REgeneration MOdel for smart URBAN transformation

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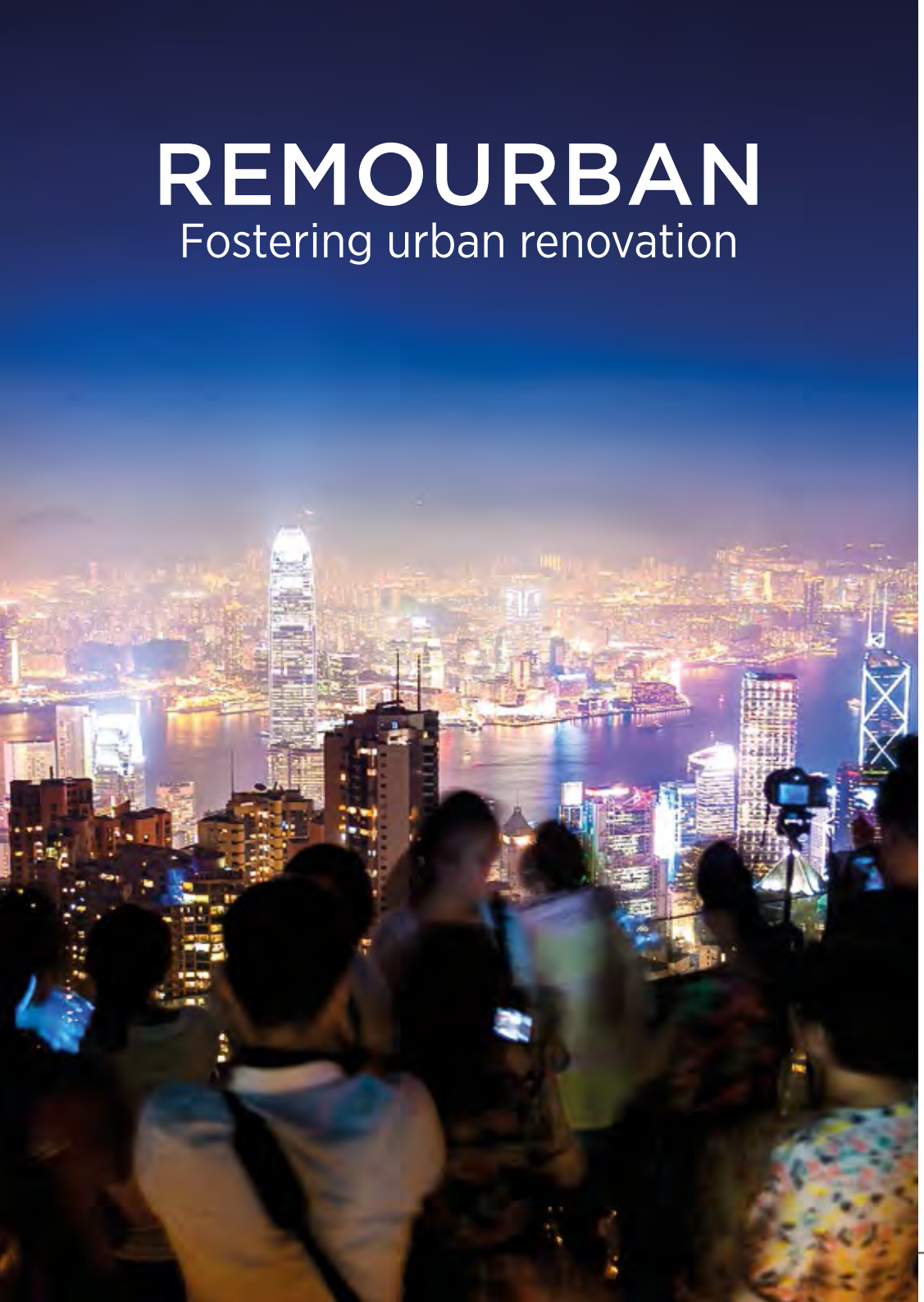
REMOURBAN

Fostering urban renovation



REMOURBAN is a 5-year EU-funded project aimed at designing and validating a sustainable urban regeneration model in the Lighthouse cities of Nottingham (UK), Valladolid (Spain) and Tepebasi/Eskişehir (Turkey), while maximising its replication potential in two Follower cities, Seraing (Belgium) and Miskolc (Hungary).

The Urban Regeneration Model (URM) is a methodological guide resulting from the technical innovations developed and implemented during the project. It combines energy, mobility and ICT to improve the quality of life in European cities. The urban renovation strategy is based on citizen engagement of citizens to ensure social acceptance and make them the cornerstone of the smart city of the future.

The REMOURBAN model also features new business models for city renovation and strategies to address non-technical barriers and help public administrations and local governments understand their goals and objectives and evaluate the progress in making their cities smarter and more sustainable environments.

INTERVIEW
to REMOURBAN Coordinator

What's unique about REMOURBAN?

In REMOURBAN we have developed an Urban Regeneration Model (URM) drawing on the knowledge and experience of implementing measures in the Lighthouse cities of Nottingham (UK), Valladolid (Spain) and Tepebasi (Turkey). We make this information available to other cities in order to transform them into smarter and more sustainable places. What makes the difference is that the URM also addresses non-technological aspects, such as engaging with citizens or implementing business models to foster replication.

How did the project engage with citizens? Did you receive a positive feedback?

At the beginning we faced some difficulties. We offered citizens ready-made solutions without involving them in the decision-making process and this made them reluctant to go ahead with our interventions. We therefore changed tack and set out a strategy to engage with them. This was key to success: empowering citizens and establishing a continuous dialogue to dispel all their doubts and provide information on the measures we were implementing. We set up committees and organised meetings with external experts to gain people's acceptance. Then, when they started noticing the savings and improved conditions, we received very positive feedback. We had to adapt our communication strategy and formats in order to reach out to both the elderly and young people. We sent letters to older residents and went to schools to ask children what kind of future they want for their cities. The aim was to show what REMOURBAN could do in this respect.

Do the cities involved in the project have something in common?

They have something very important in common: size. According to recent statistics, most of Europe's population lives in cities and this trend will continue. Cities with the biggest percentage of population are mid-sized cities. In REMOURBAN we chose to work with such cities because they have the highest potential for replicability. Of course, there were some cultural differences, but our cities were able to learn from each other and find ways to adapt the solutions we developed.

Are the project results in line with the expectations?

At present we are monitoring and evaluating the project's impacts. The data collected so far shows that we have met our expectations and, in some cases, exceeded them, for example by using a higher share of renewables in buildings or by increasing the number of electric vehicles.

How do you see the project's legacy?

The lighthouse cities benefited directly from our action: we improved quality of life, created healthier environments and fought against climate change and energy poverty. Nevertheless, I think that the main legacy of the project is how we are putting together all the lessons learnt, and the information gained from implementing the measures, and making this available to others. The follower cities within the project, Seraing in Belgium and Miskolc in Hungary, are testing the URM to generate their own plans and understand how they can replicate the measures performed in the lighthouse cities. We are also working with other cities like Segovia in Spain, Oxford in the United Kingdom and Kadiköy in Turkey to ensure further replication. In REMOURBAN we are trying to make a difference by delivering a practical set of tools to support cities in evaluating the impact of different measures and identify the potential for replicability based on their specific conditions. After the end of the project, we will make the URM or at least some parts of it available to more cities.

Miguel Ángel García Fuentes
CARTIF Technology Centre

RESULTS
in figures

INTEGRATED INFRASTRUCTURE

Number of variables collected in the central platform:

1927

Number of IT services and applications deployed:

6

SUSTAINABLE MOBILITY

Status at the project start:

kWh/person-yr

8,340

kg of CO_2/person-yr

2,752

Impact generated by the project:

Energy reduction

5.1%

CO_2 emissions reduction

5%

LOW ENERGY DISTRICT

Status at the project start:

kWh/person-yr

4,500

kg of CO_2/person-yr

1,485

Impact generated by the project:

Energy reduction

34%

CO_2 emissions reduction

50%

THE SMART REGENERATION OF REMOURBAN LIGHTHOUSE CITIES

THE LIGHTHOUSE CITY OF VALLADOLID

Valladolid is the capital of the autonomous region of Castile and Leon, the biggest region in Europe. The city covers an average surface of 58.000 sq. mi. (almost 4% of the EU territory). It is the biggest city in the north-west part of Spain, with a population of 307,052 people.

Inhabitants	Area (ha)
307,052	19,790

FASA DISTRICT

The district is characterised by high construction and high population density (340 inhabitants per ha). The interventions put in place by REMOURBAN reduced the energy consumption in heating and lighting thus increasing energy efficiency in the buildings and improved the comfort for the dwellers through better thermal insulation. The project also fostered the use of renewable energy (e.g. through biomass-based district-and-water heating and installation of photovoltaic panels for power generation). Thermostats and meters have been installed to optimise energy consumption.

Inhabitants	Area (m^2)
1,180	24,000

WHY REMOURBAN?

Improve energy efficiency

Increase the use of renewable energy

Reduce energy consumption

GENERATED IMPACT

Energy savings: 32%

CO_2 emissions: -87.57%

Citizens involved: 1,000

ACTIONS

PUBLIC CHARGING INFRASTRUCTURE

Valladolid's EV charging infrastructure was improved with the installation of new Fast EV Charging Stations and EV Charging points.
In 2018 more than 8,500 recharges were made by 324 different users, with an average time per recharge of approximately 3 hours. This supposes a total consumption of more than 64,000 kWh, equivalent to more than 400,000 km travelled by electric vehicles, saving 74,842 tons of CO2.

Fast charging points for public use	Semi-fast charging points for public use	Other public charging points
1	4	15

SUSTAINABLE MOBILITY

With the support of REMOURBAN, the city of Valladolid added 5 public e-buses, 45 private e-vehicles and 2 municipal car-sharing e-vehicles to its fleet.
Two economic incentive calls, for a total amount of 405,750 euros, were launched for the purchasing of taxi e-cars, delivery and commercial fleets as well as for charging points. Smartphone applications are used to provide information on the availability of electric vehicles of the municipal fleet for car sharing.

People using the car-sharing system	New electric vehicles in the city	CO_2 avoided per year (tons)
12	52	118

CITY INFORMATION PLATFORM

The city information platform collects and stores the time series of values of energy and mobility variables monitored at local level and sends the updated data to the Global ICT Platform. A Shared Infrastructure planning allows the systematic exploitation of synergies between smart grid, broadband infrastructure and district smart metering infrastructure. Apps for information on transport are also available to monitor electric cars and recharging infrastructures.

City variables collected/monitored	Energy variables collected/monitored	Mobility variables collected/monitored
268	214	199

ENERGY EFFICIENT DISTRICT RETROFITTING

With the aim of achieving a Near Zero Energy District in Valladolid, 19 residential buildings in the FASA district have been retrofitted with the support of REMOURBAN.
The interventions focused on improving the thermal performance of the buildings' envelope and achieving a biomass-based district heating. In addition, BIPV façades were installed to lower energy bills and recover some of the investment.

Area retrofitted (m^2)	Area of retrofitted façade (m^2)	Energy consumption by renewable energy
24,700	15,435	80.26%

THE LIGHTHOUSE CITY OF NOTTINGHAM

Located in the East Midlands, Nottingham is one of the UK's core cities and a pioneer in the fight against climate change. The city has already met its Energy Strategy target and aims to become the first carbon neutral city in the UK by 2028.

Inhabitants	Area (ha)
318,000	7,460

SNEINTON DISTRICT

Sneinton was selected as the demonstration area for the REMOURBAN project in Nottingham.
There was a significant amount of properties of different archetypes and tenure suitable for retrofit. REMOURBAN facilitated the improvement of over 300 Nottingham City Council properties, managed through its Arm's Length Management Organisation Nottingham City Homes, and a further 50 private sector properties project managed by Nottingham Energy Partnership.

Inhabitants	Area (ha)
6,400	56

WHY REMOURBAN?

Saving energy through energy efficiency

Saving money through electric mobility

Reducing fuel and CO_2 emissions

Easing the traffic in the city centre

GENERATED IMPACT

Energy savings: 39.7%

CO_2 emissions: -40%

Citizens involved: 8,100

ACTIONS

ULTRA-LOW ENERGY HOMES

Nottingham is the first UK City to adopt the retrofitting housing solution known as "Energiesprong". The household's energy demand has been greatly reduced and can mostly be generated on site via smart use of renewable energy technologies. Environmental performance has been improved to almost net zero carbon.
This approach won the UK Housing Award for Innovation of the Year in 2018.

Dwellings retrofitted	Total metres retrofitted	Energy consumption
10	738	-68.03%

EV CHARGING INFRASTRUCTURE

With the help of REMOURBAN, the city of Nottingham increased the number of electric buses on its bus network and invested in charging points for the deployment of a city car club EV.
Nottingham has one of the largest electric bus fleets in Europe with nearly 60 electric buses.

New Electric vehicles	Total electric km	Total recharges
16	500,000	3,096

REAL TIME ENERGY MAP

The project has given citizens in the pilot access to better knowledge of the energy consumption through visual data, enabling them to make informed decisions. This helps Nottingham City Homes to predict immediate future usage and balance demand of renewable technologies through the Energy Center to save money and reduce carbon emissions.

Dwellings monitored	Sensors	Average response time (milliseconds)
40	277	91

LOW TEMPERATURE HEATING & SMART CONTROLLER

Nottingham City has the largest district heating network in the UK. REMOURBAN saw the opportunity to use the return flow from the existing high temperature network as the demonstration site was close to the existing low carbon energy from waste district heating network. This has presented Nottingham with a cheaper and more effective proposition for heating residential homes.

Thermal comfort increase	Average temperature of dwellings in winter	Average temperature of dwellings in summer
40.46%	19°C	23°C

THE LIGHTHOUSE CITY OF TEPEBAŞI

Eskişehir is located on the mid-western side of Anatolia. The Porsuk River divides the city in half. Tepebaşı is located on the northern side of the river. As a railway and highway intersection, Tepebasi is in a strategic position, connecting major cities like Ankara and Istanbul.

Inhabitants	Area (ha)
830,000	267,800

TEPEBAŞI DISTRICT

Tepebaşı district has 39.34% of the total population of Eskişehir. The building typology in the demo site consists mainly of semi-detached villas. Although built in 2007, the district building stock was energy-inefficient and poorly insulated. In this respect, the REMOURBAN retrofit acted as an example for thousands of residential buildings with similar characteristics, both in Eskişehir and in other cities all over Turkey.

Inhabitants	Area (ha)
335,000	130

WHY REMOURBAN?

Reduce energy consumption

Reduce carbon emissions

Improve transport infrastructure

GENERATED IMPACT

Energy savings: 53%

Emissions: -63%

Citizens involved: 6,000

ACTIONS

SMART STREET LIGHTING

Tepebaşı has deployed a new intelligent lighting system along four of its streets. The new lights automatically dim when there is nobody around and turn brighter when movement is detected. The system's LED bulbs are more reliable and more energy efficient than conventional high-pressure sodium bulbs. This smart lighting perfectly balances the citizens' need to feel safe by ensuring well-lit public spaces, while cutting back on the district's overall energy costs.

LED bulbs	Dimmable light-emitting diodes	Lumens
25	46	700

E-BIKES AND CHARGING STATIONS

Tepebaşı's new e-bike infrastructure includes 30 e-bikes and 45 charging stations in three locations to ensure that all citizens can be reached.
The bikes are designed to be rented and have protection against both outside weather conditions and theft. The pay station provides an interface where users can select what type of bike they will rent, for how long and how they will pay for the rental.

People subscribed	Single e-bike station energy consume (kWh)	Battery life (km)
200	5.5	150

CITY ON CLOUD

"City on Cloud" is a platform of platforms that integrates different applications implemented in Tepebaşı. It is hosted on the Cloud, hence the name. Local servers located at the demo site collect real time energy data from the Building Energy Management System. The platform collects energy data from the demo site as well as from other smart city applications such as Energy Monitoring System for Electric Meters, Solar Panel System, Vehicle Tracking System, E-Bike Management System, Smart Street Lighting System. It is designed in a modular fashion so that other applications can be added at any time.

City variables collected/monitored	Energy variables collected/monitored	Variables collected/monitored
340	572	3,000

DISTRIBUTED GENERATION – PV SYSTEM INSTALLATION

The photovoltaic system was installed in 2018 and consists of a 116.6 kWp rooftop Building Integrated Photovoltaic system plus a 58.3 kWp Carport Canopy on the ground. A battery system with 6 kW has also been installed to store energy in the demo site. This extra power storage mainly serves the outdoor lighting system in the event of a blackout. The PV system is integrated with the City on Cloud platform. To foster a conscious behavioural change, users can monitor their energy consumption in every building unit.

PV system power (kWp)	Annual production (kWh)	CO_2 avoided (tons/year)
174.900	233,492	163.4

ENSURING REPLICATION IN EUROPE

SERAING

Which measures will the city of Seraing launch locally following the REMOURBAN example?

The REMOURBAN project has strengthened the interest of Seraing for a smart approach to energy & mobility management, using ICT as vectors of efficiency. Various projects have been initiated in this respect, such as Seraing being pilot territory for promoting the retrofitting of private housing via an IT platform; study of cycling routes connecting the inner network to neighbouring towns; replacement of a selection of used municipal vehicles with cleaner electric or CNG vehicles (Walloon funds). Regional funding for a large study to plan the future implementation of micro-grids/smart grids within a defined district of the city has also been requested. Moreover, the studies carried out as part of REMOURBAN's replication plan and the resulting action plan will be a starting point for future developments.

When will you start implementing them?

Some have already been launched while others are waiting for funding.

What are the main goals and what do you expect to achieve in your city?

Tackling fuel poverty; increasing renewable energy production, improving mobility (multi-modality, transport efficiency and reduction, development of soft mobility, etc.).

How have the citizens of Seraing reacted to the initiative?

A wide variety of stakeholders were engaged: citizens, in connection with urban regeneration urban projects led by the city; local companies (energy/IT sectors or IT) & academics. They brought their vision and perspective on the future of the city.

Christelle Degard
REMOURBAN Project Manager
for the City of Seraing, AREBS

ENSURING REPLICATION IN EUROPE

MISKOLC

Which measures will the city of Miskolc launch locally following the REMOURBAN example?

The project's good practices and methods are very up-to-date, remarkable and transferable. Therefore, Miskolc city would like to introduce more smart and sustainable projects, such as launching a smart traffic management system and an e-ticketing system, as well as other kinds of low energy project e.g. smart grid, in order to better ways of leveraging intelligent technologies.

When will you start implementing these measures?

The above-mentioned projects will be rolled out within one to two years and the city endeavours to exploit more and more EU funding in the near future. This will ensure better quality of life for its citizens and hereby contribute to reach a more liveable city, upholding the results of these projects (especially the achievements of REMOURBAN project) for a long term.

What are the main objectives and what do you expect to achieve in your city?

The main goal of Miskolc is to take the city along a path of sustainable development and to give priority to smart city developments. In recent years, lots of successful energy efficient schemes have been implemented in Miskolc, and the city aims to continue this drive towards greater energy efficiency.

How have the citizens of Miskolc reacted to the initiative?

Citizens of Miskolc have welcomed the smart city initiatives, and they use these developments every day, such as the free WiFi access in public transport, or EV-chargers. These smart city developments enable people to open their eyes to the world and to make them become more environmentally conscious.

Mr. Gábor Prion
Mayor's Commissioner for IT service
and SMART coordination

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 646511

Regenerate your city with REMOURBAN

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