

Enabling circular construction through integrated geoportal-based decision support in Andalusia

The geoportal supports circular design decisions by integrating data, geospatial analysis, and Life Cycle Assessment (LCA) within the construction workflow.

- It offers adaptive interfaces for users with different expertise levels, enabling tasks such as identifying recycled material suppliers, locating waste treatment facilities, and optimizing transport routes.

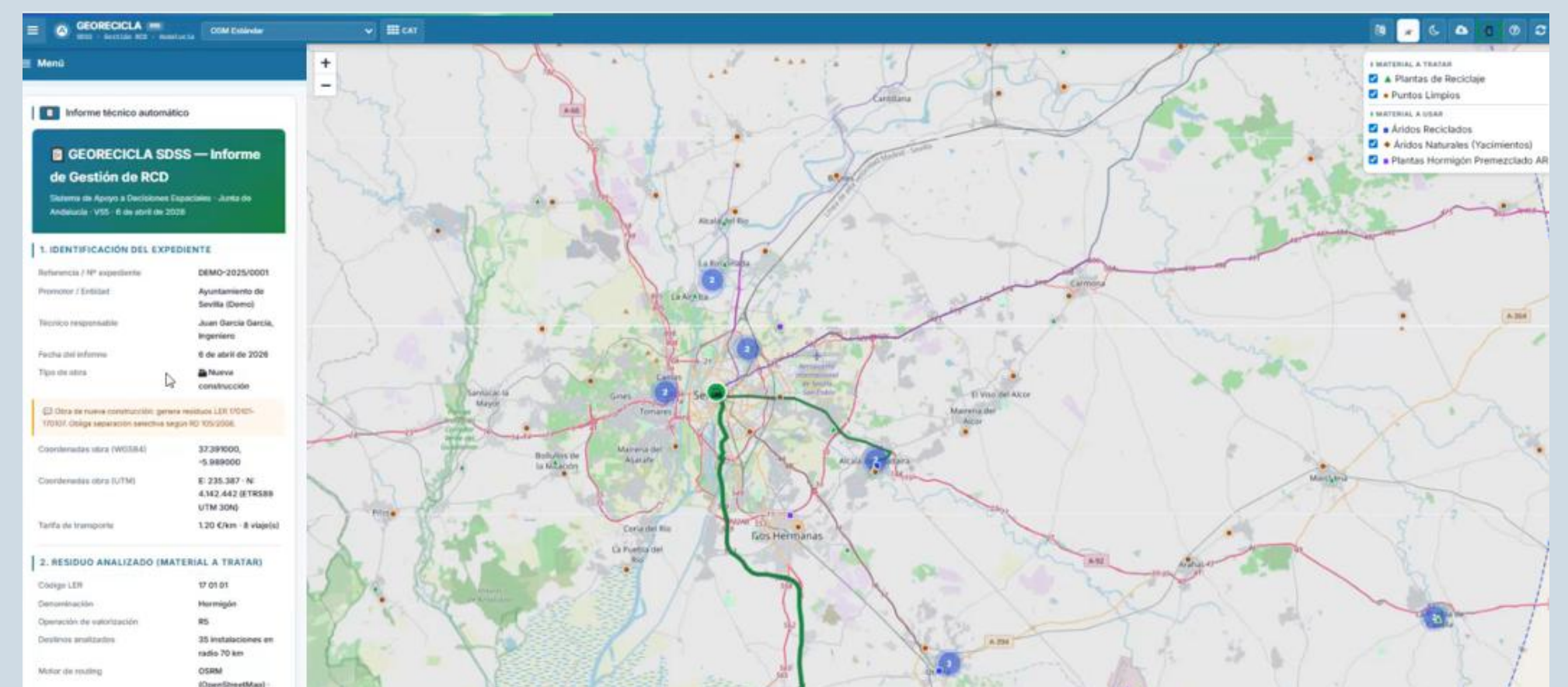


Fig. 1. Screenshot of the results (graphics)*.

- It addresses key gaps in current practices and provides actionable insights on transport-related impacts (A4, A5, C2).
- Its reporting and visualization features enhance usability, supporting stakeholders in implementing circular economy strategies and reducing greenhouse gas emissions in the construction sector.

Introduction

The construction sector generates large amounts of Construction and Demolition Waste (CDW) due to its predominantly linear economic model, contributing significantly to global waste generation, resource consumption, and greenhouse gas emissions. In the European Union, CDW is projected to increase by up to 70% by 2050 if current practices persist. Although strategies such as the use of recycled materials can substantially reduce emissions, their implementation is hindered by limited access to reliable data, a lack of advanced decision-support tools, and weak integration with design processes. In Andalusia, where CDW represents a significant share of total waste, these challenges are particularly relevant.

To address this gap, GeoRecicla is developed as an intelligent geoportal that optimizes transport routes, facilitates the use of recycled materials, and supports circular economy practices in construction.

Methods

The development of the geoportal followed a two-stage methodology. First, the potential uses of the platform were identified, along with the relevant data sources, followed by data collection and adaptation to align with the portal's workflow. Second, the tool was developed, including the integration of AI models.

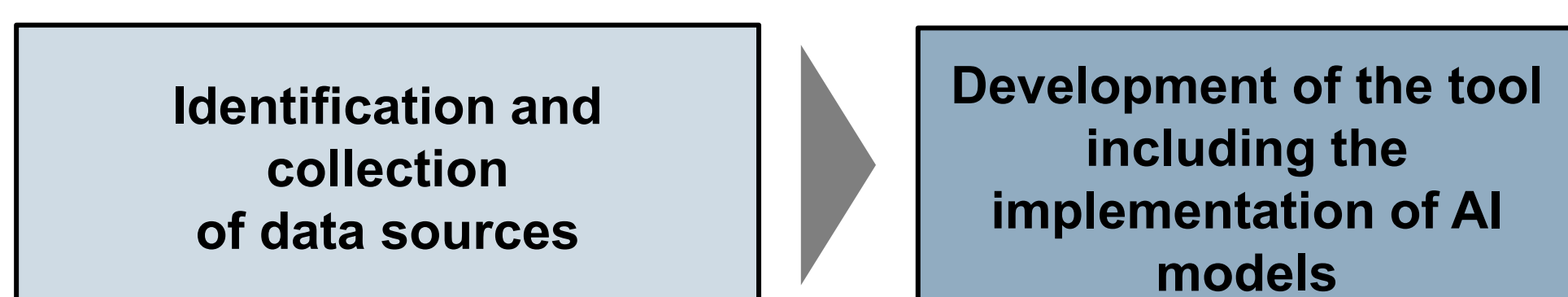


Fig. 2. Scheme of the methods*.

Results

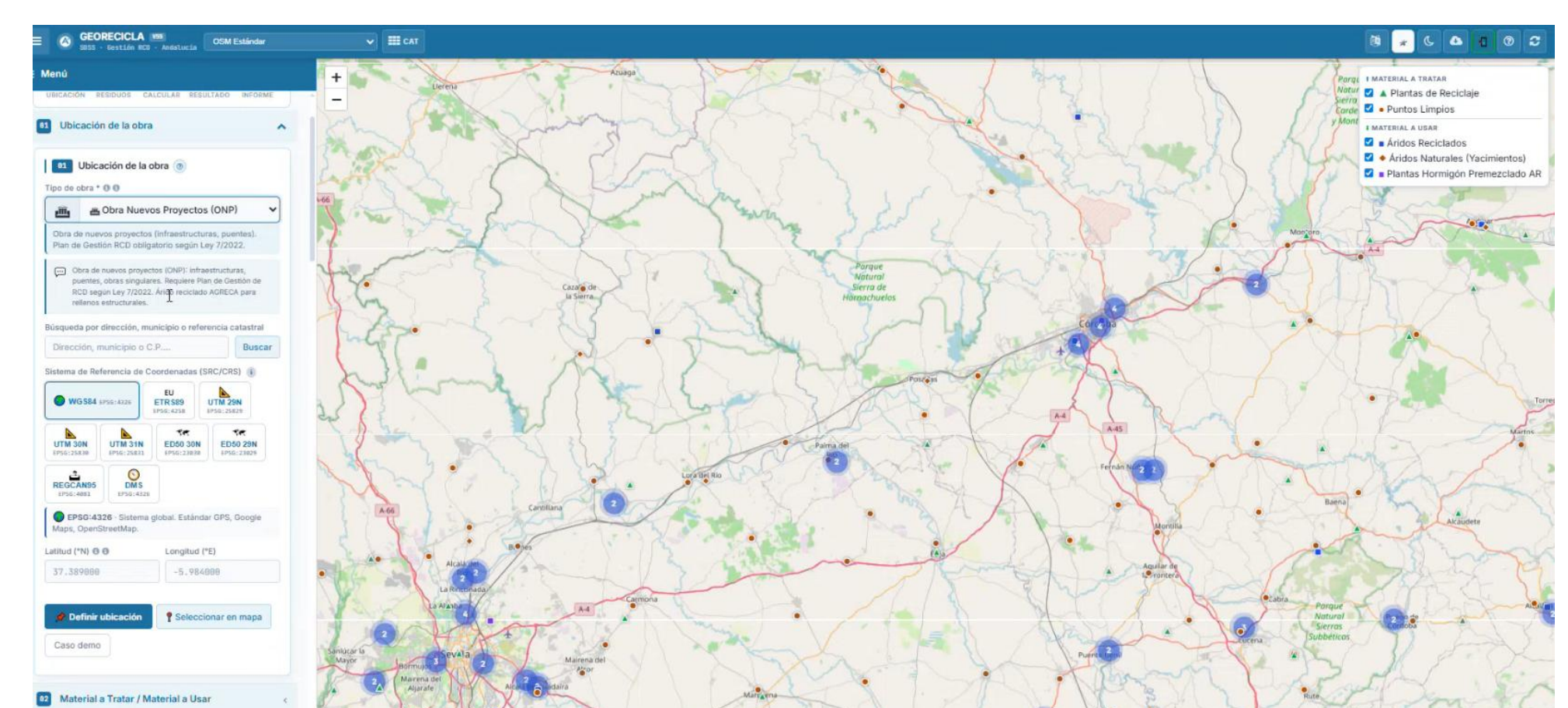


Fig. 3. Screenshot of the results (graphics)*.

* Source: Authors owns elaboration.

The geoportal is designed with a structured approach to input and output data, ensuring consistency and reliability for decision-making. Input data includes user-defined parameters such as construction activity type, materials, and location, while output data provides optimized routes, environmental impact indicators, and summary reports.

Conclusions

This study developed a platform to support circular construction in Andalusia by facilitating the use of recycled materials and reducing environmental impacts. Currently at a preliminary stage, the tool requires validation through real-world case studies and user testing, with future versions including an English interface.

Acknowledgement

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