



BIOZE Digital Tool: User Manual

- **Policy question** the tool addresses is: “*What is the ideal combination of locations for large-scale digesters to be able to efficiently process a certain amount of manure in the region based on a selected set of relevant suitability criteria?*”
- **Learning goals** of the tool are:
 - Learning about the benefits and the trade-offs of large-scale bio-energy production.
 - Improved understanding of the problem of locating large-scale digesters.
 - Reflection of policy assumptions.
 - Understanding other stakeholders’ preferences and concerns.
 - Insights to the problem from a regional perspective.
- **Scope:** Large-scale mono-digesters
 - Capacity: 119,547tonne/year
 - CAPEX: €6 million
 - OPEX: €1 million per year
 - Land requirement: 5 ha
 - Lifespan: 12 years

BIOZE Digital Tool involves a **two-phase learning process** for users to experiment with various policy options on the construction of new biogas digesters - specially the large-scale digesters suitable for processing high quantity manure from pig and chicken farms - and understand their benefits and trade-offs. This user manual will guide you through the steps. Access the tool at <https://bioze-interreg.streamlit.app/>.

Home Page

1. Below is the Home page upon entering the tool. You can find brief information about the tool as well as a simple user guide on the Home page. Use the sidebar to navigate to other pages.



BIOZE Interactive Tool

About the tool...

The tool consists of a two-step learning process to engage users to learn about the benefits and trade-offs associated with placement of large-scale biogas digesters.

How to use the tool...

Phase 1: Suitability Analysis

Phase 1 welcomes users to conduct a multi-criteria suitability analysis. Suitability analysis can be considered a method of site selection.

We will use this method to determine the appropriateness of a give area in the region for building a large-scale digester.

At the end of this phase, you will have a list of candidate sites for large-scale digesters.

Phase 2: Policy Explorer

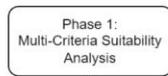
Phase 2 invites users to explore combinations of candidate sites for large-scale digesters in order to efficiently process manure produced in the region for biogas production.

We will use your list of candidate sites from Phase 1 to generate scenarios consisting of the most strategic locations for digesters to meet certain goals.

At the end of this phase, you will learn the costs and benefits of different scenarios.

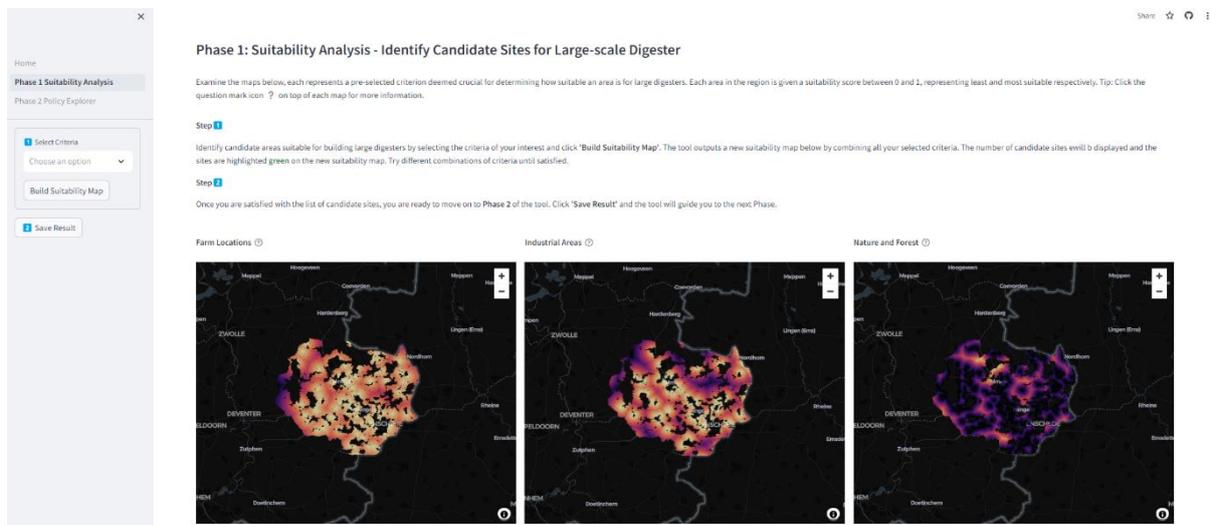
Iterative Learning

Intuition



Phase 1: Suitability Analysis

2. **Explore suitability criteria maps:** Below is Phase 1 of the tool. You will see maps, each representing a pre-selected criterion deemed crucial for determining suitable locations for digesters. Hover over the question mark icon to access detailed information about each map and the variable of interest they show.



3. **Build a multi-criteria suitability map:** Select criteria of your interest from the sidebar. Click , after which the tool will aggregate the selected criteria to produce a multi-criteria suitability map as shown below.

Home

Phase 1 Suitability Analysis

Phase 2 Policy Explorer

1 Select Criteria

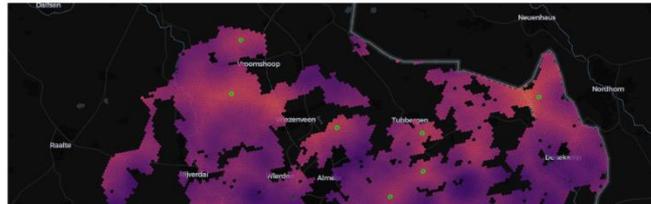
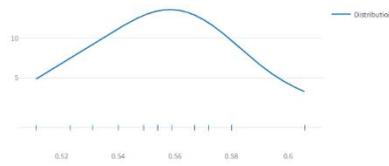
- Urban and resid...
- Nature x
- Industrial areas x
- Water Bodies x

Build Suitability Map

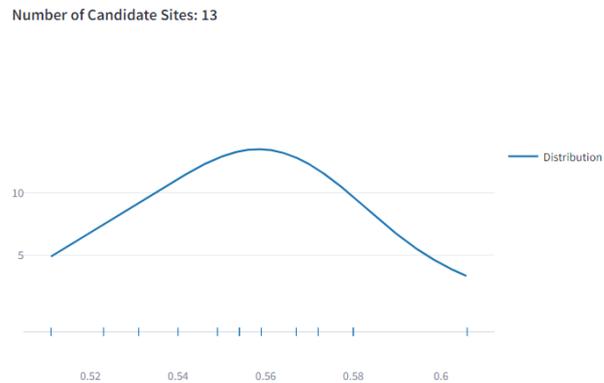
2 Save Result

Suitability Map

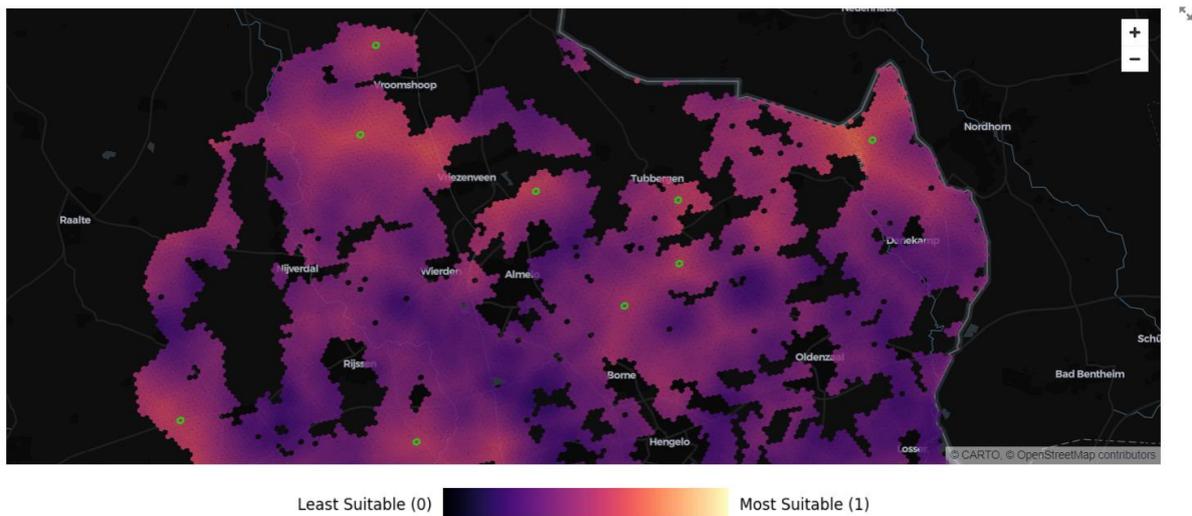
Number of Candidate Sites: 13



- Number of candidate sites:** The tool will inform you how many candidate sites can be extracted from your multi-criteria suitability map. These candidate sites represent areas with high suitability. In addition, the distribution plot is shown to visualize the distribution of candidate sites in terms of their suitability level.



- Location of candidate sites:** The locations are highlighted in **green** on the map.



- Repeat and refine:** Experiment with different criteria combinations. Repeat until satisfied with the list of candidate sites.
- Save results:** Click to save your candidate sites. You will be guided to the next Phase.

Phase 2: Policy Explorer

- Policy Explorer is for exploring optimal combinations of candidate sites for building large-scale digesters to process manure in the region with the lowest cost possible.

Home

Phase 1 Suitability Analysis

Phase 2 Policy Explorer

Manure Utilization Target (%):

0 100

Map Layers

Farms

Digesters

Suitability

Click to learn more about this dashboard

Phase 2: Policy Explorer

The map below displays where your candidate sites from Phase 1 and the farms in the area are located. By utilizing manure from local farms, we can produce biogas as a substitute for natural gas, promoting renewable energy and preventing greenhouse gas emissions from manure. Investigate the best locations to build large digesters based on various policy goals concerning the amount of manure designated for biogas production.

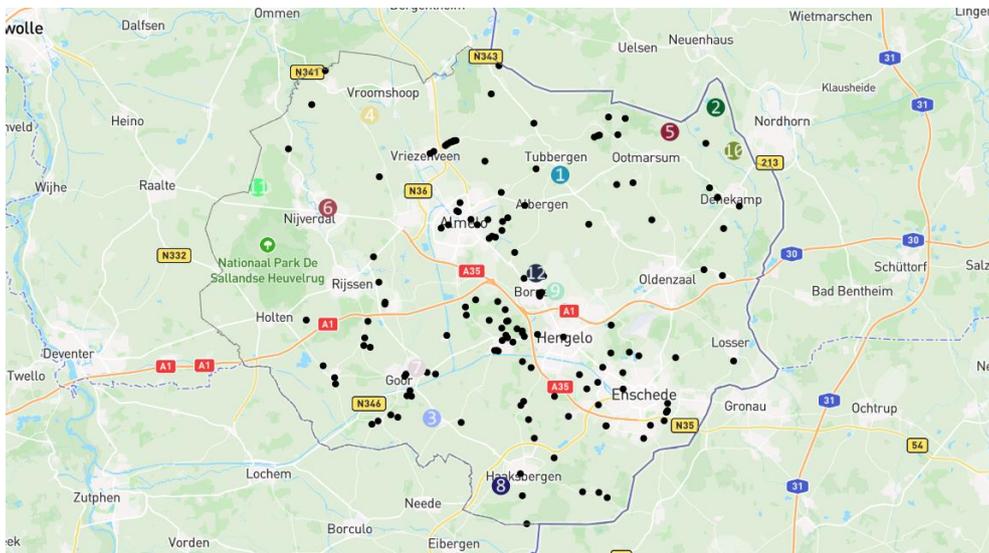
Determine how much of the manure in the region you would like to use for biogas production and indicate that amount with the 'Manure Utilization Target (%)' slider. The tool will find the most strategic locations to build large digesters to meet your target.

You can determine which candidate sites are included in the analysis by selecting them in 'Customize Site Selection'. By default all sites are included in the analysis.

How to read the map

Customize Site Selection

2. Map legend (before analysis):
 - a. Small marker – farms.
 - b. Large marker (with number labels) – candidate digester sites.



3. User inputs:
 - a. Customize site selection bar: Select sites to include/exclude in the analysis and click submit.

Customize Site Selection

Select specific sites to include in the analysis. By default, all sites are included.

Choose an option

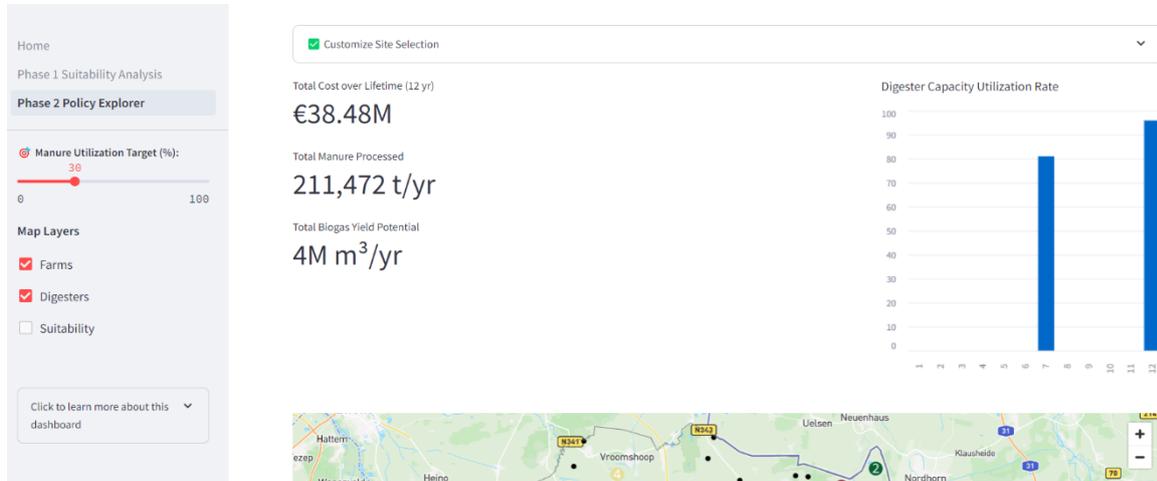
Submit

- b. Manure utilization target (%) slider: Adjust the proportion of manure in the region to be used for biogas production.

Manure Utilization Target (%):

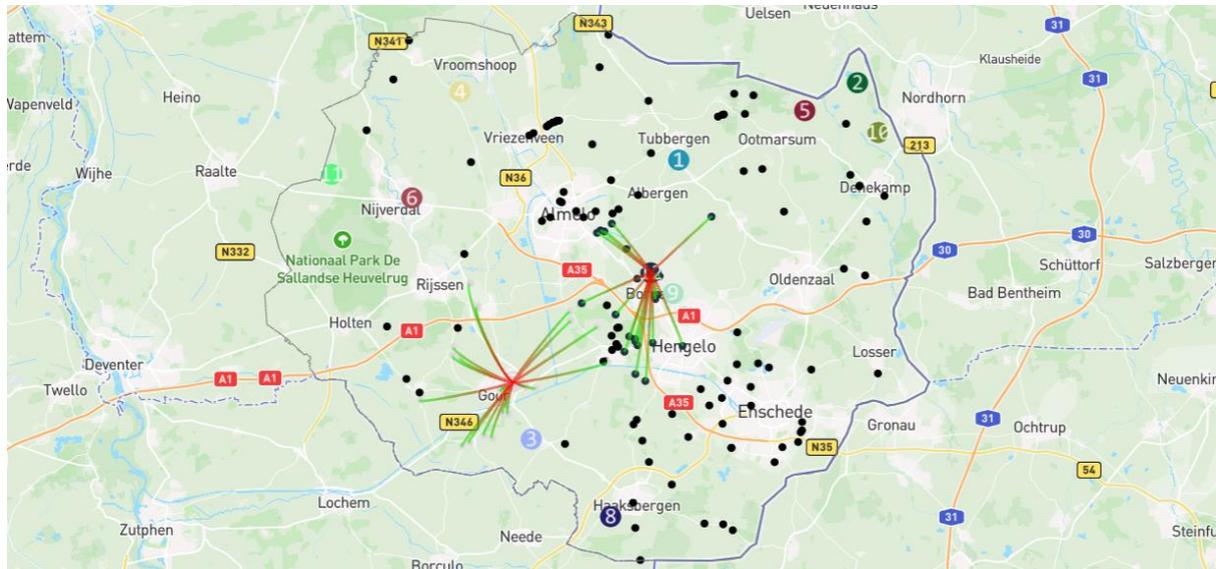
0 100

4. **Search for solution:** As manure target slider changes, the tool will search for optimal combination of digester sites to meet the manure utilization target with the lowest total cost.
5. **Benefits and trade-offs:** Explore the presented benefits and trade-offs of the solution.



6. Map legend (after analysis):

- a. Small marker – farms, marker color matches the digester it is assigned to; black marker means the farm is not included in the solution.
- b. Large marker – digesters.
- c. Red/green arc – assignment of farms to digesters.



Link to code: https://github.com/springonions-87/bioze_digital_mapping_tool