

TIMEPAC

Academy

Session 5

Advanced analysis of EPC data as a support tool for local, regional and national energy planning

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14 March 2024



Introduction

Only with energy indicators is not enough to carry out building renovation plans at different scales.

It is required to consider other dimensions such as social, economic, urban, and environmental.

Using **composite indicators**:

*A composite indicator is formed when **individual indicators** are compiled into a single index, on the basis of an underlying model of the **multi-dimensional concept** that is being measured.*

Composite indicators

Purpose

- To simplify complex information
- To facilitate comparisons
- To offer a qualified understanding of multidimensional issues.

Creation

1. Selection of Indicators (I_i)

2. Normalization (X_i)

- Standard deviation from the mean
- Distance from the mean

3. Weighting (w_i)

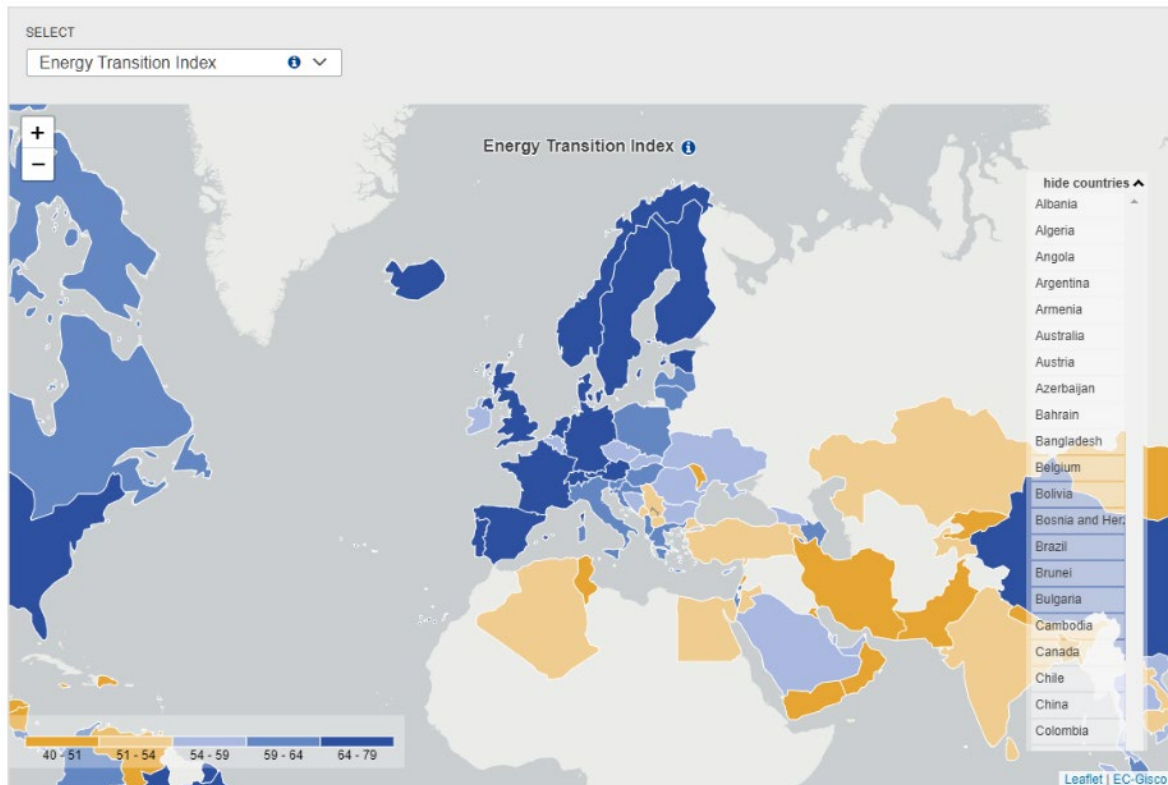
$$\sum_i^N w_i = 1 \quad 0 \leq w_i \leq 1$$

4. Aggregation

$$I = \sum_i^N w_i X_i$$

Composite indicators

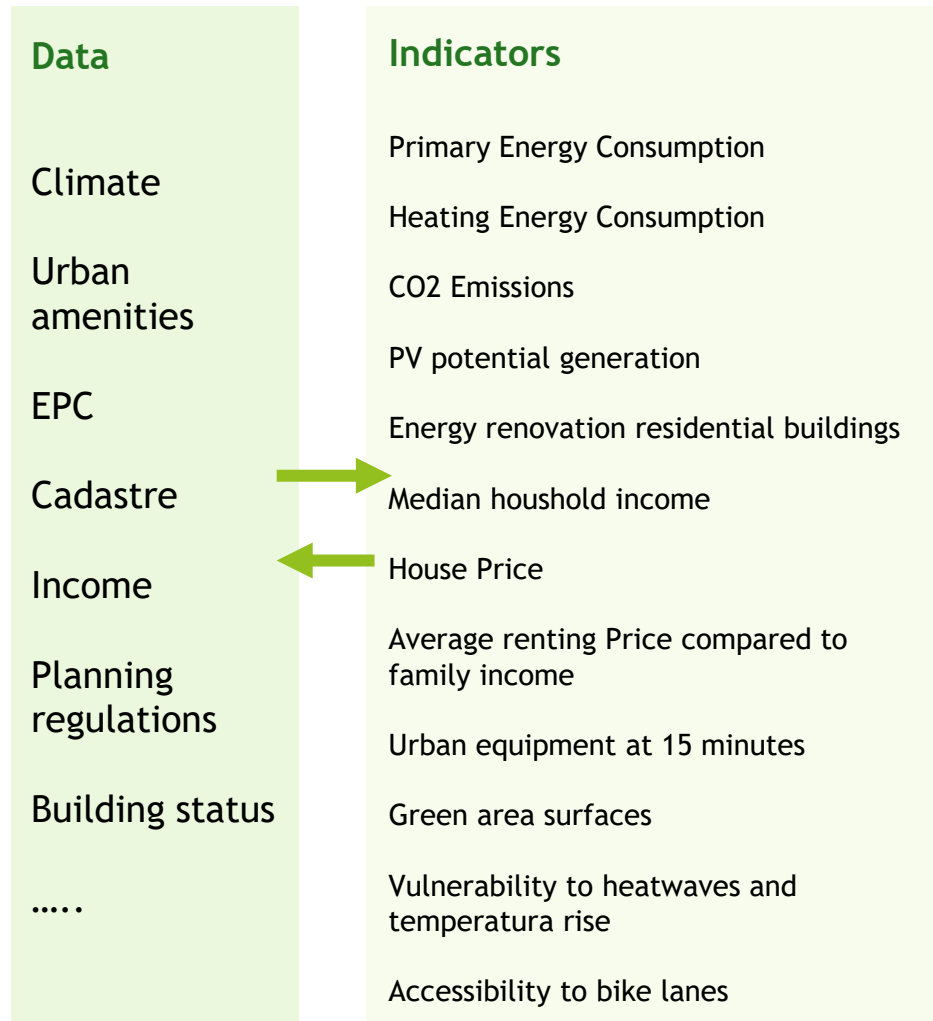
The **Energy Transition Index** summarizes on countries' energy system performance and their energy transition readiness



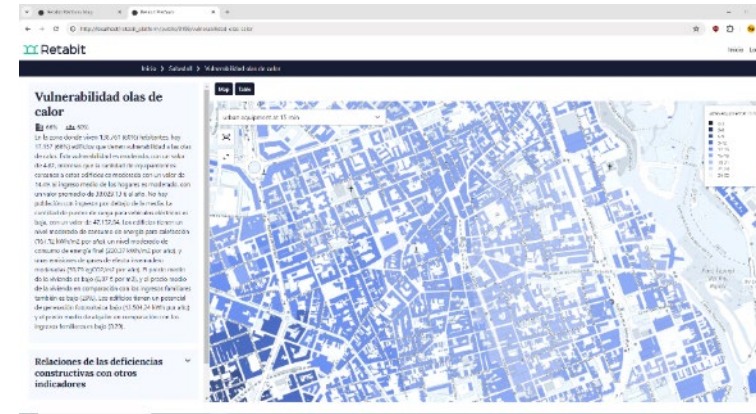
<https://composite-indicators.jrc.ec.europa.eu/explorer/explorer/indices/eti/energy-transition-index>

https://www3.weforum.org/docs/WEF_Fostering_Effective_Energy_Transition_2023.pdf

Retabit platform

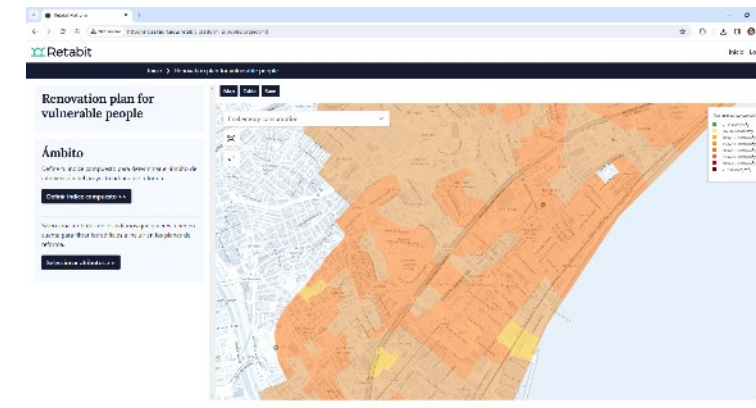


Buildings to renovate



Which buildings to renovate taking into account multiple domains and scales - integrating multiple data sources

Renovation plans

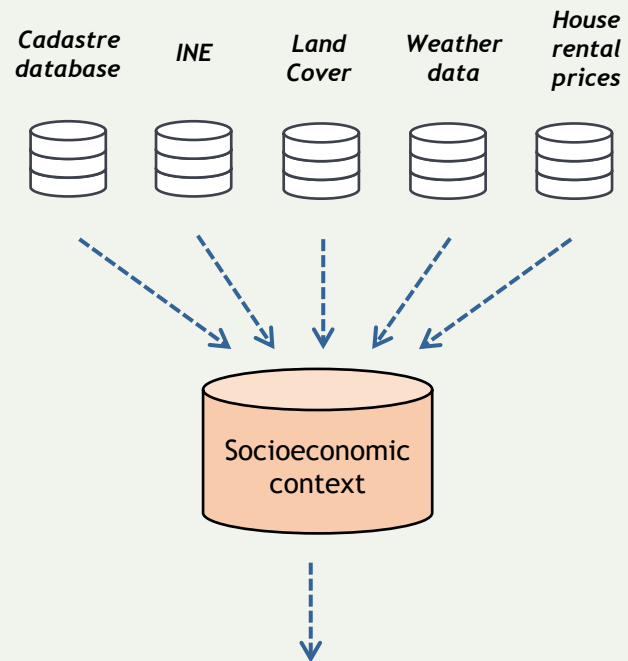


Which measures to apply to improve baseline conditions - applying archetypes

Socioeconomic context

Which densified areas with low urban and building quality are inhabited by economically vulnerable populations?

Socioeconomic context



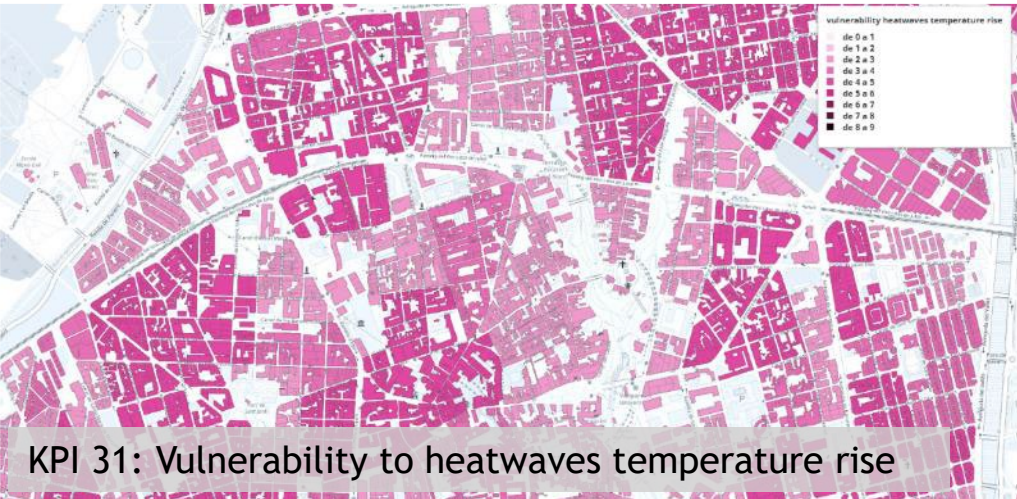
Which densified areas with low urban and building quality are inhabited by economically vulnerable populations?

Median Household income
Vulnerability to heatwaves temperature rise
...

Example of socioeconomic KPI application



KPI 20: Median household income

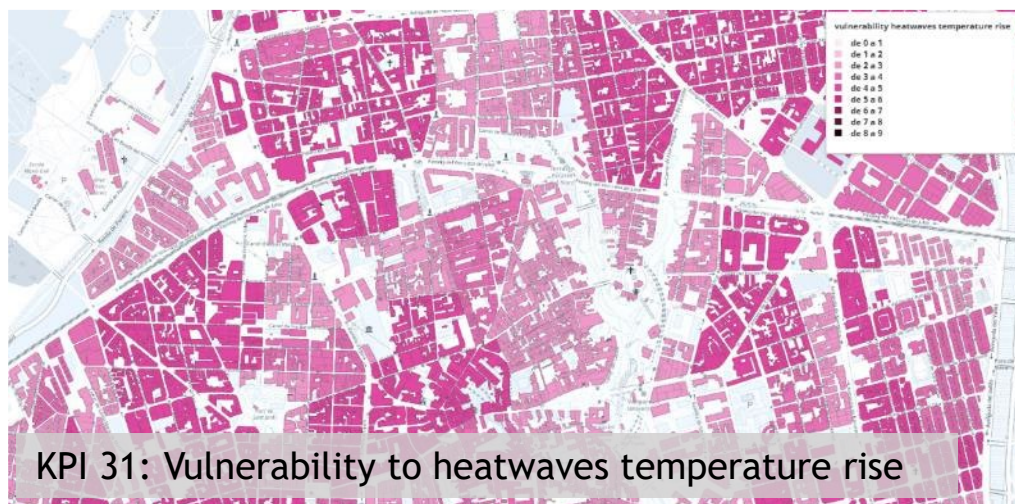


KPI 31: Vulnerability to heatwaves temperature rise



Composition: KPI 31 + (1-KPI 20)

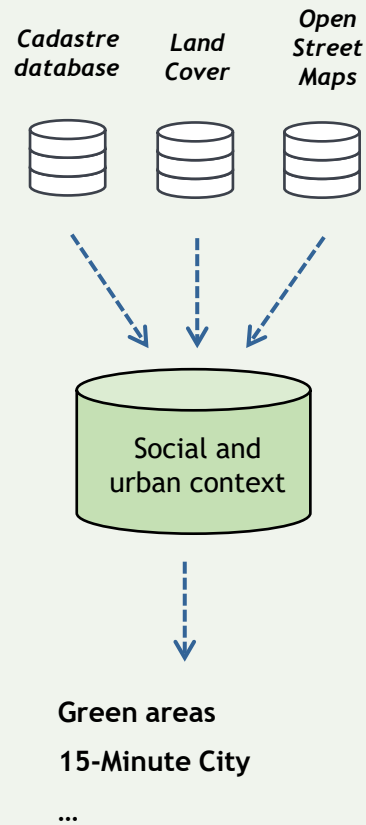
Example of socioeconomic KPI application



Social and Urban context

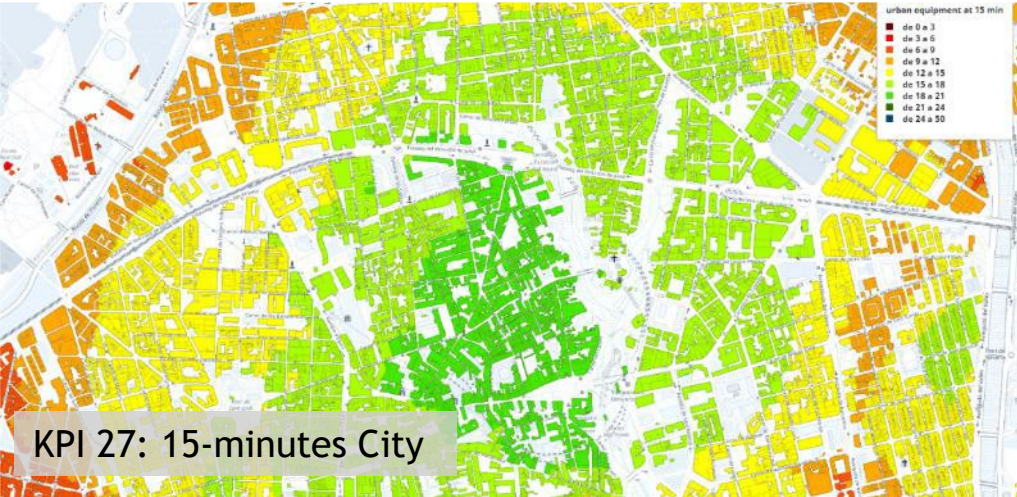
Where are the areas with limited access to green spaces and essential urban amenities near buildings?

Social and Urban context



Where are the areas with limited access to green spaces and essential urban amenities near buildings?

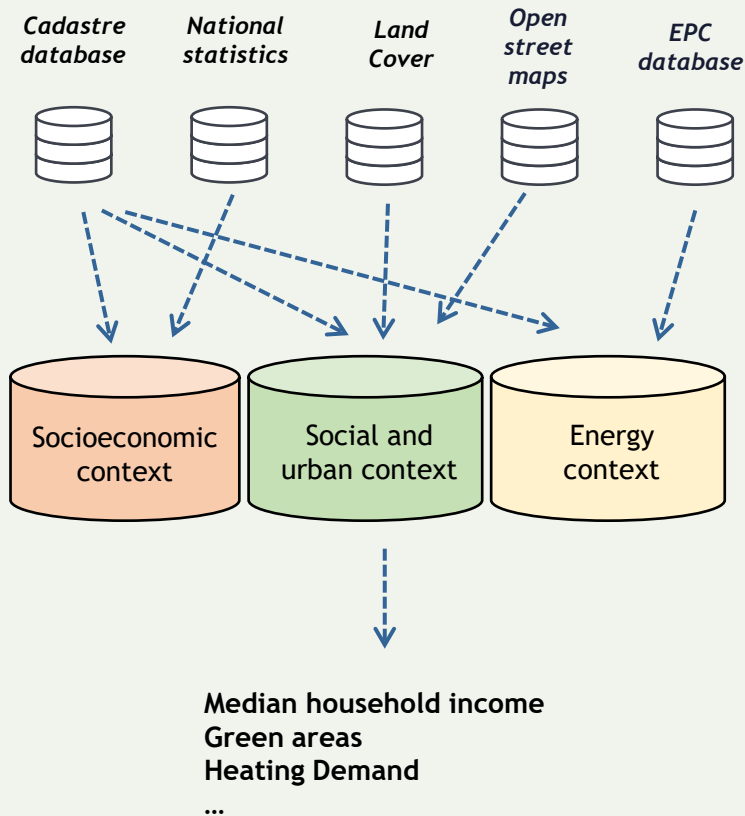
Example of social and urban KPI application



Example of social and urban KPI application



Environmental, Social and Urban context

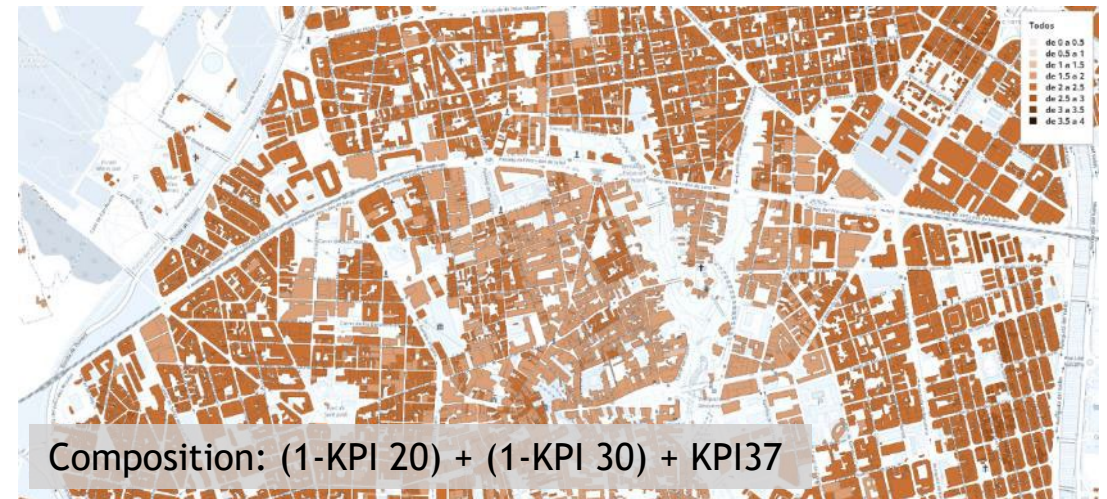


Where are the areas where vulnerable inhabitants live in non-efficient buildings within an urban context that do not enhance energy efficiency?

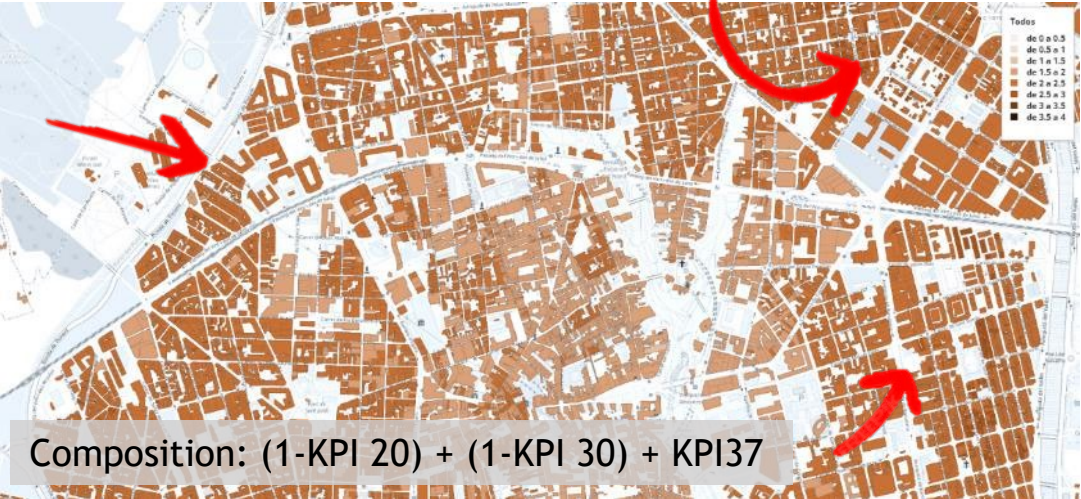
Example of energy, socioeconomic and urban KPI application



Example of energy, socioeconomic and urban KPI application



Example of energy, socioeconomic and urban KPI application



Renovation plan for vulnerable people

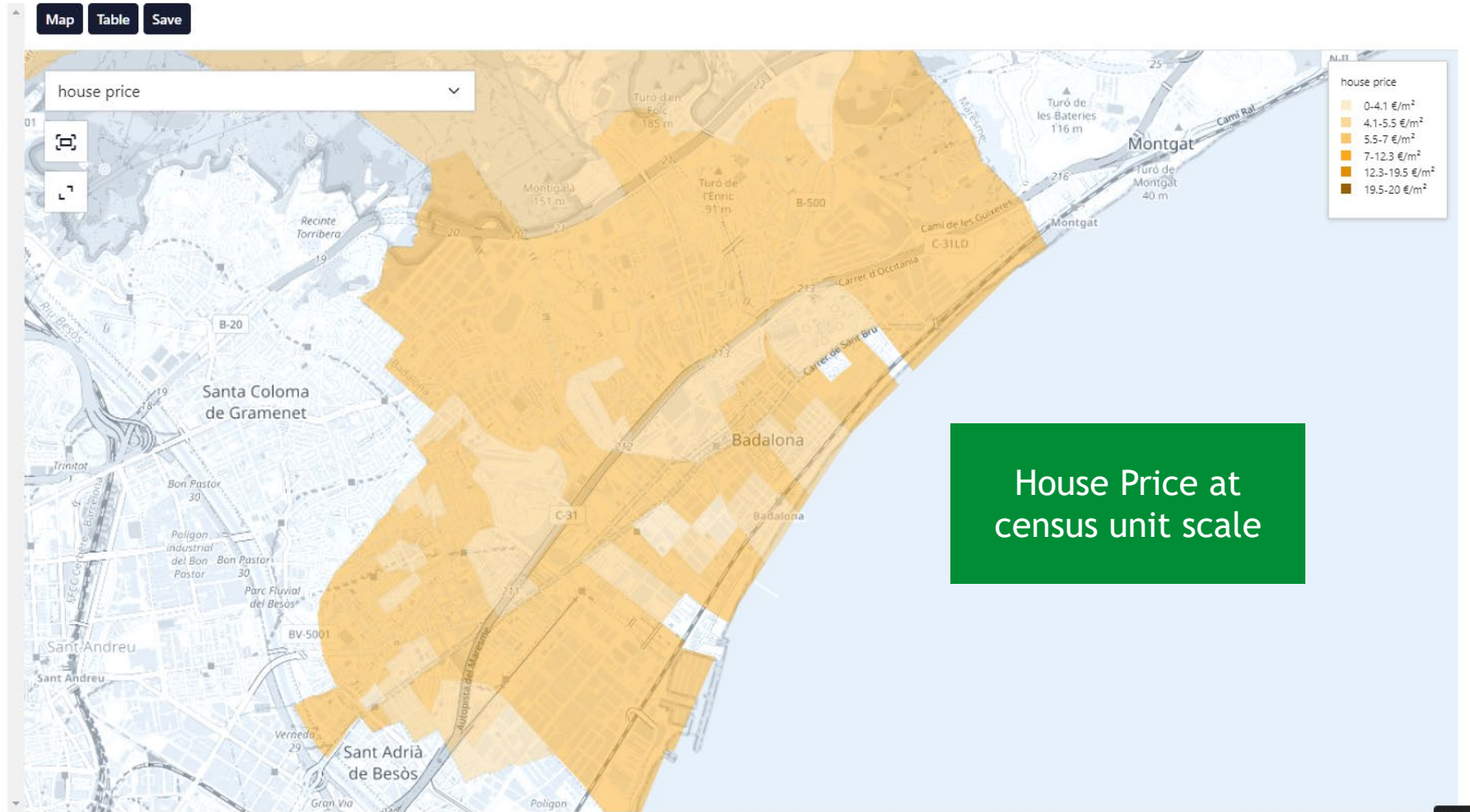
Àmbito

Define tu índice compuesto para determinar el ámbito de intervención del proyecto urbano de reforma.

[Definir índice compuesto >>](#)

Selecciona atributos de los edificios que quieres tener en cuenta para filtrar los edificios a incluir en los planes de reforma.

[Seleccionar atributos >>](#)



The RETABIT platform

Renovation plan for vulnerable people

Àmbito

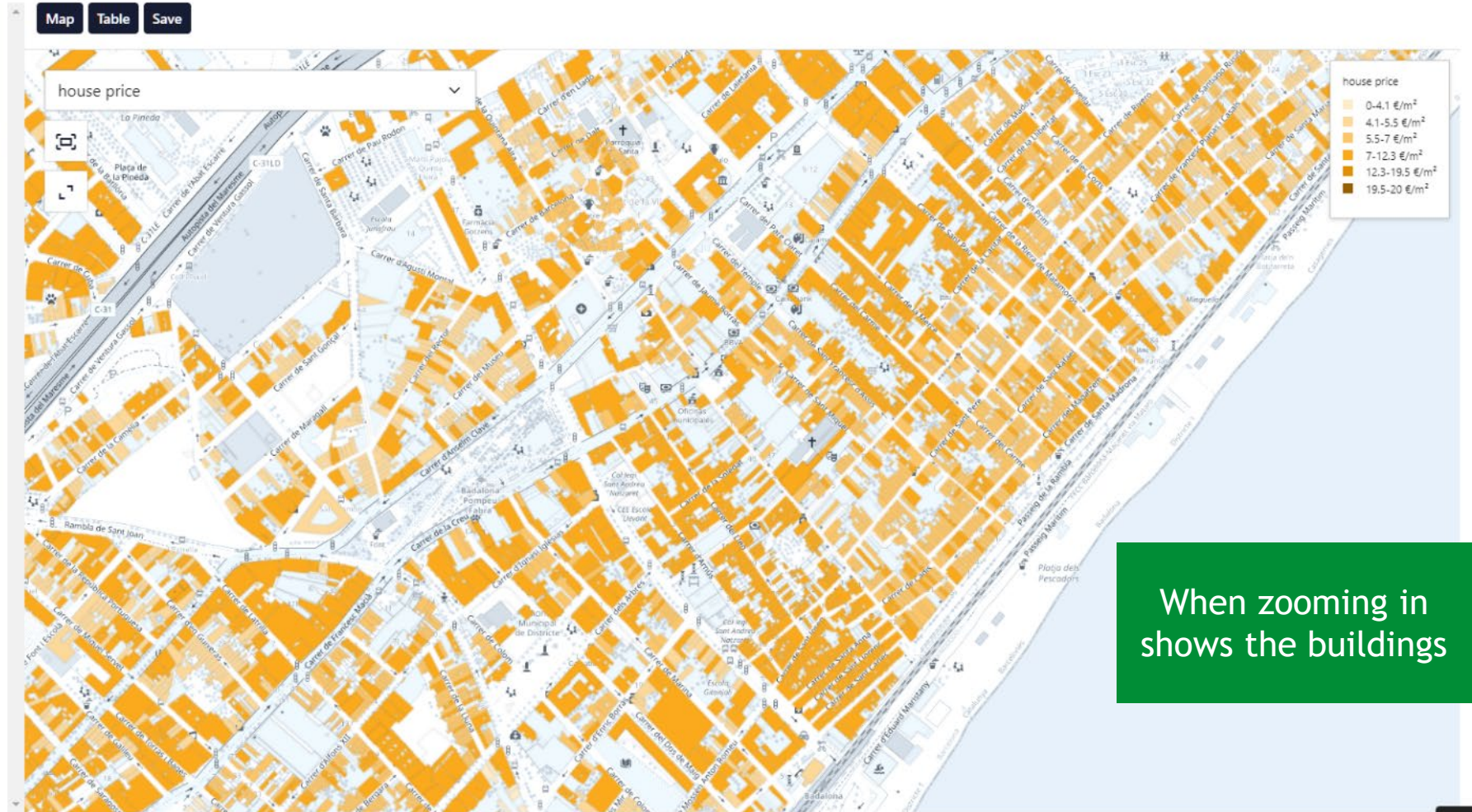
Define tu índice compuesto para determinar el ámbito de intervención del proyecto urbano de reforma.

Definir índice compuesto >>

Selecciona cuentas de reforma

Selecciona

A composite indicator can be created



The RETABIT platform

Índice compuesto

Inicio Logout

Definir indicador compuesto

Explica con qué criterios quieres definir el indicador compuesto.

Enviar

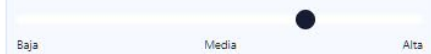
Indicadores seleccionados

Puedes establecer el peso de cada indicador con la barra de desplazamiento

final energy consumption



median household income



Indicadores disponibles

renewable energy consumption

pv potential generation

energy efficient and energy recovering_homes

energy efficient and energy recovering homes

population income below 60 average

energy renovated residential buildings

Todos

house price

urban equipment at 15 min

green area surfaces

vulnerability heatwaves temperature rise

Innovation plan for vulnerable people

Map Table Save



The user selects the indicators and weight them with the slides

Once is done, the platform normalise the indicators and aggregates them based on the weights

The RETABIT platform

Índice compuesto

Definir indicador compuesto

Explica con qué criterios quieres definir el indicador compuesto.

Where are the areas with limited access to green spaces and essential urban amenities near buildings?

Enviar

Indicadores seleccionados

Puedes establecer el peso de cada indicador con la barra de desplazamiento

urban equipment at 15 min

Baja Media Alta

green area surfaces

Baja Media Alta

accessibility to bike lane

Baja Media Alta

Indicadores disponibles

renewable energy consumption

pv potential generation

energy efficient and energy recovering_homes

energy efficient and energy recovering_homes

Todos median household income house price

Innovation plan for vulnerable people

As there are many indicators, the user can provide a description and the platform will precreate the composite indicator using artificial intelligence methods.



The RETABIT platform

Renovation plan for vulnerable people

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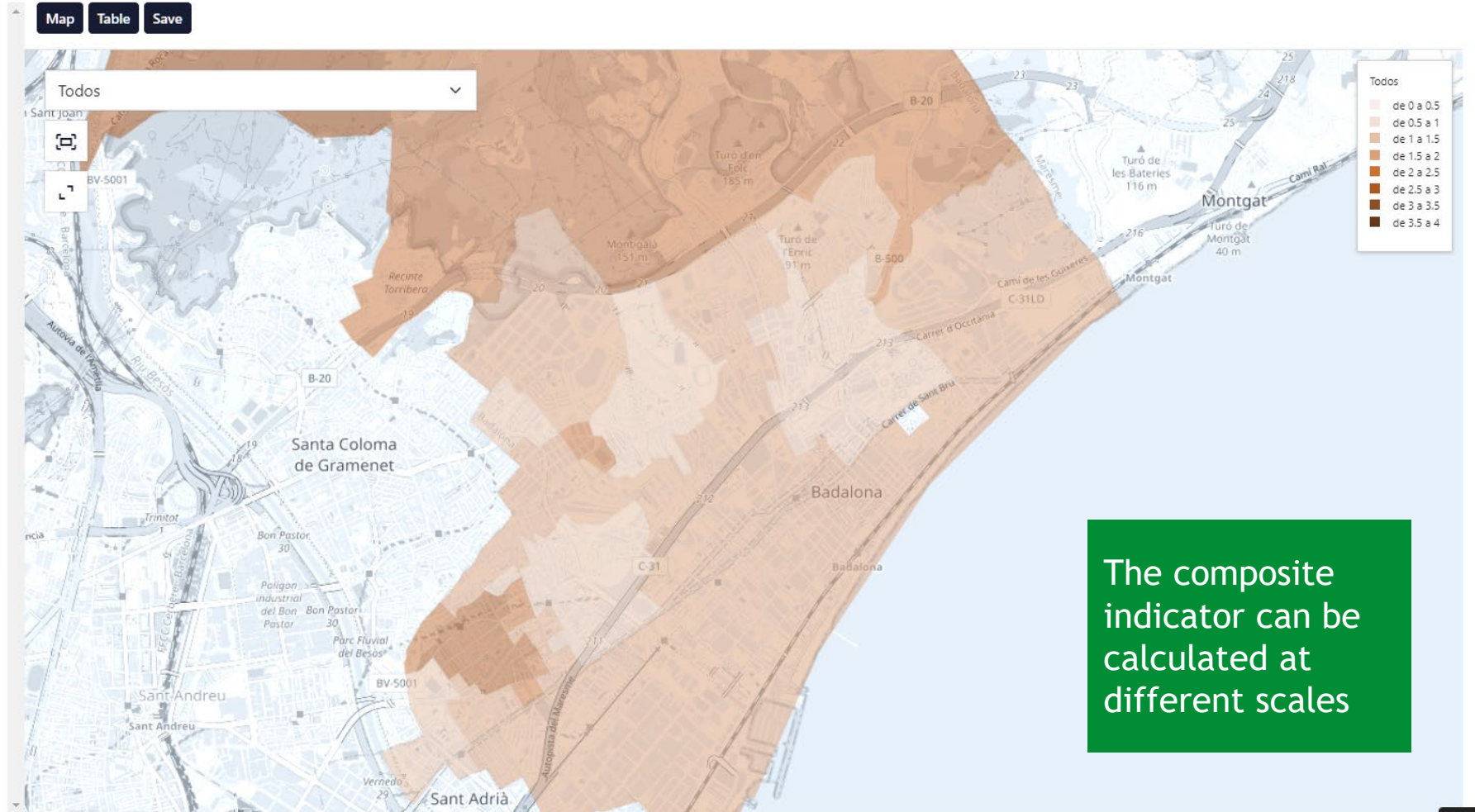
urban equipment at 15 min

green area surfaces

accessibility to bike lane

Selecciona atributos de los edificios que quieres tener en cuenta para filtrar los edificios a incluir en los planes de reforma.

Seleccionar atributos >>



The RETABIT platform

Índice compuesto

Definir indicador compuesto

Explica con qué criterios quieres definir el indicador compuesto.

Where are the areas where vulnerable inhabitants live in non-efficient buildings within an urban context that do not enhance energy efficiency?

Enviar

Indicadores seleccionados

Puedes establecer el peso de cada indicador con la barra de desplazamiento

energy renovated residential buildings

Baja Media Alta

population income below 60 average

Baja Media Alta

vulnerability heatwaves temperature rise

Baja Media Alta

green area surfaces

Baja Media Alta

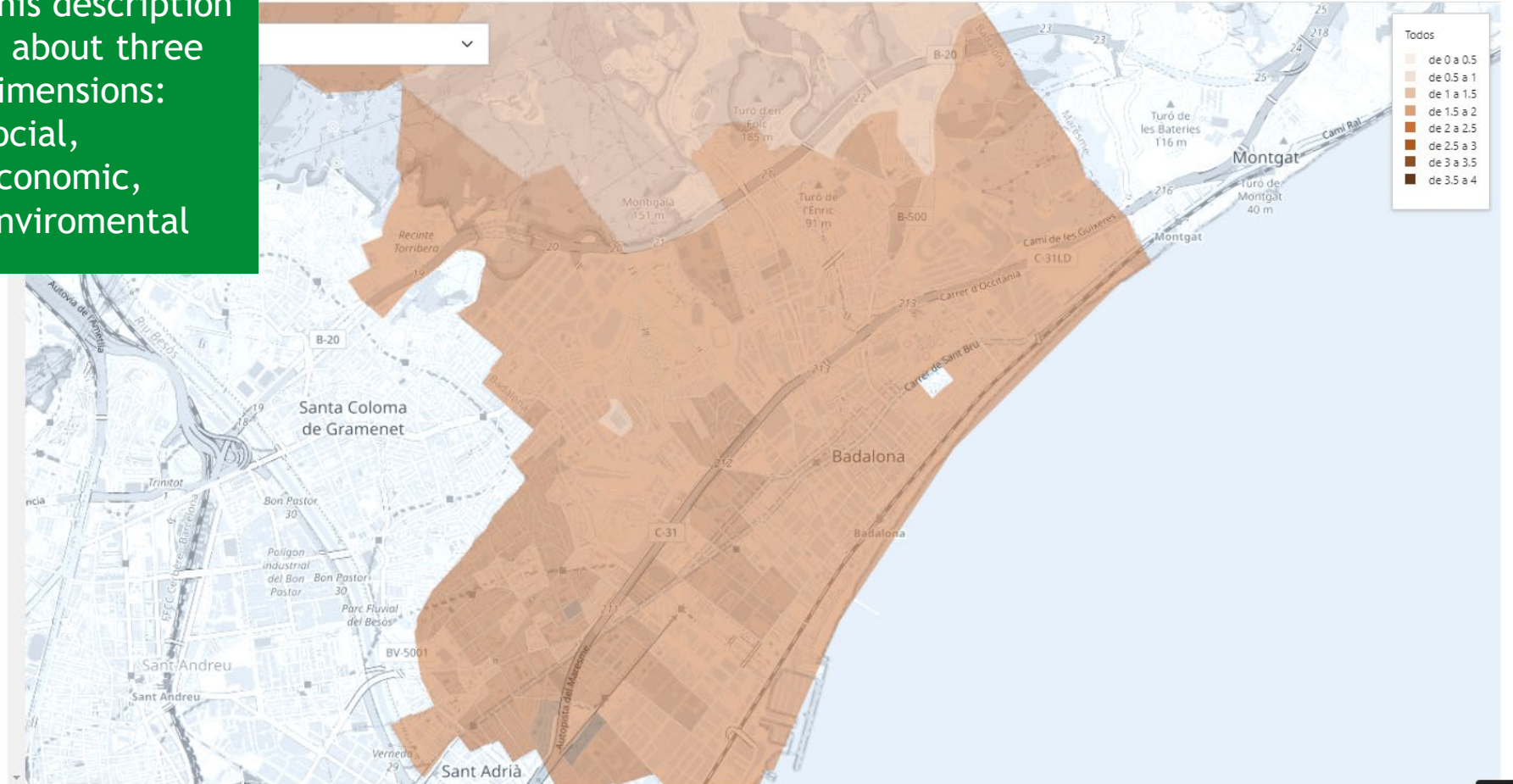
median household income

Baja Media Alta

Indicadores disponibles

Innovation plan for vulnerable people

This description is about three dimensions: social, economic, environmental



The RETABIT platform

Renovation plan for vulnerable people

Àmbito

Define tu índice compuesto para determinar el ámbito de intervención del proyecto urbano de reforma.

Definir índice compuesto >>

energy renovated residential buildings

population income below 60 average

vulnerability heatwaves temperature rise

green area surfaces

median household income

Selecciona el tipo de atributos que quieres tener en cuenta para definir el ámbito de reforma.

Selección

The attributes are summarized in the left pane



The RETABIT platform

Atributos



Listado completo de filtros

Puedes establecer el peso de cada filtro con la barra de desplazamiento

numberofdwellings

num_floors

year

porcentaje_ocupacion

Aplicar filtros

The user can filter the buildings by a set of attributes

novation plan for vulnerable people

Map Table Save



The RETABIT platform

Índice compuesto

Explica con qué criterios quieres definir el indicador compuesto.

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Enviar

Indicadores seleccionados

Puedes establecer el peso de cada indicador con la barra de desplazamiento

- energy renovated residential buildings
- vulnerability heatwaves temperature rise
- population income below 60 average
- green area surfaces
- median household income

Indicadores disponibles

renewable energy consumption

Inicio Logout

innovation plan for vulnerable people

Map Table Save



When the composite indicator is created, the user can display the sub-indicators

The RETABIT platform

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Innovation plan for vulnerable people

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Innovation plan for vulnerable people

Map Table Save

vulnerability heatwaves temperature rise



When the composite indicator is created, the user can display the sub-indicators

Take aways

Composite indicators offer a comprehensive and holistic approach to measuring complex concepts by combining multiple indicators into a single index.

Composite indicators run the risk of oversimplifying complex data. They are another tool to analyse the building stock.

Artificial intelligence tools can help decision makers by pre-creating the composite indicators.

**If you would like more information,
please visit www.timepac.eu or contact us at
alvaro.sicilia@salle.url.edu**

Thanks for your attention!