

The Green Energy Scenario

**few (but big) numbers
and contest**

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EU population:
7.2% of world's population
(505 million)

source: http://epp.eurostat.ec.europa.eu/portal/page/portal/population/data/main_tables

EU energy residential demand:
22% of world's demand

source: <http://www.eia.gov/forecasts/ieo/buildings.cfm>

In 2020, the European
consumption of energy will be
25 trillion kWh
(25,000,000,000,000)

In 2040 it will rise to 28 trillion kWh

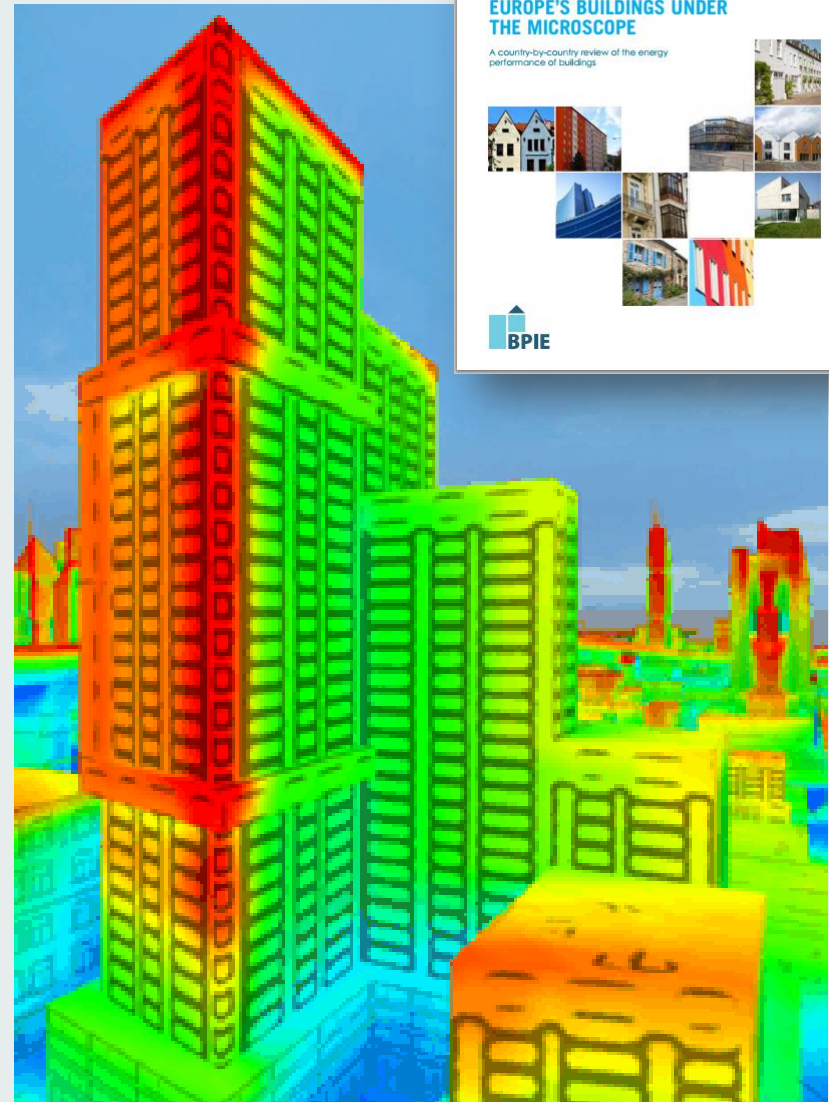
In terms of energy consumption,
buildings represent around 40%



European households are responsible for **68%** of the total final energy use in buildings, for:

- heating (**70%**)
- cooling
- hot water
- cooking
- appliances

The most used fuel is gas.



What next

Policies with highest impact on climate change mitigation in 2020

in tonnes CO₂ equivalent

CATEGORIES:

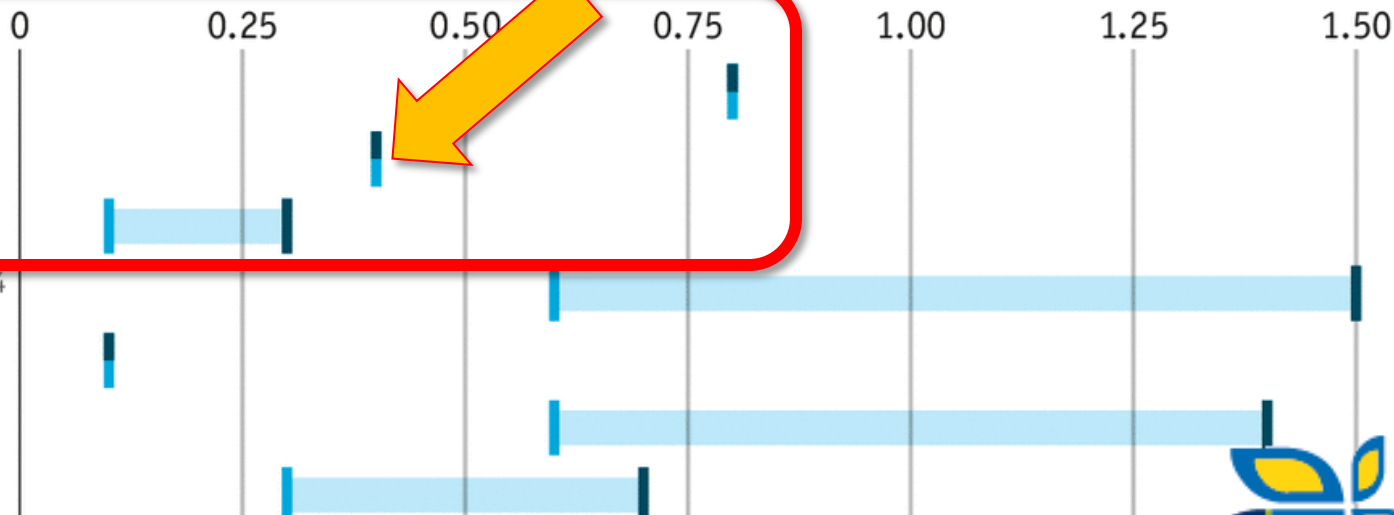
Energy production

Transport

Other regulations

Global treaties

Land & forests



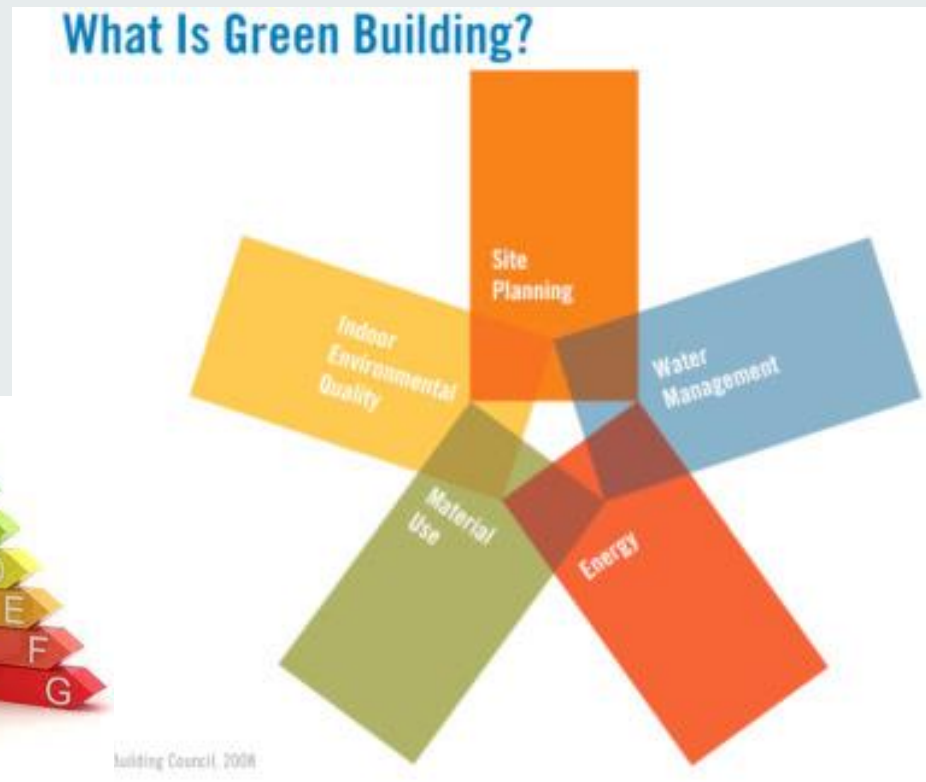
In September 2014 the Economist listed the Covenant of Mayors among '*policies with highest impact on climate change mitigation*'

See following panel for sources and explanations

*Urban targets over and above EU or national law

†Determines substitutes for gases replaced under Montreal protocol

- “The Covenant of Mayors” to increase energy efficiency and use of renewable energy sources on their territories (> 6.000 signatories for over 190 Mln people).
- Sustainable Energy Action Plan (SEAP) → CO2 reduction target by 2020
- Related information:
 - Buildings
 - Environmental info
 - Energy Infrastructure
 - Planning
 - Smart grids



Energy strategy:



- *A 20% reduction in EU greenhouse gas emissions from 1990 levels;*
- *Raising the share of EU energy consumption produced from renewable resources to 20%;*
- *A 20% improvement in the EU's energy efficiency.*



- ☐ *Reducing greenhouse gas emissions by at least 40%*
- ☐ *Increasing the share of renewable energy to at least 27%*
- ☐ *Increasing energy efficiency by at least 27%*



- *Reducing greenhouse gas emissions by 85 - 90%*
- *About 2/3 of the energy should come from renewable sources*

To achieve these goals, significant investments need to be made in new low-carbon technologies, renewable energy, energy efficiency and grid infrastructure

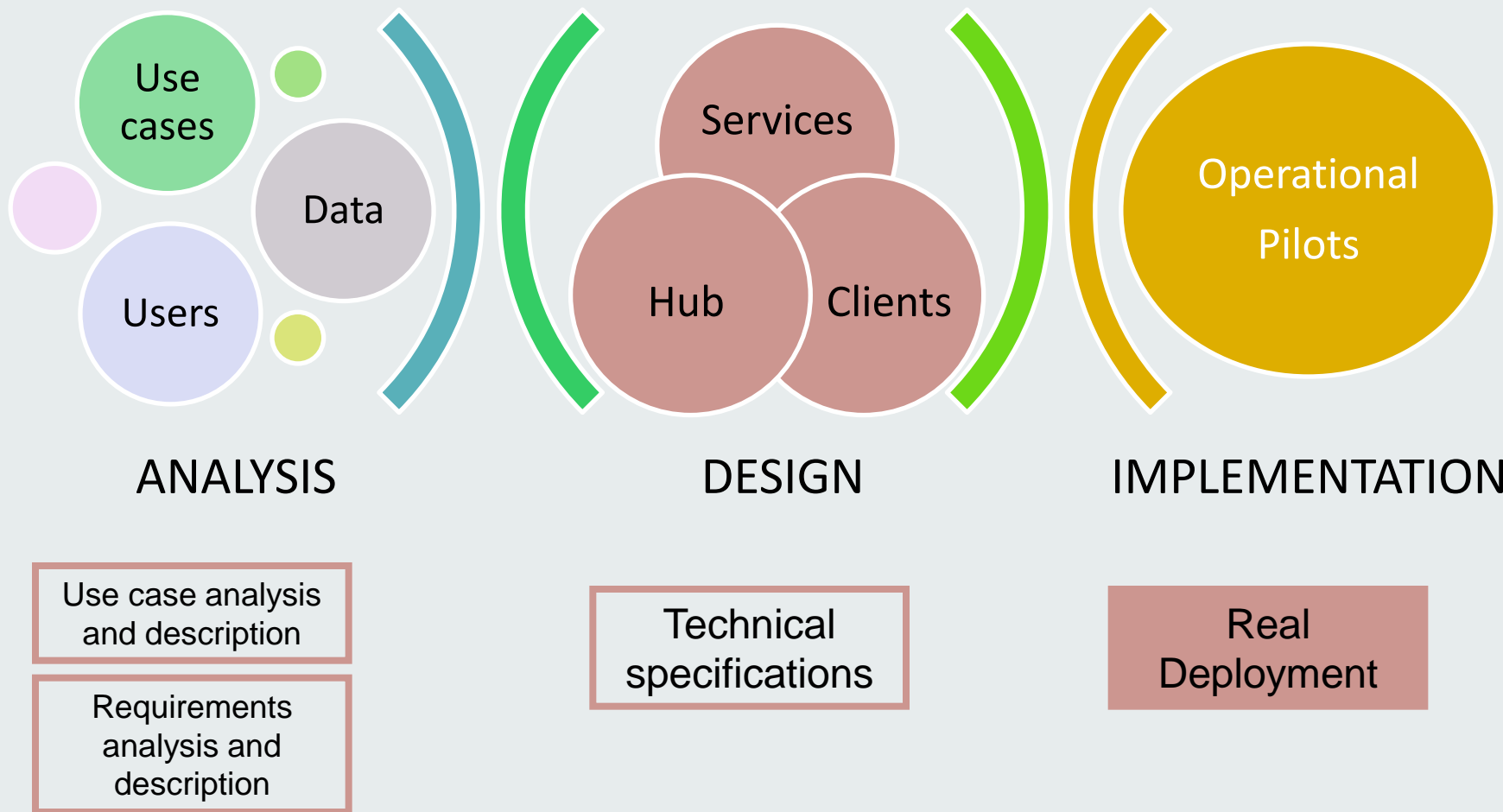
From: <http://ec.europa.eu/energy/en/topics/energy-strategy>

Objectives:

- To provide the PAs with instruments for the definition and management of their “smart energy” policies
- Support the process of energy transition (traditional to renewable) and to provide the needed knowledge
- Demonstrate the importance of data integration to optimize and improve the use of energy resources: real time sensors (enviro/climate/energy consumption), smart metering, smart grid
- To activate and test, on real use cases with high added value, new public-private collaborations
- To create an environment which favours the economic development at territorial level by exploiting the opportunities from the energy transition and the ICT potentiality

5 pilot cases (IT, GR, PT, FI, ES)

Use Cases and Requirements



5 pilot cities involved in this scenario

- Reggio Emilia (Italy)
- Maroussi (Greece)
- Oeiras (Portugal)
- Turku (Finland)
- Girona (Spain)

13 Use Cases collected

59 requirements (functional, non-functional, generic)

Use cases

- Publication of energy performance of municipal buildings
- Publication of energy performance of other buildings

General objectives

- Integrate geodata and energy data for strategic purposes
- Provide integrated open geodata

Main requirements

- Estimate energy performance and CO2 emissions
- Energy maps and reports, interoperable access to data

Use cases

- Data collection via field survey and crowdsourcing
- Energy map creation
- Data publication

General objectives

- Enable citizens and SMEs to make valuable comments and enhance their energy consumption behavior

Main requirements

- Mobile app for editing buildings' properties
- Searching capabilities for buildings
- Provide open geodata through the hub

Use cases

- Urban sustainable planning tool
- Zero-balance calculation
- Calculation of energy performance of buildings

General objectives

- Monitor energy consumption in public buildings
- Achieve a balance between various urban areas

Main requirements

- Calculate solar potential and electric balance
- Reports, statistics

Use cases

- Selecting green route
- Green driving
- Green parking

General objectives

- Shift from private to public transportation in commuter traffic
- Acquire real-life information that can be utilized in city planning and decision making

Main requirements

- Bike routing, bus timetables, paths for commuters
- Estimation of fuel consumption, collect stats

Use cases

- “I want to ride my bicycle, I want to ride it where I like”
- Find healthy bike route

General objectives

- Encourage alternative/light transportation
- Involve city users and stakeholders in data integration

Main requirements

- Provide updates to OpenStreetMap
- Estimate pollution, calculate bike routing

Green Energy scenario

Operative and re-usable pilot cases to facilitate diffusion and management of renewable energy within cities

[Learn more](#)


The ICT-PSP European project GeoSmartCity establishes a cross-platform, able to publish open GI and to provide specialized services based on open standards.

Pilot cases


The potentiality of GeoSmartCity is demonstrated through the development of 11 operative and re-usable pilot cases in the frame of the two scenarios: Green-Energy and Underground. [Learn more](#)

Virtual hub

For integration and publishing of local, web based, real-time sensor or user-generated open geo-information. [Learn more](#)

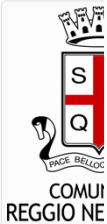
Innovative services

To facilitate the day-to-day operation and management of key municipal infrastructure sectors and public utilities activities. [Learn more](#)



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Reggio Emilia
Italy

- ✓ Poster (1.021Kb)
- ✓ Piano Clima 201
- ✓ Collana Ambient Ambientale (804)
- ✓ Collana Ambient (1.748Kb)
- ✓ Collana Ambient intervento (954Kb)

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Maroussi
Greece

- ✓ Poster (939Kb)

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Turku
Finland

- ✓ Poster (2.176Kb)

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Girona
Spain


- ✓ Poster (1.269Kb)

Object
The pilot v and disco


Open dat: available f

Real-time provided. sharing m

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Oeiras
Portugal

- ✓ Poster Green Energy (766Kb)
- ✓ Poster Underground (1.405Kb)



Oeiras Valley - Improving life, Boosting bu...

Objectives

Scenario: Green Energy

The overall objective is to monitor energy consumption in public buildings and thus achieve to set goals for reducing consumption. Data will be provided/uploaded by registered householders/occupants. Owners and other Urban Developers will provide information about energy efficiency and calculate solar potential.

Scenario: Underground

The Oeiras Municipality wants to implement an event management platform. This platform will take shape in a mobile crowdsourcing app for characterization and location of ruptures in water network.

Oeiras

www.municipia.pt

Taguspark Ed. Ciência II

n.º 11, 3º B 2740-120 Porto Salvo Portugal

38° 44' 13.8264" N, -9° 18' 18.0828" E

Scenario

- Green Energy and
- Underground

Responsible partners

Municipia

Links of interest

- Panoramic view

Green Energy specialized services / 1

- Buildings "on-site" data quality check
- Estimation of Energy Performance of buildings
- Buildings CO₂ emissions estimation
- Heat consumption dashboard
- Upload of "future "buildings
- Solar potential calculation
- Zero-balance layer
- Linked open data

Green Energy specialized services / 2

- Multi-lingual Address Geocoding
- Green preferences and routing
- Next departure time
- Drive to park

Examples

- Some pilots (e.g. Reggio-Emilia, Maroussi, Oeiras) are requesting processing services, as the estimation at individual building level of:
 - energy performance
 - CO₂ emissions
 - solar potential

A WPS “specialized” service in brief

- E.g. for the “**Estimation of Energy Performance**” this may be a (complex) process that:
 - Considers the characteristics of buildings (e.g. age of construction, size, usage, ...) as well as climatic zones
 - Calculates vertical surfaces (envelope)
 - Apply [TABULA typologies](#) for households (U-values for roof, floor, envelope, ... degree-days of the location, ...) to existing buildings
 - Generates the EP value in annual kWh (per m² or m³, according to the location and legislation)

A WPS “specialized” service in brief

Building Type

Construction Year

Country

Climatic Zone

Typical climatic parameters	
Heating season length	183 days
Average outdoor temperature during the heating season	12° C
Indoor design temperature	20° C

Facade element	Typical U-value [W/m ² ·K]	Typical % of facade
Walls	full/semi-full bricks 1,08	60%
Roof	bricks and concrete 0,95	10%
Floor	bricks and concrete 0,92	10%
Windows	thermal break frames + low-emission glass 2,63	20%

Typical building shape parameters	
Heated volume (V)	1234 m _s ³
Shape factor (S/V)	0.66 m _s ⁻¹
Useful floor area (A)	353 m _s ²

Typical Degree Days
DD_t [days/K·year]

Typical heat transmission coefficient for
building envelope
HT [W/m_s²·K]

$$Q_t = 10^{-3} \cdot HT \cdot 24 \cdot DD \cdot V \cdot S/V \cdot A$$

$$[\text{kWh/m}_A^2 \cdot \text{year}] = [\text{kW/m}_s^2 \cdot \text{K}] \cdot [\text{h/K} \cdot \text{year}] \cdot [\text{m}_s^3/\text{m}_A^2]$$

Typical Consumption
Q_t [kWh/m_A²·year]

Estimation of energy performance of buildings

With automatic estimation

Estimation of energy performance of buildings

With real EP certificates

A WFS-T “specialized” service in brief

- In order to calculate the energy performance we need data with **good level of accuracy and detail**.
- If not yet available in existing datasets, or if the quality has to be validated, we need to consider the possibility to involve local communities to **collect or correct data “on site”**.

A WFS-T “specialized” service in brief

Buildings “on-site” data quality check

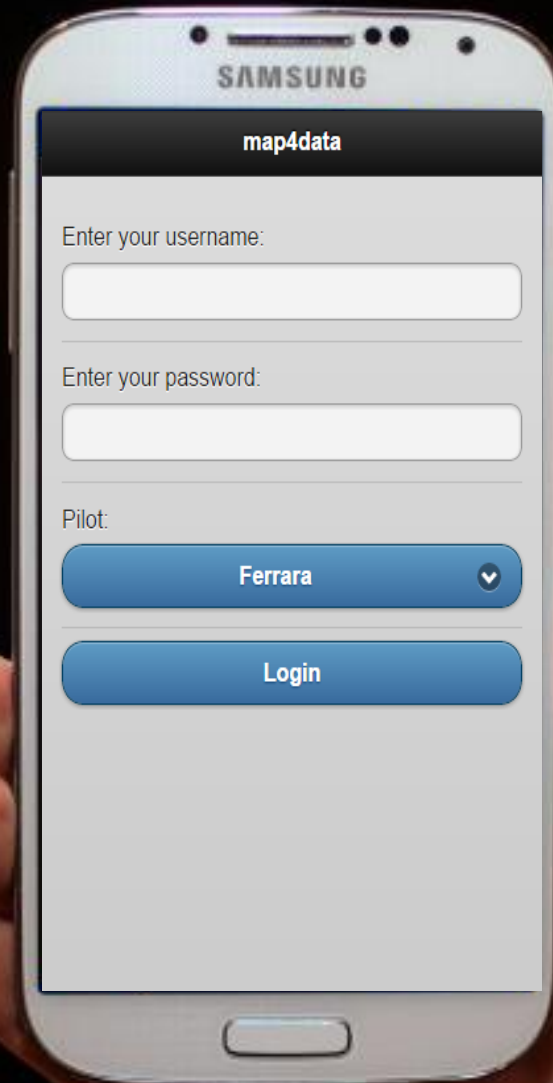


<https://play.google.com/store/apps/details?id=it.sinergis.geosmartcity.map4data>

In **Marousi(GR)** buildings' data have been collected, but some **attributes are still missing** or need to be checked (e.g. "age of construction, age of renovation, uses, ...").

An **on-site campaign** has been organized by the **EPSILON International**, involving the local School of Architecture.

People involved used smartphones and tablets to edit attributes via **WFS-T** service, and updates data on PostGIS database.





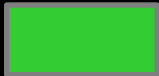
Buildings properties missing, on-site to be performed



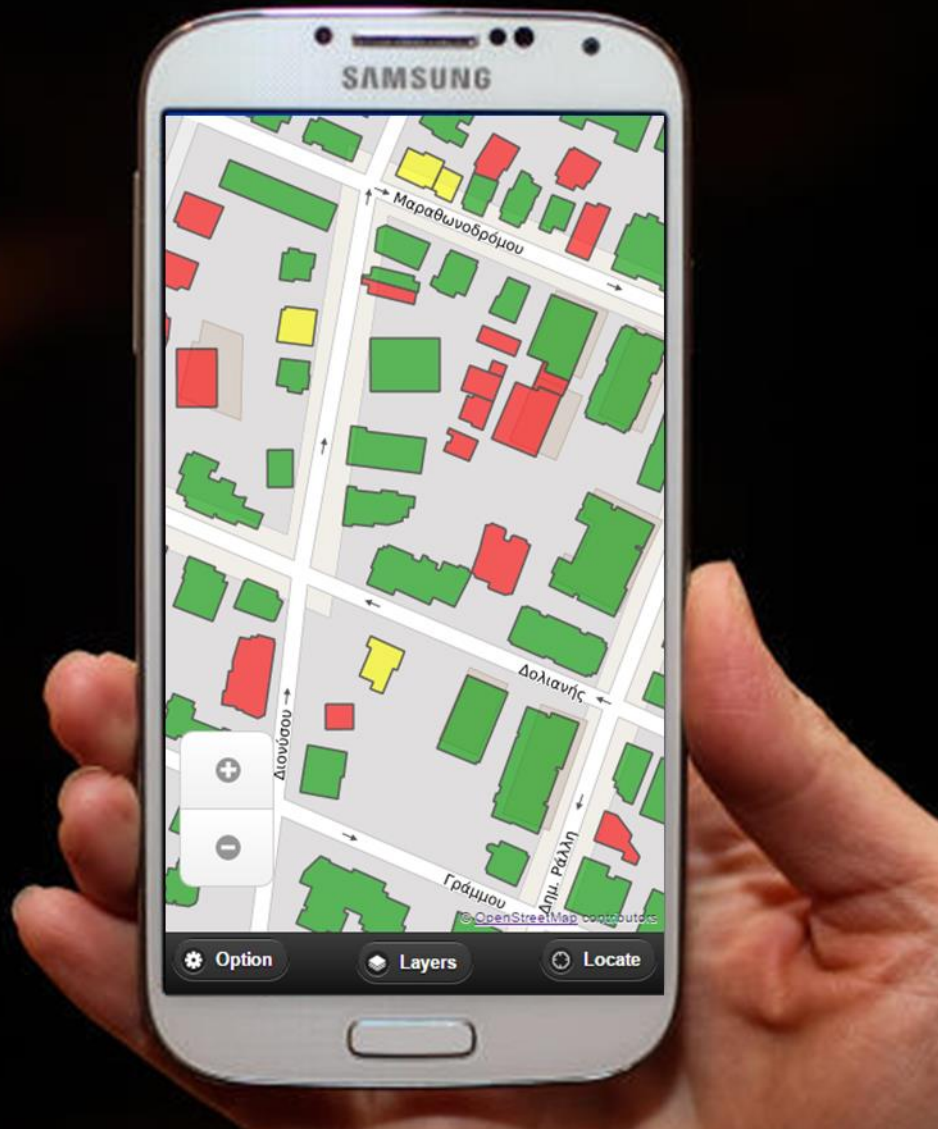
Some buildings properties still missing, on-site already done



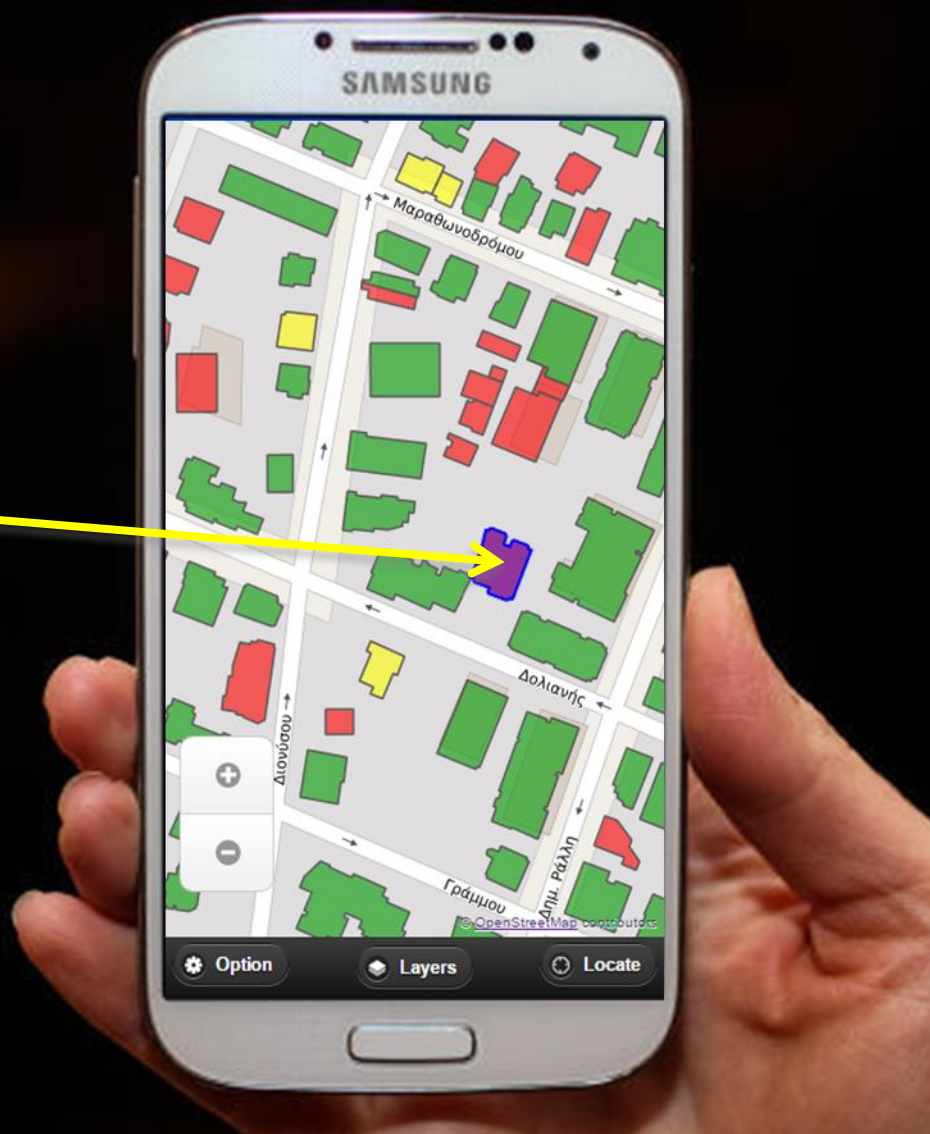
Buildings properties available, on-site check suggested



Buildings properties available and on-site check performed



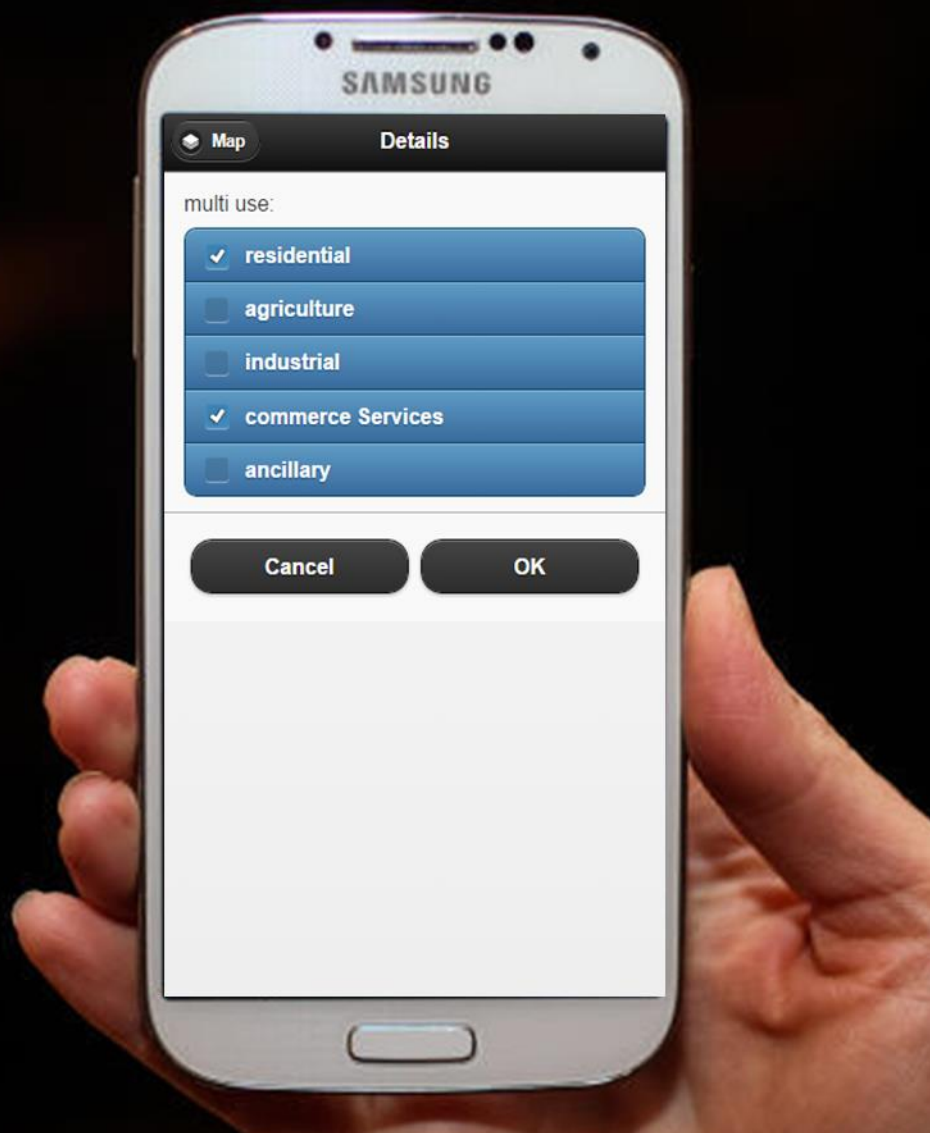
Building selection
(on 1st click)



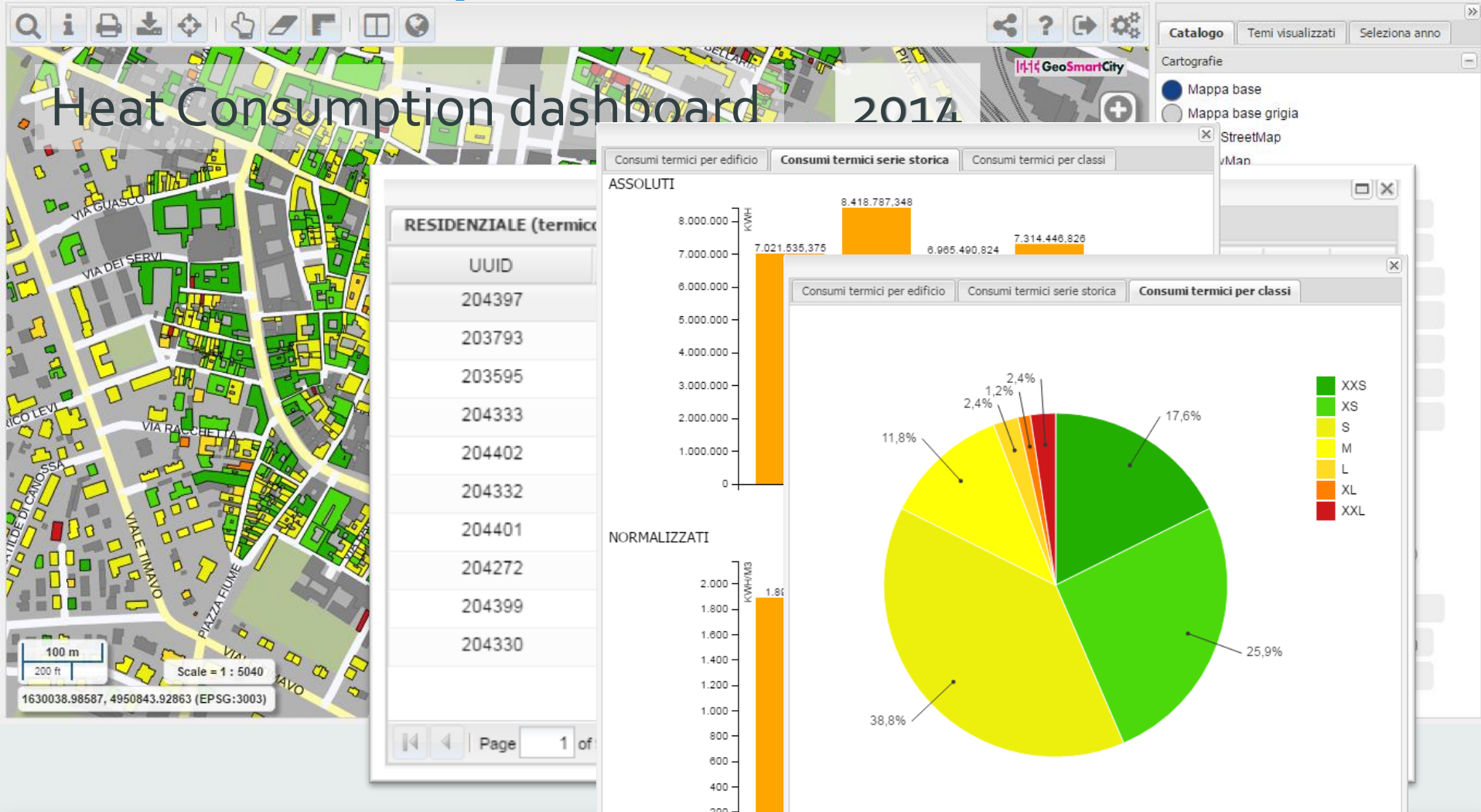
Building properties
(on 2nd click)

Editing of multi-value
attribute





A RESTful “specialized” service in brief




RDF Linked Open Data from WFS

Followers
1

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Organization



Reggio Emilia
città delle persone

Comune di Reggio Emilia

The Municipality of Reggio Emilia, with a population of more than 170,000 inhabitants, is situated in the Emilia Romagna region, in the North-Centre of Italy. It is located in... [read more](#)

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Geo

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Data a

- [WFS](#)
- [GML](#)
- [WMS](#)
- [HTML](#)
- [RDF](#)

Regg

Build

Additi

RDF dataset Reggio

[Manage](#) [Go to resource](#)

URL: <http://hub.geosmartcity.eu/catalog/dataset/e55e27a7-6604-4aee-971c-5157db510aa0/resource/5037eefd-f3df-404b-b8a1-646d23b...>

This is a sample dataset (30 buildings) has been automatically produced by an ad hoc REST-full service implemented in GeoSmartCity project. The service connects to the WFS providing spatial GML features and generates the RDF dataset. Existing ontologies were extended like the one implemented in SEMANCO project (<http://www.semanco-project.eu/ontology.htm>) by adding new concepts like the gsc:hasEnergyAmount.

[Text](#)

[Embed](#)

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Thanks ... any questions?

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Dedagroup

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