SUNSHINE

Smart UrbaN ServIces for Higher eNergy Efficiency

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Overview

SUNSHINE delivers innovative digital services, interoperable with existing geographic web-service infrastructures, supporting improved energy efficiency at the urban and building level. Specifically, SUNSHINE delivers a smart service platform accessible from both a web-based client and from an App for smartphones and tablets. In particular, the SUNSHINE platform will allow:

1

Automatic large-scale assessment of building energy behaviour based on data available from public services (e.g. cadastre, planning data etc.). The information on energy performances will be used to automatically create urban-scale "eco-maps" to be used for planning activities and large-scale energy pre-certification purposes.

2

The previous assessment will be then used, together with localised weather forecasts available through interoperable web-services, to ensure optimisation of energy consumption of heating/cooling systems through automatic alerts that will be sent to the SUNSHINE App installed on the smartphone of the final users.

3

Lastly, SUNSHINE will ensure interoperable control of public illumination systems based on Automatic Meter Reading (AMR) facilities remotely accessible, via interoperable standards, from a web-based client as well as from an App for smartphones or tablets.

The SUNSHINE technology will be eventually piloted in the context of 8 sites across 4 countries, specifically:

MALTA	CROATIA	ITALY	GREECE
Paole 2 buildings Malta College of Arts, Science and Technology	**Zagreb** 10 buildings 50 illumination units **Split** 10 buildings 50 illumination units HEP ESCO	**Ferrara** 20 public buildings **Trentino Province** 60 technical buildings **Bassano del Grappa** 4 public illumination lines **Rovereto** 5 public illumination lines **Val di Non** 3 building complexes outdoor public illumination systems	**Lamia** 5 buildings Technological Educational Institute di Lamia

SUNSHINE will be piloted for a duration of 12 months and it will target at energy and emission savings ranging, within the various pilots, from 10% to 30%, with higher savings being foreseen for pilots relying on older buildings, or equipped with older heating, cooling or lighting technologies.

Target users and their needs

Building Managers

Through the developed solutions, the project ensures an improvement of the building management and energy certification process (Scenario 1), a better building stock management, better energy performance and cost/performance ratio (Scenario 2) as well as cost-effectiveness through the use of a tool for optimizing public lighting levels (Scenario 3) for technical operators. Consequenlty, SUNSHINE provides building managers and ESCOs with the tools to:

1

Acquire information about possible refurbishment and retrofitting solutions at building level through the development of the Energy Maps Scenario, which will allow delineation of buildings or building parts in need of improvement (Scenario 1 and 2)

4

Store and easily access historical energy costs in order to plan for system renovation or develop feasibility studies for installation of new heating/cooling systems based on current standards (S2);

2

Assess public building energy performance on a monthly basis through the SUNSHINE application and compare them with the real energy behavior of the public structures (Scenario 1 and 2)

5

Remotely control lighting devices in public buildings in order to be able to adjust the level of illumination of different parts of facilities or public spaces in accordance with their current use (ie. effective lighting necessity of a road, cycle lane, parking, etc). Adjustments can be done in accordance with measurable parameters such as traffic amount or weather conditions (S3)

3

Use the SUNSHINE App integrating real-time weather observations and predictions, correlate consumption and weather conditions and receive automatic suggestions on how to improve energy performance, so informed decisions can be made on how best to manage the building stock (S2)

6

Remotely assess public lighting devices status and consumption, in order to measure possible energy savings deriving from the ability of the system to optimize the luminous flux of the individual devices according to actual situation (S3)

Citizens

If you are a SUNSHINE pilot or affiliate citizen, you will be able to use the developed services for reducing energy waste caused by heating/cooling systems unnecessarily running in weather conditions that do not require it. Through Scenario 2, buildings dwellers will be able to lower their energy bill by receiving personalized automatic alerts on weather conditions that require changes to their very own cooling/heating systems (down to their specific building). While the scenario addresses public buildings in the first step, it can easily be upscaled to encompass private residential building stock as well.

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SUNSHINE aims at modulating domestic consumption by means of "human feedback": informing in real time (by texting, twitting, notifying a smart phone app, etc.) of a spike in actual consumption, possibly caused by faulty electric appliances, changing weather conditions or extraordinary scheduled high\low tariff time intervals. This way, citizens can benefit from a costeffective, optimal energy use correlated with their comfort state indoors.

Other benefits of SUNSHINE services for citizens:

Keeping informed about energy efficiency of public buildings and subsequent energy costs and savings.

Awareness on the state of the art of public building stock, transparency and good governance, favoring regeneration policies across Europe.

A safe and well-lit urban environment, improved traffic and lowered accident and crime risk, at an optimized public cost, by way of the implementation of Scenario 3.

Public administration and planners

The SUNSHINE services and solutions will be particularly useful for local administrators and planners, who will be able to use them to gather an overview of the overall state of the buildings in the city energywise, and subsequently to design targeted policies and take welldocumented decision. Planners and Public Administration (PA) officers will thus use SUNSHINE mainly to extract analytic indicators necessary for the definition of energy saving policies for the existing public built assets and to define energy pre-certification mechanisms. In particular, Public Administrators and

Planners using SUNSHINE solutions will be able to:

1. Rapidly estimate energy performances of buildings at urban scale, in order to better define energy-saving policies based on the buildings' true requirements (Scenario 1).

2. Get information about building real energy consumption in a specific area and visualize on their PC a map of the current energy performance of the buildings within that area, useful for a better planning of actions for energy performance improvement.

3. Take informed decisions in defining areas for urban renewal and accurately assess needs and opportunities for area-based investments in neighborhood regeneration.

Technical approach: innovative aspects

Scenario 1: Assessment of energy performances and electronic energy pre-certification

The definition of a service that can provide assessment of energy behaviour of building from existing information would provide a first operational solution to the EBPD. Similarly the operational definition of the concept of "reference building" through a standardised protocol specifically engineered for urban information models in certainly of significant innovative value. By providing a reference line for the average consumption of similar buildings it will be possible for a Facility Manager to spot and correct anomalies in Energy usage.

A further innovation is the possibility to define pre-certification of buildings. This information could be then use to create online catalogues of pre-certification information on predicted environmental performances of public buildings. The project aims at providing a real control over consumption at managed facilities. The situational awareness provided by "current" meter data and weather context will allow for a "real" energy management and performance improvement.

Scenario 2: Heating/cooling forecast and alerts

The most important aspect of this scenario regards the possibility to improve energy performances and, above all, inappropriate use of energy within old buildings or within buildings with heating/cooling systems with no automatic control. These represent a major source of inefficiency due to their poor performances. The approach proposed leverage on ICT technology to facilitate behavioural changes through improved awareness of building manager and dwellers.

The project aims at integrating building characteristics with weather and meter data to gain a better understanding of the energy consumption baseline for each building and to monitor the actual performance determined by the management and usage behaviours.

Scenario 3: Optimisation of power consumption of public lighting systems

The approach proposed fosters a more optimised use of public illumination according to real (variable) requirements and from a user-friendly centralised point of access, based on extended use of interoperable standards.

The use of this approach allows integration of all illumination units with the wide ecosystem of sensors available within the area and which can be assessed and controlled via the web. The use of these protocols (specifically SAS and SES) also allows configuration of alerts that can be dispatched to the operators in case of particular conditions, which extend beyond the public lighting systems. In fact, 7 through this approach, it becomes possible to configure very complex alerts that involve a variety of sensors beyond the energy management domain. For instance an alert could configured to inform the operator whenever environmental sensors detect, within a given geographical area (e.g. the aforementioned areas surrounding the stadium), poor visibility (e.g. due to fog) when illumination system is dimmed, thus creating potential dangerous situations that would instead require setting lighting units to their full power.

CONSORTIUM

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