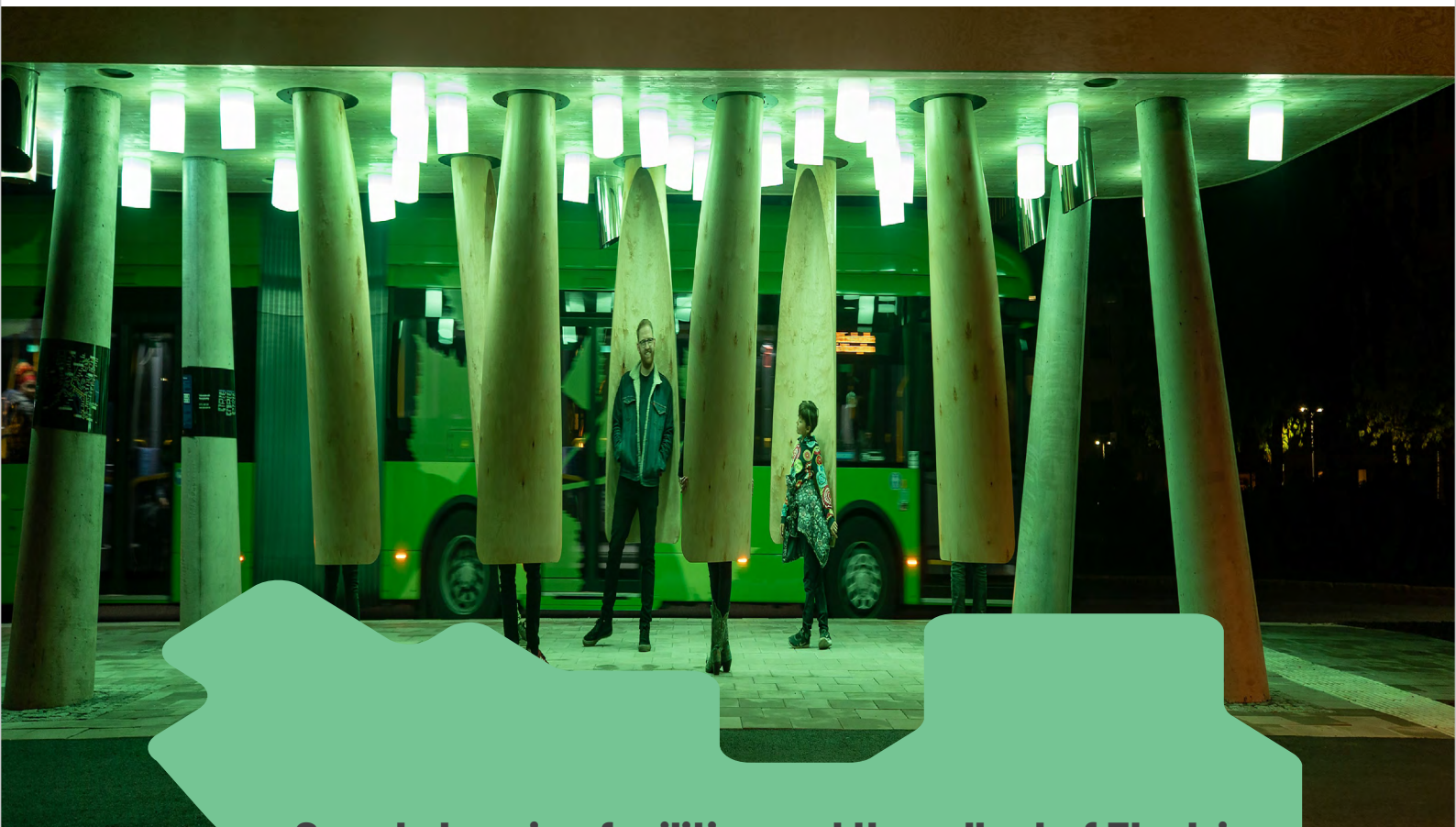


Factsheets on **Smart electricity grids and e-Mobility**

ROTTERDAM . UMEÅ . GLASGOW



Smart charging facilities and the rollout of Electric Vehicles (EVs) have the potential to cut emissions and reduce pollution

RUGGEDISED partners have implemented a number of smart mobility solutions and evaluated the “dos and don’ts” for others’ benefit.

E-CHARGING INFRASTRUCTURES

RENEWABLE ENERGY STORAGE

ELECTRIC BUSES

GREEN PARKING

About the publication

This factsheet booklet is one of four in a series that focuses on particular aspects of the smart city approach and how to tackle common challenges faced by cities and communities across Europe. The list of challenges is not intended to cover all complexities for a successful Smart City project, but provides key output from the RUGGEDISED project on specific issues. The thematic challenges found in this booklet on smart electricity grids and e-Mobility have also been covered in various ways through the many public reports available on RUGGEDISED.EU/Publications.

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Embedding smartness in city structures

In large scale projects related to city innovation and urban development, partners have to deal with more than just deploying the technological solutions. To successfully implement solutions connecting mobility and energy into the urban environment, Smart City projects have to approach the challenge from different levels within municipal organisations. RUGGEDISED has identified an operational level, a tactical level and a strategic level for Smart City projects to work with and within.

Municipal levels for innovation efforts

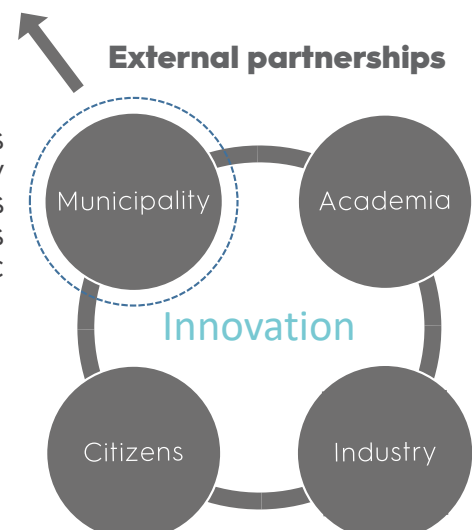


The Strategic, Tactical and Operational levels are similar for all truly innovative and groundbreaking smart city projects within urban areas, but the particulars of what should/should not be included on each level differs depending on what city-integration is necessary. In RUGGEDISED, partners have worked with 'Smart Thermal Grids', 'Energy Management' and ICT' and 'Urban Data Platforms' in addition to the content of this factsheet-booklet on 'e-Mobility and charging'. The inclusion of 'mobility' in Smart City projects allows for added benefits through better use of the electricity produced with renewables, but also adds another element of city-administration and planning into the mix.

Local Governments should embed highly innovative projects in all three levels of their organisation

Most notably, city officials working on Smart City projects should be aware of, and work with, concrete mobility plans such as SUMP – Sustainable Urban Mobility Plans – on the tactical level and the general mobility ambitions of local and regional political actors on the strategic level.

The Quadruple helix cooperation model for innovation projects.



Smart electricity grids and e-mobility in the Lighthouse Cities

Rotterdam

In Rotterdam, the RUGGEDISED partners have supported a large scale rollout of e-buses in the city through local implementations in the area 'Heart of South', including an e-charging station, support for the installation of solar panels (R5-6) and scientific research on the optimal e-charging of buses (R7).



Glasgow

In Glasgow, the City Council and its partners are deploying a Solar Canopy and an electric vehicle charging hub (G5), developing business models for deployment of e-charging and integration through batteries (G2 & G4) and installing e-charging functionality in intelligent street lights (G6).



Umeå

In Umeå, the city has taken their sustainable mobility ambitions to the next level through RUGGEDISED and has created an Electric Vehicles charging hub (U6), the highly praised bus station 'Station of Being' (U5) in addition to rolling out a Flexible Green Parking Pay-Off scheme (U7).



Bonus: Parma and the future of mobility

The City of Parma is moving fast to improve mobility and is implementing a number of innovative projects inspired by RUGGEDISED and developed independently.

Learn more at <http://parmafuturosmart.comune.parma.it>



Integration of mobility and energy

Traditionally, mobility and energy in cities have belonged to two separate parts of municipal structures and companies. This is changing fast and the development will only continue as cities become smarter and are powered by renewable energy. Successful partnerships between energy producers and mobility providers are essential for a smart and connected sustainable city.

CHALLENGE

MOBILITY AND ENERGY SYSTEMS ARE SEPARATE SYSTEMS IN CITIES

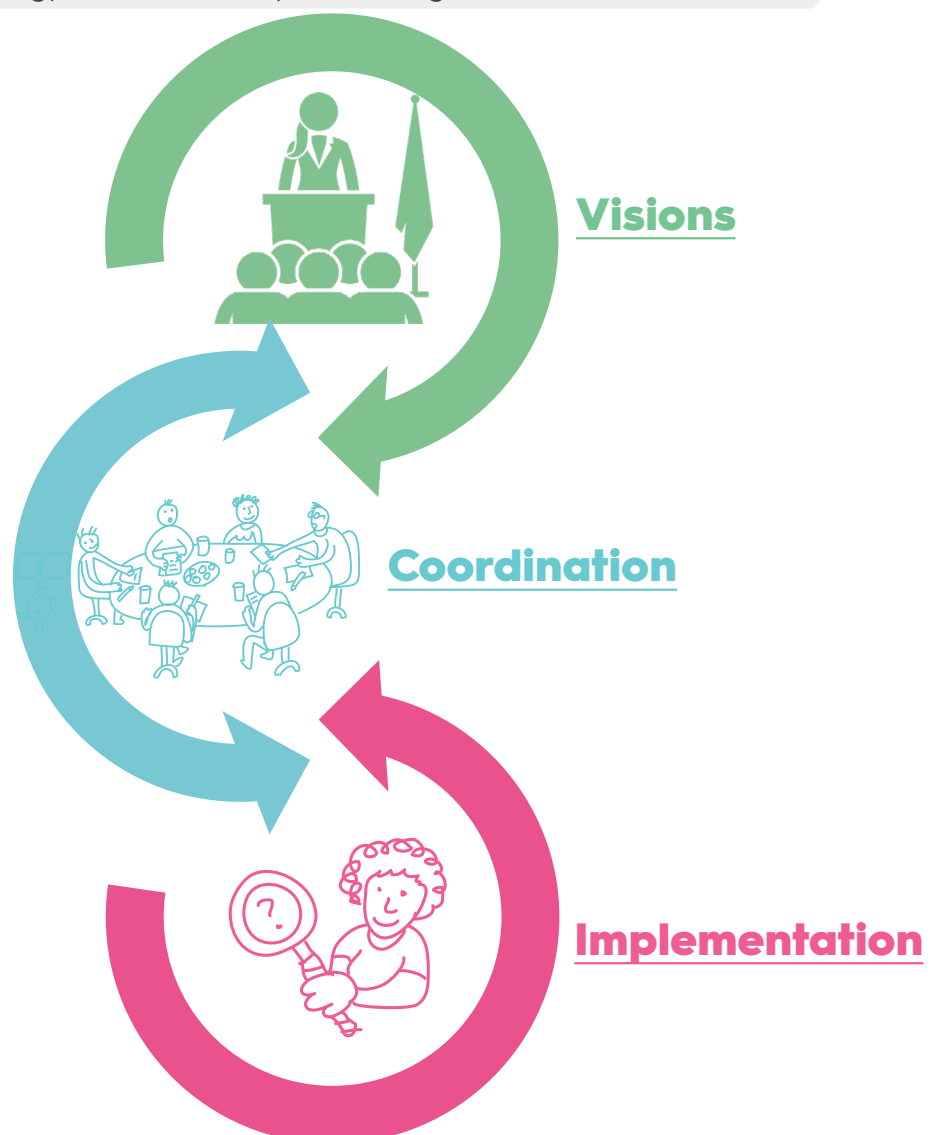
Operational approach:

Integration of specific e-charging facilities with a renewable energy supply, without a big connection to the wider grid, is the least complex solution to this challenge and has the potential to improve business models. It leads to a less complex deployment process and can support the first implementation of renewable energy that feeds directly into e-chargers.

Operation / Tactical / Strategic approach:

RUGGEDISED cities found that the connection between mobility and electricity requires a systematic approach at all three levels in tandem.

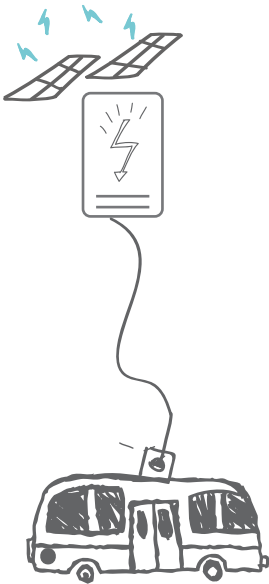
Detailed information and knowledge on the functioning and capacity of different systems/grids is necessary before plans can be made on the tactical or strategic levels and vice-versa. Innovation projects should always prepare for possible adaption when specific city plans or ambitions change and lead to new priorities. Integrating separate systems becomes more feasible, if a project successfully supports other city plans such as an overall increase of e-buses or a political wish to demonstrate a city's commitment to sustainability.



... Integration of mobility and energy

CHALLENGE

MOBILITY IS BOTH PUBLIC AND PRIVATE



Operational / tactical approach:

Connect with all stakeholders in the wider city to ensure solutions are developed jointly by business, research, the city and citizens. In RUGGEDISED, research managed to optimise the charging schedules of e-buses, thus potentially improving the business model behind the installment of solar panels in the project. One approach to involving all actors could be through the development of [Innovation Platforms](#).

Strategic approach:

Upscaling of smart electric mobility cannot happen in a vacuum and political support is needed. Whether a question of financing from investors or the deployment of a single solution, assessment of the city's overall ambition plays a role in the success of smart solutions, even when deployed by private or semi-private companies. Often, for example, investors also assess solutions in the context of political commitments, and any solution supporting the overall ambitions will be more likely to succeed.

Connecting to existing infrastructures

When setting up new hubs for e-charging or developing a smart electricity grid, project developers quickly face the challenge (or opportunity!) of existing infrastructures. If planned well, benefitting from already existing grids, buildings or structures is not just possible, but desirable. To this end, all RUGGEDISED cities worked with colleagues in the city administration and external city actors to deploy their solutions.

CHALLENGE

THE DEPLOYMENT OF CHARGING AND SOLAR INSTALLATIONS REQUIRES ROBUST GRIDS

Operational approach I: If current infrastructure does not allow for a new installation, projects can consider moving the specific geographic location of the installation within a building, lot or event district to deploy the solution more efficiently. Moving a solution closer to a power station, or in the adjacency of gravel channels, can support actual installation.

Operational approach II: Effective modelling to assess the demand pattern, for example through a Digital Twin solution, can support in choosing the best placement of a smart solution, ensuring sufficient capacity in the overall grid and the specific installations in the immediate area. Potentially, projects can change the demand patterns, for example by changing charging times, etc.

Upscaling smart charging and mobility

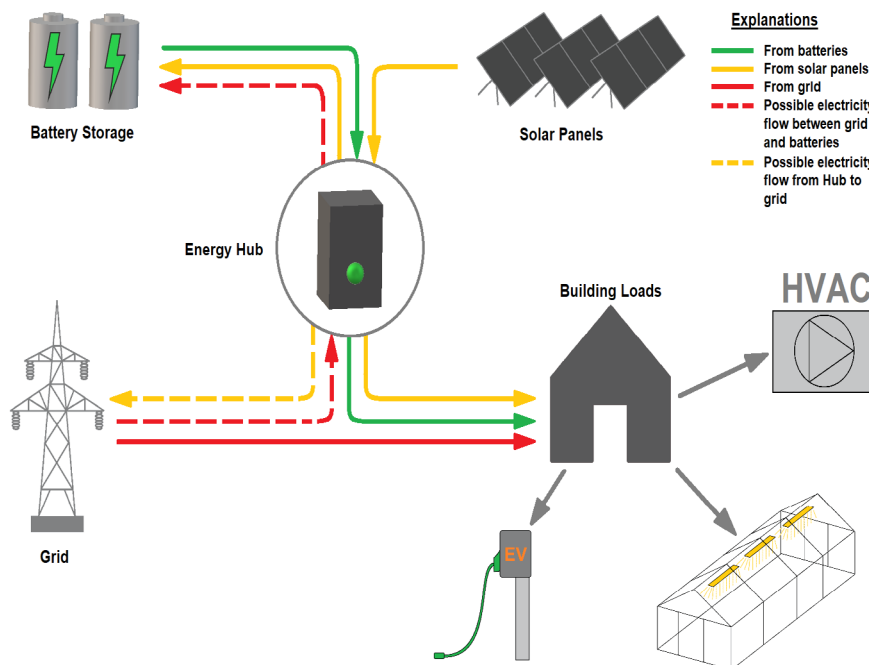
Smart and clean mobility carries intrinsic value for cities in lowering pollution and meeting the needs of the fast growing number of E-Vehicle users. The cities of RUGGEDISED all recognise this, and to support the fastest possible rollout new business models or financing schemes have also been developed.

CHALLENGE

PREPARE THE SPECIFIC SOLUTION AND THE WIDER SYSTEM FOR UPSCALING

Operational approach:

When testing a specific installation, build a tool to simulate, develop and optimise the electricity production and consumption in the building to allow for the input of key parameters related to upscaling. The challenge is to find the right balance between the loads and the battery.



Tactical approach:

Keep external stakeholders in the loop regarding local city action plans. Without this information the network operator is always behind in planning and must be reactive and rush, leading to sub-optimal situations and Smart City projects that are less likely to pay off. On the other hand, involving external stakeholders in the tactical (and strategic level) can lead to a more effective implementation of overall plans.

The combined PV and battery system connected to the electricity grid at the campus of Umea University. This visual is a part of the report 'E-charging facilities for e-vehicles installed in Umeå' written by Akademiska Hus AB.

CHALLENGE

FINDING ALTERNATIVE FINANCING MODELS



Photo: UPAB

Tactical and strategic approach:

Schemes such as green parking pay-offs, where property owners can reduce investment in parking spaces and instead support facilities encouraging smart - and clean - mobility, can alter the business model for smart mobility by diverting resources from more traditional transport investment. This diverting of priorities/ requirements often needs support on the strategic (political level).

Recommended publications for expert info

RUGGEDISED SOURCES

Online optimization to Enable Sustainable Public Transport

In this work, researchers from Erasmus University and the University of Cologne tackle the complicated problem of planning the electric charging schedule amid various sources of uncertainty. Based on the insights, a Public Transport Operator started developing an online monitoring and control system adopting some of our suggestions.



E-charging facilities for e-vehicles installed in Umeå

This report offers a description of how partners in Umeå deployed an e-charging hub with solar panels and charging facilities. It includes a description of the monitoring and analysis tools as well as the initial ideas for replication in Sweden.

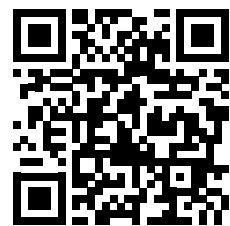
It was written by Akademiska Hus.



Implementation reports from the Lighthouse Cities

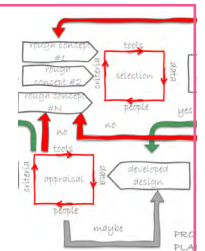
These reports detail the work undertaken by the Lighthouse Cities of RUGGEDISED to implement the cities' smart solutions.

They are written by cities for cities and share the main considerations behind the strategies in Umeå, Rotterdam and Glasgow to support other cities in developing Smart City strategies and to implement solutions.



Other RUGGEDISED material

The partners of RUGGEDISED have produced a large library of material relevant for all Smart Cities professionals. It will continue to be updated until the end of the project and covers everything from webinars to scientific publications on a wide range of issues - from European cooperation to the work done and planned in the Fellow Cities of Gdańsk, Brno and Parma.



OTHER SOURCES ON SMART ELECTRICITY GRIDS AND E-MOBILITY



Smart Cities Marketplace



Guidance Packages and booklets from EU initiatives

The European Union is compiling lessons from the large Smart City Projects through the Smart Cities Marketplace. Find booklets specifically on the impact of the EU's changing electricity market, on the development of smart cities and much more on the website.



About

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Date

10 / 2021

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All images in this publication are the property of the organisation or individuals credited. Cover image: Samuel Petersson, Station of Being

About the project

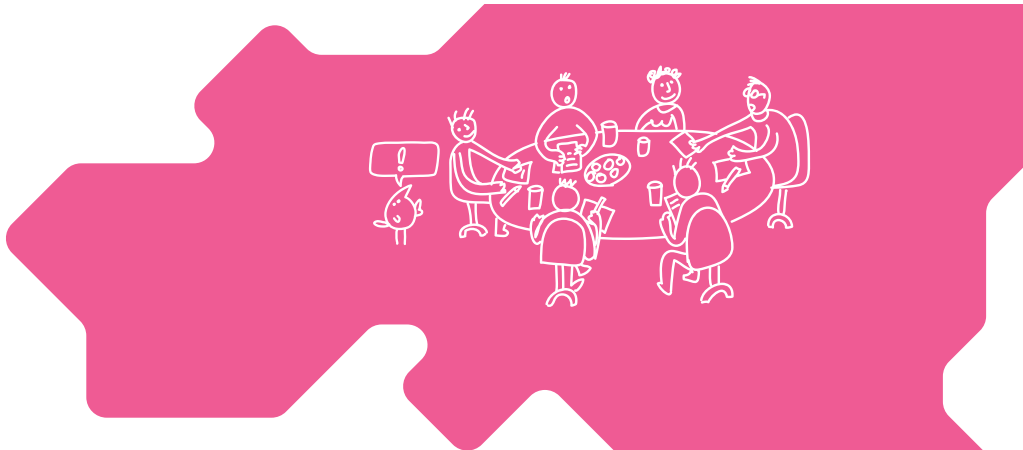
RUGGEDISED is a smart city project funded under the European Union's Horizon 2020 research and innovation programme. It brings together three lighthouse cities: Rotterdam, Glasgow and Umeå and three follower cities: Brno, Gdansk and Parma to test, implement and accelerate the smart city model across Europe. Working in partnership with businesses and research centres these six cities will demonstrate how to combine ICT, e-mobility and energy solutions to design smart, resilient cities for all.



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731198. The sole responsibility for the content of this document lies with the RUGGEDISED project and does not necessarily reflect the opinion of the European Union.




Partners



Designing smart, resilient cities for all

ROTTERDAM . UMEÅ . GLASGOW
BRNO . PARMA . GDANSK

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 Co-funded by the Horizon 2020 Framework Programme
of the European Union

