

Centre of Environmental Research

Waste Management,
Circular Economy and
Environmental Security



WP 1.E: Industrial waste

Environment - Environment for Life
12. – 14. 9. 2022

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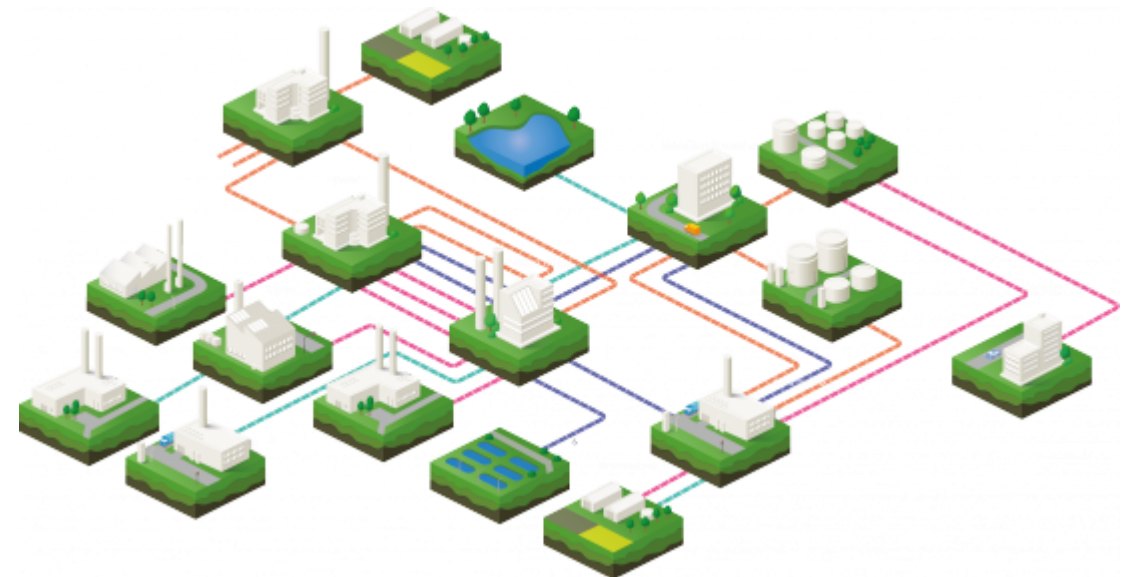
Developing industrial symbiosis in the Czech Republic using the PruSym interactive online platform

Ing. Aleš Paulu

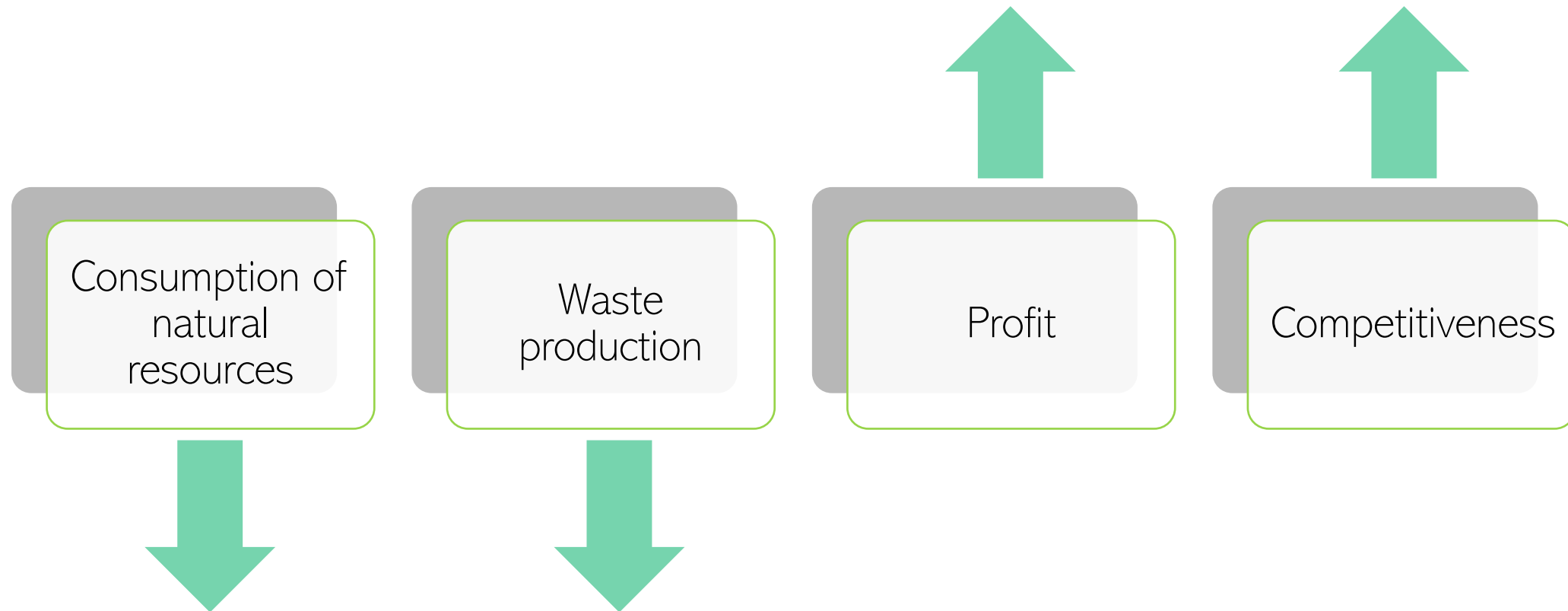
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What is Industrial Symbiosis ?

- A subset study of Industrial Ecology
- A way to tackle the ever-increasing amount of generated industrial waste and its environmental impacts
- Biological ecosystems - a model for industry
- **Physical exchange of materials, energy, water and by-products** by industrial entities that are traditionally separate
- Geographical proximity beneficial but not essential



The benefits of symbiosis



Implication

Industrial operators themselves are increasingly interested in facilitating exchange of materials

Where and what materials?



What are the benefits?





Interactive platform to support the development of industrial symbiosis in the Czech Republic

What can it do?

Provide information on the production of waste and secondary raw materials in the Czech Republic.

Model the environmental impacts of different waste and secondary raw material management scenarios, including transport

Identify new opportunities for industrial symbiosis

Who can use it?

Producers and buyers of industrial waste and secondary raw materials

Circular economy researchers

Public authorities, NGOs and the public

[Start modelling](#)

[Search database](#)

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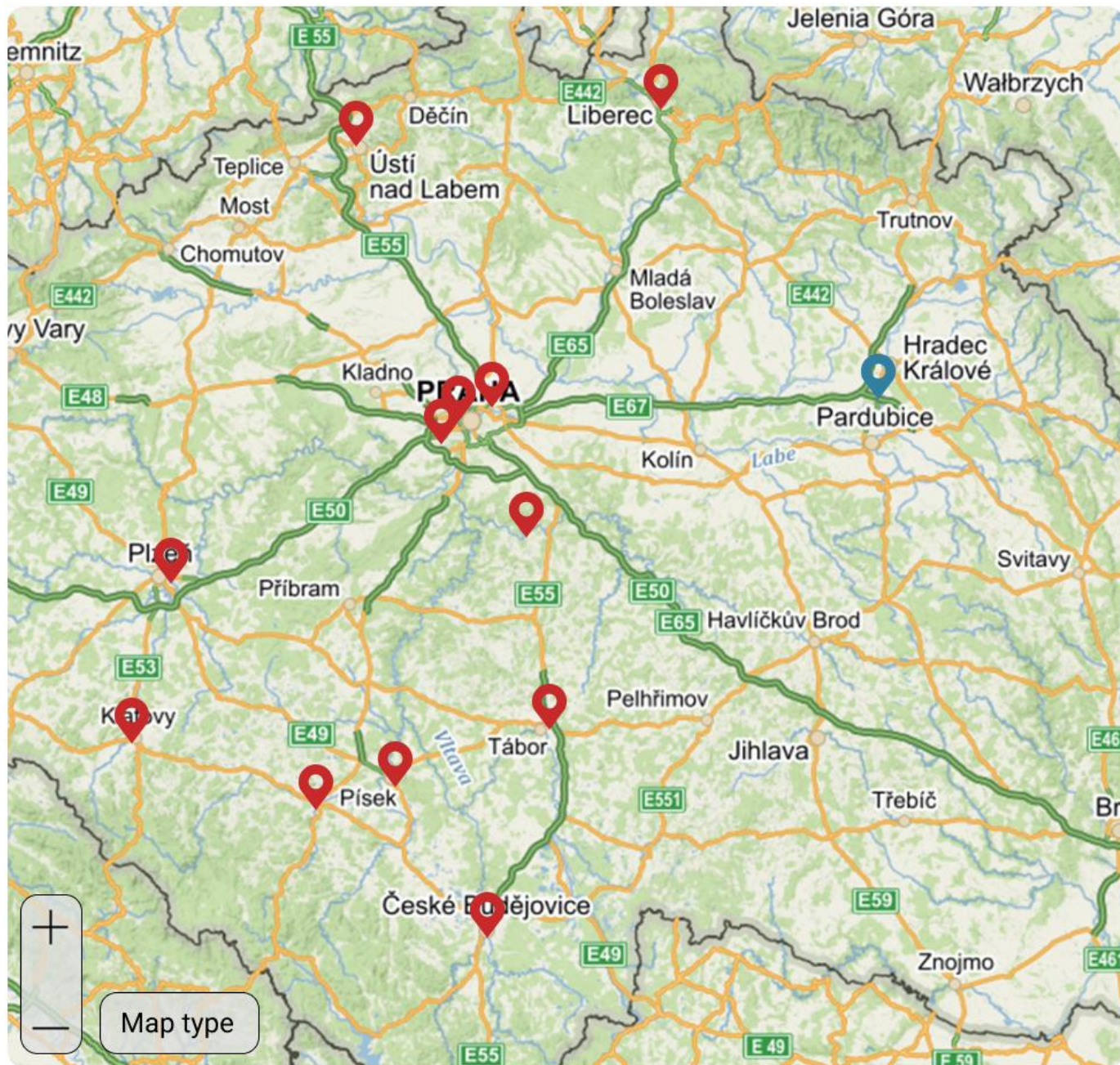
PruSym: Inside

Browsing modes

- Model (*+Results*)
- Database

Components

- Map layers
- Map points
- Info cards
- Search interface
- Transport model



Model

Material

Category
Coal combustion products

Type
FGD Gypsum

Location
Choose Map

Amount
Insert kg

Map layers

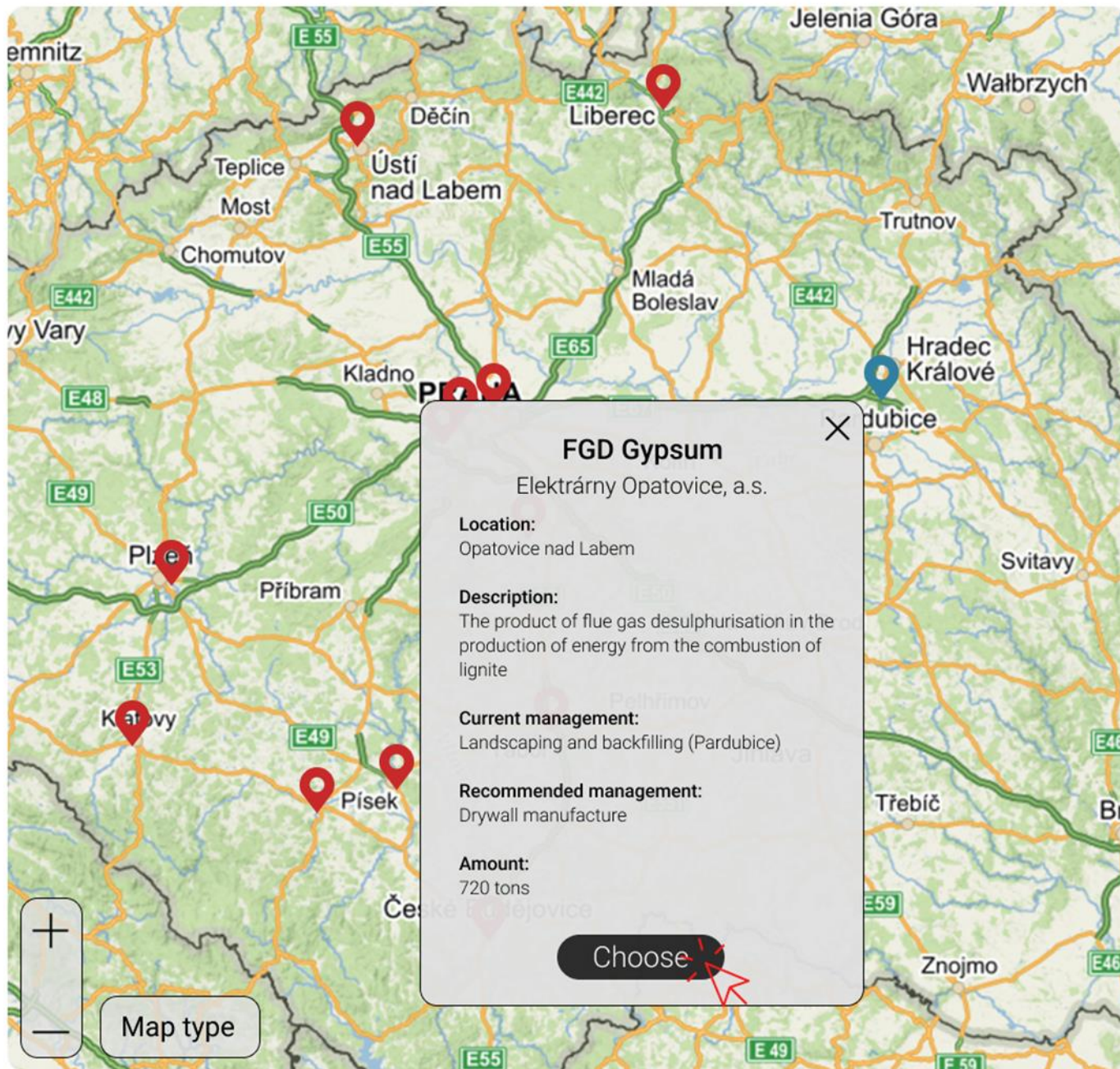
Map points

Management

Transport



Map type



Model

Material

Category

Coal combustion products

Type

FGD Gypsum

Location

Choose

Map

Amount

Insert

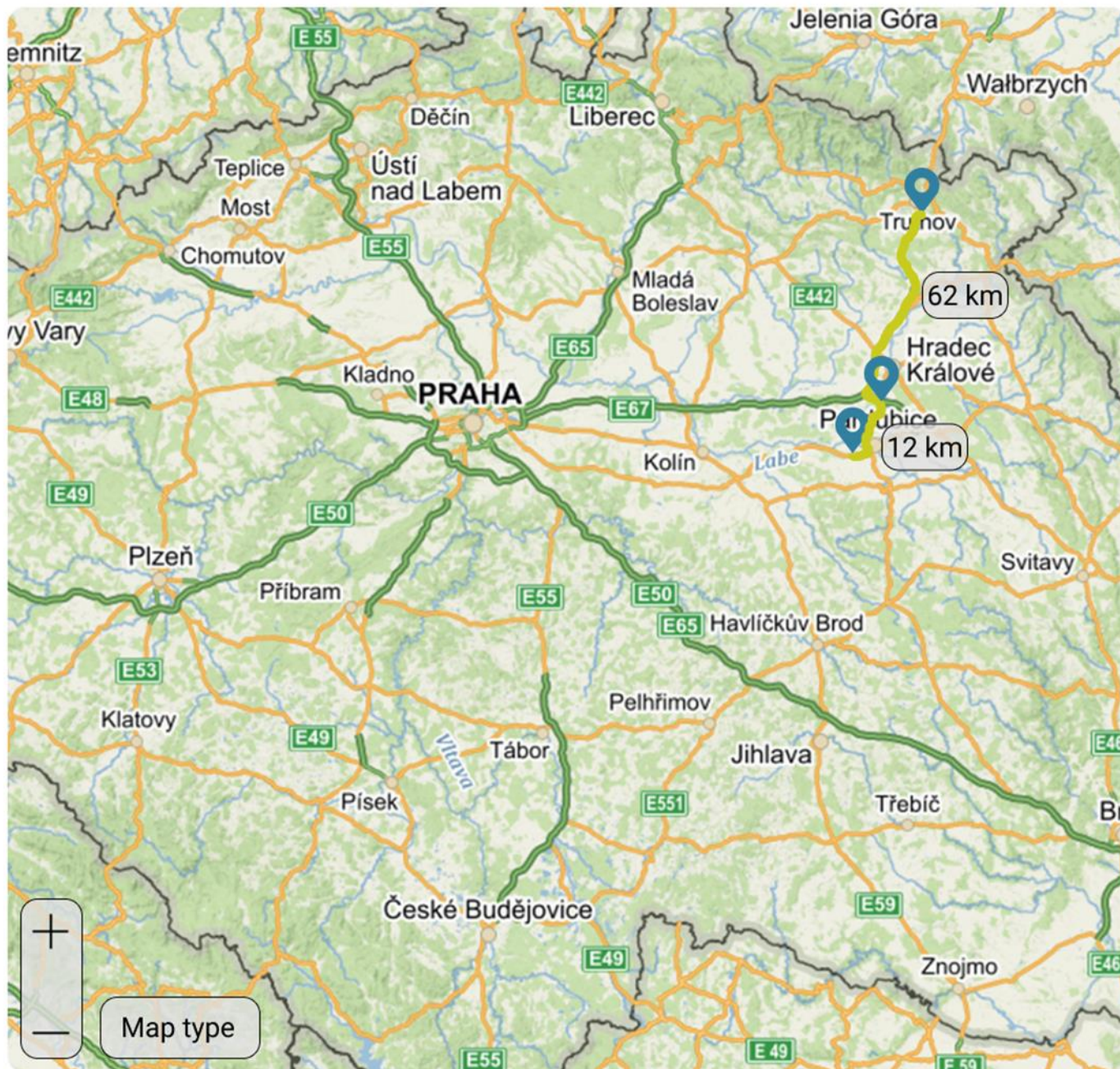
kg

Management

Transport

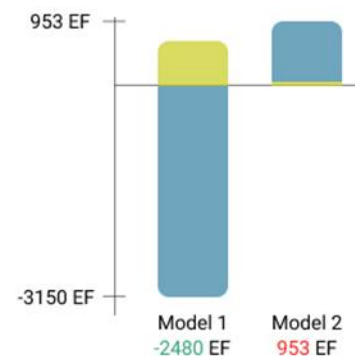
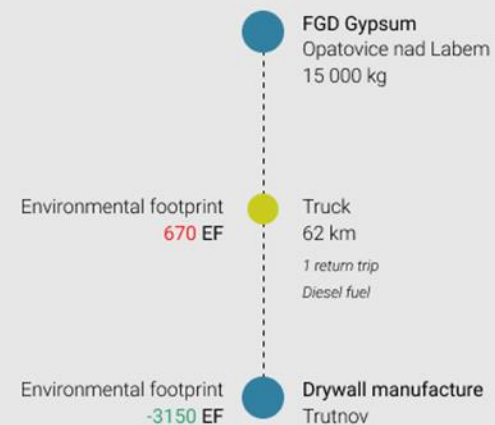
Info cards

Search interface



Results

Model 1



+ Model new method

Transport model

Results interface

PruSym: Progress to date

User interface design

Establishment and calculation of testing data for first operation

Creation of the first version of the platform (GIS layer)

Creation of the transport model

PruSym: Testing data

Coal combustion products (fly ash, slag, FGD gypsum)

Construction and demolition waste (concrete, bricks)

Production in the Czech Republic

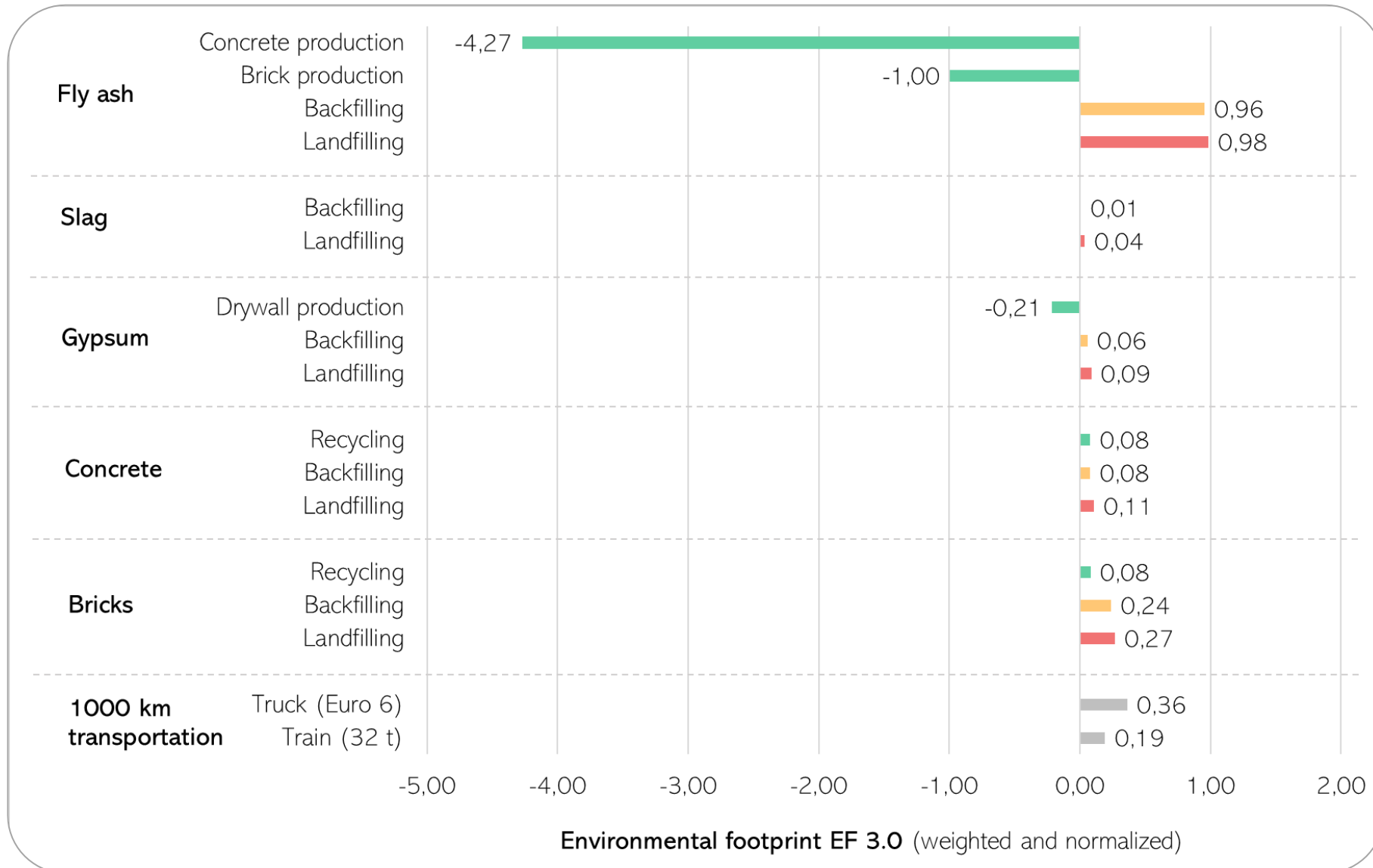
- GIS layer provided by CENIA

Environmental footprint

- Reuse x Recycling x Backfilling x Landfilling
- Transportation
- Quantified by LCA



Environmental footprint



PruSym: The first version

ArcGis Online mapping software

- Map - Map Viewer module
- User interface - Experience Builder module (developer edition)
- Incorporated CSV testing data from CENIA
- Waste production specified for small districts (ORP)
- Experience Builder limited -> Additional programming

PruSym: Transport model

- Developed by project partners from VUT Brno
- Connects individual small districts (ORP)
- Calculates route based on transported material and vehicle specifics
- Includes economic costs model
 - 5 vehicle types
 - Based on transported weight, bulk density, fuel cost and wages

PruSym: The next steps

Implementation of transport model

Additional programming

Completion of data collection for selected industries

Testing of the PruSym platform