Energy Efficiency of Buildings and GeoE3 project

Cadastral Information in Support of Infrastructure Development
Joint PCC and EuroGeographics CLRKEN Conference
Plenary Meeting of the Permanent Committee on Cadastre in the European Union
November 22, 2022

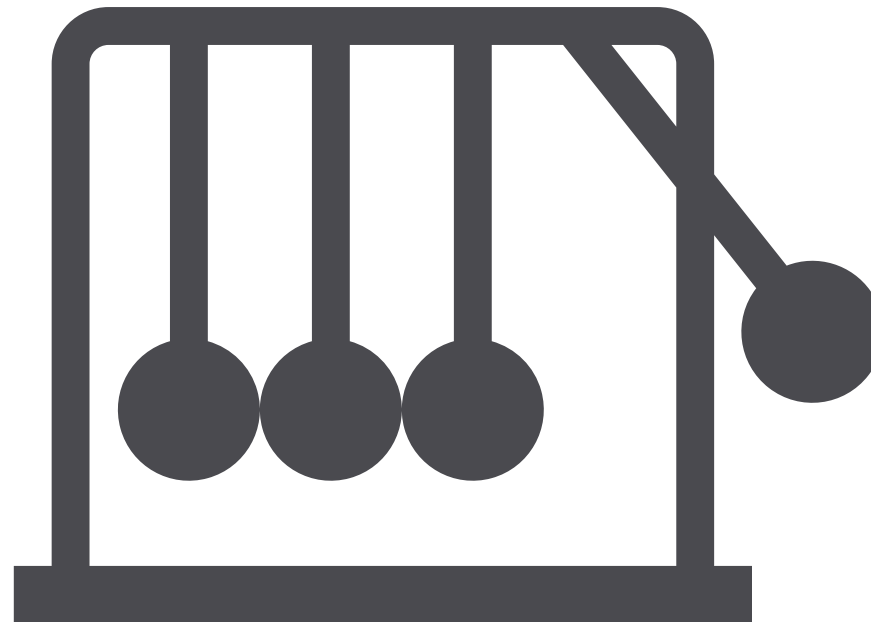Javier Luque – Spanish General Directorate of Cadastre

Efficiency

a situation in which
a person, company, factory, etc.
uses resources such
as time, materials, or labour well,
without wasting any

https://dictionary.cambridge.org/dictionary/english/efficiency
(Bussines english)

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2

PCC

PCC
Permanent Committee
on Cadastre in the
European Union

EU2022.CZ

ČÚZK

eurogeographics
CLR-KEN

GOBIERNO
DE ESPAÑA

MINISTERIO
DE HACIENDA
Y FUNCIÓN PÚBLICA

SECRETARÍA DE ESTADO
DE HACIENDA

DIRECCIÓN GENERAL
DEL CATASTRO

Cartografía
Catastral

"GeoE3 is a project co-financed by the Connecting Europe Facility of the European Union that will provide the vital connection between existing and emerging National, Regional and Cross-Border digital services."

https://geoe3.eu/

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3

Goal of GeoE3:

- exploit existing national geospatial platforms, and
- develop a cloud-based ecosystem of services…

… that …

dynamically integrate various data sets (statistical, meteorological, etc…) with geospatial data, …

…to …

- simplify the analysis and visualization of Open Public Data, and
- offer better services to citizens.

Better access and interoperability of Geospatial data /other data	• Usability of metadata information – e.g. dashboards • Integration with other data (e.g. statistics, weather data) • Accessibility through Europan Data Portal (DCAT.AP)
Dynamic harmonisation of geospatial data based on use cases and new APIs	• Example Cloud Platform which will demonstrate use cases and then used for national platform implementatios through different APIs and tools
Build an ecosystem based on national platforms	• eLearning videos • Innovation events • Benefits

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Participants:

- National Land Survey of Finland
- Finnish meteorological Institute
- Statistics Finland
- Spatineo (Finland)
- Norwegian Mapping Authority
- Cadastre, Land Registry and Mapping Agency
- Open Geospatial Consortium Europe
- Centro Nacional de Información Geográfica - Spain
- Estonian Land Board
- Information Technology Center of the Ministry of the Environment Estonia
- Aventi Intelligent Communication Norway
- Dirección General del Catastro - Spain

GEOE3
A GEOSPATIALLY ENABLED ECOSYSTEM FOR EUROPE

12 partners
5 countries

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Solution based on use cases and national implementation (not vice versa)

GeoE3 develops tools and APIs that will merge available information from national sources.

Use case 1: Solar Energy potential and energy efficiency of buildings
- Detailed 3D representation of buildings with all relevant attribute data
- Digital Elevation Model
- Climate normals and forecasts (statistical data)
- Data from Finland, Netherlands, Spain

Use case 2: Energy consumption of Electric cars
- Road data 2D and 3D
- Weather data and traffic data
- Road signs and speed limits (Finland, Sweden and Norway)
- Norway and Spain

Use case 3:Cross-border/Cross domain Smart City Finland/Estonia
- 3D data buildingis and other relevant data
- Innovation event

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A platform is being developed to:

- demonstrate data and service interoperability
- create dashboards, and
- create visualizations for an improved understanding of data from a variety of sources.

https://geoe3platform.eu/geoe3/
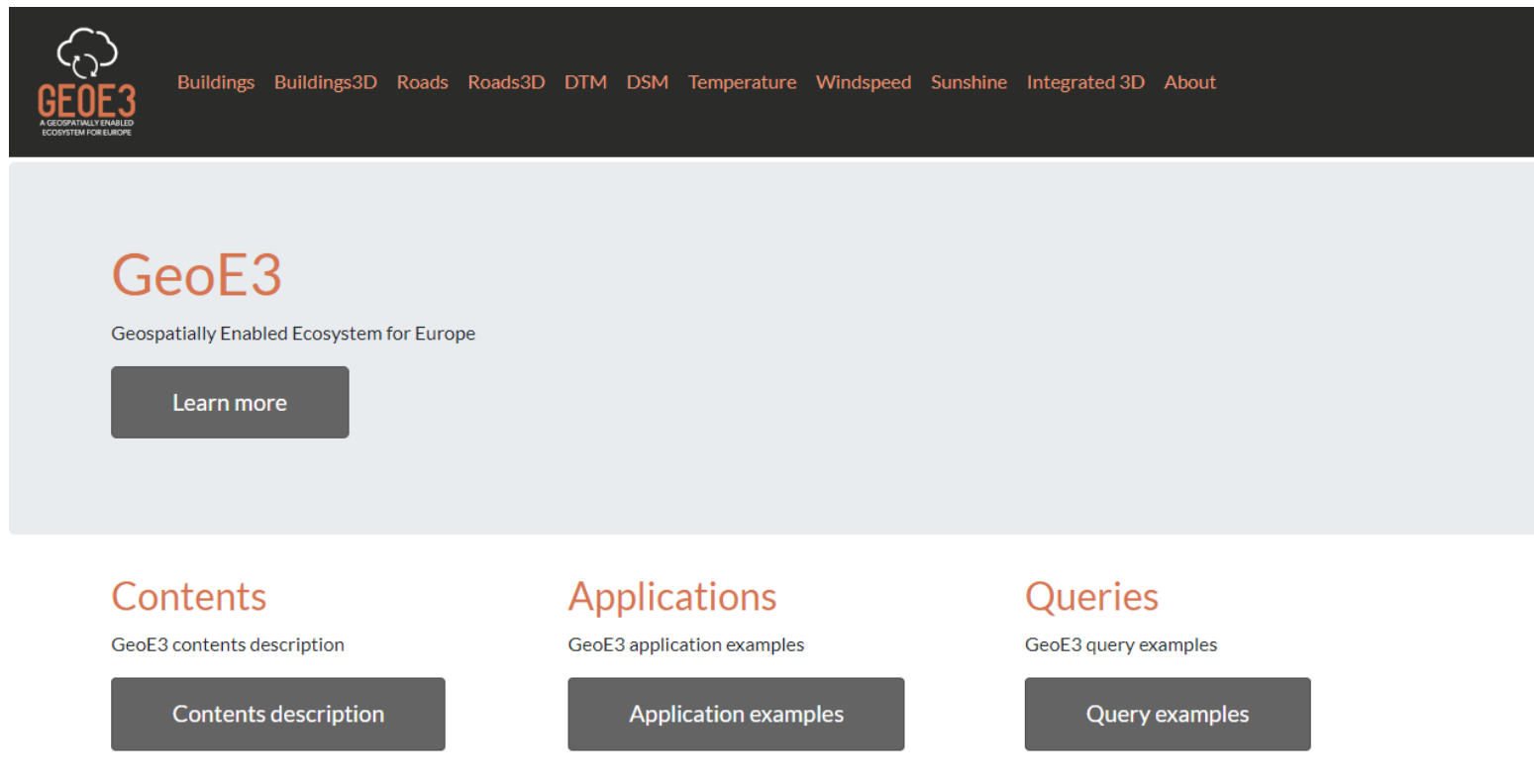
The platform simplifies the discovery of relevant data for the use cases and improve access to them through new API standard.

Buildings3D

GeoE3 OAPIF Buildings 3D

Experimental service for cross-border provision of 3D buildings

geospatial ecosystem cross-border building

| Terms of service | https://creativecommons.org/licenses/by/4.0 |
| License | CC-BY 4.0 license |

Collections
View the collections in this service

Processes
View the processes in this service

API Definition
Documentation

OpenAPI Document

Conformance
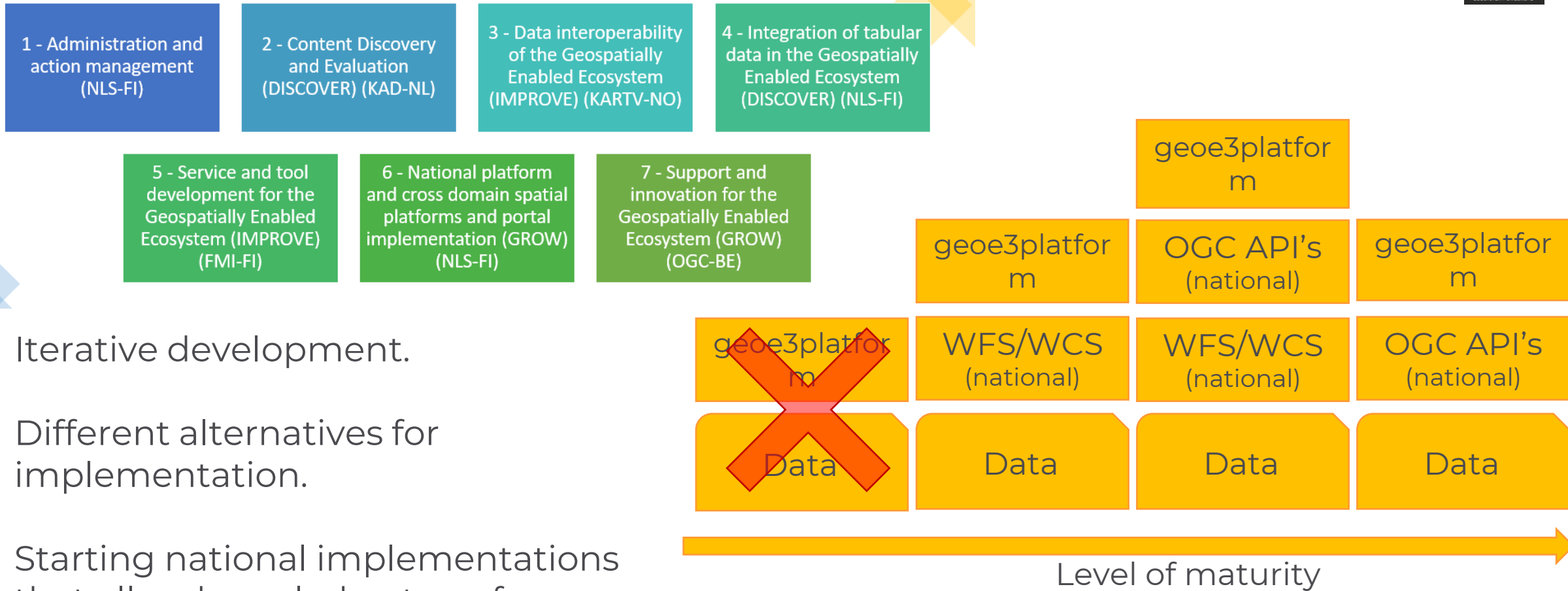View the conformance classes of this service
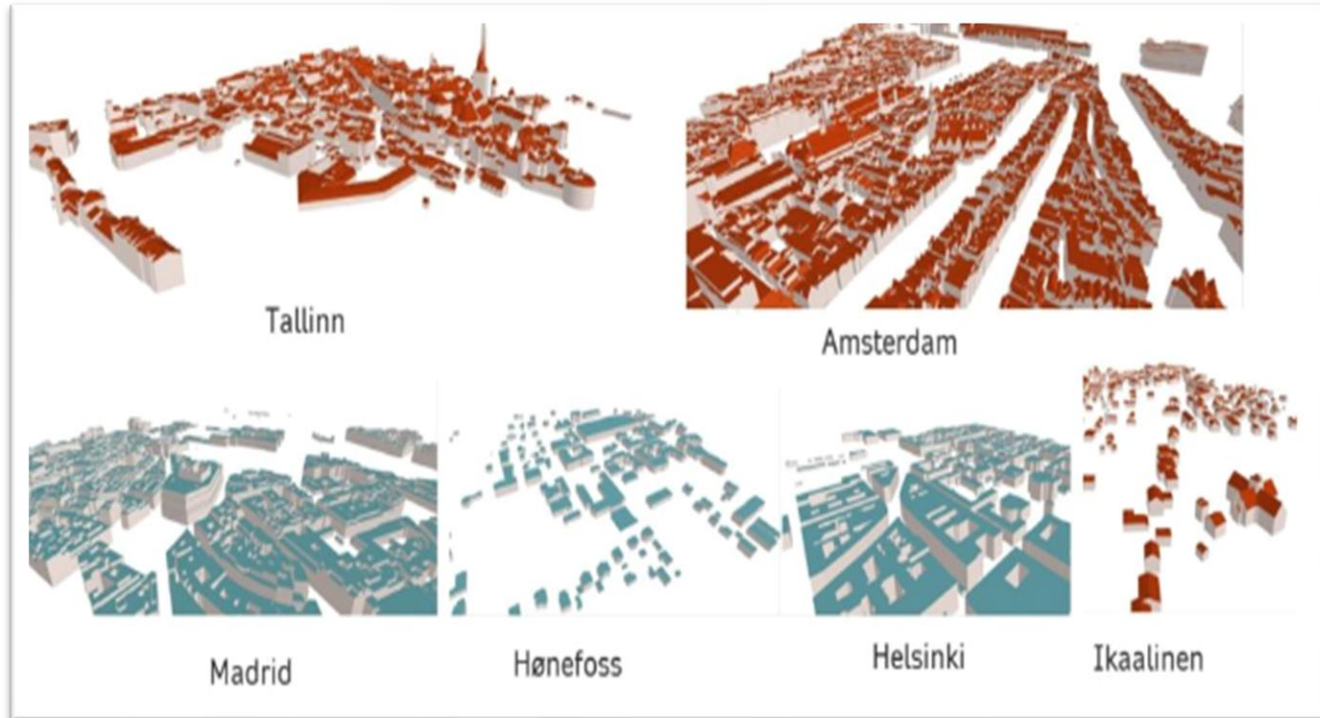
Example of the GEOE3 data integration platform. Buildings in red are at Level of Detail 2 (LoD2) and buildings in blue are at Level of Detail 1 (LoD1). LoD1 is generated on the fly using the height of the building (Spain) or the digital surface model (Finland, Norway).

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8

Development of the project

1 - Administration and action management (NLS-FI)

2 - Content Discovery and Evaluation (DISCOVER) (KAD-NL)

3 - Data interoperability of the Geospatially Enabled Ecosystem (IMPROVE) (KARTV-NO)

4 - Integration of tabular data in the Geospatially Enabled Ecosystem (DISCOVER) (NLS-FI)

5 - Service and tool development for the Geospatially Enabled Ecosystem (IMPROVE) (FMI-FI)

6 - National platform and cross domain spatial platforms and portal implementation (GROW) (NLS-FI)

7 - Support and innovation for the Geospatially Enabled Ecosystem (GROW) (OGC-BE)

- Iterative development.

- Different alternatives for implementation.

- Starting national implementations that allow knowledge transfer.

		geoe3platform	
	geoe3platform	OGC API's (national)	geoe3platform
geoe3platform ✗	WFS/WCS (national)	WFS/WCS (national)	OGC API's (national)
Data ✗	Data	Data	Data

Level of maturity

Benefits of the project

- New APIs (simplicity)
- Metadata management/accessibility
- Solutions for integration
- Innovation
- Learning

Tools developed will be very useful to the General Directorate of the Cadastre of Spain to comply with the provisions of the Open Data Directive.

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Focusing on energy efficiency of buildings…

… through the platform, energy class of the buildings could be offered (if it e

Use case 1: Solar Energy potential and energy efficiency of buildings

- Detailed 3D representation of buildings with all relevant attribute data
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- Data from Finland, Netherlands, Spain

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Focusing on energy efficiency of buildings…

… but also, it can be offered most of the data required for its estimation where it haven't been calculated.

Use case 1: Solar Energy potential and energy efficiency of buildings

- Detailed 3D representation of buildings with all relevant attribute data
- Digital Elevation Model
- Climate normals and forecasts (statistical data)
- Data from Finland, Netherlands, Spain

- 3D building model with LoD 2 detail
- relevant building attributes
- digital Surface Model (DSM) of the surrounding area
- shadow index coverage
- number of sunshine hours at the nearest observation station.
- High resolution Digital Elevation Model (DEM)
- Average wind conditions
- Wind speed normal at the nearest observation station

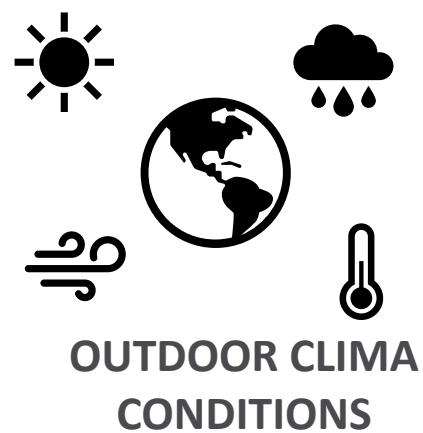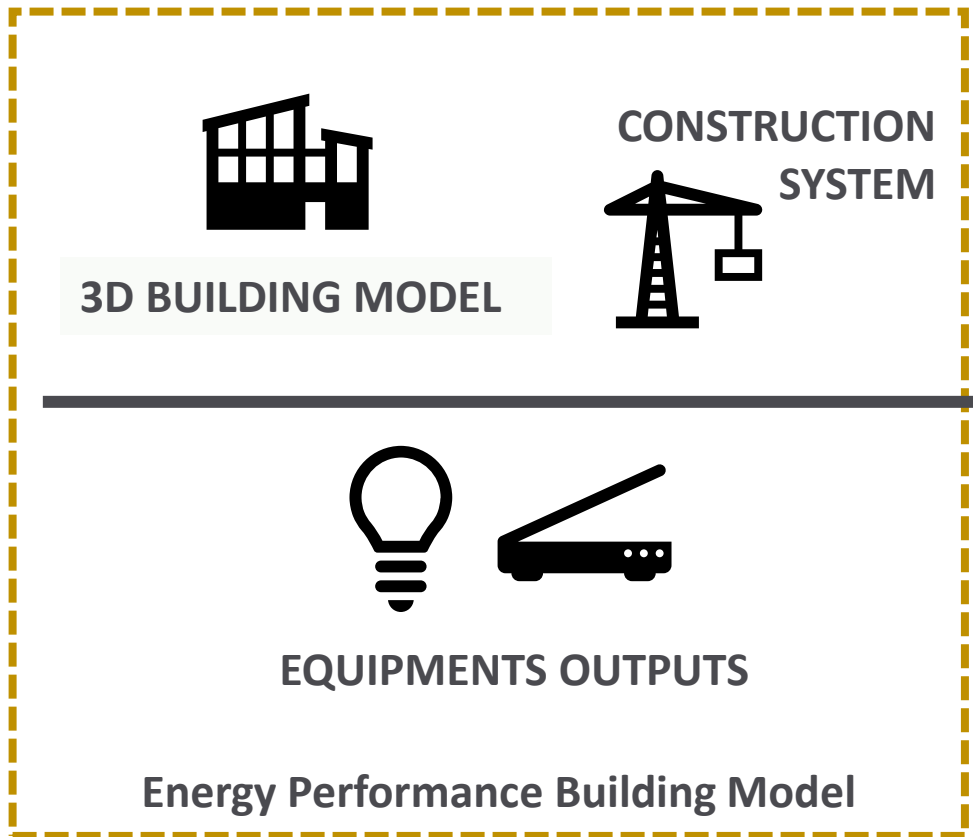| Data for estimating energy eficiency label	DATA SET NAME	DATA SET TYPE
	ENERGY EFICIENCY LABEL	ENERGY EFFICIENCY CERTIFICATE ENERGY LABEL LETTER
	GEOMETRICAL BUILDING DATA	FLOOR PLANE
		FLOOR AREA BY USE
		VOLUME BY USE
		AREA OF HOLES (doors, window ,rooflights)
		AREA OF WALL (without doors, windows etc.......)
		BUILDING USE
		BUILDING TYPOLOGY DATA
		ANTIQUITY DATA
	CONSTRUCTION SYSTEM BUILDING DATA	CONSTRUCTION MATERIALS
	EQUIPMENT BUILDING DATA DATA	EQUIPMENT BUILDING STUDY BY AGE BANDS

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12

ENERGY EFFICIENCY CALCULATION METHOD

ENERGY EFFICIENCY: MINIMIZE DEMAND, MAXIMIZE OUTPUTS

$$CONSUMPTIONS = DEMAND/OUTPUTS$$

$$C = D/\eta$$

KG CO_2/m2

$$C = \frac{D\downarrow}{\eta\uparrow} =$$

KWh/m2

Possibility of reconstruction

A
B
C

3D BUILDING MODEL

CONSTRUCTION SYSTEM

EQUIPMENTS OUTPUTS

Energy Performance Building Model

OUTDOOR CLIMA CONDITIONS

INDOOR CLIMA CONDITIONS

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13

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… and which role can play Cadastral Agencies here?

Cadastral agencies may have many information of interest for energy efficiency determination.

- Location
- Shape
- Building structure (dwelings if exists, materials, …)
- Qualities
- …

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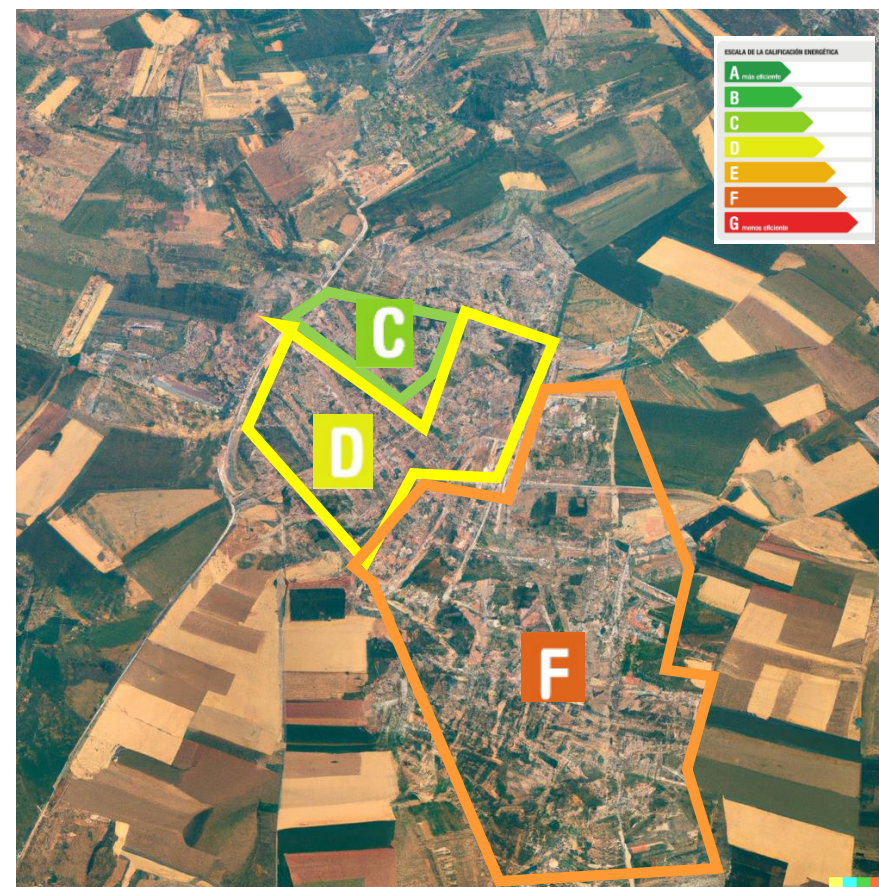
… and which role can play Cadastral Agencies here?

Cadastral information is useful to obtain energy efficiency classification and certificate of a construction…

DATA SET NAME	DATA SET TYPE
	ENERGY EFFICIENCY CERTIFICATE
ENERGY EFICIENCY LABEL	ENERGY LABEL LETTER
	FLOOR PLANE
	FLOOR AREA BY USE
	VOLUME BY USE
GEOMETRICAL BUILDING DATA	AREA OF HOLES (doors, window ,rooflights)
	AREA OF WALL (without doors, windows etc…….)
	BUILDING USE
	BUILDING TYPOLOGY DATA
	ANTIQUITY DATA
	CONSTRUCTION MATERIALS
…ATA	EQUIPMENT BUILDING STUDY BY AGE BANDS

ESCALA DE LA CALIFICACIÓN ENERGÉTICA — Consumo de energía kW h / m² año — Emisiones kg CO₂ / m² año

A más eficiente
B
C
D
E — 52
F — 298
G menos eficiente
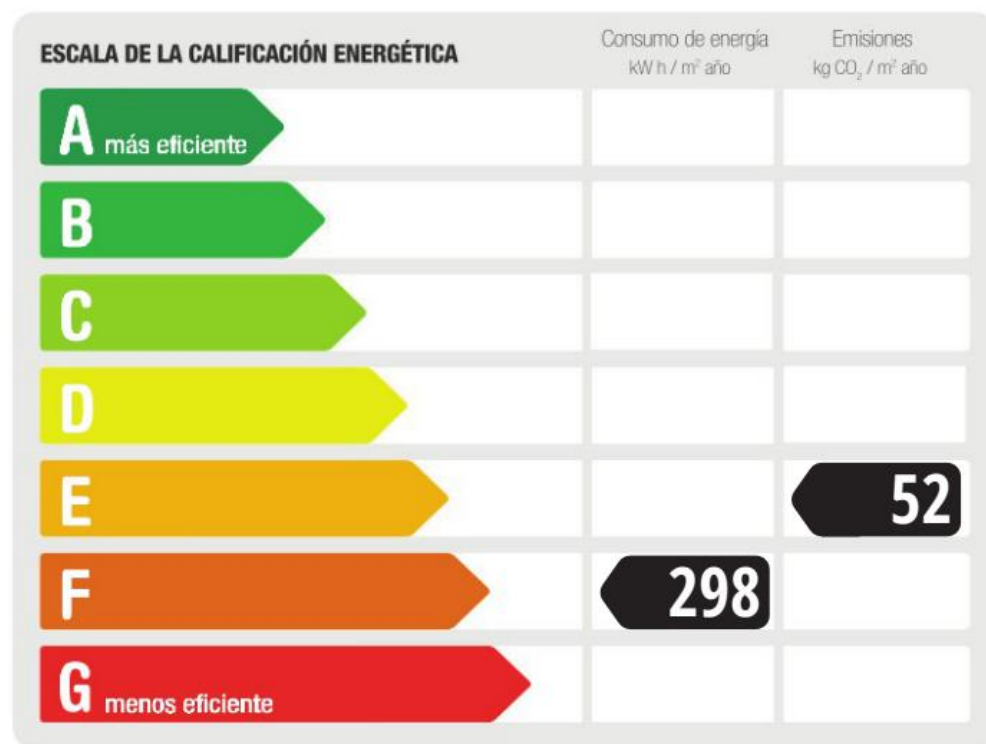
… and which role can play Cadastral Agencies here?

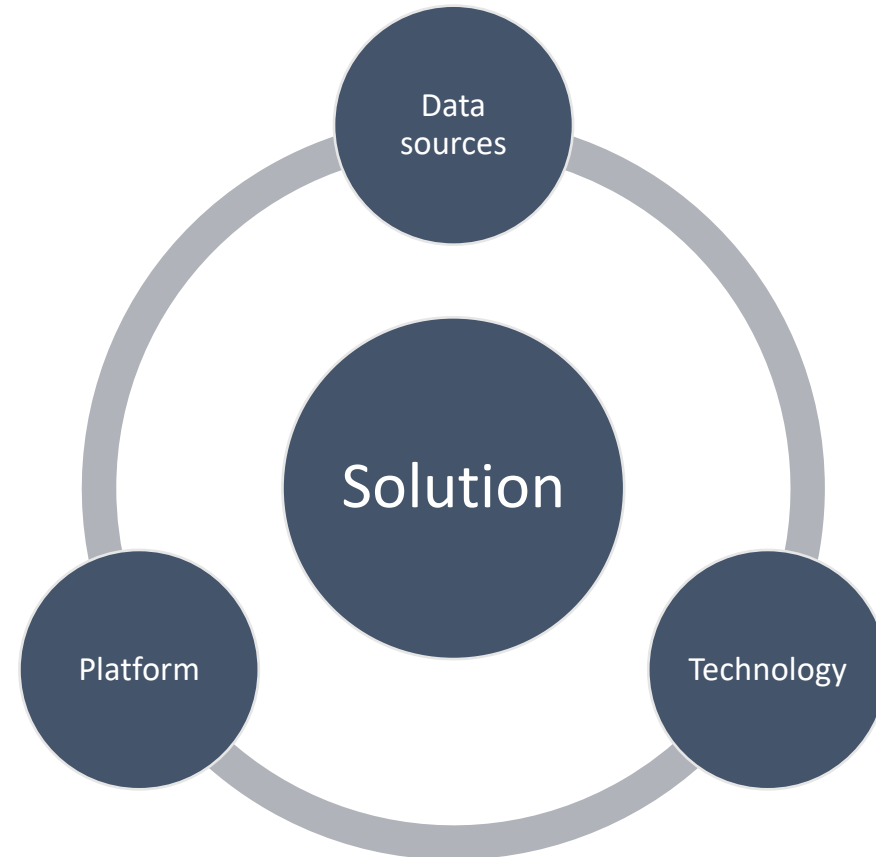…but also, to estimate classification in large areas without using much more external information.

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16

The inclusion of the information in this platform allows to obtain a more FAIR data

FAIR

Findable

Accesible

Interoperable

Reusable

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17

The combination of right data sources in a platform using last state of the art technology can foster…

- new applications,
- solutions for day to day problems,
- facilitate decision making,
- development of policy planning,
- …

Data sources

Solution

Platform

Technology

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Finally…

Platform is not limited to the data from countries of participating partners

…data from other countries can be integrated too.

Last incorporation → Slovakia

If you want to be there, please ask!!!

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Many thanks for your attention!

Javier Luque
javier.luque@catastro.hacienda.gob.es
Unit of Cartography
Spanish General Directorate of Cadastre