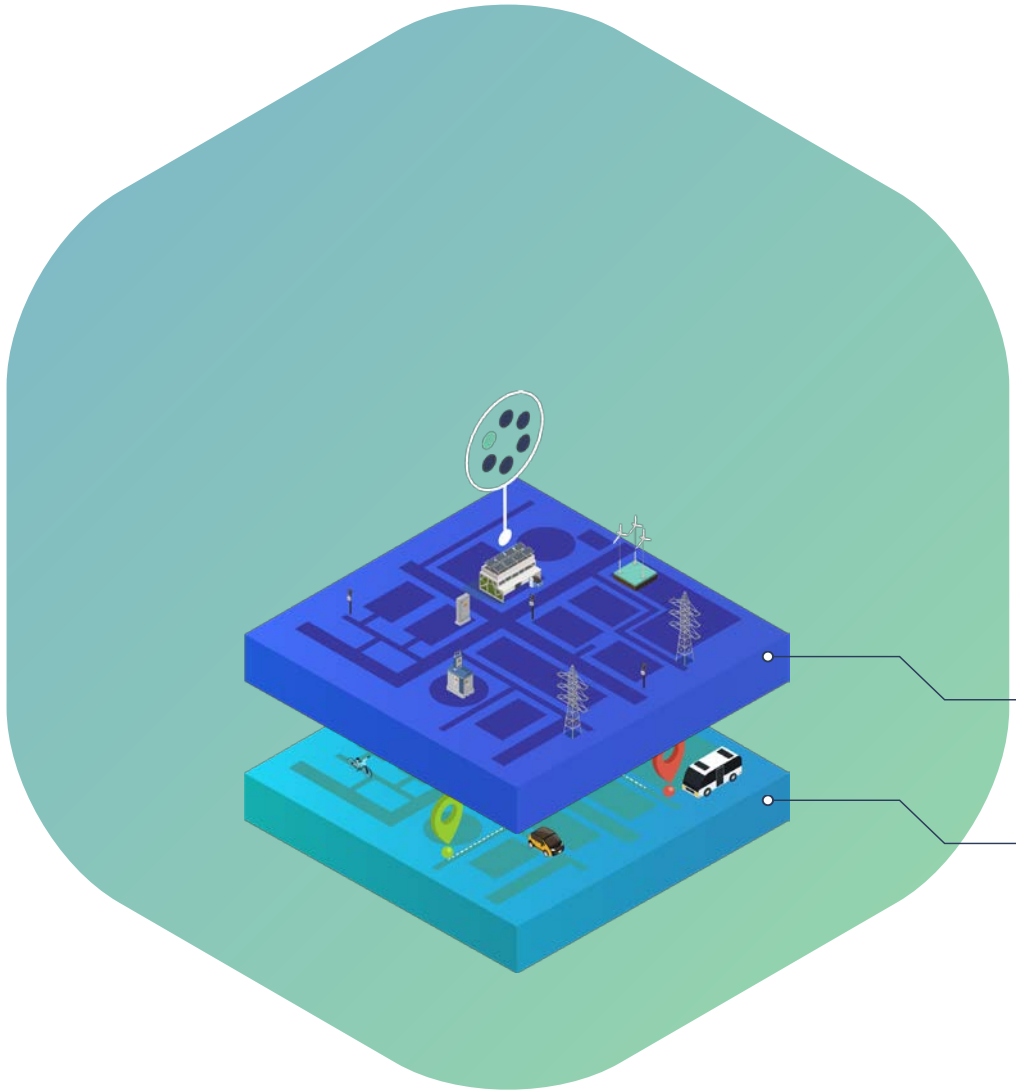
3 BALANCING THE GRID

SUMOSU Stations are able to solve network congestion and instability with no need to build extra facilities. Their stationary batteries allow the integration of intermittent renewable power without wasting energy or disrupting the current network. The constant power demand could give immediate use to the exceeding energy produced during peak hours and store the energy to work off grid if necessary. SUMOSU Stations have the technology and the critical volume of energy demand to give grid operators that capability.



SUMOSU Stations are **key locations** within the **SMART GRIDS.**

They contribute towards the optimal integration of distributed generation, as well as distributed energy storage systems, and demand side management systems, in order to relieve potential congestion of the grid, while improving its efficiency and reliability.



ENERGY

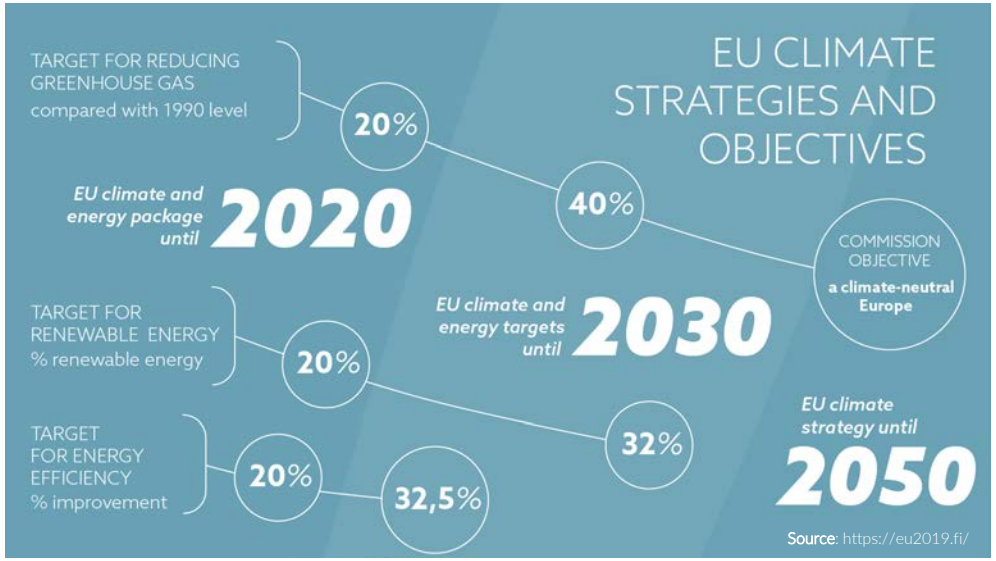
MOBILITY

Energy future will be decarbonized and decentralized.

3 Governance

Our solution is based on **a technology transfer** model, allowing the system to be **locally developed** in every region. This choice will reinforce the local economic dynamism of every country at the same time that it will foster the rapid replication of the scheme globally.

The long term effective action of SUMOSU Stations requires the involvement of **local authorities**, their ongoing commitment and a continuity of policy approach.



Advantages of public involvement through public private partnerships (PPPs)

- Cities should design EV strategies that are unique to their individual circumstances
- Partake in price regulation and perhaps initiate competitive elements to encourage efficiency and avoid monopolistic abuse in strategic sectors such as energy and mobility.
- Provide a stable and transparent framework for a collaborative action with other stakeholders from the private sector.

Meet Global Targets

- Paris Agreement targets: peak CO2 emissions by 2030, increase the share of non-fossil energy sources to 20% by 2030; and lower the carbon intensity of GDP by 60-65% below 2005 levels by 2030.
- Cut GHG emissions in Europe by at least 40 % below 1990 levels by 2030.
- Ban on new petrol and diesel cars in UK, Ireland, Denmark, Iceland, Sweden and Belgium from 2030
- Ban on all new petrol and diesel in France and Spain from 2040.

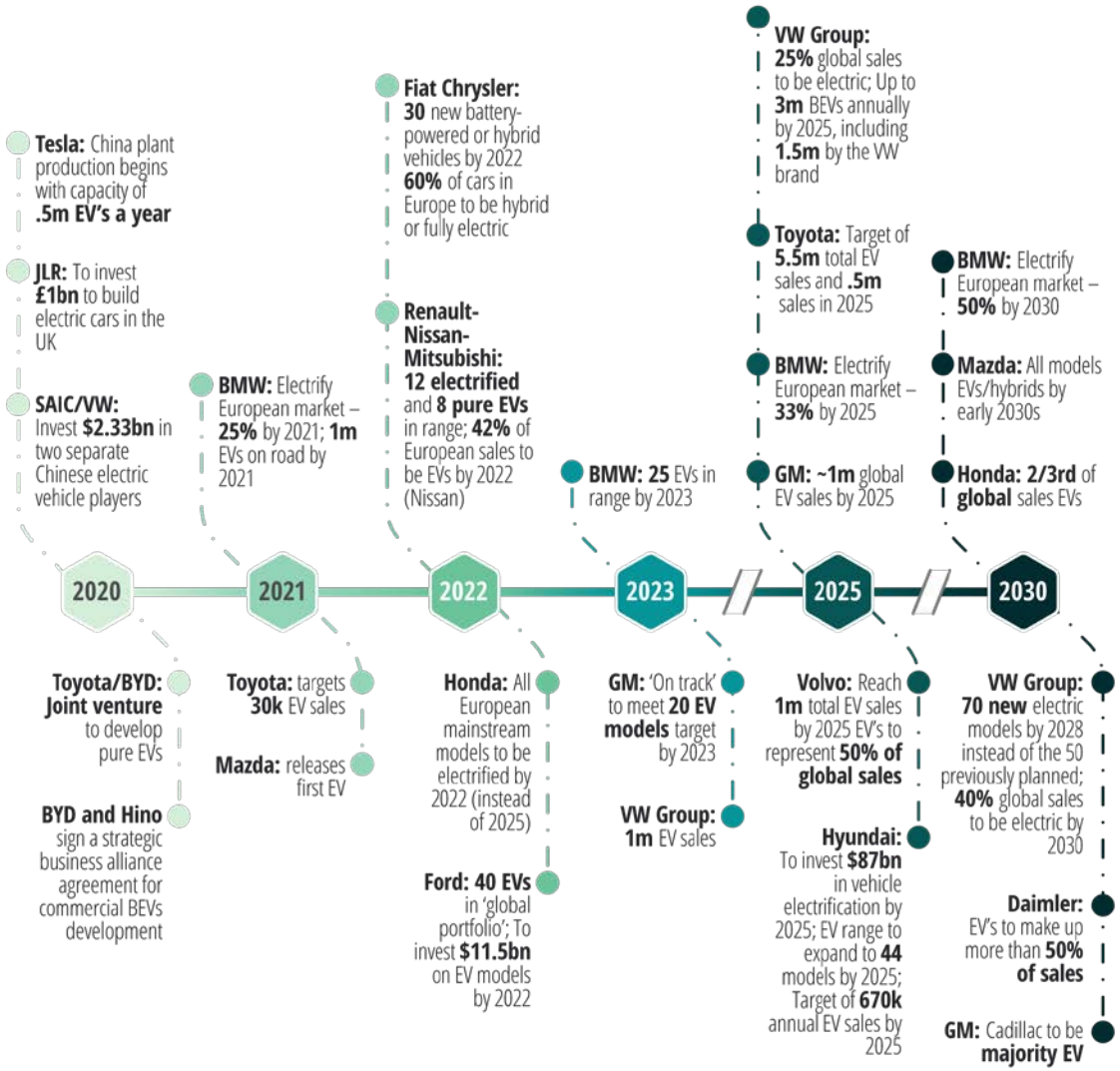
Planning a Coordinated and Dynamic Development

PPP projects must take into account the network effect and the impact of economies, so new initiatives should:

- Align infrastructure development and provision with targets from manufacturers.
- The layout of charging stations needs to be optimized and integrated in accordance with the electricity demand characteristics
- Constructing with Unified Standards and Reducing Construction Costs

FIGURE 5

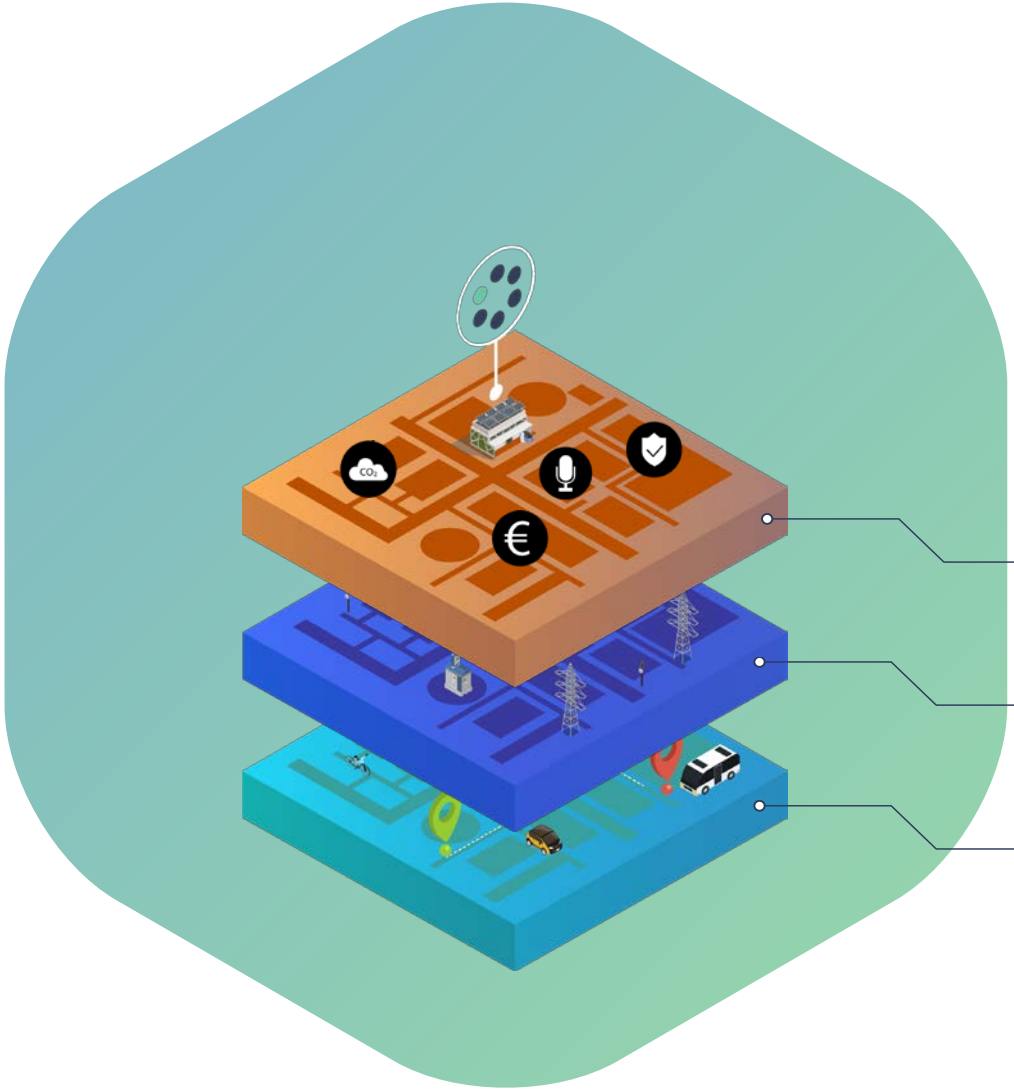
Timeline of strategic OEM targets for EVs



Source: Deloitte analysis[28]

SUMOSU Stations are **key locations** within the **PUBLIC GOVERNANCE SPACE.**

They are a short-term strategies for a long-term pathway towards the implementation of deep decarbonization plans at the local level, moving beyond just mitigating methods and building a roadmap, instead, to achieve a qualitative and transformative change.



GOVERNANCE

ENERGY

MOBILITY

National and local authorities need to commit to holistic solutions that contemplate replicability and resilience.

4 Future-ready Infrastructure

Multiple future development trends were taken into account in the planning of SUMOSU Stations, making sure that whatever the outcome is, it will always be able to harness the benefits and minimize the disadvantages of a new mobility landscape

5G

Meets the requirements to install 5G antennas, as the station can actually power itself off of some of its stationary batteries and work as an Uninterruptible Power Supply (UPS) in the event of a power blackout.

Integration of renewables

Meets the requirements to install 5G antennas, as the station can actually power itself off of some of its stationary batteries and work as an Uninterruptible Power Supply (UPS) in the event of a power blackout.

Artificial Intelligence (AI)

Meets the requirements to install 5G antennas, as the station can actually power itself off of some of its stationary batteries and work as an Uninterruptible Power Supply (UPS) in the event of a power blackout.

Autonomous vehicles (AVs).

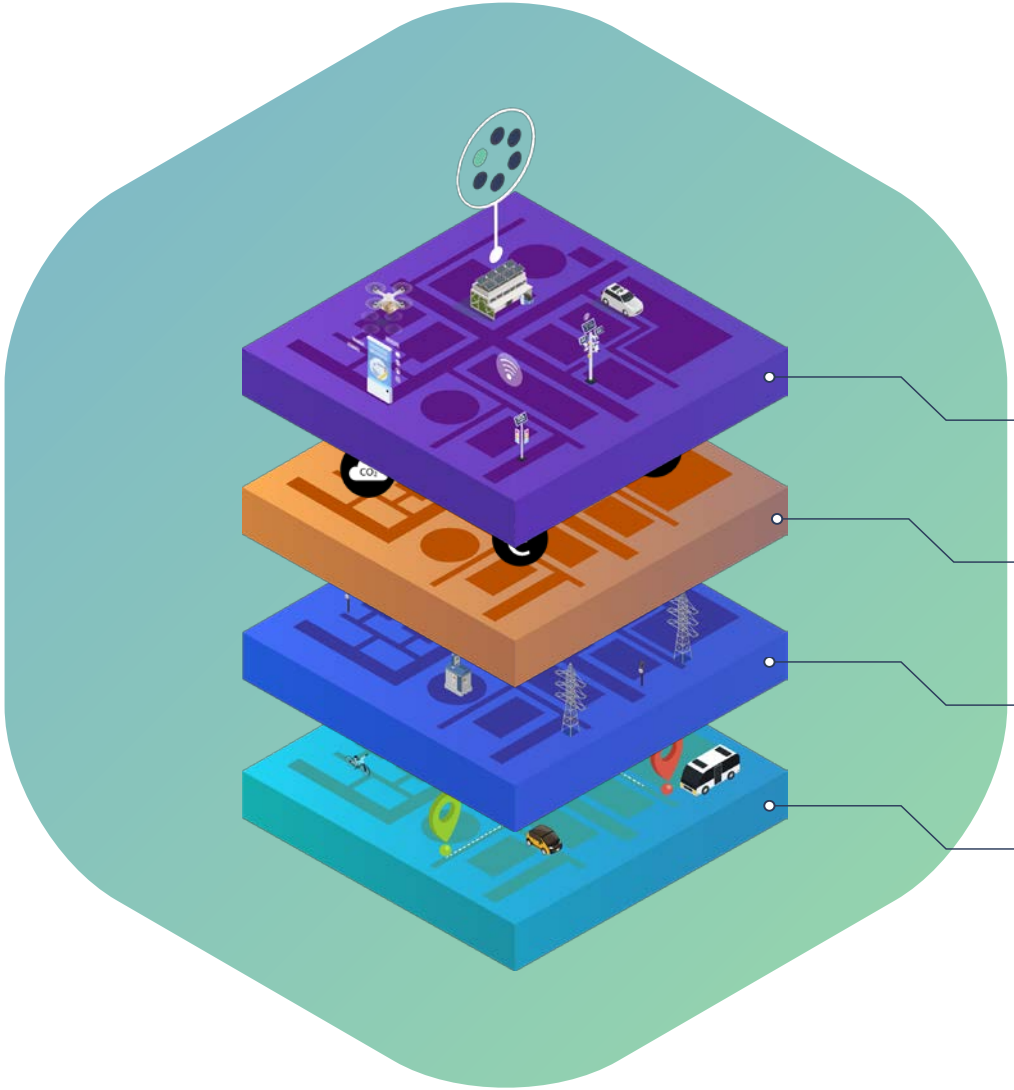
Autonomous vehicles will drive themselves around, saving on labour costs and improving road safety. However, it is important to ensure that AVs do not just incentivize more driving, leading to simply more congestion.. An existing network of SUMOSU Stations would be an ideal framework to make shore that AVs adoption is indeed electric, shared and connected.

Blockchain Technology

SUMOSU Stations are ready to adopt blockchain technology in its design to maximize the benefits of charging stations, avoiding overload of transmission and distribution equipment. Additionally, blockchain technology will also be essential to ensure the transparency and efficiency of charging right trading.

SUMOSU Stations are **key locations** to develop **FUTURE TECHNOLOGY BREAKTHROUGHS.**

They are a physical infrastructure that will set common rules, speed up exemplary projects, and pinpoint areas on which to focus R&D, and therefore, creating a sound basis to successfully develop and implement Industry 4.0-related technologies.



TECHNOLOGY

GOVERNANCE

ENERGY

MOBILITY

Digital solutions are essential to progress, but we also need to maintain a strong industrial base to develop disruptive technologies

5

Social Impact

We believe that a holistic approach to sustainability is the only way to go. That is why we strive to adopt comprehensive sustainability strategies, and with an appreciation of the many links between individual issues.

SOCIAL INCLUSION

Urban Resilience works for the integration and development of disadvantaged collectives, offering training and employment opportunities at SUMOSU Stations.

REPURPOSING OLD GAS STATIONS

Out-of-business gas stations can easily be turned into SUMOSU Stations. The space previously used by underground fuel tanks could fit the carousel of carsharing vehicles, or a battery pack designed with second-life batteries.

GREEN WALLS

Not only do vertical gardens look beautiful, they also combat pollution by filtering harmful gases and help mitigate extreme temperatures.

AFFORDABLE ALTERNATIVES

Access to mobility relates to social inclusiveness. Only if people are able to use EVs in their commutes at an affordable rate, will they be socially mobile and thus able to improve their income levels.

CIRCULAR ECONOMY

The stations use recycled or responsibly sourced building materials. Recycling efficiency rates of electric vehicle batteries in the EU can mitigate dependence on imported materials and help to retain the value of recovered materials in the EU economy.

ADD ONs

Other additional features can be included adapting to the needs of the community: AE Defibrillators, CO2 metering stations, free WIFI, vending machines...

HUMAN-CENTERED CITIES

The project intends to gradually remove on-street parking spots to give priority to pedestrians. Positive effects of promoting shared-mobility schemes are not only reduced carbon emissions and less congestion, but also efficient land use and revitalized public space, with a subsequent impact on the local economy

MAXIMIZING RESILIENCE

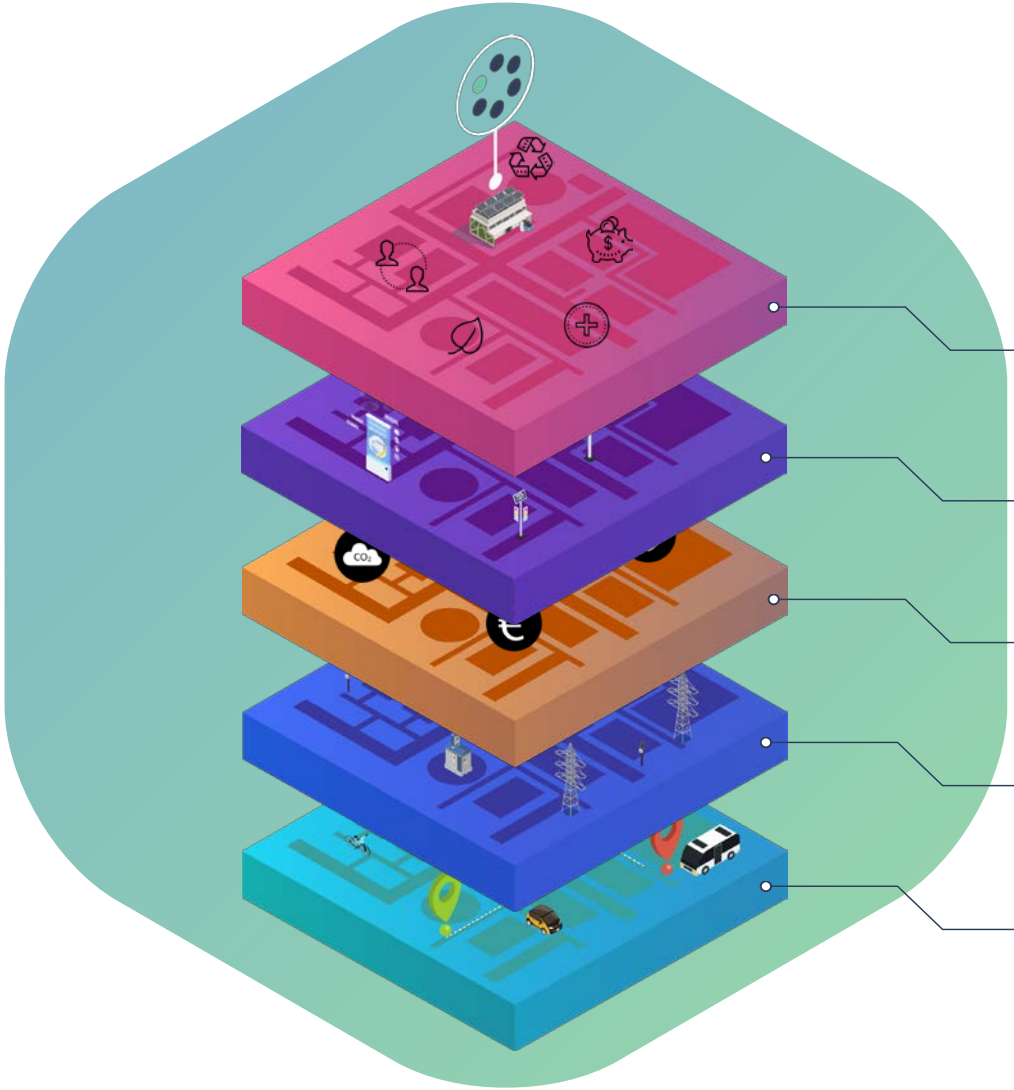
Distributed patterns of mobility or energy networks allow to reduce their fragility levels and cope with natural disasters, power outages or system failures. Also, the stations can become emergency power sources to guarantee business continuity in case of an incident.

HYGIENE & SAFETY MEASURES

Staff will clean cars regularly and will have upgraded cleaning procedures with anti-viral and anti-microbial solutions.

SUMOSU Stations are **key locations** within **SMART COMMUNITIES.**

These stations are more than plain infrastructure: they link technical advances with non-technical factors for the development of a comprehensive model of intelligent city. Their deployment will be able to create direct benefits for citizens in terms of well-being, on social inclusion, environment, technological innovation, circular economies, or tackling problems such as pollution, congestion or energy management.



COMMUNITY

TECHNOLOGY

GOVERNANCE

ENERGY

MOBILITY

Smart communities are not those with best technologies, but those actively engaged in the promotion of economic development, job growth, and an increased quality of life.

Our Allies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