REMOURBAN - Smart City Valladolid

Urban renewal

Address 1 - street : 47013 CAAMAñO 126, VALLADOLID, España

Population : 5 681 hab
Number of jobs : 80 empleos
Starting year of the project : 2015
Delivery year of the project : 2018
Key words : Smart City, sustainability, modernization, electromobility, urban regeneration

2.9 ha

8 993 500 €

Proposed by :

ID CARD

REMOURBAN is a large-scale demonstration project, whose objective is to accelerate urban transformation towards the concept of smart city taking into account all aspects of sustainability. The demonstration addresses a holistic intervention in Valladolid (Spain), well balanced in terms of actions on energy, mobility and ICT, which is monitored and properly evaluated. The interventions of the mobility sector focus on improving the sustainability of urban mobility, safety and the reduction of atmospheric and acoustic pollution. Energy sector interventions focus on achieving low energy and low carbon emission districts, and ICT sector actions focus on the integration of urban infrastructures to take advantage of their isolated performance. The demonstration in Valladolid aims to reduce 50% of the energy consumed and 80% of CO2 emissions, actively involves more than 5,700 citizens, reduces consumption of the target district by at least 50% (398 apartments and dwellings, total 24,600 m2) and switch to central heating system renewable energy, deploy more than 50 electric vehicles (buses, taxis, car sharing and last mile delivery), improve charging infrastructure by adding fast loading points, implement an information platform for the city, gathering more than 5,000 variables and deploying several value-added services (for the management of energy demand).

Programme

- Housing
- Public facilities and infrastructure
- Others

CO2 Impact

CO2 Impact : 1 170 tCO2

Method used to calculate CO2 impact

CCO2 equivalente asociado con el consumo de energía.
Emisiones totales de CO2 evitadas en el distrito: 954.36 tCO2 / año Emisiones totales de CO2 evitadas para acciones de movilidad: 215.12 tCO2 / año Promedio de emisiones de CO2 evitadas por ciudadano: 205.86 kg CO2 / año por ciudadano

Project progress

- Operational phase

Key points

- Governance
- Quality of life
- Economic development
- Mobility
- Smart city
- Resources
- Energy /Climate

Approaches used

- RFSC
- Agenda 21
- Others

Data reliability

Self-declared

TERRITORY

Type of territory

Valladolid is a medium-sized city located in the center-north of Spain. It has 301,876 inhabitants (data of 2016), but it has a metropolitan area where 0.5 million people live. It is the administrative capital of the region of Castilla y León and the focus of the metropolitan area of Valladolid, composed of several surrounding municipalities that represent more than 400,000 inhabitants. Valladolid, located at a height of 690m.a.s.l.

Under a Mediterranean continental climate, it occupies a strategic position in the north of Spain, so it has been a center of industrial development since the 50s.

Regarding the climatic conditions, the Mediterranean continental climate is the typical climate of the north-central area of Spain, as well as of Valladolid. The winters are quite cold, with fairly low temperatures and generally cloudy days. Mornings or even whole days are often cloudy due to irradiation (around 60 days per year). Summer is the driest season and temperatures often exceed 30 °C with a significant range due to the flow of sunlight from solar radiation, and also due to nocturnal radioactive exchange to the sky. According to this, heating is the main energy demand in buildings, since cooling devices are usually not present in homes.

The city of Valladolid is included in the initiative "Smart City of Valladolid and Palencia", which covers a series of challenges for the city in the framework of technological, social and economic innovation directly related to citizens, the industrial network and administrations . Therefore, this initiative seeks to position Valladolid as a benchmark in the fields of sustainable development and as drivers of innovation within the framework of the CE Joint Plan.

The REMOURBAN project aims to help Valladolid in the urban transformation towards a more intelligent and sustainable city. The interventions included in the REMOURBAN project aim to reduce 50% of the energy consumed and 80% of CO2 emissions, actively involving more than 5,700 citizens. To this end, the consumption of the target district has been reduced by 50% (398 homes, in total 24,600 m2), fossil fuels have been replaced by renewable sources in the central heating system, a fleet of electric vehicles has been deployed (buses, taxis, car sharing), the charging infrastructure has been improved incorporating fast loading points and an information platform has been developed for the city, which gathers more than 5,000 variables and displays several value-added services (for the management of energy demand).

To help Valladolid in its urban transformation, a district was chosen to demonstrate a set of interventions that has improved the energy conditions of the buildings, but also the quality of life of the inhabitants of the area. The main objective of the implementation of these interventions is not only to improve the conditions of the chosen area, but to use the results and knowledge obtained to replicate these interventions in other areas of the city and also in any city in the world.

The district of FASA, the chosen neighborhood, is located in the southeast of Valladolid. It has an area of 3.5 hectares and belongs to the neighborhood of Delicias, which was the first neighborhood built outside the track, during the decades of the 50s and 60s. With some variations of the original plan, the FASA district, which was designed and built to principles of the 60s for workers of the company FASA, consists of 19 blocks, a tower, a building for central boilers, a park, some sports facilities and 2 parkings. Some of the buildings have their main facades oriented east and west and the rest to the northeast and southwest.

The district's energy system consisted of two fossil fuel boilers (natural gas and heating oil) to provide thermal energy for each of the buildings. The boiler room is located in a separate building and contains equipment for the generation and distribution of thermal energy. The boiler room is located in the center of the urbanization and provided only thermal energy for the heating system to 19 building blocks and the tower. The distribution of thermal energy was made through three circuits of different dimensions that provide heating through simple constant flow pumps. There are thermal energy exchange substations on the ground floor of each building that consists of a tubular heat exchanger and a pump with three mixing valves. Inside each building, the heat distribution is vertical by several pipes that feed the radiators in each apartment. Domestic hot water (DHW) is produced individually in each home with different technologies depending on the source of energy in each particular case: natural gas, butane and electricity.

With regard to mobility, there is a total figure of 169,511 vehicles (source JCYL-SIE, 2013), which is 133,371 cars, which means that there are 388.20 automobiles per 1,000 inhabitants registered. The total number of taxi licenses in the city has been constant in the last 10 years, totaling 466. Regarding public transport buses, in Valladolid there are a total of 150, most of them manufactured by the company MAN (117 buses). Less participation of other brands such as IVECO (20 buses), MERCEDES BENZ (8 buses) and IVECO PEGASO (5 buses). Three types of fuel are used for buses: 103 buses have LPG fuel, while 46 buses use diesel fuel and there is a hybrid bus. The public transport network includes buses from 4 years to 18 years following an almost linear distribution: 50% are around 12 years old, while 25% are around 7 years old and 75% are 16 years old.

REMOURBAN chose one of the lines to improve its sustainability. Line 7 is considered one of Valladolid's emblematic bus lines since its route runs from the southwest to the northeast of the city, crossing the city through the city center and the historic area. Therefore, it basically covers the city and has been chosen as potentially containing most of the representative information regarding traffic conditions in the city. Within the framework of the REMOURBAN project, Valladolid is carrying out interventions in the three main pillars of the project -energy, mobility and ICT- to improve its sustainability and intelligence.

Climate zone

[Csb] Coastal Mediterranean - Mild with cool, dry summer.

Land price

Land price : 1 509 €/m²

More info

http://www.remourban.eu
http://es.remourban.eu/

KEY FIGURES

Housing floor area

Housing floor area : 36 500 m²

Refurbished floor area

Refurbished floor area : 24,70 ha

Number of residential units

Number of residential units : 398

Total investment costs (before tax)

Total investment costs (before tax) : 8 993 503 € HT

Amount of the investment taken in charge by the local authorities

Amount of the investment taken in charge by the local authorities 2 673 250 € HT

Total of subsidies

Total of subsidies : 6 433 501 € HT

Detail of subsidies

The total investment (€ 8,993,503.03) is divided into the following sections: Retrofit of the District (€ 2,286,000.13), District heating and distributed generation (€ 1,892,606.9), Mobility (€ 4,581,300)) and Integrated Infrastructures (€ 233,600).€ 3,760,251.10 (42%) were financed by the European Union's Horizon 2020 research and innovation program under Grant Agreement n. 646511. 2,673,250 € (30%) were contributions from the Municipality of Valladolid City Council and 2,577,208.03 € are covered by private funds.

GOVERNANCE

Project holder

Name : REMOURBAN Project

Type :

General description :

REMOURBAN is a 'Lighthouse Project' funded by the European Union's Horizon 2020 research and innovation program under Grant Agreement n. ° 646511. The project is fully aligned with the European Smart Cities strategy. The final objective of this project is to design and validate a model of urban regeneration in the cities of Nottingham (United Kingdom), Valladolid (Spain) and Tepebasi / Eskisehir (Turkey), while maximizing its replication potential in two other cities: Seraing (Belgium) and Miskolc (Hungary). The model takes advantage of the convergence between energy, mobility and ICT to improve the quality of life, ensure social acceptance and empower citizens. REMOURBAN has tested a range of technical innovations and solutions, as well as new business models for the renewal of the city and strategies that address non-technical barriers. The strategy of urban renewal focuses on the citizens because they become the cornerstones to make a smart city a reality and not only will they be the most affected by the improvements but they will also be the common factor of each of them. The project will demonstrate that, by improving the current conditions of a city, it is possible to achieve low-energy districts and more sustainable urban transport, as well as perceive a higher quality of life. REMOURBAN, therefore, will focus on improving energy efficiency, the reduction of greenhouse gas emissions, the renewal of districts, the sustainability of transport, access to urban information and citizen participation. It aims to achieve a great impact throughout Europe through the results of the REMOURBAN project at European level, showing that the model of sustainable urban regeneration can be applied and replicated easily.

Project management

Description :

REMOURBAN is a five-year project that began in 2015. It is coordinated by the CARTIF Foundation and each of the three demonstration sites is led by its City Council. The Valladolid City Council is responsible for directing the Valladolid demonstration site whose interventions can be divided into the three main pillars of the project:

- Energy: interventions focused on improving the energy efficiency of the FASA district. ACCIONA and VEOLLIA are in charge of the development of these interventions
- Mobility: interventions focused on improving urban mobility in Valladolid. The Valladolid City Council, GMV, IBERDROLA and CARTIF have participated in the deployment of these activities.
- ICT: deployment of a platform in the city of Valladolid, basic services and tools to support decision-making. XERIDIA is the company in charge of the city platform and the development of services.

All the interventions carried out within the REMOURBAN project focus on the citizens, which is why a citizen participation strategy has been developed to involve and empower citizens in the transformation activities of their city.

Project stakeholders

CARTIF Foundation, City Council of Valladolid, ACCIONA VEOLIA, GMV, XERIDIA, IBERDROLA

Function : Other

Cartif Foundation: REMOURBAN Project coordinator and partner in charge of the evaluation framework. Valladolid City Council: leader of the demonstration team, co-financer of the project, owner of electric buses and vehicles to share vehicles. ACCIONA: Construction company responsible for the modernization of buildings, the control of comfort conditions, the installation of the integrated photovoltaic system and lighting. LED.VEOLIA: Partner in charge of the interventios related to the new district network of heating and sanitary hot water. GMV: Partner in charge of tracking electric vehicles. XERIDIA: Developer of the Urban Platform of Valladolid, REMOURBAN Global Platform and central services of this platform. IBERDROLA: Company in charge of the deployment of the charging infrastructure for electric vehicles.

contact@remourban.eu

Construction21 company page :

More info : http://www.cartif.es

http://www.ava.es

SOLUTIONS

MODEL OF URBAN REGENERATION

Description :

One of the main objectives of the REMOURBAN project, from a methodological point of view, has been to develop a holistic model of urban

regeneration, highly replicable, jointly addressing the transformation of energy in buildings and districts, urban mobility and covering the integration of urban infrastructures related to these two fields through ICT as a technological enabler. In this context, REMOURBAN has carried out the following tasks to help other cities in their transformation process towards more intelligent and more sustainable spaces:

- Identification of innovative activities currently applied to the buildings and mobility sectors.
- Identification of non-technological barriers and legal and regulatory issues that affect the transformation of the city.
- Development of innovative strategies for citizen participation and empowerment.
- Identification of innovative business cases to guarantee the bancability of the innovative activities proposed.
- Development of a framework to evaluate the improvement towards sustainability and intelligence.
- Finally, the development of a replicable and integrated Urban Regeneration Model that integrates all these activities.

- Urban project governance
- Citizen participation
- Other

Company :
Company :

CITIZEN COMMITMENT STRATEGY

Description :
The strategy of urban renewal in Valladolid focused on making citizens the cornerstones to make a smart city a reality. The challenge was to involve citizens so that they felt involved in this holistic urban transformation. Several tools and mechanisms were used to support the deployment of the citizen participation strategy, such as involving political support, refining the delivery of information or organizing several meetings to explain the project to the citizens and to know their thoughts and doubts. Different websites, newspapers and social networks were also used to support the strategy of citizen participation.

The strategy of sustainable mobility (intermodality) in the Valladolid city depends on the mobility infrastructure and the fleet of electric vehicles. The main actions aim to promote the benefits of intermodality. In order to provide more benefits to citizens in terms of convenient mobility, intermodality was promoted between buses, bicycles and carpooling. A single contactless card is available to be used with all the means of transport cited. Smartphone and web applications will allow travelers to more efficiently and transparently manage the organization of their routes and the related payment (through Google Wallet, PayPal); they will receive information about the waiting time for a bus to arrive at a specific stop, nearby stops...

- Urban project governance
- Citizen participation
- Other

QUALITY OF LIFE

Net density

137.24

ECONOMIC DEVELOPMENT

TRANSPORT

Mobility strategy

The main objectives defined in the REMOURBAN project for Valladolid in relation to urban mobility interventions are:

- Improve transportation efficiency
- Improvement of penetration rates of FEV / FHEV vehicles in the different vehicle fleets
- Reduce investment in energy in transportation
- Reduce pollution and greenhouse gas emissions
- Promote the use of public transport
- Optimize the use of the fleet of vehicles of the City of Valladolid
- Improve the recharging infrastructure for public use, which is necessary to promote the adoption of electric vehicles in the city

To achieve the identified objectives, several actions have been defined within the project:

- Increase the FEV / PHEV fleet in Valladolid:
  - 5 buses
  - 2 FEV vehicles for the City Council's private fleet and the deployment of a vehicle sharing service
  - 45 private electric vehicles (taxis, last mile fleets, private vehicles)
- Car sharing service
- Improve the charging infrastructure in Valladolid:
  - Electric bus charging infrastructure
  - Public charging infrastructure: 18 standard charging points and 1 fast EV chassis station
  - 22 loading of private charging points for public use

SOLUTIONS

e-BUSES FOR PUBLIC TRANSPORTATION

Description :

The first of the actions in the area of Valladolid city is the purchase of 5 PHEV buses and 2 ultrafast recharging points by the Valladolid City Council. Buses have a high relative impact because they carry a large number of passengers and have a high occupancy rate. These buses circulate on line 7, crossing the city center and the historical area of the city (the low emission zone), where traffic has been restricted occasionally due to pollution levels. The buses are model VERIS.12 Hybrid +, class I, 12 m long, 2,550 mm wide, with low floor, two doors and capacity for at least 85 passengers (22 seated and 2 wheelchairs).They comply with the ECE R66.02 valid from 2017, which regulates the strength of the assembly on buses and the requirements of the rollover test. The charging infrastructure includes all the tools and ICT equipment necessary to ensure complete and accurate monitoring of the process from the facilities of AUVASA. The batteries are also developed throughout the acquisition process so that the latter are fully adapted to the fast charging technology. Buses operate in full electric mode while crossing the city center, specifically while driving within the low emission zone. While in electric mode, the only source of energy required to drive the vehicle will come from the Energy Storage System. In addition to the natural efficiency increase of electric motors (and hybrid propulsion systems) compared to traditional internal combustion engines (ICE), it should reduce fuel consumption by about 30%, the vehicle will recover energy during braking and will recharge the batteries during the stops at the fast loading points. It is expected to reduce fossil fuel consumption by an additional 33%, thus achieving a global fuel consumption reduction of around 63% compared to a conventional diesel bus. Global pollutant emissions will also be reduced in an almost direct proportion. All electric vehicles are being monitored. The monitoring is done through an on-board equipment that provides vehicle GPS tracking, communication capabilities and integration with the vehicle's internal communication systems in order to retrieve information about the vehicle's operating parameters, such as battery level , the state of charge or the power delivered to the motor. In the case of electric buses, which have been specifically designed for the municipality, the communication between the on-board device and the hybrid bus has been designed to measure, which has allowed to gather a large number of operational parameters and even use the device to manage the switching from electric to hybrid operation by using the GPS location information provided by the device. The installation on the buses has been carried out by GMV personnel who already operate the fleet management system of the municipality's bus system and provide information on: fuel level, speed, GPS location, distance traveled, energy consumption,auxiliary systems (heating / air conditioning, etc.) energy consumption, ultracapacity power level, battery power level, battery charge power, combustion engine consumption, delivered combustion engine power and regeneration braking energy. GMV, as a monitoring partner of REMOURBAN mobility actions, is responsible for collecting this data and transmitting the information to the local and global REMOURBAN platforms. To do this, a set of web services has been developed to communicate with Cartif, which gathers the data, processes them beforehand and uploads them to local and global platforms. ELECTRIC BUSES RECHARGING INFRASTRUCTURE Two new Fast EV (120 kW) charging stations dedicated to recharging electric buses have been installed at the beginning and end of Line 7. The number 7 urban bus line in Valladolid, operated by Auvasa, covers the route between Arturo Eyries and Barrio Belén, has been electrified thanks to the implementation of the rapid bus loading system through the device called 'pantograph'. With this implementation, hybrid buses operate 100% in electric mode in the so-called Low Emission Zone (ZBE) in the historic center. The impact of CO2 has been calculated assuming a total of 150,000 km traveled per year as the total bus fleet, emissions of 2.68 kg of CO2 per liter of diesel and the consumption of diesel buses before 0.5 l / km traveled, compared to less than 0.22 l / km planned for the new model.

CO2 Impact : 152,76 tCO2

- Electric vehicles
- Other

SERVICE OF SHARING CAR AND ELECTRIC VEHICLES FOR THE FLEET OF THE MUNICIPALITY

Description :

As part of the action of vehicle fleets shared by the municipality of Valladolid, an online platform was implemented to allow a more rational and effective use of the vehicles. Several studies show that the use of vehicles is less than 20% (in the best-case scenario), which means that they spend most of their time parked. This is very inefficient and, in part, is related to limiting the use of vehicles to a single owner.

Car sharing systems try to reduce vehicle downtime by allowing multiple users to share a fleet of vehicles for their trips between destinations. This has several advantages (it reduces the need for parking space, waste of scrapped vehicles, etc.), particularly if the vehicles in the fleet are well-maintained and efficient models, as is the case of the Municipality of Valladolid that has opted for vehicles totally electric.

The platform offers two access modes for administrators and end users. For end users, the platform allows to verify available vehicles, request new reservations and also share trips with other users (through advertising trips to other users who want to join).

The system also provides end users with simple profile editing capabilities and allows them to manage (extend, modify or cancel) their existing vehicle reservations.

The administrator interface is more complex and offers more advanced functionality, such as viewing all reservations in the system (and being able to manage them), managing users, vehicles, access cards, etc.

Finally, the vehicle sharing platform also offers reporting functions to administrators, providing information on reservations, the distance traveled by the user or the incidents that occurred to a particular vehicle.

Given that a higher level of vehicle use is achieved, it can provide an equivalent or better service with fewer vehicles, which reduces mobility costs and allows to invest in more efficient vehicles, which benefits the environment in many ways. On the one hand, in the case of the municipality of Valladolid, electric vehicles have been selected for the system, which has a direct impact in terms of greater efficiency and reduction of exhaust emissions. On the other hand, it can provide the service with a smaller number of vehicles, which reduces the proportional ecological impact of the manufacture and disposal / recycling of the vehicle.

Assuming a total traveled distance of 20,000 km per year per automobile, the savings in tailpipe emissions would amount to 5.09 tons of CO2 per year.

CO2 Impact : 5,09 tCO2

- Electric vehicles
- Other

FLEET OF PRIVATE ELECTRIC VEHICLES AND PRIVATE LOAD POINTS

Description :

Valladolid City Council launched a process of outsourcing services to encourage the purchase of electric vehicles and obtain data to measure

the environmental impact in terms of energy efficiency and savings.

The framework agreement is based on two main services: automatic data transmission provided by the GMV device and non-automatic data (surveys carried out by users on their experience of using electric vehicles, suggestions for improvements, dissemination and communication activities, etc.).

The awarded electric vehicle will carry an on-board monitor, supplied and installed by the project through the GMV partner, which will provide the appropriate technological solutions system. In particular, this system will be the OBU (On Board Unit) with GPS capabilities and CAN bus connection.

This system, always active, will allow recording the following information: GPS location, information received by the CAN bus of the electric vehicle itself. In general, the information related to the state of charge of the batteries and the energy consumption.

In addition to the above, periodically the bidder (taxi drivers, last drivers of mille vehicles ...) must provide information about their experience to provide qualitative and essentially subjective information about the use of the electric vehicle.

On the other hand, the bidders also provide support in the dissemination and communication of mobility actions for the REMOURBAN project in the city of Valladolid. At the same time, their assistance is of great value to develop recommendations, suggestions to improve campaigns, events and other communication activities to promote in the field of electric mobility.

The Framework Agreement is divided into two lots:

- Lot I: Autotaxis, last mile fleets and commercial fleets operating locally.**45 e-vehicles have been purchased within this lot**
- Lot II: supermarkets, shopping centers and service stations that must provide data from their point of loading to be controlled**22 loading points have been included in this lot**.

The distance traveled for these vehicles will vary a lot. Some vehicles, such as taxis or the subsequent delivery service, are expected to have a higher use than others (private car fleet vehicles), but on average we can estimate 10,000 km traveled by year. With that distance and assuming that vehicles replace a set of modern vehicles with the same distribution of diesel and gasoline that is currently on the market (60% diesel and 40% gasoline), the amount of CO2 saved is 57.27 tons per year.

CO2 Impact : 57,27 tCO2

- Electric vehicles
- Other

CHARGING INFRASTRUCTURE IN VALLADOLID

Description :

This intervention consists of updating and expanding the public collection infrastructure of the Valladolid city. The intervention is divided into several types of actions:

- Increasing the power of the charging points to reduce the battery charging times.
- Updating of loading points to new models with communication modules. This allows the charging points to connect to the backend system to facilitate the operation and supervision of the charging infrastructure.
- Deployment of new charging infrastructure for public use, including fast (50kW) semi-fast load points (22kW)

(I) 14 standard EV charging points (7.4 Kw): improvement of 15 loading points of the existing EV charging infrastructure of Valladolid city for general use by private users:

o 12 locations of EV charging points to be updated: the equipment has been replaced and the electrical installation has been upgraded to 7.4 kW / single load point

o 2 EV charging points (7,4kW) were updated with new communication modules.

(II) 4 new EV 4 charging points (22kW) dedicated to electric taxis that will be placed at selected taxi stops throughout the city.

(III) 1 new fast EV charging station (50kW) dedicated to taxis and charge.

- Electric vehicles
- Other

SMART CITY

Smart City strategy

The energy, transport and ICT sectors are essential for the day-to-day of the city. In fact, these sectors are widely considered as potentially appropriate for achieving economic and social benefits, because they are key to the quality of life of citizens and also represent the majority of people's interrelations with technology. REMOURBAN aims to develop and validate in three lighthouse cities, one of them being Valladolid, a model of sustainable urban regeneration that takes advantage of the convergence area of the energy, mobility and ICT sectors to accelerate the deployment of innovative, organizational technologies and economic solutions to significantly increase the efficiency of resources and energy, improve the sustainability of urban transport and drastically reduce greenhouse gas emissions in urban areas. This model of urban regeneration aimed at decision makers, investors, public sector and industry, combines appropriate technological solutions and innovative financial schemes (new business plan) to drastically improve the sustainability of the city, actively involve citizens and guarantee a high level of potential for replication at European level.

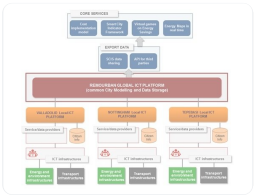
From the ICT point of view, a city information platform has been developed within the REMOURBAN project. The Information Platform of the City of Valladolid is the system in charge of collecting, tracking and processing all the variables that are monitored in the city to comply with the requirements of the REMOURBAN implementation and monitoring plan, which will evaluate the effectiveness of the interventions carried out in the different areas: buildings and energy districts, urban mobility and integrated infrastructures, calculating a set of efficiency indicators based on these supervised variables, in line with the main concept of smart cities and allowing decision-making for new improvements and new interventions.

The city platform will collect these variables from local sensor networks, data sources and IoT devices. Taking into account the value of these data, the ICT platform has also been created to analyze and present this information through graphs, reports and other resources within a web interface.

Finally, the city platform will share its variables with the global REMOURBAN platform, which centralizes and stores the entire set of variables from the three cities participating in REMOURBAN (Valladolid, Nottingham and Tepebasi), acting in turn as a source of data for some central services developed to take full advantage of the information stored on this platform by offering specific value added services to end users.

SOLUTIONS

ICT VALLADOLID PLATFORM



Description :
Valladolid's ICT platform is based on the evolution of the Smarkia energy monitoring software solution implemented as a cloud service. The only necessary requirement for the platform is to guarantee some type of connection between the platform (implemented in a hosting provider as a software solution in the cloud) and the monitored device.

Here, a "monitored device" is a term used to represent any of the different types of devices related to the REMOURBAN project with respect to urban mobility (such as monitored data sensitive to the vehicle, fuel consumption, geolocation, etc.), buildings and district devices and ICT.

The ICT platform collects and stores all the data from the monitored devices, so that it can be treated and analyzed to provide the project with valuable information for the corresponding monitoring and evaluation processes.

The main expected objectives of the implementation of the city platform are:

- The information platform of the city developed in REMOURBAN is considered an information management tool that allows the realization of the smart city.
- Compiling and analyzing the different data coming from the city, specifically in energy, urban mobility and integrated infrastructures, the platforms are enabled to share data with the global REMOURBAN platform, thus having a centralized storage system with all the data set of REMOURBAN project, continuously updated.
- The local and global information will be available for the different actors involved in the project or external, to consult the key information of the project that allows the exchange of knowledge and decision making among the companies or municipalities interested in carrying out interventions similar in their cities to those carried out in REMOURBAN.
- The time series of variables tracked in the city platform will be the basis for calculating efficiency indicators to assess the effectiveness of interventions carried out in cities within the fields of energy, urban mobility and integrated infrastructures.
- The temporal series of variables tracked in the city platform will form the information repository within the global platform, and this information will be shared with four central services developed within the scope of REMOURBAN to provide the end users (citizens, companies, municipalities...) additional services that will be fed with the data stored in the global platform (provided, in turn, by the city platforms).

Therefore, the city platform is the source of the raw data and the driver of other tools to make the most of this data for analysis, the acquisition of quantifiable results on the effectiveness of the REMOURBAN interventions and the subsequent decision-making .

- The platform should facilitate the participation of citizens by giving feedback on the use of energy in their cities, and inform and encourage them to change their behavior for greater energy savings.
- Digital services

RESOURCES

ENERGY/CLIMATE

Climate adaptation, resources conservation, GHG emissions

The intervention plan foreseen for the FASA district combines a set of measures in the fields of energy, mobility and ICT, implementing specific priority actions (technologies and innovative solutions) aimed at improving the sustainability of this area by increasing energy efficiency and the reduction of GHG emissions in this area.

To achieve the objectives related to the low energy districts, an intensive plan of adaptation of the buildings was implemented in all the buildings of the district (24,700 m2 of conditioned area) taking advantage of the homogeneity of the existing constructive and aesthetic solutions. Therefore, the energy demand of these buildings has been drastically reduced by the implementation of profitable strategies related to walls and ceilings while allowing the implementation of measures of active energy production in the building envelope (for example, the integrated photovoltaic construction).

The second set of priority actions related to achieving this "low energy district" are related to district heating and DHW systems, through the improvement of existing thermal heating (changing the source of energy from gas to renewable energy sources, renewing the heating network and improving the efficiency of the system) and the integration of the current individual domestic hot water systems in this thermal network.

Finally, these actions have been combined with an ICT platform designed to control energy efficiency and integrated into an advanced control system for district heating and the comfort of indoor spaces.

Energy mix

In addition to the energy savings produced by passive interventions, the REMOURBAN project aims to integrate renewable energy sources as a system of distributed generation in buildings to promote social acceptance of these innovative solutions and demonstrate their effectiveness.

To achieve this goal, a ventilated photovoltaic facade integrated into the south facade of the tower has been installed.

In this south facade of the tower, there are two large areas that stand out from the rest of the south façade, with the sunniest spaces in terms of kWh / year. In these areas, a photovoltaic ventilated façade with a sufficient surface area has been installed to reach 27.4 kW of power and an annual output of 24,400 kWh.

As for the generation of heat for the district heating system and sanitary hot water, the existing gas boilers were replaced by two new biomass boilers. Therefore, the main heat production is covered by the biomass boilers (90%) supported by the gas boiler (10%) in periods of peak demand.

SOLUTIONS

RENOVATION OF DISTRICT HEATING. BIOMASS BOILERS

Description :

BOILER ROOM: BIOMASS BOILERS

Renovations in the boiler room of the district included the installation of two new biomass boilers, a biomass silo, an inertia tank, a hydraulic separator, two collectors and three pumping stations. All this equipment is inside the boiler room.

The new biomass silo feeds the two new boilers, where thermal energy is produced together with the old gas boiler. To ensure an adequate inlet temperature of the water to the biomass boilers, an intermediate storage tank was installed.

The heated water is collected in a hydraulic separator. From there, it is directed to an intake manifold where the flow is divided into three pumping stations, one for each circuit. Each station consists of two pumps with a frequency converter.

When the water returns to the boiler room, it is collected from each circuit by the return manifold. From there, it goes to the hydraulic separator, where the flow is collected before it is stored in the three different boilers.

DISTRICT HEATING NETWORK

The functionality of the district heating network is to distribute the hot water from the boiler room to the buildings, where the heat exchange substations will be located.

There was an existing district heating network, which was built together with the buildings and provided heating to all the houses. The new district heating not only provides heating, but also sanitary hot water (DHW). Therefore, it must meet the energy needs of heating and domestic hot water.

The above DH network used superheated water (120 ° C). The new district heating generates water at 85ºC, thus reducing heat losses. In addition, the new pipes are better insulated, in order to minimize heat losses.

All circuits have a leak detection system that mitigates the problems caused by leaks, which were very common in the original network due to their deterioration over the years.

SUBSTATIONS

Each building has a substation. Its function is to transfer heat from the DH network to the building's DHW storage tank and to the heat exchanger of the heating system. Then, the heated water is pumped to the different homes according to their energy needs. Each pumping station is composed of two pumps with a frequency converter that allows the generation of energy to be adapted to the real needs of the end users.

To determine the energy consumption, two energy meters have been installed in the substations. The first has been located before the heat exchanger and the second before the intermediate storage tank. Therefore, the heating and DHW consumption in each building can be measured.

Control and measurement at the housing level

Originally, the houses had no heating control system. To improve efficiency and energy comfort, a system has been installed to control the heating work hours to ensure comfort with minimum consumption. To fulfill that purpose, thermostatic valves were installed in each radiator. These valves allow to control the temperature in any room of the house at any time. Therefore, the heated areas are those in which a user is located, avoiding energy losses in unoccupied areas.

By intervening in existing buildings and systems, it is expected to achieve a 33% reduction in the consumption of thermal energy for heating. Another 5% savings is expected thanks to the innovative comfort controllers and urban heating management. In terms of electricity consumption, it is planned to obtain additional savings of 25%. Finally, 87.57% of the reduction of CO2 emissions is due to the installation of biomass boilers both for district heating and for the new centralized system of ACS. In total, a reduction of 954.36 tons of CO2 per year is expected (808.09 kg CO2 per year per citizen).

CO2 Impact : 954,36 tCO2

- Climate adaptation
- Renewable energies
- Low-carbon materials/ infrastructure
- Other

Company :

MODERNIZATION AT DISTRICT SCALE

Description :

The aim of the REMOURBAN project is to reduce energy consumption as much as possible with cost-effective solutions and different sources of funding (European Commission through the REMOURBAN project, local government grants fund and homeowners). In this way, the following interventions have been selected.

- Passive interventions: external thermal insulation of facades and ceilings

The lack of insulation in the entire envelope and large thermal bridges are the main problems that affect the district's energy performance. Therefore, the best profitable solutions to improve the envelope are:

External thermal insulation of the facades: by means of this intervention, the buildings could be isolated avoiding additionally the typical thermal bridges (slabs and pillars) when the internal insulation is installed. All the facades of the buildings in contact with the houses have been isolated with the ETICS system. The system consists of a 60 mm EPS insulation plate fixed to the brick wall by means of adhesives and mechanical fixings; after this, a first layer of mortar, a fiberglass mesh and a second layer of mortar is applied; the last step is to apply a finish that provides the aesthetic appearance chosen.

Insulation of the roof of the block on the last slab and insulation of the roof of the tower on the existing waterproofing: in the FASA district there are two types of solutions, one for the sloping roofs of the blocks and another for the flat roof of the tower. In the case of the blocks, the interventions consist, first of all, in an intensive cleaning of the space between the last concrete slab and the sloping roof, since it has been used constantly by the birds to live there. Once the slabs were completely clean, the polyurethane foam was sterilized to a thickness of 60 mm. The density of the foam must be less than 36 kg / m3 to reach the level of planned thermal insulation. Finally, all the accesses that are used to ventilate this space were closed with a metal mesh to prevent the entry of birds.

In the case of the tower, the intervention consisted of installing a geotextile layer on the existing asphalt layer to protect it, then an XPS insulation board 60 mm thick and 35 kg / m3 density, then another layer of geotextile 200 g / m2 made of short polyester fiber and finally a 10 cm burial layer made of washed and clean pebbles of 25/40 mm.

- Active interventions: renovation of lighting in common areas and BIPV solution

These interventions are divided into two groups, the first is distributed generation and the lighting intervention and the second is the District Heating Intervention and the ACS interventions.

Lighting interventions: all the lights that are placed in the rooms and stairs of the building were replaced by LED lamps of between 15 and 20 W of power and 1500-2000 lm of luminous power. Distributed generation: BIPV solution. The enormous potential of spanish solar energy is wasted due to the lack of awareness and the high cost of building integrated solutions. From REMOURBAN, we want to encourage investment in the BIPV solution to demonstrate its effectiveness, in this way, a ventilated facade has been installed on the south facade of the tower with photovoltaic glass cladding panels. On the south facade of this tower, there are two large areas that stand out from the rest of the south façade, which are the sunniest spaces in terms of kWh / year. In these areas, a photovoltaic ventilated façade with sufficient surface area was installed to reach 27.4 kW of power and an annual output of 24,400 kWh.

CO2 Impact : 147,36 tCO2

- Climate adaptation
- Renewable energies
- Low-carbon materials/ infrastructure
- Other

Company :

BUILDINGS

Buildings

The FASA neighborhood was built during the 60s by the workers of the Renault factory in Valladolid, and is composed of 19 blocks of 5 floors, a tower of 14 and a building containing the thermal power plant that supplies heating to the 398 homes that they make up the neighborhood. These buildings presented serious deficiencies in their thermal insulation that resulted in lack of comfort as well as low energy efficiency.

The heating system consisted of a district network supplied by two fossil fuel boilers (natural gas and heating) and was divided into three different circuits that provide heating to the 398 homes, while domestic hot water (DHW) was produced individually in each house with different technologies depending on the source of energy in each particular case: natural gas, butane and electricity.

In REMOURBAN, with the objective of converting the neighborhood into a Near Zero Energy District, a set of actions was designed to modify both the building envelope and the current thermal generation systems. These actions are described in the following lines:

DISTRICT RETROFITTING: FACADES, ROOFING, LIGHTING RENOVATION IN COMMON AREAS AND DISTRIBUTED GENERATION:

The aim of the REMOURBAN project is to reduce energy consumption as much as possible with cost-effective solutions and different funding sources (European Commission through the REMOURBAN project, local government grants fund and owners' investment). In this way, the following interventions have been selected.

PASSIVE INTERVENTIONS: external thermal insulation of facades and roofs

The lack of insulation in the entire envelope and large thermal bridges are the main problems that affect the district's energy performance. Therefore, the best profitable solutions to improve the envelope are:

External thermal insulation of the facades

By means of this intervention, the buildings could be isolated avoiding in addition the typical thermal bridges (slabs and pillars) when the internal insulation is installed. All the facades of the buildings in contact with the houses have been isolated with the ETICS system. The system consists of a 60 mm EPS insulation plate fixed to the brick wall by means of adhesives and mechanical fixings; after this, a first layer of mortar, a fiberglass mesh and a second layer of mortar is applied. The last step is to apply a finish that provides the aesthetic appearance chosen.

Thermal insulation of roofs

In the FASA district there are two types of solutions, one for the sloping roofs of the blocks and another for the flat roof of the tower. In the case of the blocks, the interventions consist, first of all, in an intensive cleaning of the space between the last concrete slab and the sloping roof, since it has been used constantly by the birds to live there. Once the slabs were completely clean, the polyurethane foam was sterilized until it reached a thickness of at least 60 mm. The density of the foam must be less than 36 kg / m3 to reach the level of planned thermal insulation. Finally, all the accesses that are used to ventilate this space were closed with a metal mesh to prevent the entry of birds.

In the case of the tower, the intervention consisted of installing on the existing asphalt waterproof layer a geotextile layer, 80mm of mineral wool with asphalt finish on the top and a second asphalt layer on the insulating panels.

ACTIVE INTERVENTIONS: renovation of lighting in common areas, photovoltaic solar installation integrated in facade and biomass

heat network

Renovation of lighting in common areas

All the lights found in the landings, portals and stairs of the building have been replaced by LED lamps of between 15 and 20 W of power and 1500-2000 lm of luminous power.

Distributed generation: solar photovoltaic installation integrated in the facade

The enormous potential of solar energy in Spain is wasted due to the lack of awareness and the high cost of building integrated solutions. From REMOURBAN, we want to encourage investment in the BIPV solution to demonstrate its effectiveness, in this way, a ventilated facade has been installed on the south facade of the tower with photovoltaic glass cladding panels. On the south facade of this tower, there are two large areas that stand out from the rest of the south façade, which are the sunniest spaces in terms of kWh / year. In these areas, a photovoltaic ventilated façade with sufficient surface area was installed to reach 27.4 kW of power and an annual output of 24,400 kWh.

RENEWAL OF DISTRICT HEATING:

Boiler room: biomass boilers

Renovations in the boiler room of the district included the installation of two new biomass boilers, a biomass silo, an inertia tank, a hydraulic separator, two collectors and three pumping stations. All this equipment is inside the boiler room.

The new biomass silo feeds the two new boilers, where thermal energy is produced together with the old gas boiler. To ensure an adequate inlet temperature of the water to the biomass boilers, an intermediate storage tank was installed.

The heated water is collected in a hydraulic separator. From there, it goes to an intake manifold where the flow is divided into three pumping stations, one for each circuit. Each station consists of two pumps with a frequency converter.

When the water returns to the boiler room, it is collected from each circuit by the return manifold. From there, it goes to the hydraulic separator, where the flow is collected before it is stored in the three different boilers.

District heating network:

The functionality of the district heating network is to distribute the hot water from the boiler room to the buildings, where the heat exchange substations will be located.

There was an existing district heating network, which was built together with the buildings and provided heating to all the houses. The new district heating not only provides heating, but also sanitary hot water (DHW). Therefore, it must meet the energy needs of heating and domestic hot water.

The above DH network used superheated water (120 ° C). The new district heating generates water at 85ºC, thus reducing heat losses. In addition, the new pipes are better insulated, in order to minimize heat losses.

All circuits have a leak detection system that mitigates the problems caused by leaks, which were very common in the original network due to their deterioration over the years.

Substations:

Each building has a substation. Its function is to transfer heat from the DH network to the building's DHW storage tank and to the heat exchanger of the heating system. Then, the heated water is pumped to the different homes according to their energy needs. Each pumping station is composed of two pumps with a frequency converter that allows the generation of energy to be adapted to the real needs of the end users.

To determine the energy consumption, two energy meters have been installed in the substations. The first has been located before the heat exchanger and the second before the intermediate storage tank. Therefore, the heating and DHW consumption in each building can be measured.

Control and measurement at the housing level

Originally, the houses had no heating control system. To improve efficiency and energy comfort, a system has been installed to control the heating work hours to ensure comfort with minimum consumption. To fulfill that purpose, thermostatic valves were installed in each radiator. These valves allow to control the temperature in any room of the house at any time. Therefore, the heated areas are those in which a user is located, avoiding energy losses in unoccupied areas.

Contest

Building candidate in the category

Gran Premio Ciudad Sostenible

Premio de los Usuarios

Date Export : 20240104155327