

A construction worker wearing a white hard hat with the brand name 'CENTURION' and a brown jacket is working on a grid of rusty rebar. The worker's hands are visible, gripping the rebar. The background is a rough, grey concrete wall.

# **Building material stock models: general approach and practical implementation**

**Odense, 29-30 October 2018**

## › TODAY

1. BOB model explained
2. Structure
3. Value propositions
4. Discuss assumptions and possibilities European field

# BOB – TNO's Urban Stock model

## Challenge

- Drastically reduce the environmental and materials footprint of the built environment sector
- Life time extension, biobased solutions and re-use/recycling of materials and resources is necessary
- Where are these materials and are they fit for purpose

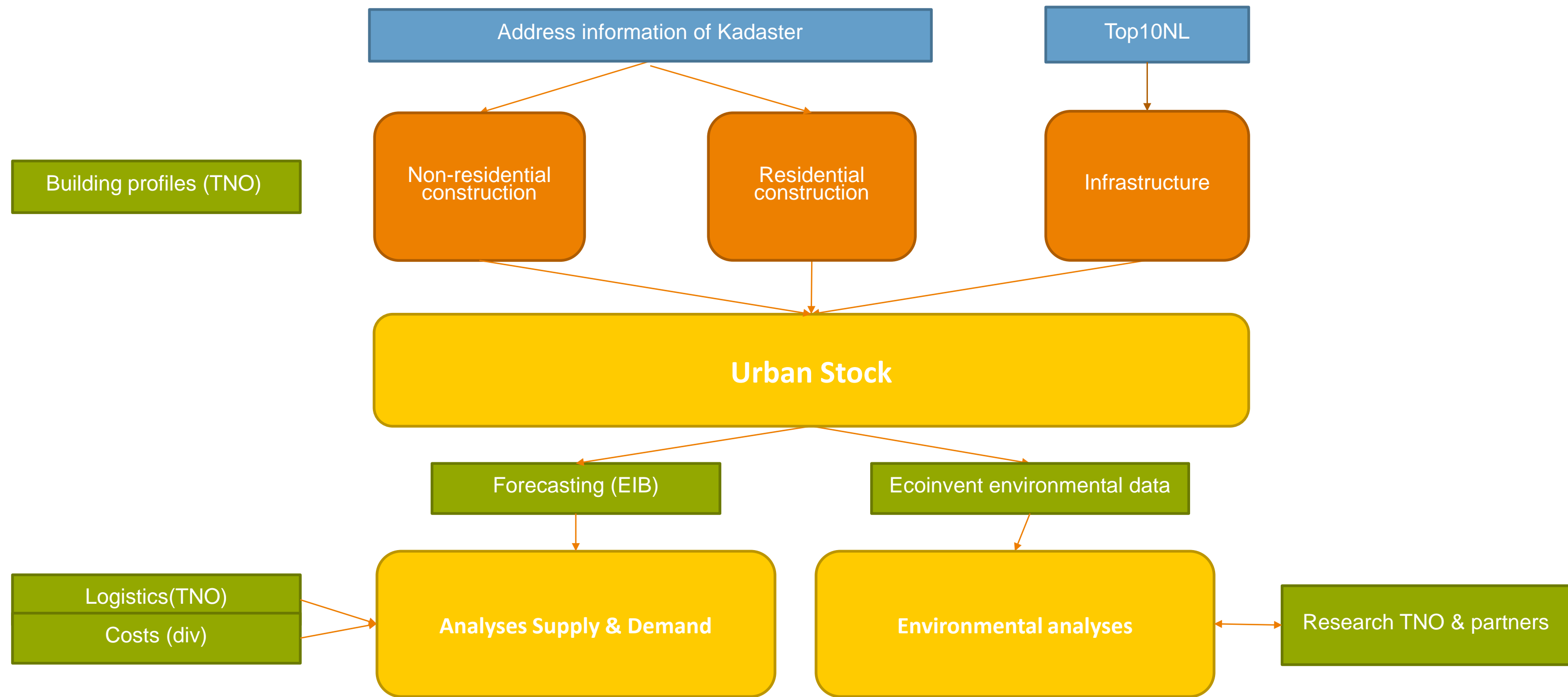
## Approach

- TNO developed an urban stock model (BOB), covering the Netherlands
- It enables forecasting of potential supply and demand of (secondary) building materials
- BOB stores information on the footprint of various materials in residential buildings, offices and infrastructure
- BOB is based on public sources and TNO developed building profiles
- BOB is a unique rough material passport of the Netherlands in total

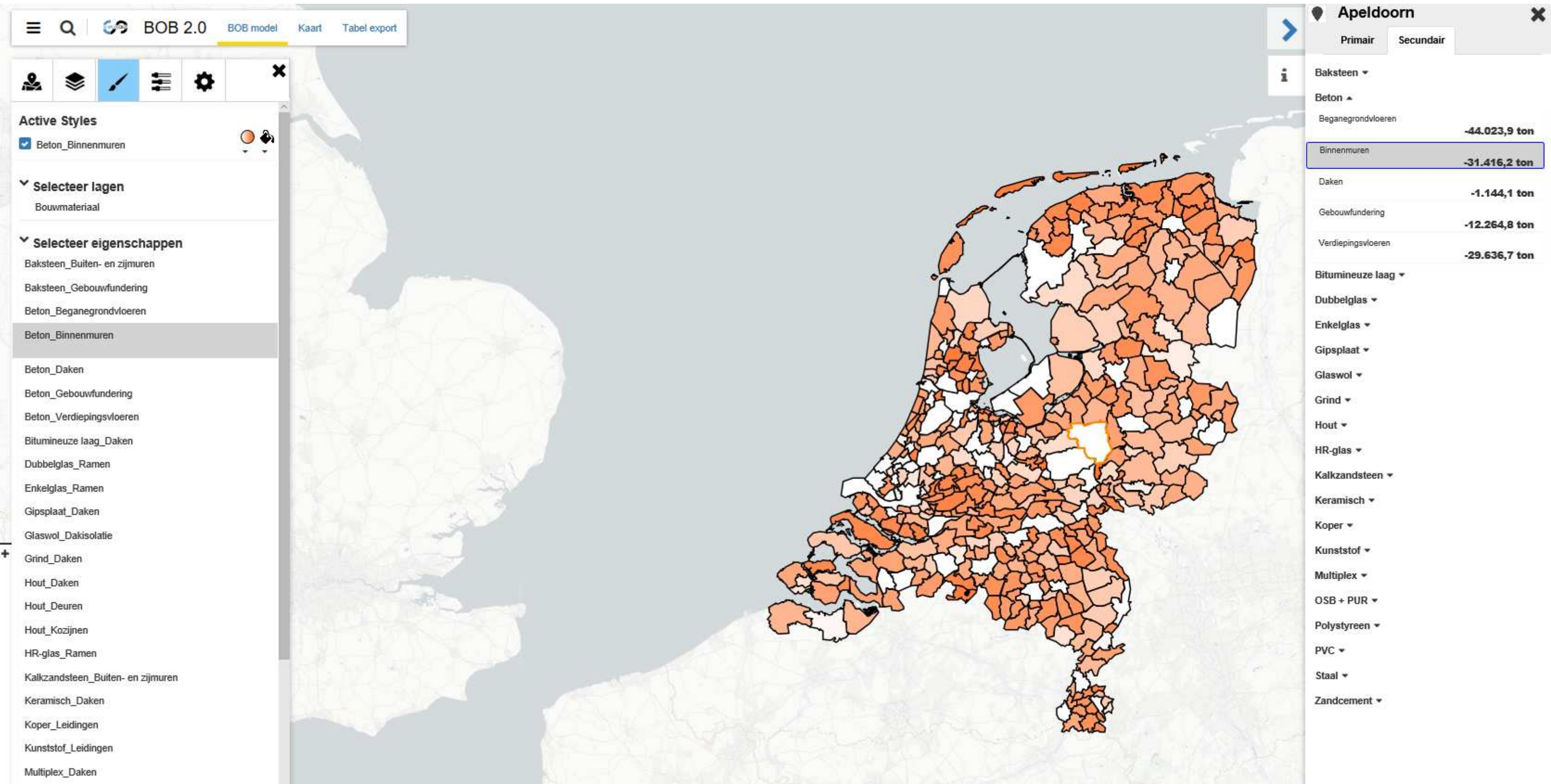
## Result

- BOB supports urban planning of local governments
- BOB adds facts because of its environmental and materials footprint data
- Aim is to exchange data with Madaster to accelerate towards detailed material passports
- Resulting in practical and smart reuse and recycling

# Structure of BOB model







# Value proposition BOB model



## Current BOB value proposition

- Supporting decisions on which and how circularity goals can be achieved.

*by*

- Concretising the amounts (supply and demand) of building materials for the purpose of informing local policy (for example regarding spatial planning and tenders, renovation policies, etcetera).

*for*

- (National), Regional, Local governments

*through*

- Advice on analyses and outcomes of the model

## Future BOB value proposition

- Supporting decisions on which and how circularity goals can be achieved.

*by*

- Include analyses on demolition & upcycle techniques
- Include quality assessments
- Include residual value methodology

*for*

- Governments, Housing corporations and asset managers

*through*

- Advice on analyses and outcomes of the model

## Value proposition BOB & Partners

- Supporting decisions on reuse and recycling of (secondary) building materials

*by*

- Offering a self explanatory tool with detailed information for decision making (materials, impact, costs, techniques, etc)

*for*

- Total building value chain

*through*

- e.g. license software tool (?)
- tbd

# Stakeholder involvement for tool development

## ➤ Current market experience BOB

- Projects for the city of Assen, Metropole Region of Amsterdam and the Ministry of the Interior.

## ➤ Reciprocal relation

- Quantitative insights on CE strategies for clients - industrial area redevelopment (Assen), the port region redevelopment (MRA) and Circular Built Environment Agenda (MI);
- While allowing for development and finetuning BOB-model based on concrete market demand.



Ministerie van Binnenlandse Zaken en  
Koninkrijksrelaties



# › Discussion

- **What is your practical market experience with stakeholders in your region?**
  - a. What kind of stakeholders are interested in digital tools?
  - b. What are their questions, or what are the problems they want to solve?
  - c. (How) do you involve these stakeholders in your tool development?
  
- **Do municipalities in your region express the ambition to build in a more circular manner?**
  - a. Do cities set targets regarding material reuse and demolition management?
  - b. What needs do cities in your region have in terms of data and knowledge?
  - c. What are current barriers to circular building in your region?



›

# THANK YOU FOR YOUR ATTENTION

# Current market experience BOB in NL

## Amsterdam port region:

- *Why:* Amsterdam looked for a way to optimally close material cycles for the redevelopment of a part of the port region into a residential area.
- *What:* BOB provided insights into types and amounts of available materials, an overview of possible strategies for low-impact material reuse and advise on next steps (focus on asphalt and concrete)
- *Follow up:* Expansion of the study to the whole harbour region of Amsterdam.

## City of Assen:

- *Why:* Assen aspired to concretise their ambition to build a new neighbourhood following circular principles.
- *What:* Comparison of three scenario's of circular construction for the re-development of an industrial area. Insights in environmentally best option (reuse of building structures and complete building components).
- *Follow up:* Further analysis of the results into exact material supply and demand for selected option. Actual implementation expected.

## Ministry of Internal Affairs:

- *Why:* The MIA sought quantitative input on national ambitions for circular economy in the built environment.
- *What:* An explorative study into the environmental impacts of circular building within the residential and utility sector, focussed on high-value reuse of CDW and optimal use of CDW for new building projects. Based on scenario analyses.
- *Follow up:* Results used by the taskforce 'transition agenda Built Environment'.









Active Styles

Beton\_Binnenmuren

▼ Selecteer lagen

Bouwmateriaal

▼ Selecteer eigenschappen

Baksteen\_Buiten- en zijmuren

Baksteen\_Gebouwfundering

Beton\_Beganegrondvloeren

Beton\_Binnenmuren

Beton\_Daken

Beton\_Gebouwfundering

Beton\_Verdiepingsvloeren

Bitumineuze laag\_Daken

Dubbelglas\_Ramen

Enkelglas\_Ramen

Ongecategoriseerd\_Bedekking muren en plafond

Ongecategoriseerd\_Dakwaterafvoer

Ongecategoriseerd\_Verdiepingsvloeren

Gipsplaat\_Daken

Glaswol\_Dakisolatie

Grind\_Daken

Hout\_Daken

Hout\_Deuren

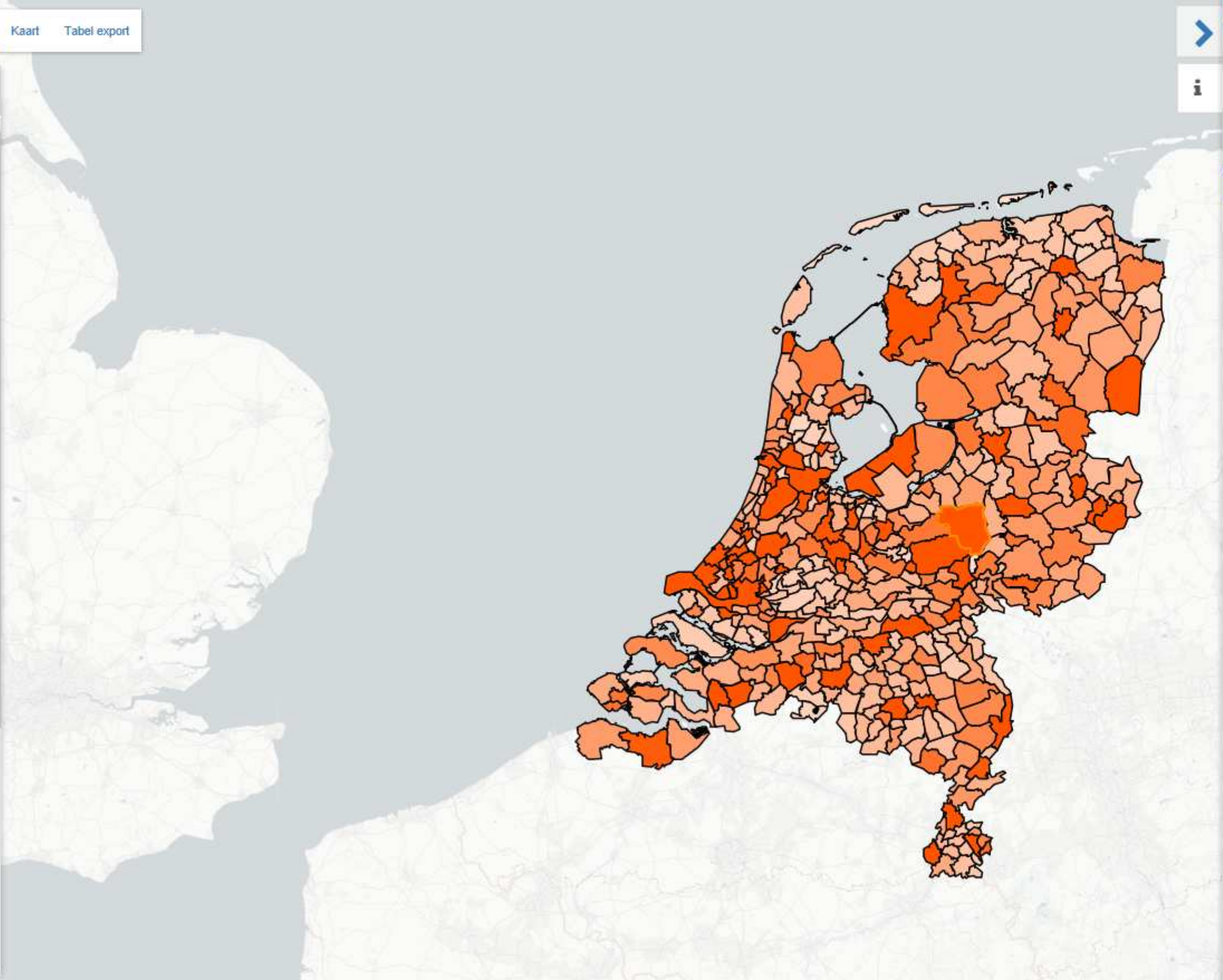
Hout\_Kozijnen

HR-glas\_Ramen

Kalkzandsteen\_Buiten- en zijmuren

Keramisch\_Daken

Koper\_Leidingen



Apeldoorn

Primair

Secundair

Baksteen ▼

Beton ▲

Beganegrondvloeren

Binnenmuren

Daken

Gebouwfundering

Verdiepingsvloeren

Bitumineuze laag ▼

Dubbelglas ▼

Enkelglas ▼

Ongecategoriseerd ▼

Gipsplaat ▼

Glaswol ▼

Grind ▼

Hout ▼

HR-glas ▼

Kalkzandsteen ▼

Keramisch ▼

Koper ▼

Kunststof ▼

Multiplex ▼

OSB + PUR ▼

Polystyreen ▼

PVC ▼

Staal ▼

Zandcement ▼

Zink ▼

47.718,9 ton

32.425,8 ton

1.279,5 ton

13.351,9 ton

31.483,8 ton



Active Styles

Betonpuin\_Beton\_Binnenmuren

▼ Selecteer lagen

Bouwmateriaal

▼ Selecteer eigenschappen

A-hout (onbehandeld)\_Hout\_Beganegrondvloeren

A-hout (onbehandeld)\_Hout\_Binnenmuren

A-hout (onbehandeld)\_Hout\_Buiten- en zijmuren

A-hout (onbehandeld)\_Hout\_Daken

A-hout (onbehandeld)\_Hout\_Deuren

A-hout (onbehandeld)\_Hout\_Gebouwfundering

A-hout (onbehandeld)\_Hout\_Kozijnen

A-hout (onbehandeld)\_Hout\_Verdiepingsvloeren

Betonpuin\_Beton\_Beganegrondvloeren

Betonpuin\_Beton\_Binnenmuren

Betonpuin\_Beton\_Daken

Betonpuin\_Beton\_Gebouwfundering

Betonpuin\_Beton\_Verdiepingsvloeren

Betonpuin\_Gasbeton\_Binnenmuren

Betonpuin\_Stucwerk\_Bedekking muren en plafond

Betonpuin\_Zandcement\_Beganegrondvloeren

Betonpuin\_Zandcement\_Verdiepingsvloeren

B-hout (behandeld)\_Hout\_Beganegrondvloeren

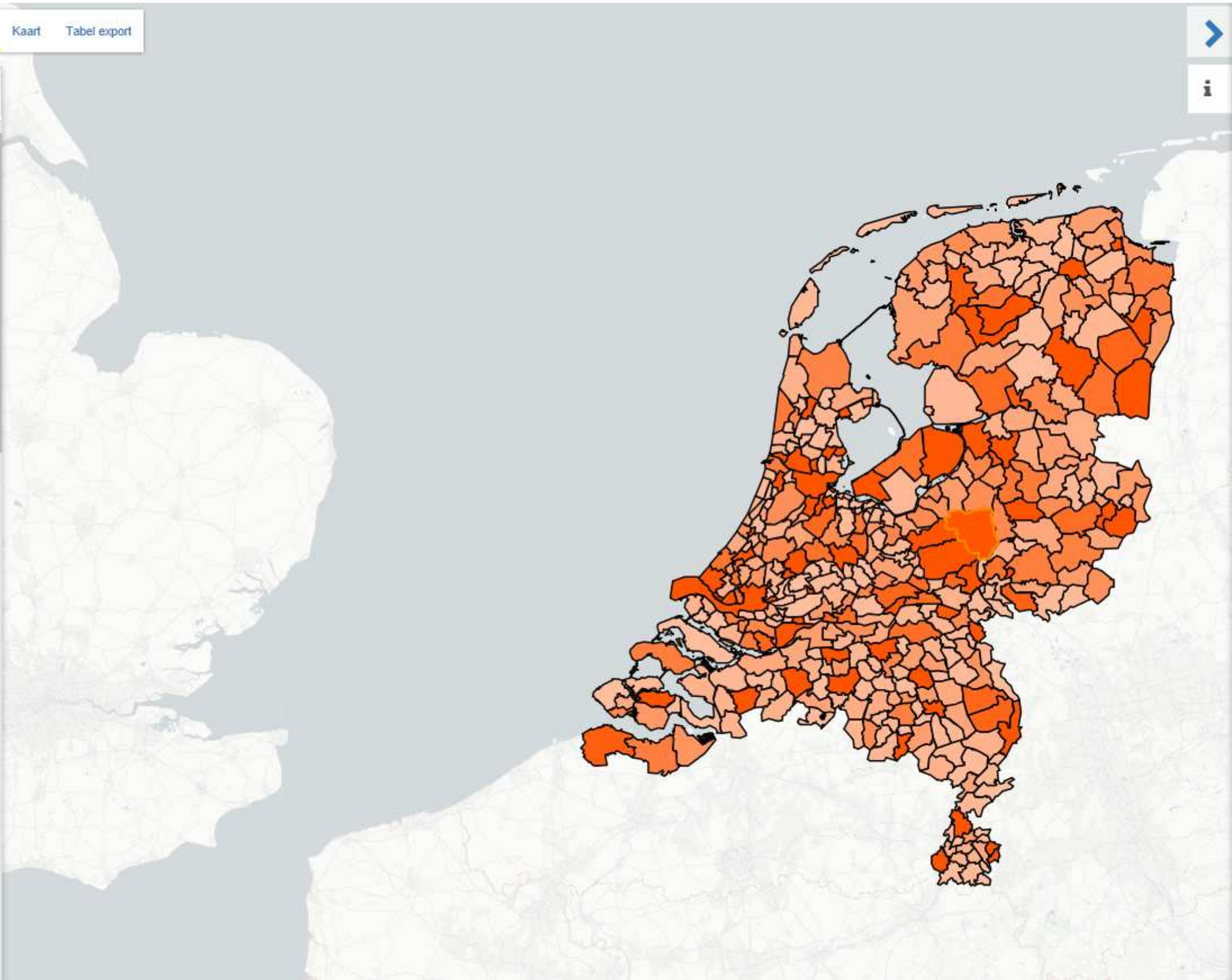
B-hout (behandeld)\_Hout\_Binnenmuren

B-hout (behandeld)\_Hout\_Buiten- en zijmuren

B-hout (behandeld)\_Hout\_Daken

B-hout (behandeld)\_Hout\_Deuren

B-hout (behandeld)\_Hout\_Gebouwfundering



Apeldoorn

Primair

Secundair

A-hout (onbehandeld) ▼

Betonpuin ▲

Beganegrondvloeren

3.695 ton

Binnenmuren

1.009,6 ton

Daken

135,4 ton

Gebouwfundering

1.087,1 ton

Verdiepingsvloeren

1.847 ton

Binnenmuren

207,7 ton

Bedekking muren en plafond

109,8 ton

Beganegrondvloeren

737,5 ton

Verdiepingsvloeren

368,6 ton

B-hout (behandeld) ▼

C-hout (geïmpregneerd) ▼

Dakbedekkingsmateriaal bitumineus ▼

Gipshoudend materiaal ▼

Glasrecycling ▼

Isolatiemateriaalafval ▼

Koperrecycling ▼

Kunststoffenverwerking ▼

Mengpuin ▼

Metselwerkpuin ▼

Plafondplatenafval ▼

Staalrecycling (niet roestvrij) ▼



Vraag/aanbod

Resultaat

Vergelijk

Importeer

Routes ?

Resultaat opslaan

Herkomst	Materiaalsoort	Materiaalhoeveelheid	Productwaarde	SloopKosten	VerwerkingsKosten	LogistiekeKosten	kgCO2	AantalVoertuigen	Afstand	VoertuigKm	Bestemming
Heerhugowaard	Betonpuin	1668,0 ton	€-1.668,00	€1.668,00	€16.263,00	€4.291,50	2.718,0 kg	112	25,5 km	2861,0 km	Tol Milieu
Tol Milieu	Beton	1668,0 ton	€33.360,00	€1.668,00	€41.700,00	€2.260,50	1.507,0 kg	56	26,9 km	1507,0 km	Struyk Verwo Infr
Struyk Verwo Infra B.V.	Prefab muur	1668,0 ton	€83.400,00	€0,00	€0,00	€1.327,20	1.051,0 kg	56	19,7 km	1106,0 km	Amsterdam
Purmerend	Betonpuin	332,0 ton	€-332,00	€332,00	€3.237,00	€193,50	123,0 kg	23	5,6 km	129,0 km	Tol Milieu
Tol Milieu	Beton	332,0 ton	€6.640,00	€332,00	€8.300,00	€484,50	323,0 kg	12	26,9 km	323,0 km	Struyk Verwo Infr
Struyk Verwo Infra B.V.	Prefab muur	332,0 ton	€16.600,00	€0,00	€0,00	€284,40	225,0 kg	12	19,7 km	237,0 km	Amsterdam
Totaal		6000,0 ton	€138.000,00	€4.000,00	€69.500,00	€8.841,60	5.947,0 kg	271	124,5 km	6163,0 km	