

# EV Energy

Paving the way  
for a future  
decarbonisation  
of the energy and  
mobility sector

*Good  
Practice  
for  
Good  
Policies*







# It is time for a coherent policy!

European cities are moving massively into electric mobility with electric vehicles (EVs), from motorcycles to cars and buses to trucks. This is important to create healthier cities. Solar energy in the city is also growing as the most viable clean energy source in densely populated areas, and EV technologies are reaching market maturity. However, governments across Europe are struggling with the development of charging infrastructure, especially with its implementation and financing. The largest challenge is in arranging integration of clean energy and mobility at larger scales in and around the city.

Three main topics can be seen in this area:

- Favouring electric vehicles (EVs)
- Supporting renewable energy in the city
- Developing EV charging infrastructure

But policies differ in each European country and on each topic, and integration of these three topics is absent. Furthermore, policies change frequently, which creates uncertainty. These are major hurdles in the city's transition. Stable and coherent policies are needed to make this change a reality.

Good examples do exist, but need more visibility, upscaling and replication. Therefore, business cases based on policy are required.

## The EV ENERGY project

This policy brochure is realised by the EV ENERGY project, where good policies and practices are exchanged. We focus on both the project partners and on outstanding policies in this field across Europe.

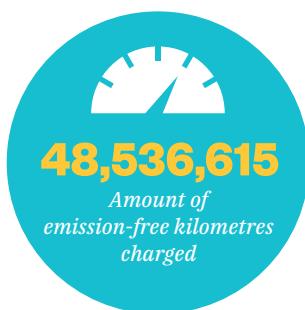
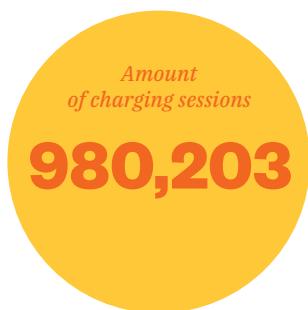
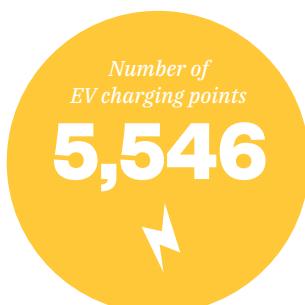
Conclusions can be found in the last pages, captured in recommendations at various scales.

# Amsterdam — The Netherlands

## Demand driven Expansion of the Public Network of EV charging points

Amsterdam's policies focus on the development of a reliable infrastructure for electric vehicles as key contributors to the city's energy transition efforts.

Amsterdam makes it easy for EV drivers to request a public EV charging point near their homes. A step-by-step process from online request, through assessment, to a final decision takes just two months.



## Flexpower innovation, neighbourhood clean scale energy & grid optimisation

Amsterdam is at the forefront of developing an operational electric vehicle charging system with a flexible charging in the public space.

104 charging stations with a 'static smart charging profile' have increased charging capabilities. The focus is on reducing the EV demand during energy peaks and increase in between. Technical and software improvements have been developed and tested, resulting in charge load reduction. Further results show that solar energy can be used for EV charging since charging loads increase during the day.

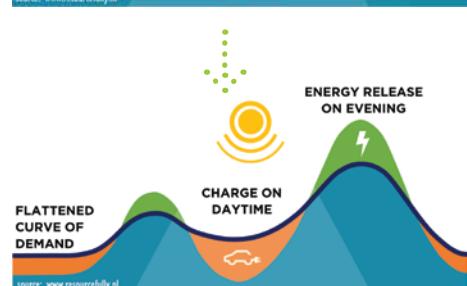
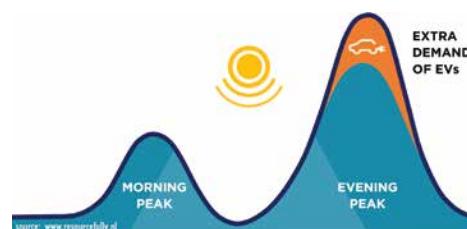
From test cases comes this recommendation: Different types of neighbourhoods (residential/office/city centre) have different consumption energy patterns. In order to reach the area's full potential you have to make a thorough analysis to determine the best energy strategy. In 2019 the flexible charging system is expanded to 912 charging points in Amsterdam.

The number of charge points is expected to rise to 16.000 - 23.000 by 2025. A strategy is formulated to guarantee the reliability of the charging network.



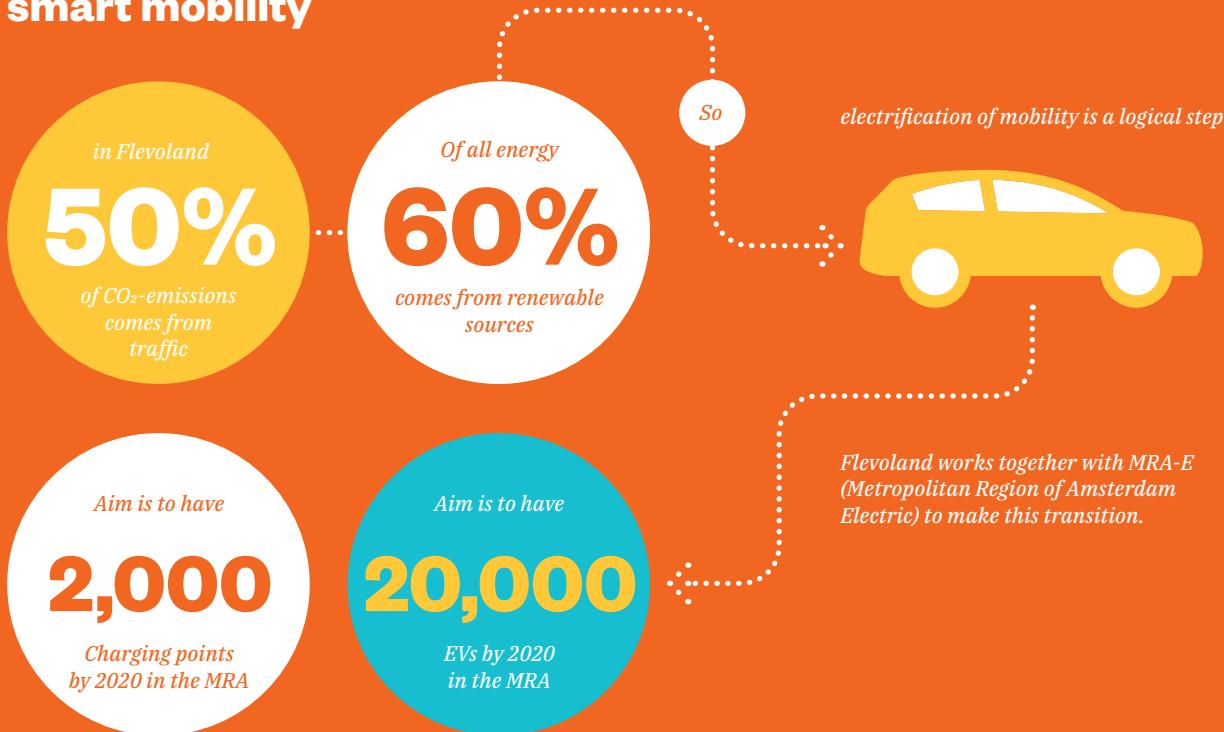
## Dutch Policy: Clear, comprehensive targets and incentives

- The Netherlands has set a target to ban the sales of new petrol and diesel powered cars by the year 2030.
- Reduction in registration and road tax based on CO<sub>2</sub> emissions
- Free public parking and charging
- Green Deals approach to public-private partnerships. Removing legislative barriers enables innovation and accelerate action.
- Encouraging clean electric transport via train, tram, bus and taxis
- Experiments with innovative energy exchange mechanisms and financing in neighbourhoods focused at grid and energy driven flexibility



# Flevoland — The Netherlands

## Flevoland and electric/ smart mobility



## Learning from partners and innovative area development

EV ENERGY policy learnings and good practice from the urban development of the Stockholm Royal Seaport are applied to the sustainable area development of Lelystad Airport and Lelystad Airport Business Park.

The stakeholders involved have the ambition to create an energy positive area. There is both a large potential for solar energy (a.o. on roofs of logistics centres, solar canopies on the car parks) and a growing need for energy. In terms of mobility there are large developments: passengers coming to the airport with cars, commuters, taxi's, rental cars, first initiatives of car sharing, EV charging infrastructure and trucks from the logistics centres.

The area stakeholders have started to develop a integrated plan for the area, including the design of a smart future proof grid by the grid operator.

This will save costs and can make the difference between a positive and negative business case for the solar and mobility projects.

## Other smart mobility projects in the MRA

- improvement of the information for EV drivers
- use of locally produced renewable energy for charging
- local energy storage and the use of electric cars for delivery services.
- two fast chargers at regional fuel stations.



*In 2030 all new public buses will be emission free and fueled with local/regional renewable sources.*

*Flevoland stimulates the use of e-bikes (infrastructure, the last mile, bike sharing).*

# Oslo — Norway

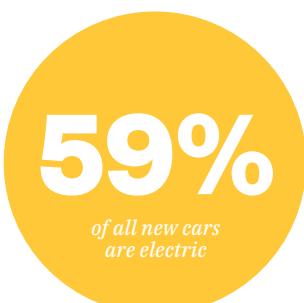
## Policy: Beneficial incentives & Political willingness

The adoption and deployment of zero emission vehicles in Norway has been driven by policy, and actively supported by the government since the 1990s.

- 1996 → no vehicle tax for EVs
- 1997 → no toll for EVs
- 1999 → free municipal parking
- 2011 → from 355 to 1,996 Battery Electric Vehicles (BEVs) = 562% growth
- 2018 → 72,689 out of the 144,885 cars sold are BEV = 49%



68%

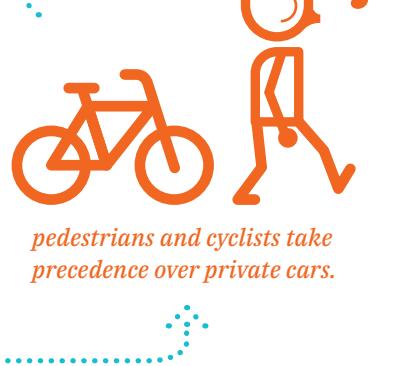


No other country in the world has invested as large as on electric vehicles like Norway. Half of all new cars sold are either fully electric or hybrid, making the country of 5.3 million the largest per-capita market for EVs.

The city of Oslo is determined to maintain its progressive policies in green mobility.

There are 3 main challenges ahead:

- Need a faster deployment of chargers
- Need to provide charging opportunities for people living in multi-family buildings
- Need to shift commercial fleets to electric



## Way Forward

In the National Transport Plan 2018-2029, a goal was set for all sales of new cars, urban buses and light commercial vehicles by 2025 to be zero emission vehicles.

The fleet of electric cars is one of the cleanest in the world since 98% of the electricity generated in the country comes from hydropower.

In 2017, and as a result of its fast growing EV adoption, Norway was able to achieve its climate target for average fleet CO<sub>2</sub> emissions (85 g/km) for new passenger cars three years earlier than pledged.



# Denmark



## Danish real-life experiences to predict the future

The Parker project aimed to apply grid-balancing services to a fleet of EVs. The goal was to demonstrate these vehicles' potential to support the electricity grid as power resources. V2G services have been tested across different brands of EVs (Mitsubishi, Nissan and PSA).

Real life tests are taking place at Frederiksberg Forsyning. A multi supply utility in the heart of Copenhagen, supplying 110,000 customers with district heating , water and city gas.



The project focused on being **replicable** and **scalable**. A group of researchers compares the results from the real life tests to theoretical calculations. The ambition is to provide calculations of various models while also trying to prove that the calculations are correct via testing in real life.

"We're also analyzing the value system, i.e. who will earn money on this, and why they should participate," explains Jens Christian Morell Lodberg Høj.

More information at <http://parker-project.com>

## Denmark Policies: Way Forward

"In just 12 years, we will prohibit the sale of new diesel and petrol cars. And in 17 years, every new car in Denmark must be an electric car or other forms of zero-emissions car."

Prime Minister  
Lars Løkke Rasmussen

The new policy represents a great change for Denmark, which saw EV sales plummet after the government began phasing out incentives in 2015. Last year, plug-in vehicle sales represented just 0.4% of the Danish market, a pittance compared to the numbers in neighbouring Sweden (5.3%) and Norway (39%).

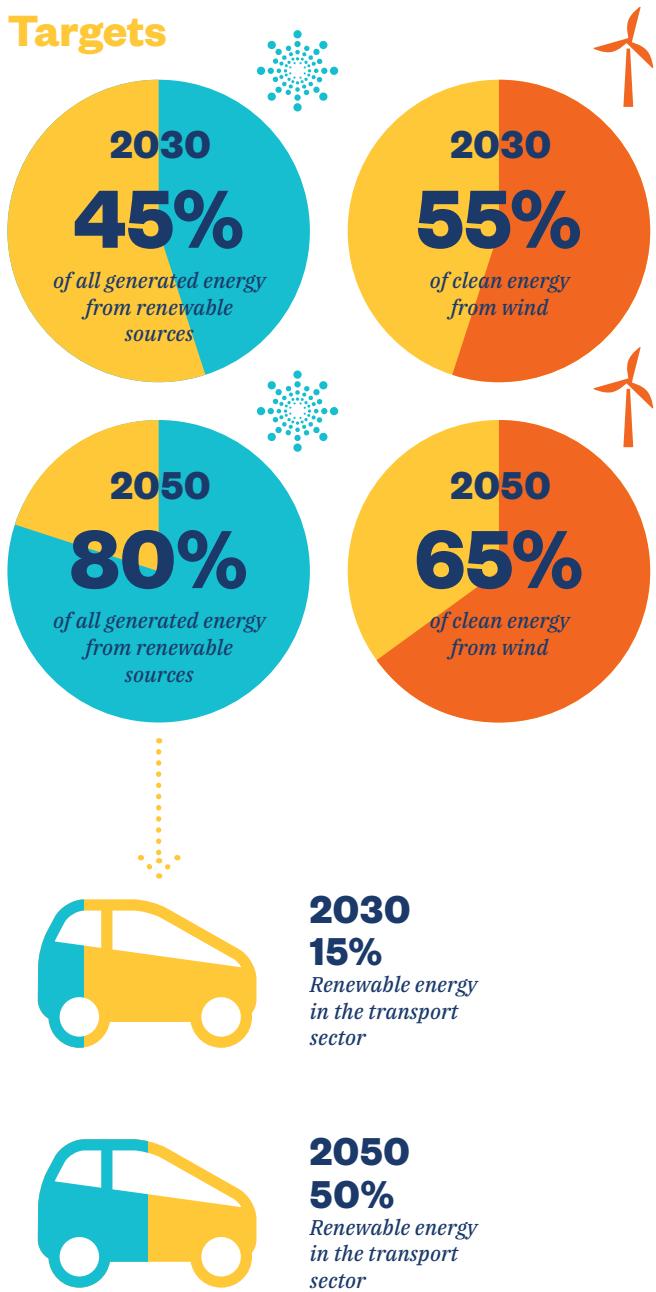
# Kaunas — Lithuania

## Lithuania's National Energy Independence Strategy: progressive and innovative

### 2018 National Energy Strategy

This strategy includes the country's energy targets and guidelines on their implementation by 2030 and outlines the trends of energy development by 2050. One of the key targets is increasing energy production from renewable resources.

#### Targets



### Promoting electric mobility

Lithuania aims to reduce pollution from mobility by increasing the number of EVs on the Lithuanian roads and cities. This will be achieved by developing EV charging infra-structure and by motivating people to use EVs.

Kaunas University of Technology and the Ministry of Transport and Communications are partnering in the promotion of the EV mobility in country.

### Promoting EV online [elv.lt](http://elv.lt)

Aplinkos Apsaugos Institutas started a Lithuanian EV-related website which provides useful information about EV types, charging infra-structure, car-sharing, services and other important information: [elv.lt](http://elv.lt)

### Developing a charging infrastructure

The Ministry of Transport and Communications of the Republic of Lithuania initiates the development of EV charging stations along Lithuanian highways and main roads. This action motivates private businesses and municipalities to an action and develop infrastructure within the cities.



# Rome — Italy

## Rome's Sustainable Urban Mobility Plan



A planning instrument to attract private investments for the implementation of e-infrastructures.

**Results:** new charging points throughout Rome and 700 more until 2020.

The tool with which the regional competences in energy planning are implemented, with regard to the rational use of energy, energy saving and the use of renewable sources.



## Italy and Electric vehicles: progress and incentives

In Italy, the number of EVs is still minimal, but significant enough to signify a trend among Italian drivers towards sustainable mobility.



## Italian RES Policies: Support Schemes & Legislation

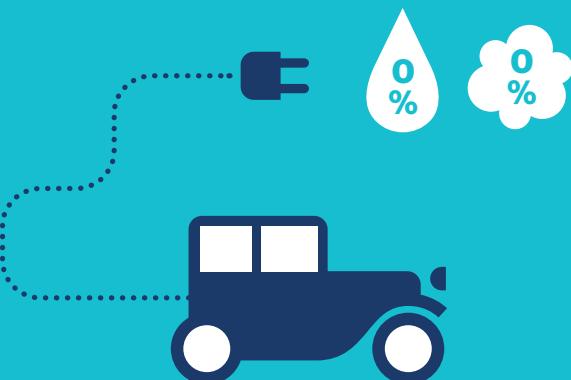
Electricity generated from renewable energy sources is promoted through VAT- and real estate tax deductions.

Electricity from renewable energy sources fed into the grid can be sold on a guaranteed minimum price. If free market prices are higher, the price difference will be reimbursed.

Alternatively, renewable energy producers can opt for net-metering which provides economical compensation to PV-producers for the electricity fed into the grid.

## Back to the future: retrofitting

RETROFIT is a pragmatic Italian legislation to open a new market, focused on converting conventional vehicles with combustion engines into retrofitted electric cars, efficient, zero emissions and zero fuel consumption.



# Barcelona — Spain

## Barcelona and electric mobility

### Catalan Law of Climate Change

Barcelona is one of the leaders in e-mobility in the country. The Catalan Law of Climate Change (16/2017) promotes a collective public transport model not based in private vehicles. The goal is sustainable and zero-emissions public transport.

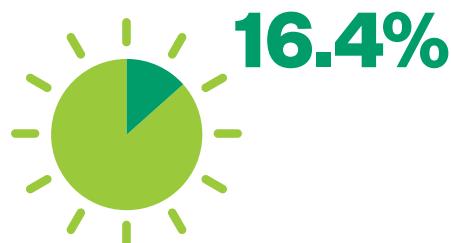


## Vehicle2Grid potential

The potential of electric vehicles and renewable energies in Catalonia is massive and new EV registrations increase strongly: between January and June 2017 registrations of hybrids and EVs increased 84.3% compared to the same period of 2016.



In 2017, renewable energy supplied 16.4 % of electricity consumption in Catalonia. There is a high potential for solar energy generation that is yet to be exploited.



## Expanding the public charging infrastructure

### PIRVEC Plan

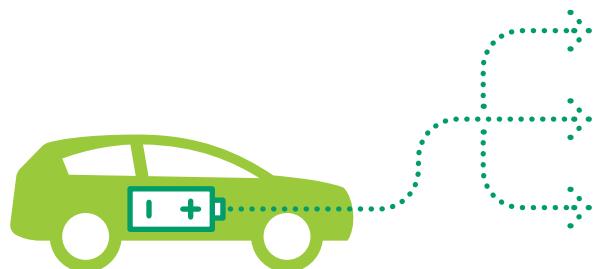
Installing 100 fast charge points, 400 semi-fast charge points and 25,000 standard charge points up to 2019.

The objective for 2019 is to have a charge point every 30 km across the whole of Catalonia.



### National Agreement on Energy Transition

This agreement defines a new renewable, clean, decentralised, democratic and sustainable Catalan energy model to promote the introduction of electric vehicles through the development of a region-wide charging network.



With V2G technology in charge points, the integration of renewable energy represents a key element for a system change based on distributed energy.

Two current V2G initiatives in Catalonia:

The SAVIES project has developed a smart microgrid integrated in Santa Perpetua city council with electric vehicles that consume renewable energy from the building.

Within the GrowSmarter project, another V2G practice is implemented in Catalonia by a pilot which aims to integrate local renewable production with electric vehicles using their storage capacity.

# United Kingdom

## Expanding the public charging infrastructure

Since 2011

**20,600**

battery electric, plug-in hybrid and fuel cell electric vehicles

Ultra-low emission vehicles

**1.8%**

of all car sales in 2017

Market share is increasing to

**2.7%**

in 2018

The UK manufactures

**20%**

of electric cars sold across Europe in 2018



Rapidly expanding charging network of

**23,000 connections and**

**13,700 devices**

Monthly new charge points in 2018

**600**

of which 60 are rapid chargers



## British Policy: Zero Emission Strategy and Birmingham Declaration

### The Road to Zero Strategy

New measures to clean up road transport and to put the UK at the forefront of the design and manufacturing of zero emission vehicles.

The UK Government partners with industry, local government, consumers and the international community to accelerate the global shift to cleaner transport and is playing an active leadership role.

### Birmingham Declaration

At the Zero Emission Vehicle Summit in 2018, the UK brought together governments and industry from around the world to provide impetus to the development of the global electric car market, including the signing of the Birmingham Declaration.

- build a smart infrastructure network
- support zero emission research and development
- investment to create new zero emission technologies
- promote a sustainable, circular economy to drive down emissions throughout the supply chain.

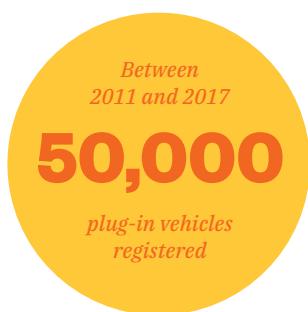
## The Potential for Vehicle2Grid

The UK benefits from crucial commitment from government, the regulator, system operators and network operators to remove barriers to entry for rolling out V2G infrastructure.

A report commissioned by UK Power Networks and Innovate UK in 2018 and a detailed market review in a report from CENEX, investigate and describe the market landscape for V2G.

# Stockholm — Sweden

## Swedish Policies: tax incentives and political will



The Swedish government has been quite active in facilitating and offering benefits such as up to 50% savings with purchase subsidies by investing in a zero-emission vehicle. This national bonus system increased in July 2018 and is a testimony to how committed the Swedish government is on reducing the nation's CO<sub>2</sub> emissions. This is why the government also offers attractive rebates of up to 25% on electric bikes. Furthermore, the government is now taxing regular petrol and diesel vehicles at a higher rate than EVs.

## Citizen's Led ElectriCITY & V2G

ElectriCITY is a citizens' initiative to reduce the climate footprint. The project is called **Hammarby Sjöstad 2.0** and its goal is to be climate neutral by 2030. The project works with companies, academia, authorities and Sjöstadsföreningen, an association of 12,000 people who are part of test beds in smart energy, sustainable transport, and sharing economics. They try out innovations, small or large, for living a more sustainable lifestyle.

**Charge at Home** is the project that focuses on increasing the number of electric vehicles. Goal is to have 1,000 charging points in underground garages in Sjöstad by 2020. The project offers a vehicle-to-grid (V2G) test bed that will make it possible to rent out your electric car battery.

## Stockholm: Fast-growing capital set to be fossil-fuel free

The City of Stockholm is to be fossil-fuel free by 2040. The City Council has set up a milestone target for emissions of no more than 2.3 tonnes of CO<sub>2</sub>e (carbon dioxide equivalents) per resident by 2020. The toughest challenge requiring the most urgent action is the transportation sector.

Tactics and tools towards sustainable transport:

- Congestion charging
- Environmental zones for vehicles
- Enabling use of renewable fuels and electric vehicles, including charging infrastructure
- High investments in pedestrian and cycling infrastructure, improved public transport, strategies for efficient goods transport and consolidation services
- Governance tools to reduce parking places in new developments
- Investments in mobility services



# Conclusions

Various good practices and pilots in European cities are proving the powerful potential of electric mobility integrated with renewable energy. The practices illustrated in this brochure demonstrate the efforts being made by cities to realise this energy & mobility transition.

It is clear that the technology to enable this transition already exists and is becoming affordable. Solar panels can now earn back the initial investment costs approximately 4 times during their lifetime, but this depends on the existence of green national policies. Electric vehicles and batteries are also becoming more financially attractive as prices fall.

Still, the pace at which these technologies are adopted at city level in order to have a significant impact is slow. European projects are integrating EV & renewable energy, demonstrating the value using pilot systems; however, in many cases these remain pilots and only a few remain as integrated operational systems after the projects end.

Upscaling and replication are needed to make a significant transition at city level. Some market concepts are incentivising companies to act (for example, revenues based on variable energy prices and grid balancing), but are yet to provide substantial value to neighbourhoods or cities. Only a few operational approaches exist that are easy to upscale or replicate. There is a growing need for financial incentives that can stimulate local clean energy and mobility integration.

**A number of steps can be taken towards implementing clean energy & mobility:**

-  **Promoting the consumption of locally-produced energy, which will reduce grid utilisation and grid upgrade costs**
-  **Stimulating local renewable energy production, thereby enhancing the reduction of CO<sub>2</sub> emissions**
-  **Adjusting the time periods in which high consumption (EV charging, for example) takes place so that it coincides with renewable generation, reducing grid impacts**
-  **Establishing of flexible EV charging points which use surplus energy from local renewable production, realising true clean mobility**

# Recommendations

We recommend the following measures to progress with the transition:

1

Incentivise the use of clean energy and mobility by rewarding user.

2

Define the geographical scale of the system implementation (e.g. city blocks or neighbourhoods) to ensure the approaches are tailor-made to the local situation.

3

Make a long-term integrated plan which takes the needs of inhabitants into account.

4

Set out policies and financial incentives that ensure long-term certainty & stability.

5

Create a larger market in Europe through coordination of policies.

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