XCARCITY Urbanism Next

Desiging car low cities

Barry Ubbels (Amsterdam)
Daniel Scheerooren (AMS)
Carla Robb (TNO)
Bart van Arem (TU Delft)
Maaike Snelder (TU Delft/TNO)

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1 Million new houses? What about accessibility and liveability ?

.

- The road transport system has reached the limits:
  - usage of space
  - externalities
- Public transport system has also reached capacity limits.

Can we imagine a city without private cars?

Scarcity of space
eX Car City
---------- +
XCARCITY?

XCARCITY facts and figures

- Duration: 1st June 2023 -1st June 2029
- Budget: 4 M€ by NWO, 2 M€ by partners
- 9 PhD candidates, 2 postdocs, 1 programmer, TNO researchers (60 person years)
- 33 partners from academia, public and private sector
- Lead by TU Delft: Bart van Arem (PI), Maaike Snelder (co-PI)

Perspectief programme of NWO (Dutch Research Council)

New, challenging research projects within the application-oriented and technical sciences that generate economic and social impact in thematic areas relevant to the Netherlands.

https://www.nwo.nl/en/researchprogrammes/perspectief/previous-awards

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Smart mobility – promising solutions

Flexible combinations of:

- walking and cycling
- shared electric vehicles
- transport hubs
- traffic management

Building on service orientation and electrification of mobility.

Will this work?

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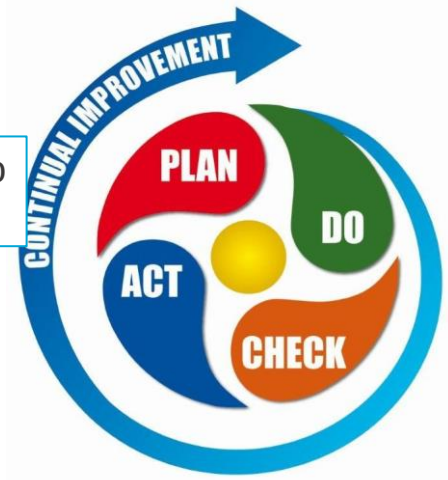
Proposition XCARCITY?

Digital twin federation
Real-time management & Strategic planning

Model-based scenario development

Real-life and virtual reality data



Implementation of interventions

Monitoring and analyses

Innovations:

Mobility service orientation instead of a transportation infrastructure orientation

Closes the loop between data-driven and model-based approaches

Develops integrated, smart, safe and sustainable mobility services

Support collaborative decision making by stakeholders

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Towards content-rich digital twins

SP1 Framework, method and guidelines for optimal **sensor network design** and predictions

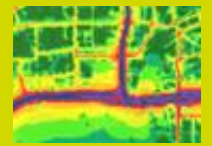
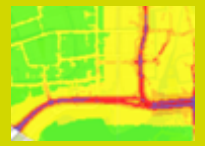
SP2 Insights in **behavioral responses**

SP3 Algorithms for and insights in the design of **smart mobility applications**

SP 6 Digital twin





SP4 Algorithms for and insights in the design of integrated transport networks

SP5 Algorithms for large-scale collection of mobility data for **traffic management**

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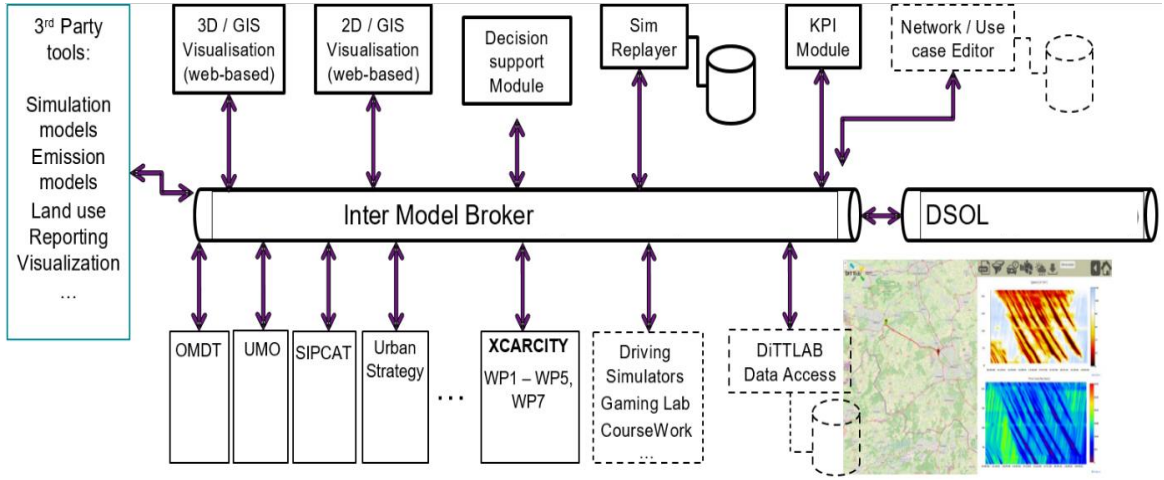
Digital twin federation



- 3D models of the cities selected for the use cases
- Open source model architecture of XCARCITY DT and communication protocol
- Visualisation dashboard and user interface
- Scenarios for selected use cases, with interactive options, visualisations and KPIs

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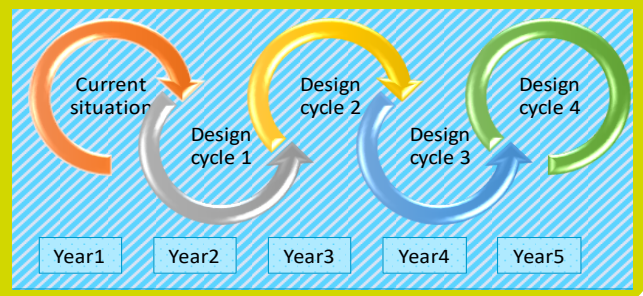
Utilisation approach

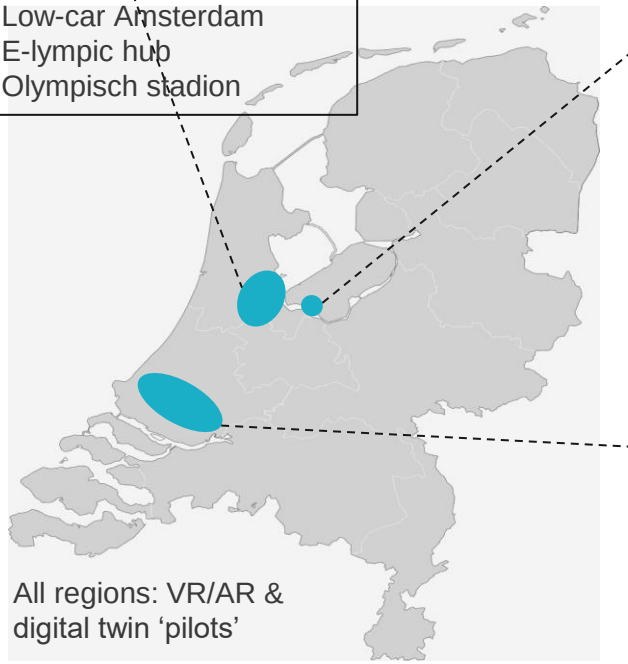
Pilots and applications, research by design, stakeholder interaction



Amsterdam and surroundings: centralized trip patterns

Pilots, e.g.
- Low-car Amsterdam
- E-lympic hub
- Olympisch stadion

Almere Pampus: a new city district



All regions: VR/AR & digital twin 'pilots'

Metropolitan region Rotterdam-The Hague: decentralized trip patterns

Pilots, e.g.
- BMW shared mobility
- MaaS pilots
- Dynamic road spaces

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Goal today

- Explore together how digital twins can be used to design car low areas
  - Interventions
  - Key Performance Indicators
- Based on a case study for Amsterdam

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Duration	Topic
10 min	**Introduction to the programme** (Maaike Snelder - TNO + TU Delft)
10 min	**Amsterdam use Case - Zuidas Challenges** (Barry Ubbels– Amsterdam Gemeente)
15 min	**Low-car interventions** (Sean van der Lee - Master Research)
15 min	**Urban co-design processes:** (Daniel Scheerooren – Amsterdam Institute)
30 min	**Digital Twins Demo!** Maaike Snelder
10 min	**Break**
70 min	**Interactive Session + Co design** World Café
30 min	Topic 1: **Strategic Planning**
10 min	Break
30 min	Topic 2: **Impact assessment and monitoring**
10 min	Assessment Panel
10 min	Close out

Working on better cities with fewer cars

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Zuidas Challenges

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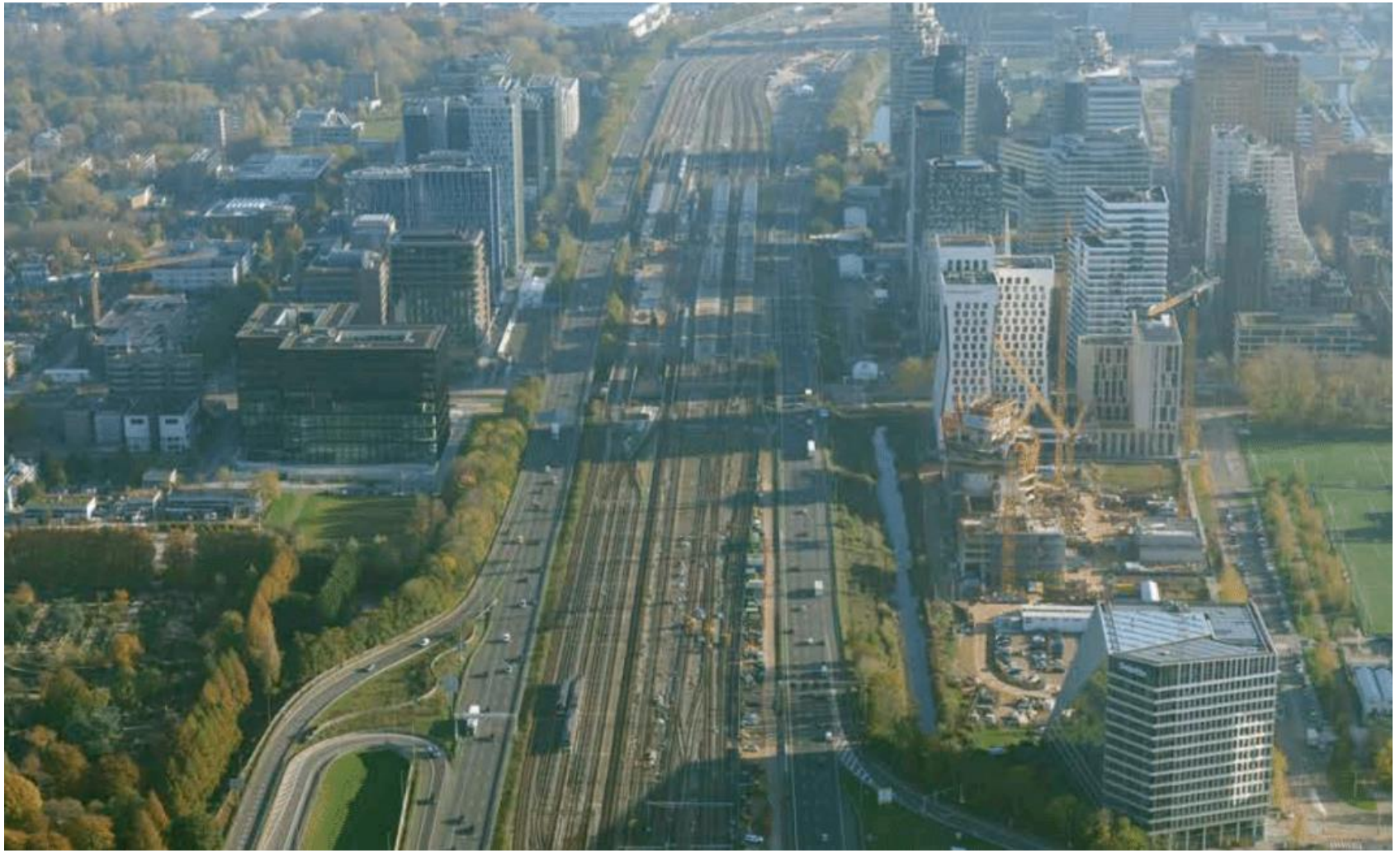
Use case Zuidas (now)



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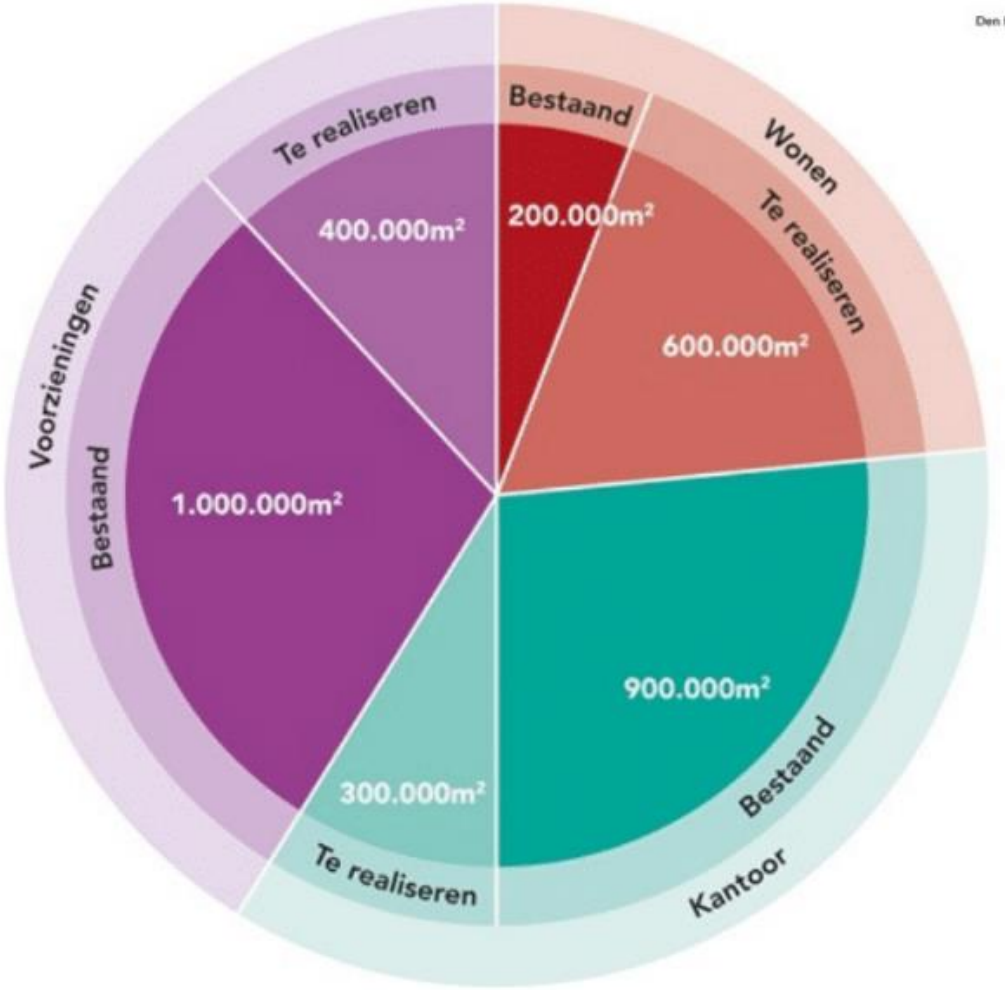
Use case Zuidas (planned)



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Use case Zuidas (challenges)

Foto: Zuidas.nl/Jaap Brouwer

Foto: stadsarchief Amsterdam

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Challenge 1:
Support Zuidas in mobility transition

- Traditional business area with high car dependency and many (unused) parking garages
- No change means no accessibility and no development
- How to affect behavior/mindset (employers, employees, project developers) and keep area accessible and liveable

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Challenge 2:
New tooling to support decision making

- Zuidas relies on tools such as 2D mapping and traditional transport model (VMA)
- Need for new visualization tools (3D) that support in spatial planning choices (how to divide space between staying and moving)
- Special attention for walking (large pedestrian flows expected)
- Use case design Parnassusweg

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Questions for session

- How can a digital twin be applied given the challenges of Zuidas?
- What KPI’s should be used?
- Given existing projects/programmes (Amsterdam 3D, Twinning4Resilience (EU), DRO project, Smart Mobility programme MRA)

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Amsterdam 3D

Link: 3D Amsterdam

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Low Car City

Which measures can we take to reduce cars in the city?

Ir. Sean van der Lee
09/10/2024

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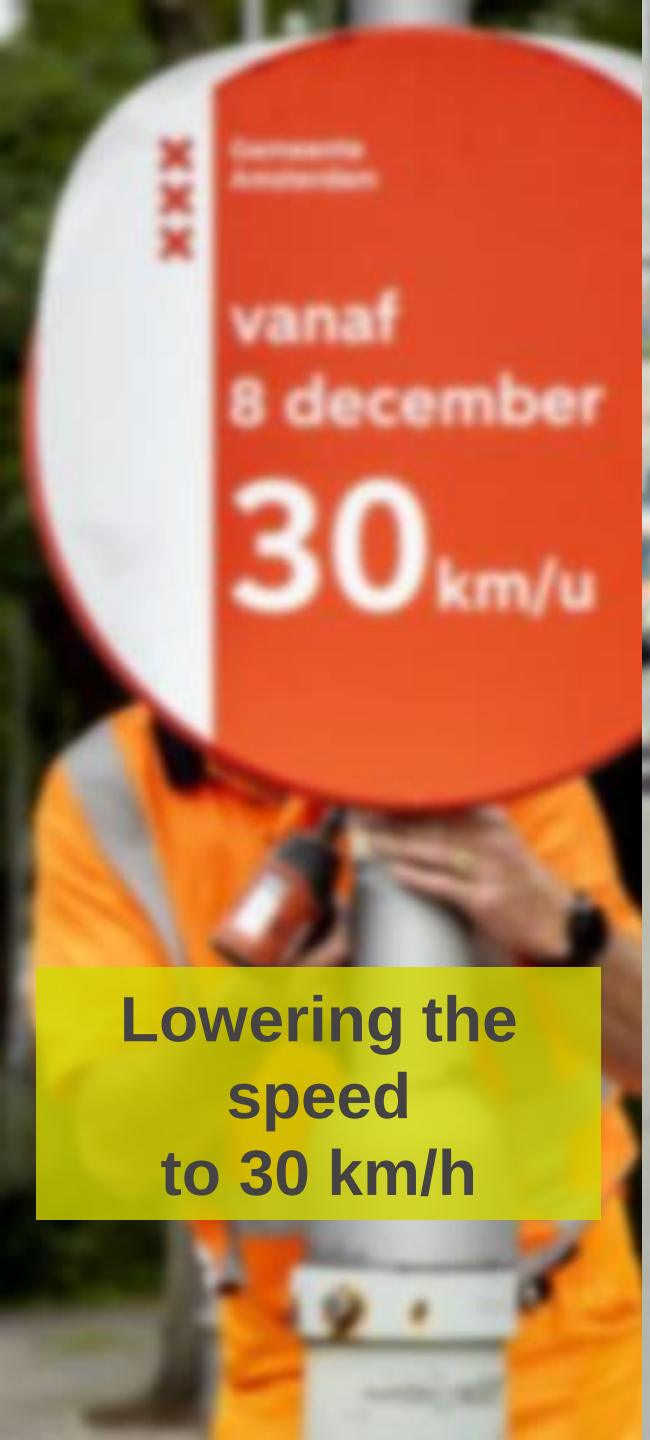
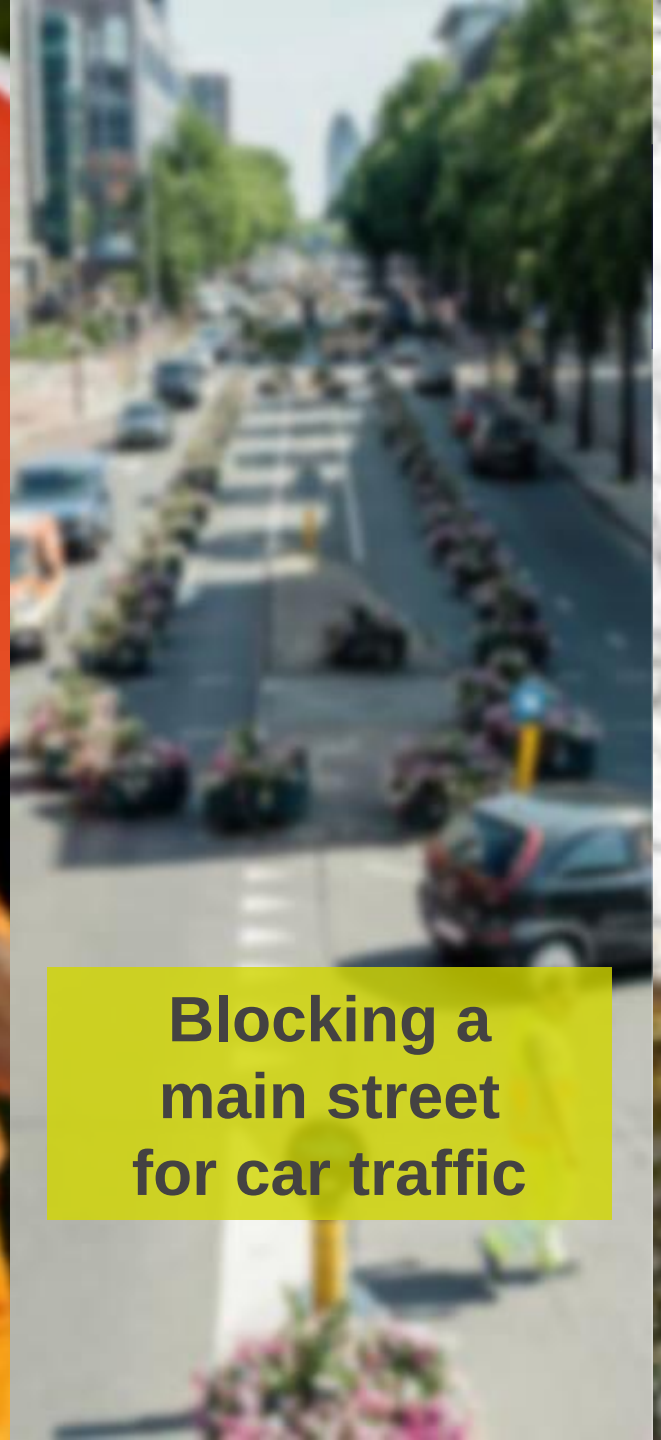
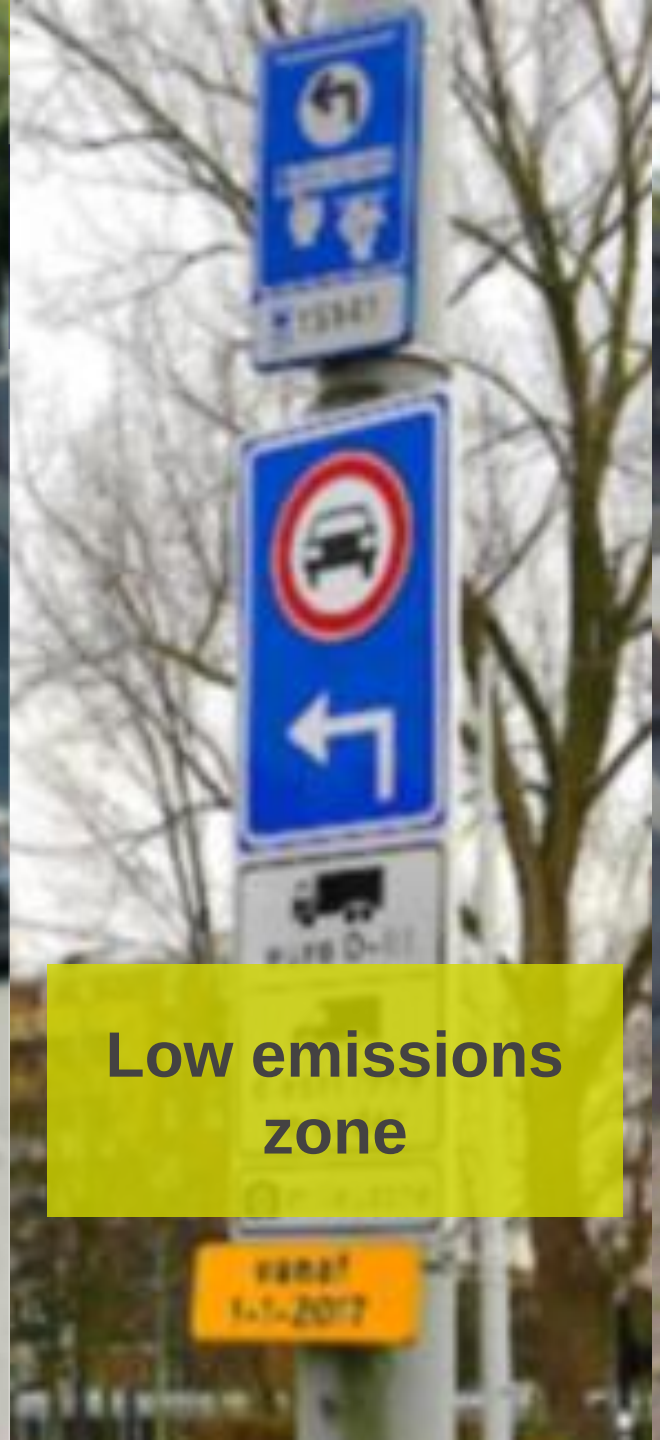


Lowering the speed to 30 km/h

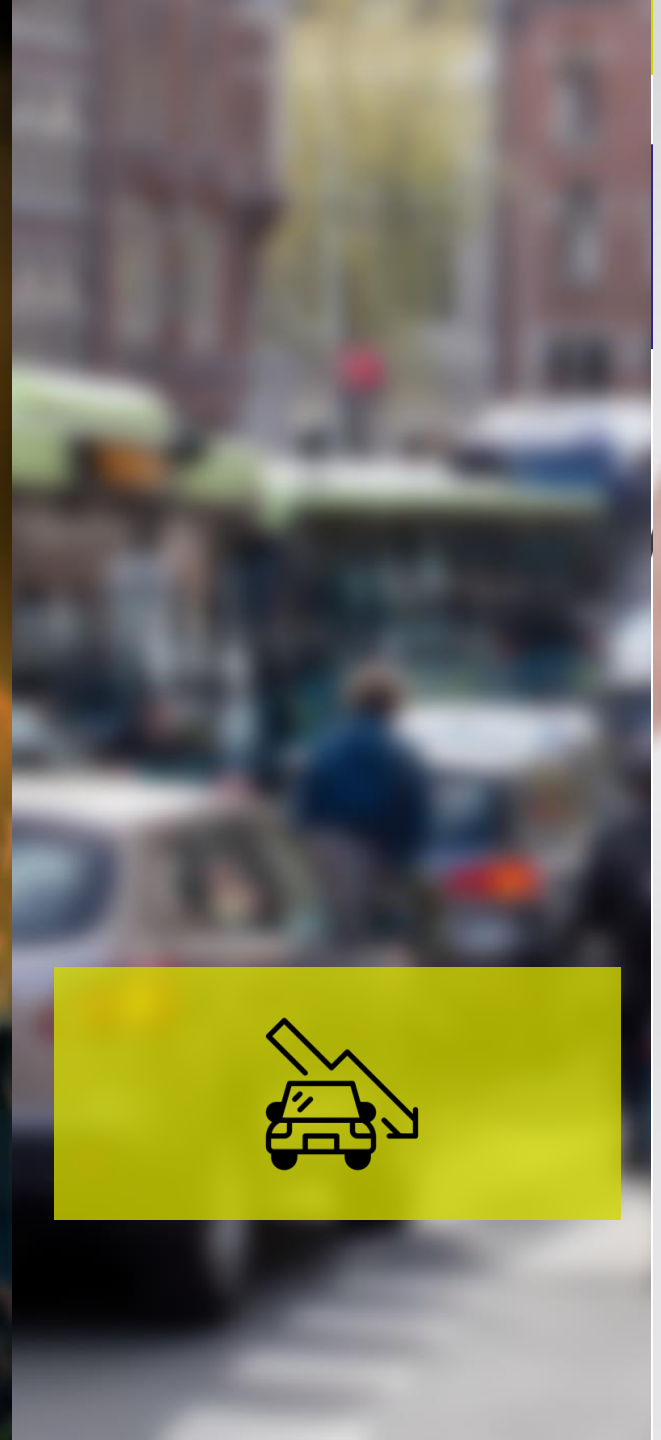


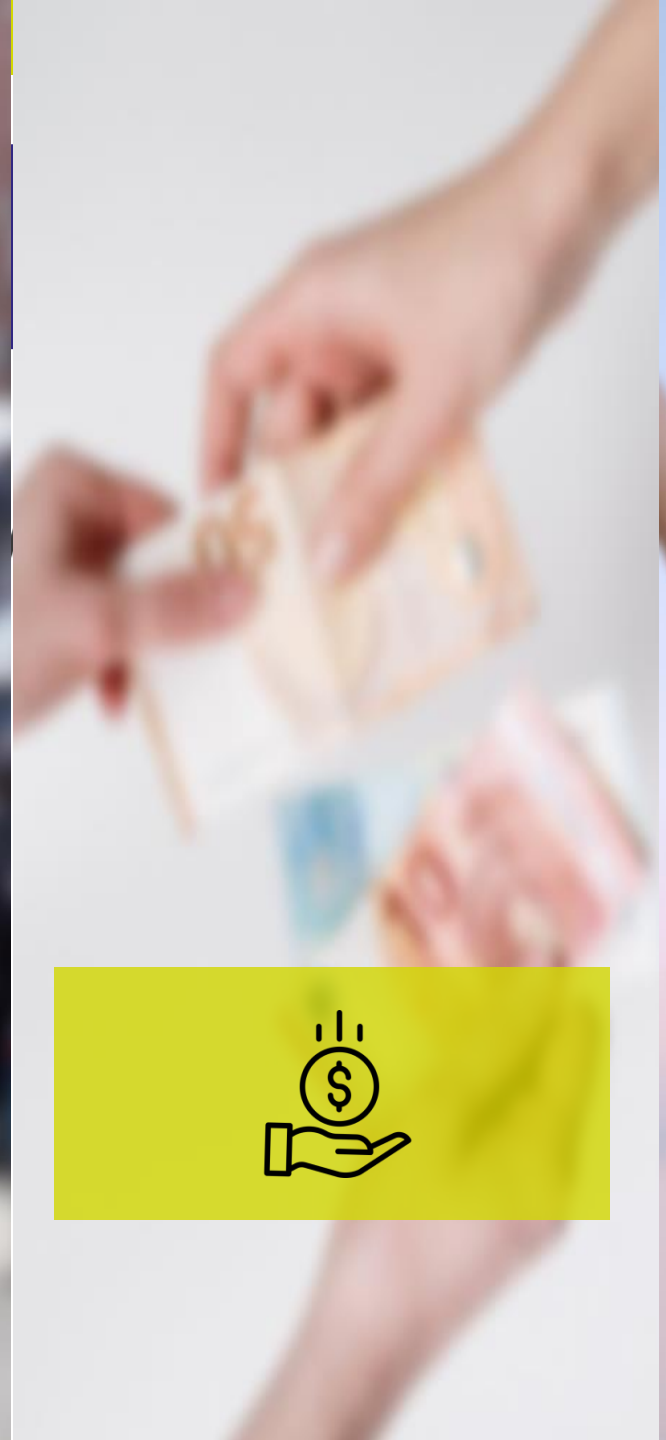
Blocking a main street for car traffic

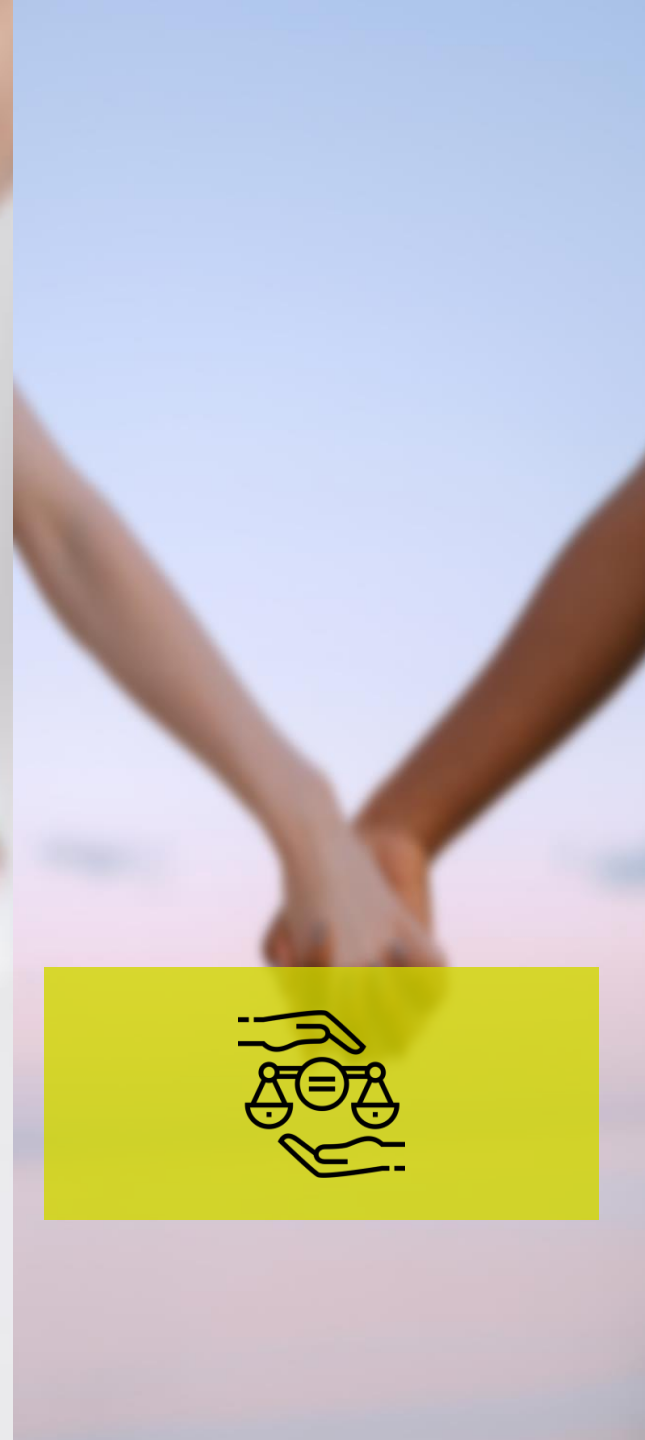


Low emissions zone

Increasing parking price





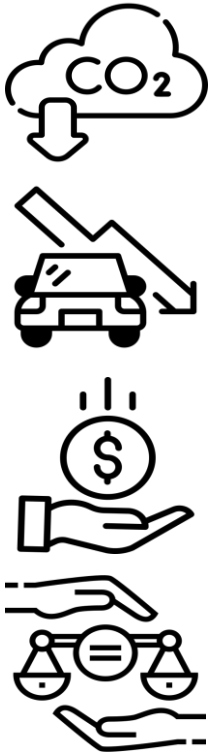



Setting
Emission
Standards


Lowering
the
Speed


Blocking
Car
Traffic


Increasing
Parking
Prices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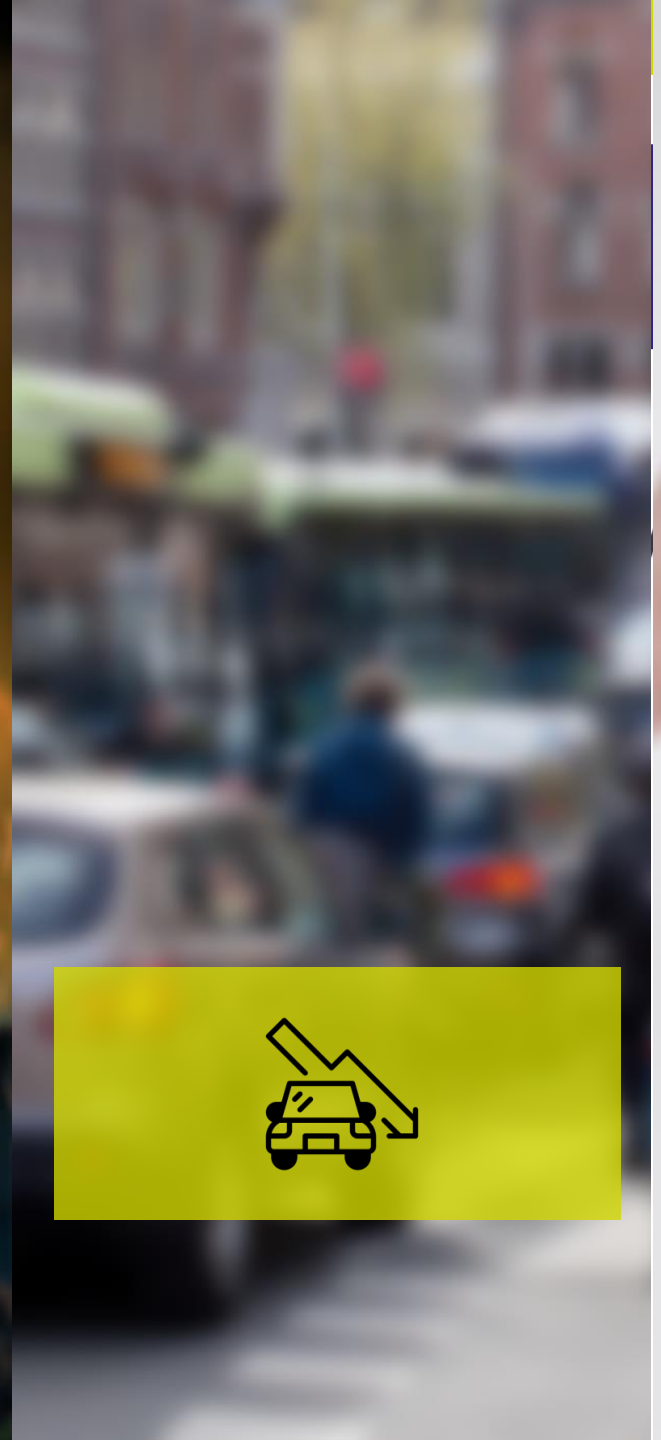

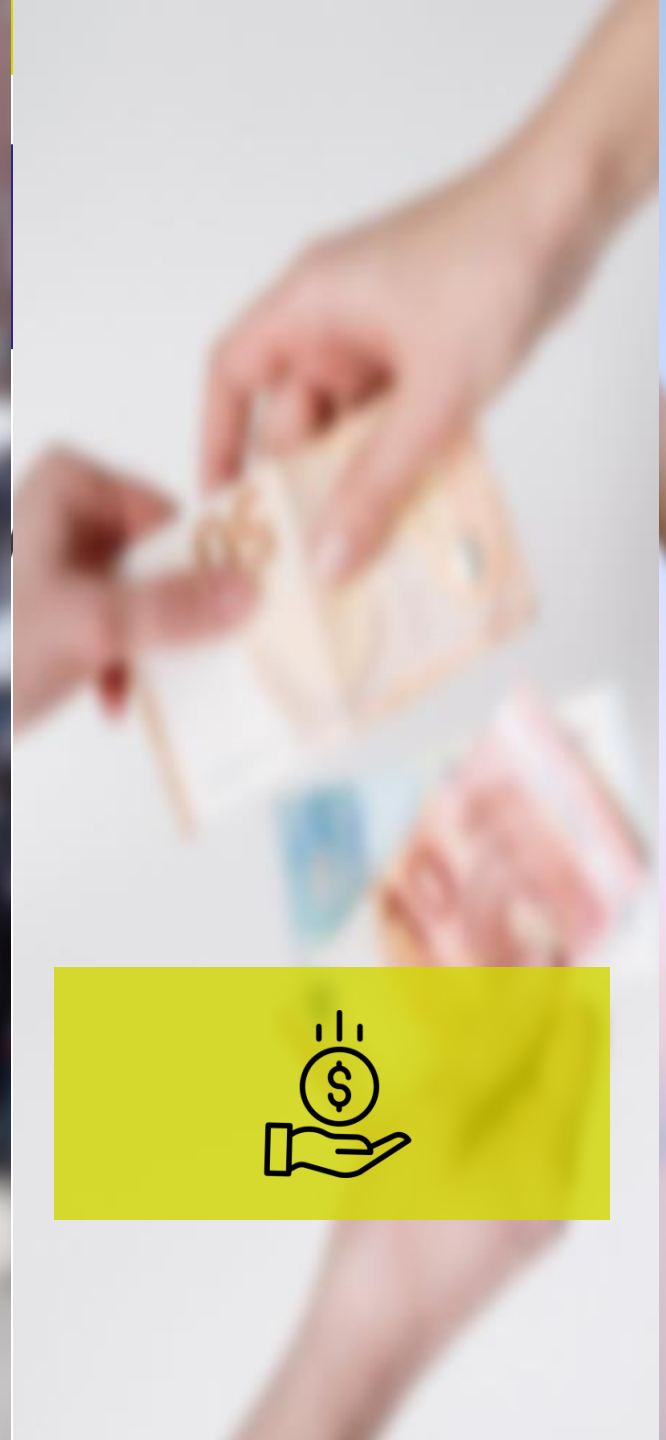

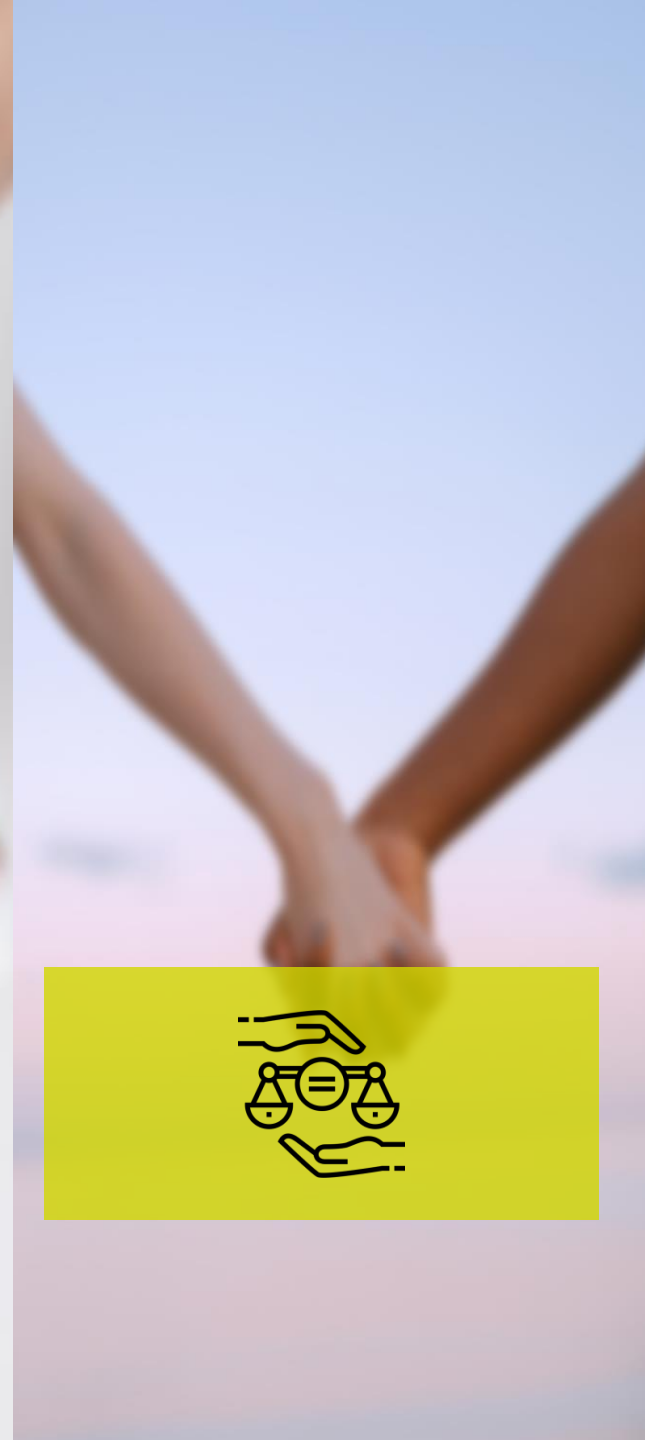

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Paris

Paris to charge SUV drivers higher parking fees to tackle 'auto-besity'

Size, weight and motor will be taken into account as councillors target 'dangerous, cumbersome' vehicles

Protecting free off-peak travel for 10 million older and disabled people

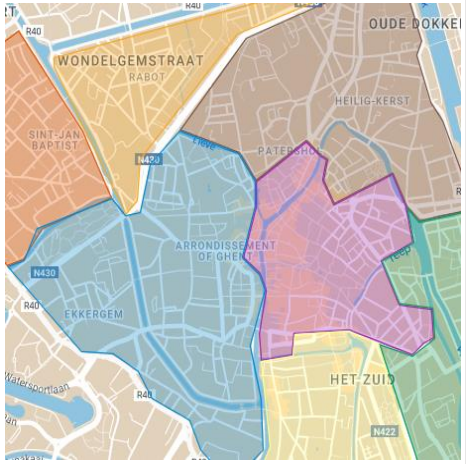
Department for Transport

Categories of measures

Regulation

Infrastructure

Land-use



Information

Pricing

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Main questions

Why reduce the number of cars?

What are fair measures that spread effects equally?

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All measures

Regulations

- Low emissions zones
- Limited traffic zones
- Car-free zones
- Car-free days
- Lowering the speed
- Parking regulations

Pricing

- Congestion charge
- Distance-based pricing
- Toll roads
- Mobility credits
- Parking pricing
- Public transport fare reduction

Land-use planning

- X-minute city
- Division into sections
- Parking minimums & maximums
- Remote parking & shuttle service
- Quality of public transport

Infrastructure

- Infrastructure for active modes
- Shared micromobility
- Shared cars
- Multi-modal planners

Marketing, communication

- Information campaigns

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	Traffic	Cost	Emission	Fairness
Decreasing attractiveness				
Entry restrictions				
Low emissions zone	3-28%	100-200 million Annual loss 1-6 mil	$PM_{2.5}$: 25-27% reduction PM_{10}: 3-23% reduction NO_X: 0-6% reduction NO_2: 5-46% reduction CO: 0% CO_2: 0	Lower income households have higher emitting vehicles. Subsidy can replace older vehicles
Limited traffic zone	5-20%	615.000 for 1 area Annual profit	$PM_{2.5}$: 12-14% reduction PM_{10}: 12-22% reduction NO_X: 12% reduction CO: 9% CO_2: 12	Accessibility of centre decreases for visitors
Car-free zone	11-88%	Low	PM: 68% reduction - 10% increase NO_X: 75% reduction - 11% increase CO_2: 88% reduction - 12% increase	Accessibility of centre decreases for visitors
Car-free days	27%	45,000 – 2 million	$PM_{2.5}$: 0-49% reduction PM_{10}: 13% reduction - 300% increase NO: 0-95% reduction NO_2: 0-50% reduction CO: 0-35% reduction $Black\ carbon$: 80% reduction	Accessibility of centre decreases for visitors and traffic is diverted to areas outside the car-free zone
Infrastructural change				
Division into sections	17-35%	8 million Annual profit	$NO2$: 18% reduction	Accessibility of the city decreases for residents
Lowering the speed	Unclear	Low Annual profit	$PM_{2.5}$: 4-33% reduction NO_X: 25% reduction - 5% increase NO_2: 4-25% reduction CO_2: 0-25% reduction	Significantly increases traffic safety
Parking policy				
Parking regulations	10-30%	Low	Reduction	Behaviour is changed without increasing the cost
Parking pricing	4-39%	Low	Reduction	Most behavioural change will be from people with a lower income
Parking minimums & maximums	10-30%	Low	Reduction	Behaviour is changed without increasing the cost
Remote parking & shuttle	4-30%	Low	Reduction	Behaviour is changed without increasing the cost
Road pricing				
Congestion charge	11-27%	150-200 million Annual profit 50-200 mil	PM_{10}: 6-16% reduction NO: 7-25% reduction NO_X: 8-13% reduction NO_2: 15% reduction - 20% increase CO: 6-9% reduction CO_2: 14-20% reduction	Low-income households pay more in relation to their income
Distance-based pricing	0-15%	100-500 million Annual loss	Reduction	Low-income households pay more in relation to their income and will travel less
Toll roads	12-15%	Annual profit	Reduction	Low-income households pay more in relation to their income and will travel less
Mobility credits	6-24%	High	Reduction	Low-income households pay more in relation to their income and will travel less. However, it improves the distribution of income among travellers
Increasing attractiveness of alternatives				
Infrastructure for active modes	5-15%	Benefit/cost ratio 2.6	NO_X: 2500kg reduction CO_2: 1500 tonnes reduction	Affordable transportation for most people benefitting everybody
Improved public transport				
Quality of public transport	2-10%	Positive benefit/cost ratio	Reduction	Improves accessibility for everybody but attracts wealthier households
Public transport fare reduction	10-20%	100-1200 p/traveller	Reduction	Can be used to attract new users and increase equality of accessibility
Shared vehicles				
Shared micromobility	0-40%	Low	Reduction	Mostly used by a specific demographic but increases accessibility for all
Shared cars	0-50%	Low	$PM_{2.5}$: 2-4% reduction CO_2: 3-18% reduction	Increases mobility options for all travellers
Multi-modal planners	0-50%	Low	10-20%	Provides an alternative service without restrictions but is most used by a specific demographic
Multiple centres	Yes	Dependent on the city	Reduction	Increases accessibility and decreases distance for all
Information campaign	7-11%	Low Annual profit	CO_2: 11% reduction	Equality can be increased by providing information

Measure	Presence in Amsterdam
Regulation	
Low emissions zone	
Limited traffic zone	
Car-free zone	
Car-free days	
Lowering the speed	
Parking regulations	
Pricing	
Congestion charge	
Distance-based pricing	
Toll roads	
Mobility credits	
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Land-use planning	
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Remote parking & shuttle service	
Quality of public transport	
Infrastructure	
Infrastructure for active modes	
Shared micromobility	
Shared cars	
Multi-modal planners	
Marketing, information	
Information campaign	

Innovation, experimentation & co-creation

Daniël Scheerooren
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Mobility is often controversial…

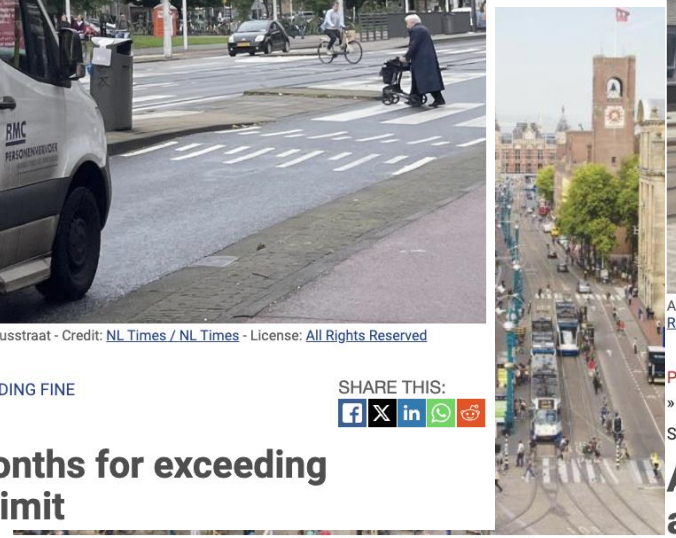
A van in a 30 km/h zone in Amsterdam slows down to let a woman cross Linnaeusstraat - Credit: NL Times / NL Times - License: All Rights Reserved

BUSINESS AMSTERDAM SPEED LIMIT 30 KM/H CJIB SPEEDING FINE

SHARE THIS:

WEDNESDAY, 25 SEPTEMBER 2024 - 14:30

Nearly 40,000 fines in four months for exceeding Amsterdam's 30 km/h speed limit



Aerial view of the Dam square, Amsterdam - Credit: gianliguori / DepositPhotos - License: DepositPhotos

A sign warns drivers of increased paid parking times, and rising fees in the Amsterdam city center. 14 June 2023 - Credit: NL Times / NL Times - License: All Rights Reserved

POLITICS BUSINESS PARKING AMSTERDAM PARKING RATES MELANIE VAN DER HORST

» MORE TAGS

SHARE THIS:

SATURDAY, 24 JUNE 2023 - 08:15

Amsterdam parking fee to rise sharply from July 3; Some areas with 24-hour paid parking

POLITICS BUSINESS WEESPERSTRAAT CLOSURE BETTER TRAFFIC FLOW CAR TRAFFIC

» MORE TAGS

SHARE THIS:

SUNDAY, 23 JULY 2023 - 10:55

Trial of closure of Weesperstraat in Amsterdam comes to an end, irritation and more traffic as a result

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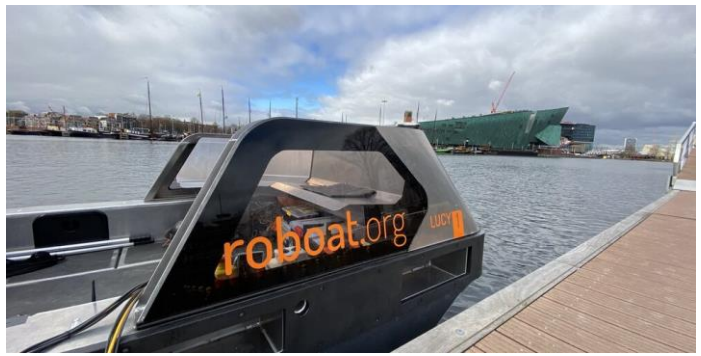
Why do urban experimentation?

Lesson 1: Innovation requires adaptation and flexibility

Innovation needs an adaptive and flexible approach, because

- there is no general approach to addressing **complex urban challenges**
- talent is needed that constantly adapts to today's global knowledge economy
- how you arrive at the solution is as important as the solution itself.

Through **learning by doing**, you unravel processes, powers and principles as you go.



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Why co-create?

Lesson 2: Innovation requires trust

In order to produce a continuous stream of innovative solutions that matter, true partnerships require trust. Trust that the other partners are highly committed partners, with an enduring commitment and that understand the interdependent nature of success.

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Why do living labs?

Lesson 3: Innovation requires a place

- Innovation needs a safe place to discover, learn, develop, apply, and improve — within and alongside the city.
- A physical space for all partners, away from their usual workspace at the universities or municipal desks, that is inspiring. A place that allows all partners to work freely and brainstorm aloud.
- An open place where there are no prerequisites that prevent acceptance or participation to the place.
- It's a way to balance the nature of the challenge (**practice**) and the current state of knowledge (**research**)

Such place encourages cross-pollination of partnerships, the development of new concepts and the nurturing of new talent.

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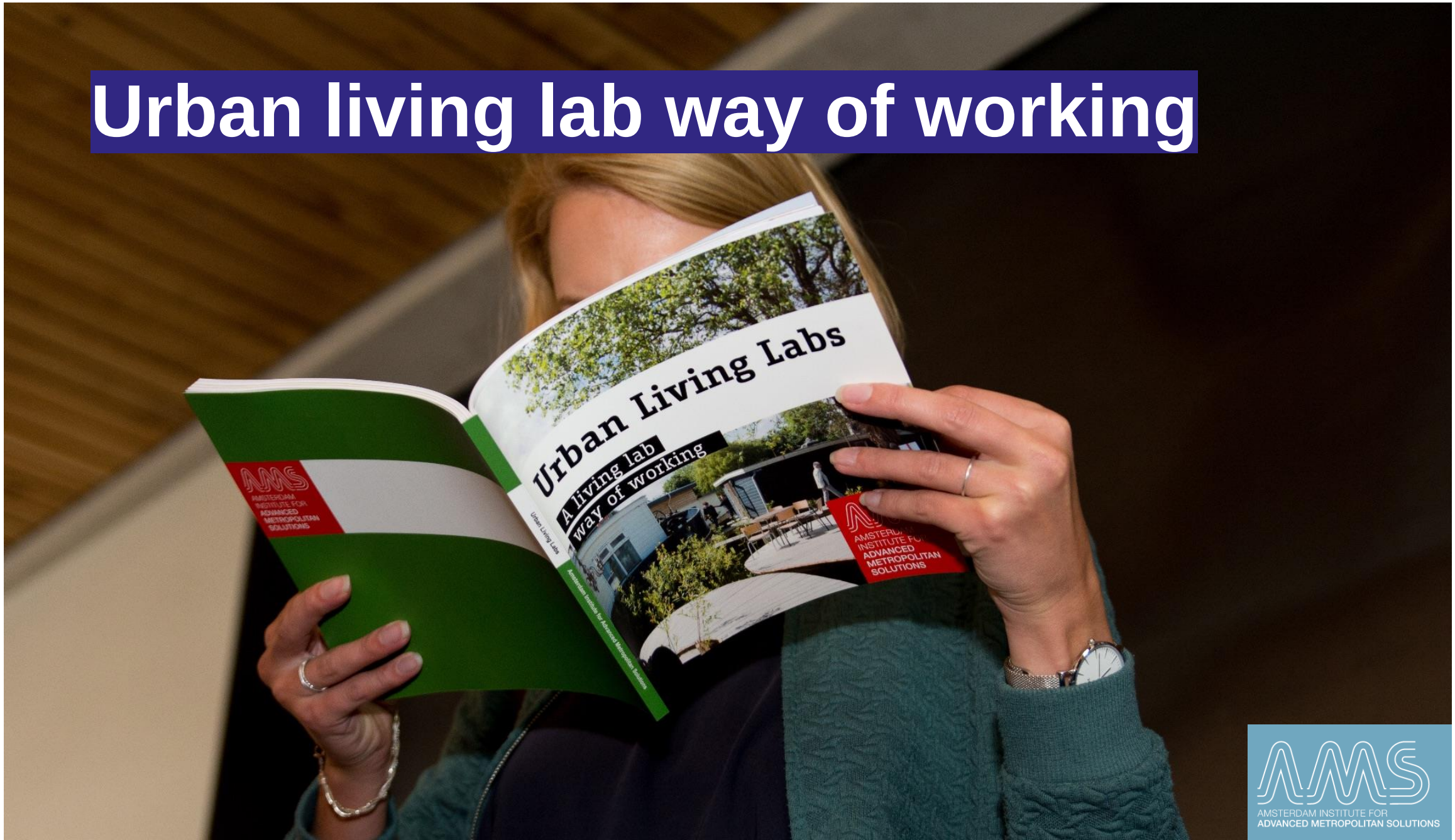
Where co-creation can make a change

Urgent, social, complex challenges that can best be solved iteratively *with stakeholders*

Urban living lab way of working

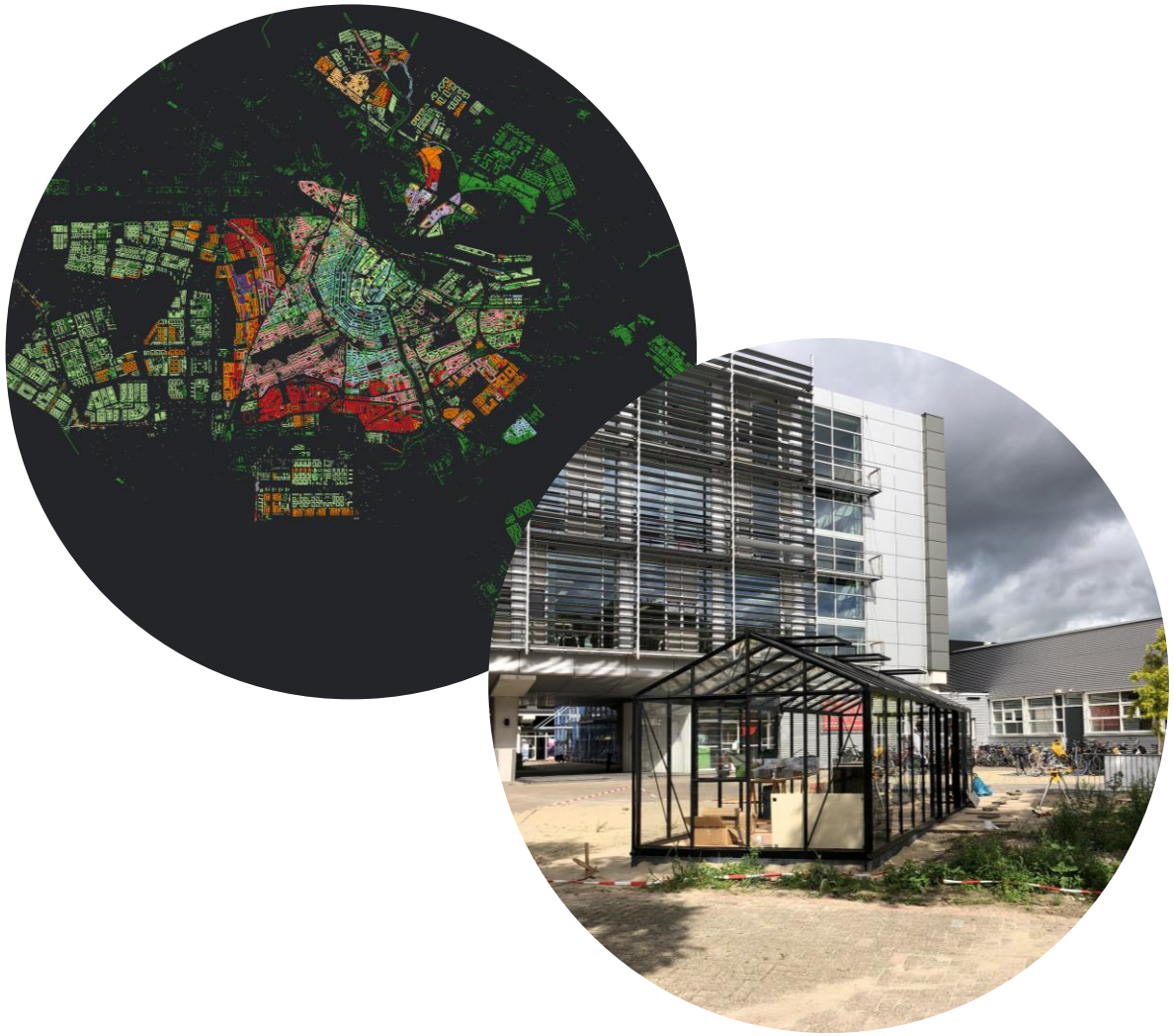


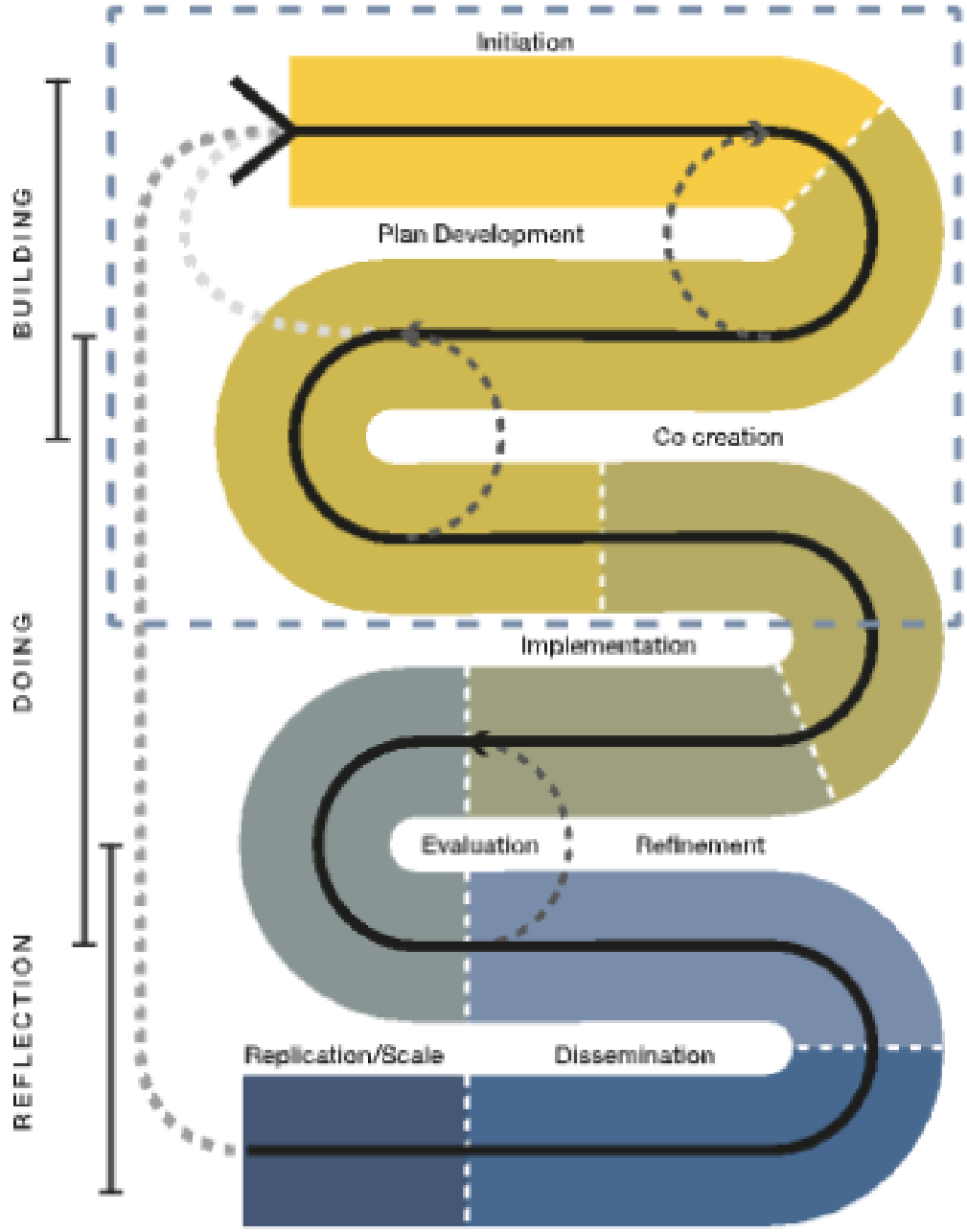
Features of an urban living lab

Urban Living Labs provide a perfect set-up for experimenters to **validate urban innovations** addressing **complex urban challenges**

• **Labs…**	• **AND…**
• occur in **real-life**	• have an **academic backbone**
• are small-scale **urban environments**	• aim to be **replicated at the urban scale**
• are **challenge driven** (responsive to the missions of the city)	• involve urban **innovations**
• happen with relevant **stakeholders** (students, scientists, citizens, companies, and cities)	• have **low barriers to collaboration**
• are carried out in a highly **diverse community**	• co-create and test in **an iterative way**
• have a strong focus on **societal impact**	

ULL Way of working





Urban Living Lab way of working

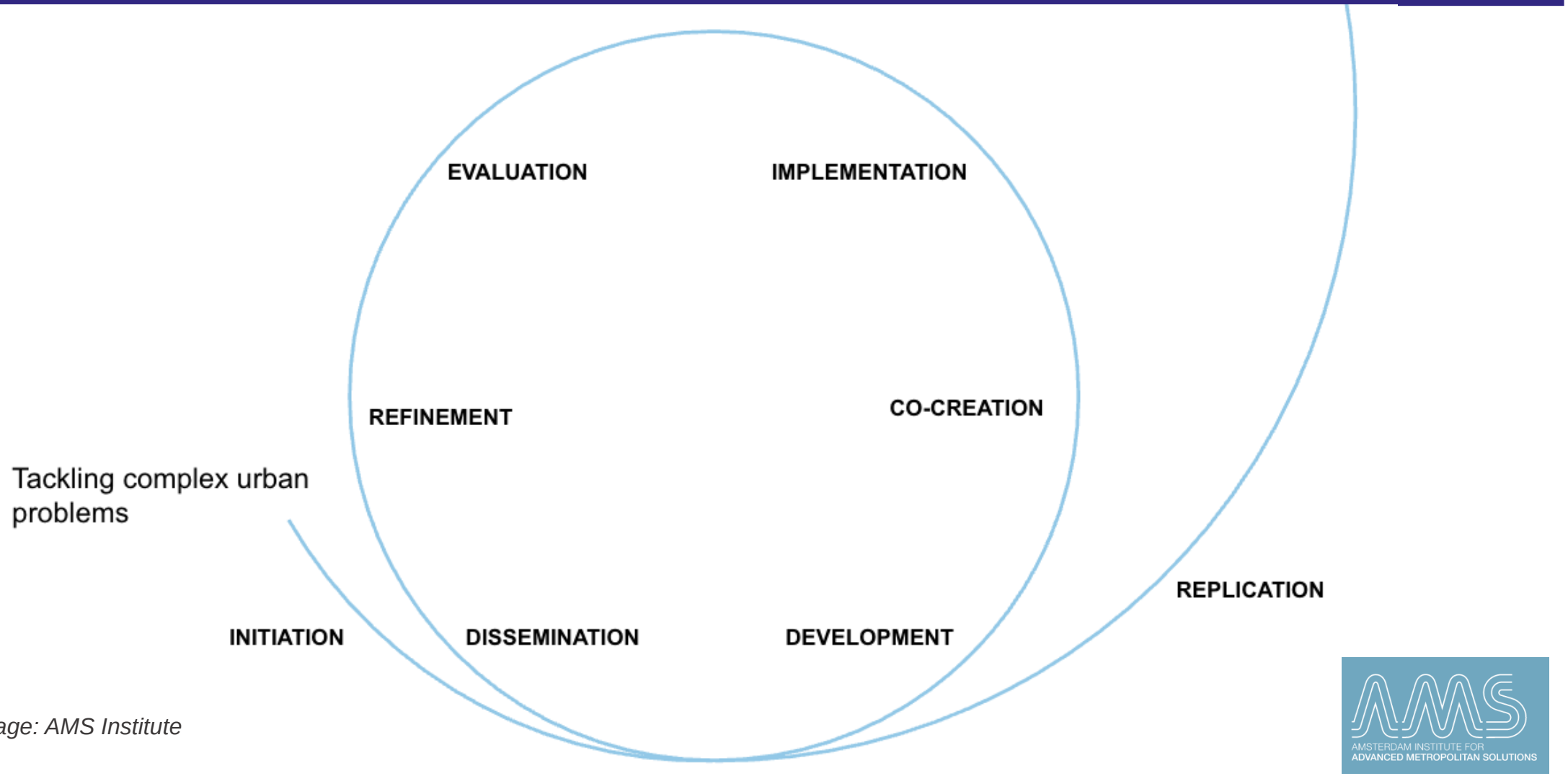


Image: AMS Institute

Examples in mobility

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Recent ’low-car’ pilot: Weesperknip

In the Weesperstraat pilot area (low-car interventions for 6 weeks):
+ 18 percent less car traffic in the neighborhood (Weesperbuurt)
+ 3 percent less traffic in whole city (about 11.000 cars)
+ 14 percent better air quality in the pilot area.
    + inhabitants could sleep with their windows open
    + inhabitants could cross the streets easier

Inhabitants of the pilot area were **very positive!**

In research among 4377 traffic participants **74 percent was unhappy** with the pilot!

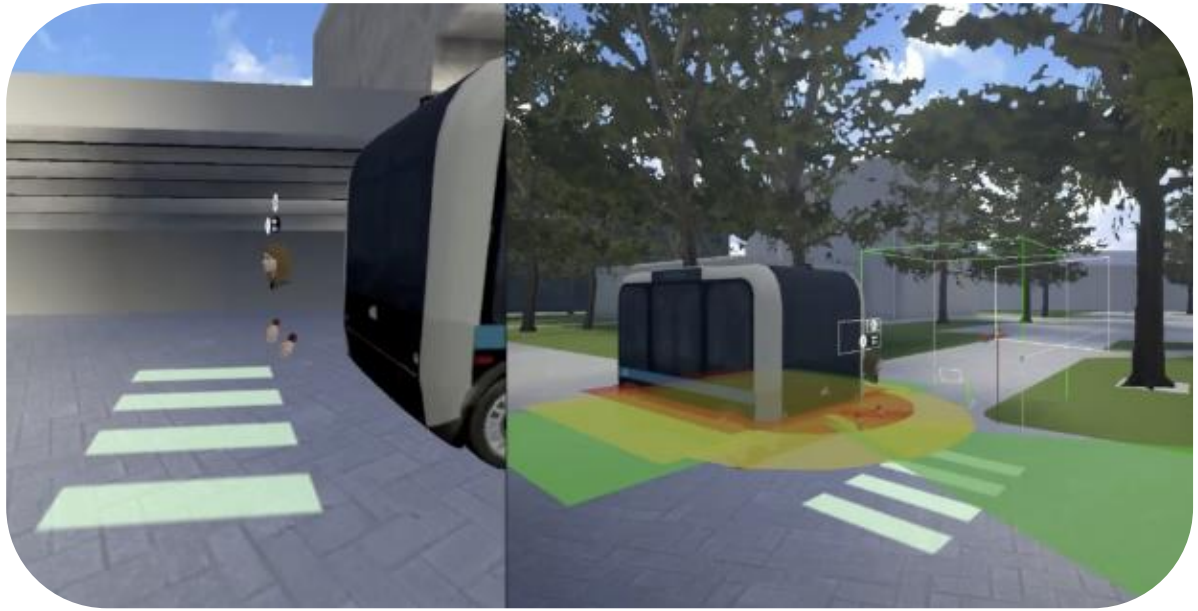
Along the **detour route (Kattenburgerstraat):**
- 40 percent more traffic on the detour route
- 3 minutes extra travel time (8 minutes during peak moments)
- In the streets along the detour route, air quality worsened by 9 percent
- Inhabitants were negative
    - Inhabitants found the area less accessible
    - Noise and stench.

Source: https://architectenweb.nl/nieuws/artikel.aspx?id=57557

Digital Twins experiment in mobility

Safe Interactions of Pedestrians and Cyclists with Automated Transport (SIPCAT)

- Digital Twin of the Marineterrein
- Experiment and test interaction in a controlled environment



Source: https://www.ams-institute.org/urban-challenges/smart-urban-mobility/safe-interactions-of-pedestrians-and-cyclists-with-automated-transport-sipcat/

What else?

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How can digital twins support in the co-creation and innovation processes for urban challenges?

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Digital Twins

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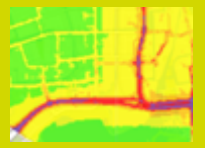
Proposition XCARCITY

Digital twin federation
Real-time management & Strategic planning





Model-based scenario development

Implementation of interventions

Real-life and virtual reality data

Monitoring and analyses

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Mobility in eXtended Reality Lab

Location: 6.99

Hardware

XR application

XR simulator

eXtended Reality (XR)

Virtual Reality (VR)

Virtual environment where interact with virtual elements

Virtual Reality (VR)

Mixed Reality (MR)

Blend of real-world with virtual elements where physical and virtual elements can interact

Mixed Reality (MR)

Augmented Reality (AR)

Real-world with an overlay of virtual elements

Augmented Reality (AR)

* Christian Briggs and the Interaction Design Foundation

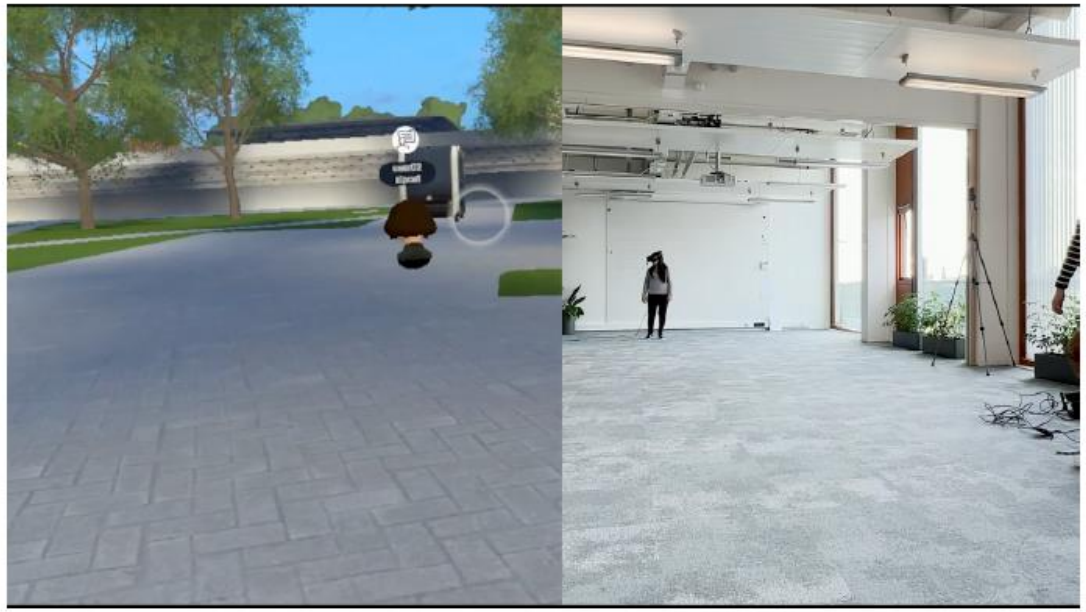
Advantage of VR

1. High experimental control

- **virtual scenes** can be quickly built, modified
- control **possible factors** in the virtual environment

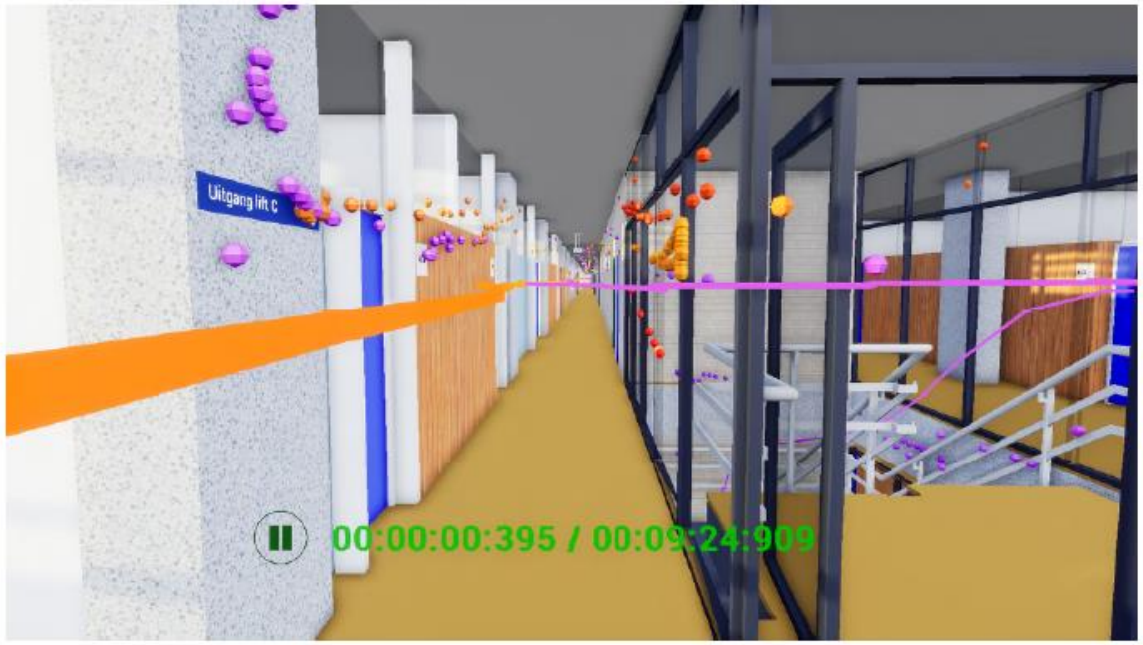
2. High immersion

- not **likely** to encounter in real-life
- too **dangerous** to expose



3. Data richness and quality

- more **accurately** and **automatically**
- collect **sufficient** behavioral data for **complicated**, **stressful,** and even **dangerous** scenarios
- Possible to collect other types of data via surveys, biosensors, motion trackers



4. Representativeness

- different locations and different times
- increase the heterogeneity of sampling

5. Cost

- operational and logistics costs are lower
- used repeatedly

Urban Mobility Digital Twin

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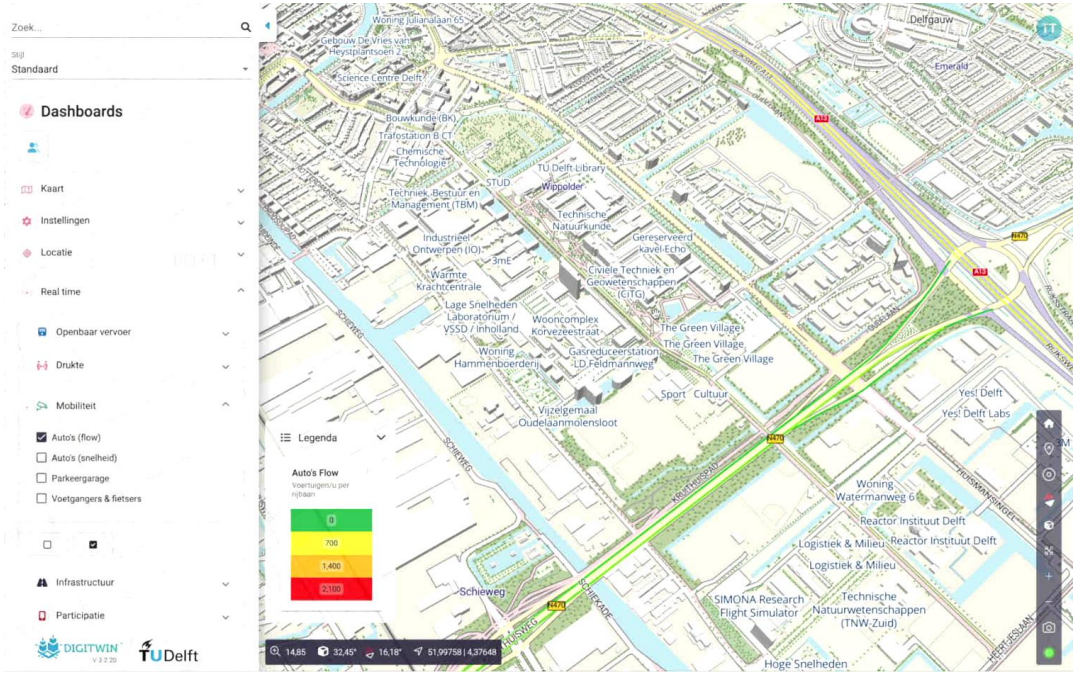
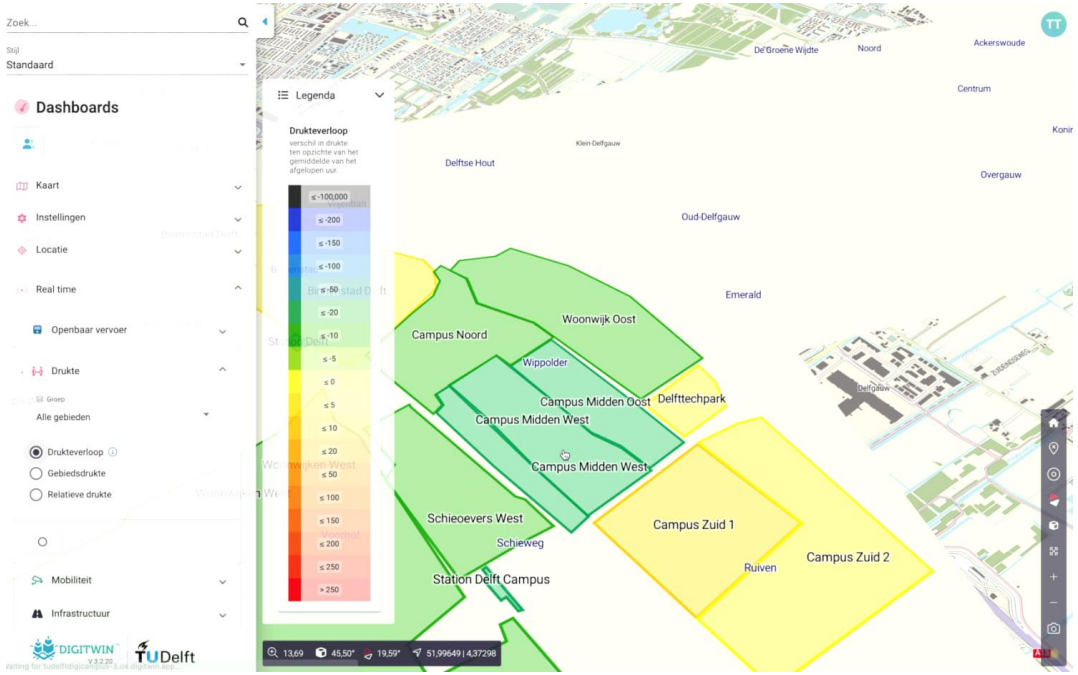
UMDT sensors and travel patterns



Video UMDT sensors



Video UMDT travel patterns

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UMDT

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- https://365tno.sharepoint.com/:v:/r/teams/P060.50991/TeamDocuments/Team/Management/02-Meetings/External%20Meetings/Consortium%20Meetings/2024/CM%201%20-%20June/material/DT%20Videos/7%20OMdt%20patronen.mov?csf=1&web=1&e=Y4HMYZ

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Urban Strategy

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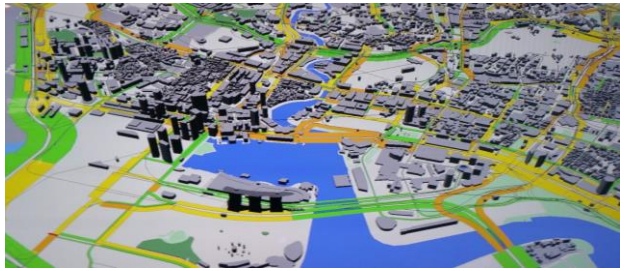
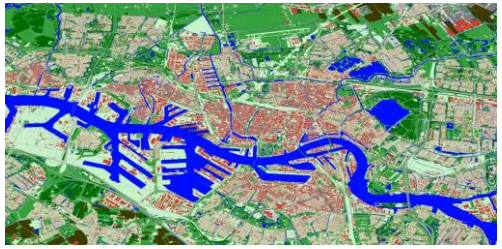
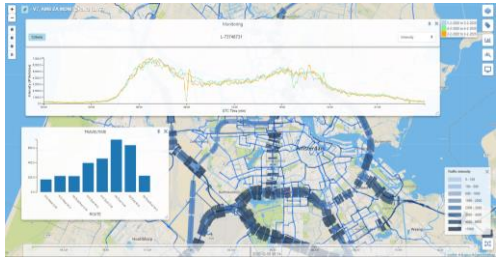
Digital Twins with Urban Strategy

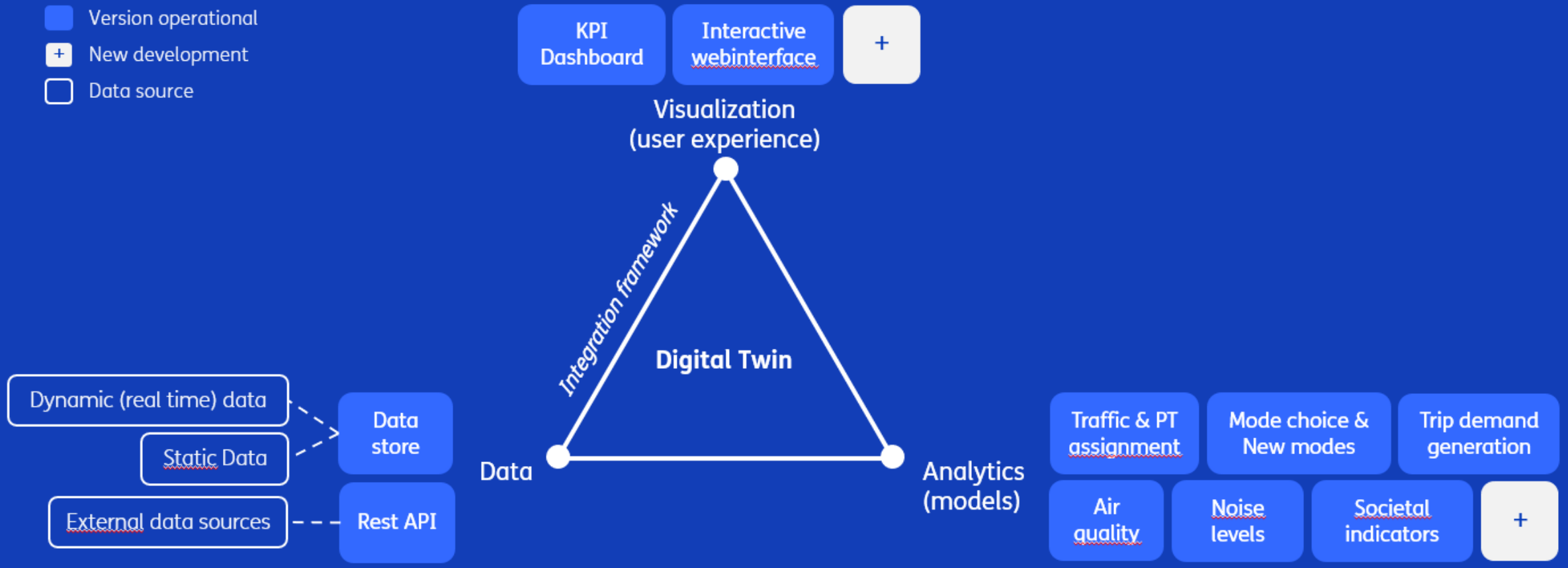
Making Complexity Manageable







Digital Twins: making complexity manageable



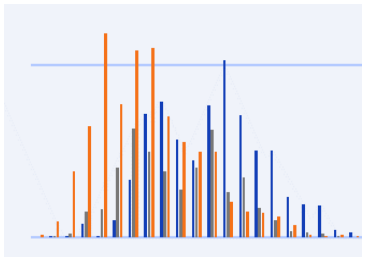
Walter Lohman, Hans Cornelissen, Jeroen Borst, Ralph Klerkx, Yashar Araghi, Erwin Walraven,
Building digital twins of cities using the Inter Model Broker framework, Future Generation Computer Systems, Volume 148, 2023, Pages 501-513, ISSN 0167-739X,
https://doi.org/10.1016/j.future.2023.06.024.

Urban Strategy simulation modules

Mobility Demand

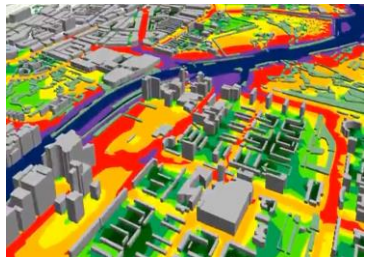
Multi-mode network allocation

Active transport cycling & walking

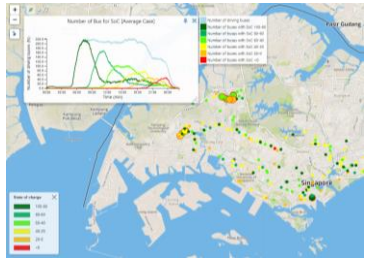


Distribution of accessibility

Air quality (road & Industry)

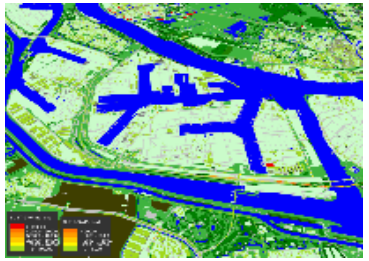


Noise (Road, Rail & Industry)



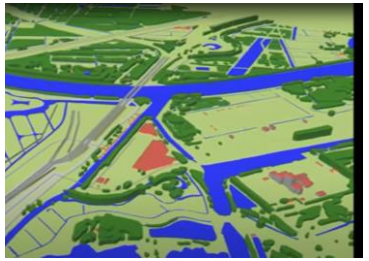
Electric fleet simulation

EV – power grid Interaction



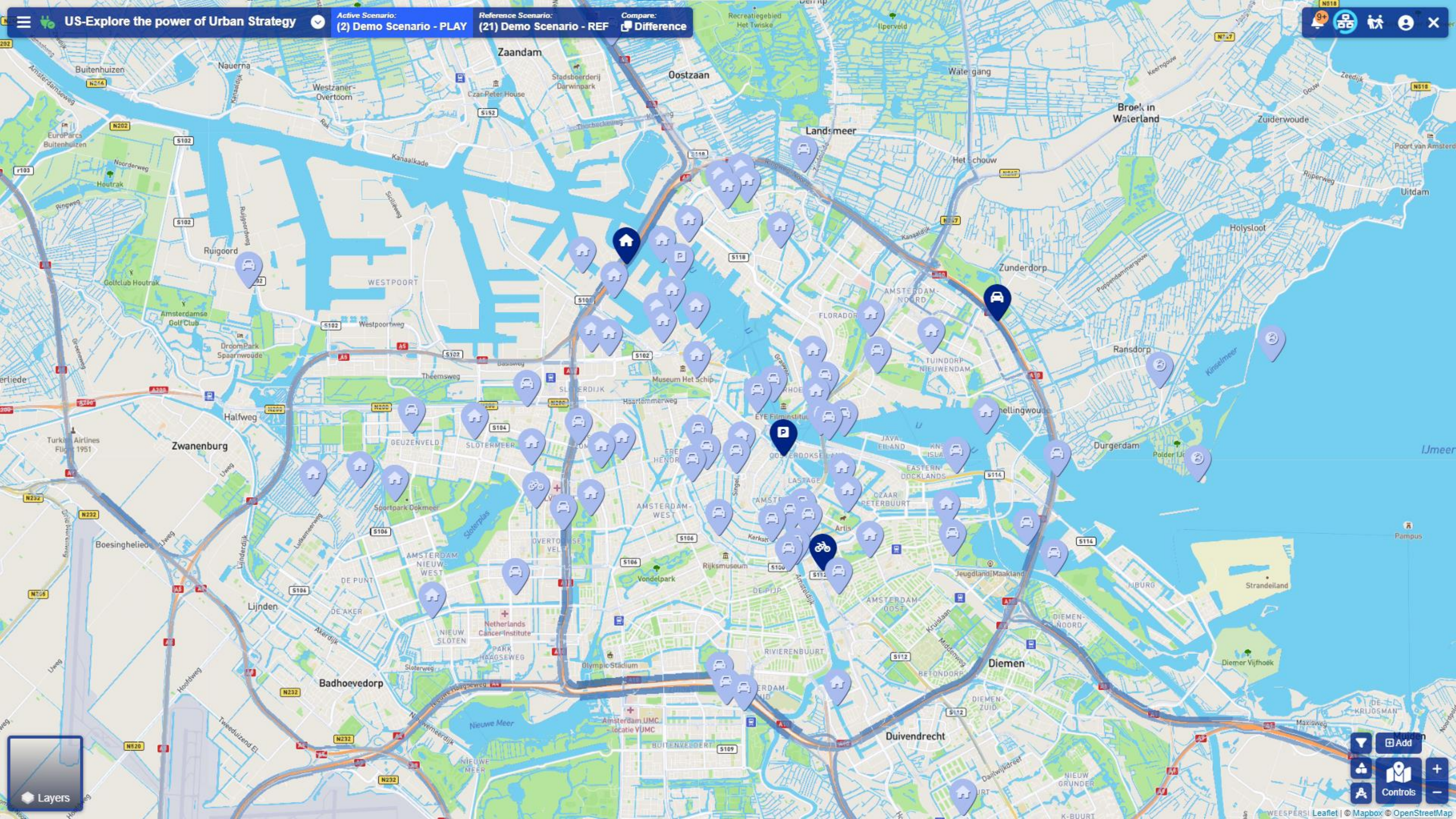
Greenhouse gas emissions

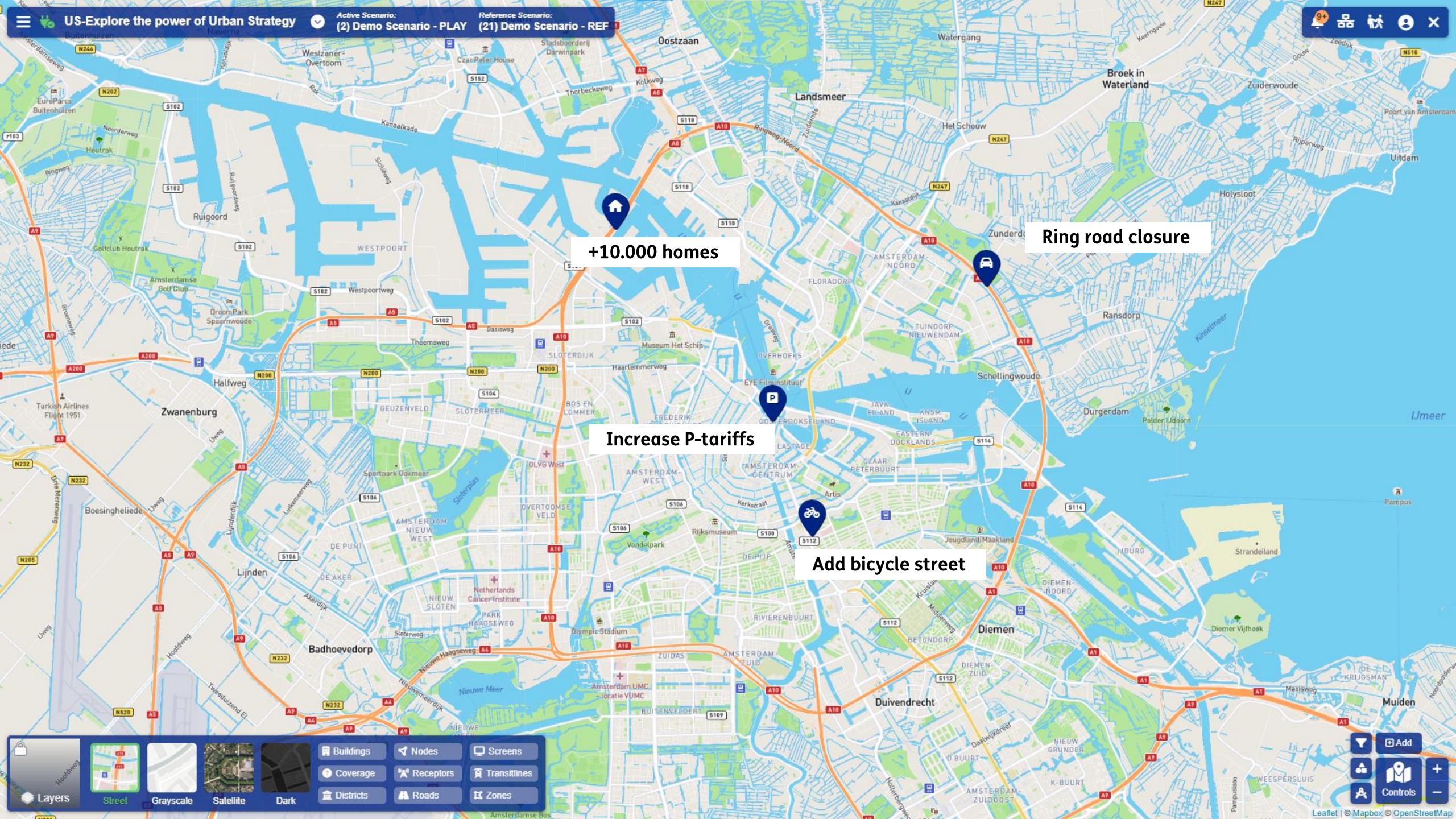
Infrastructure Resilience

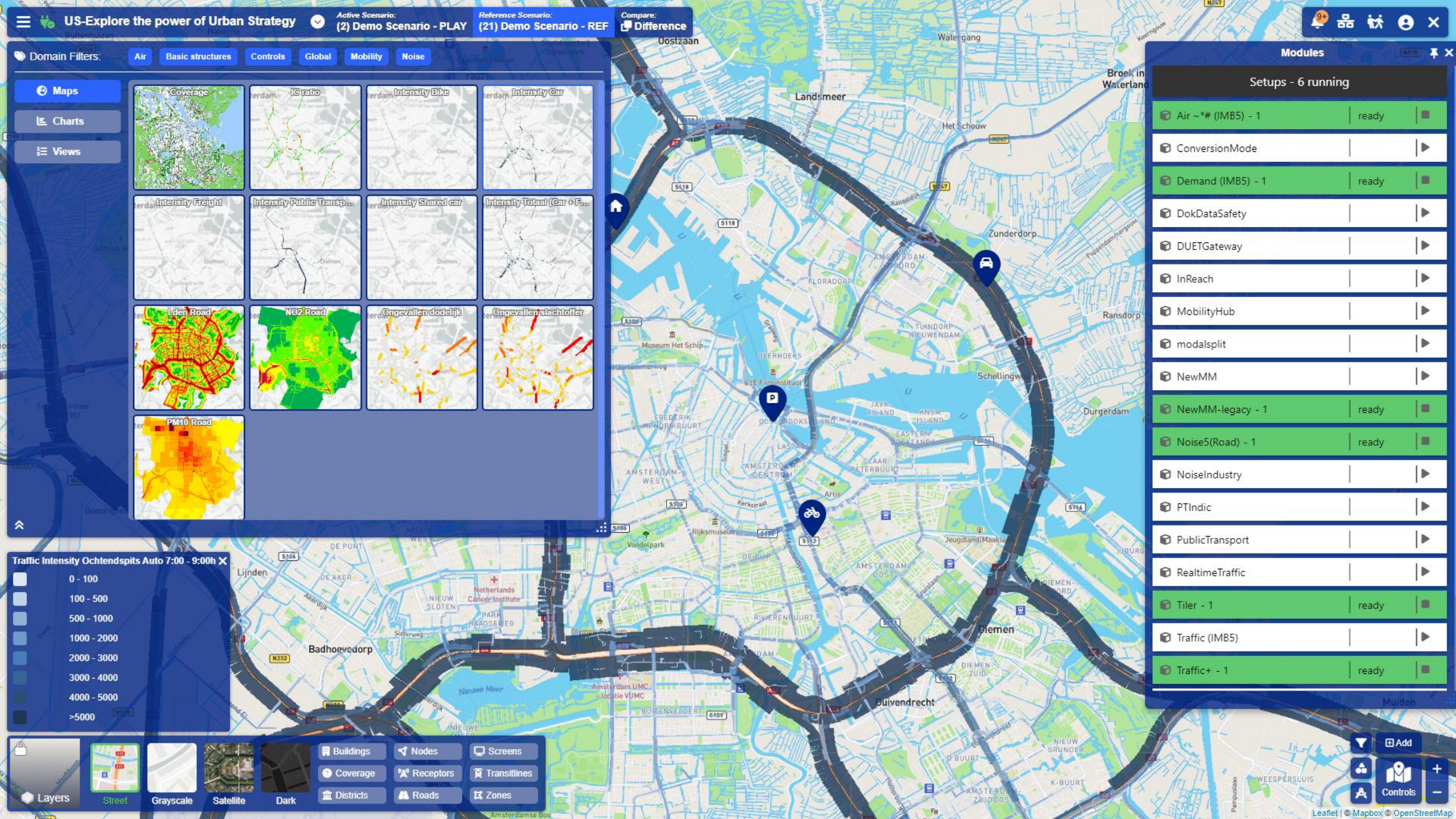


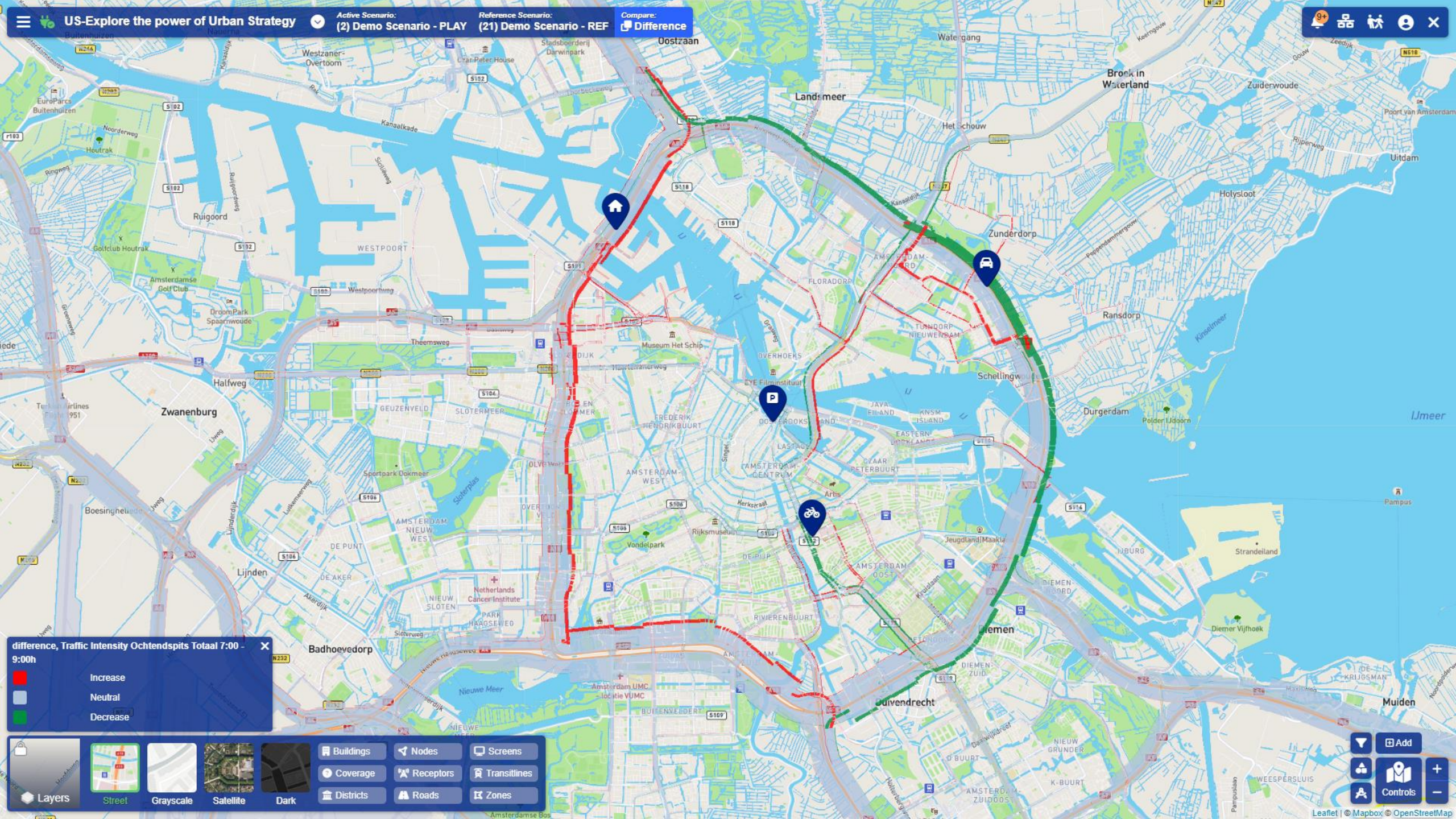
Spatial impacts

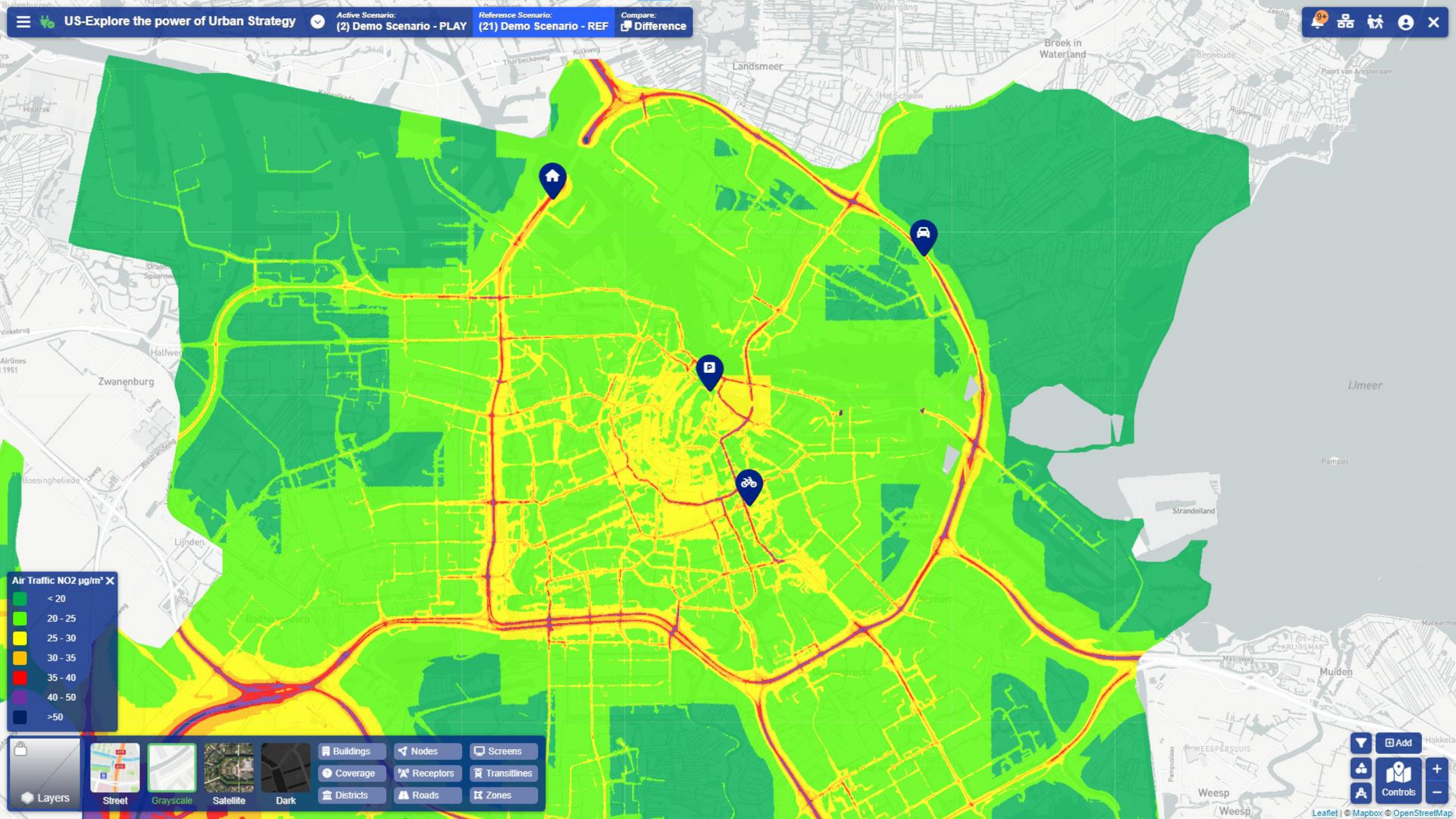
Well-being indicators

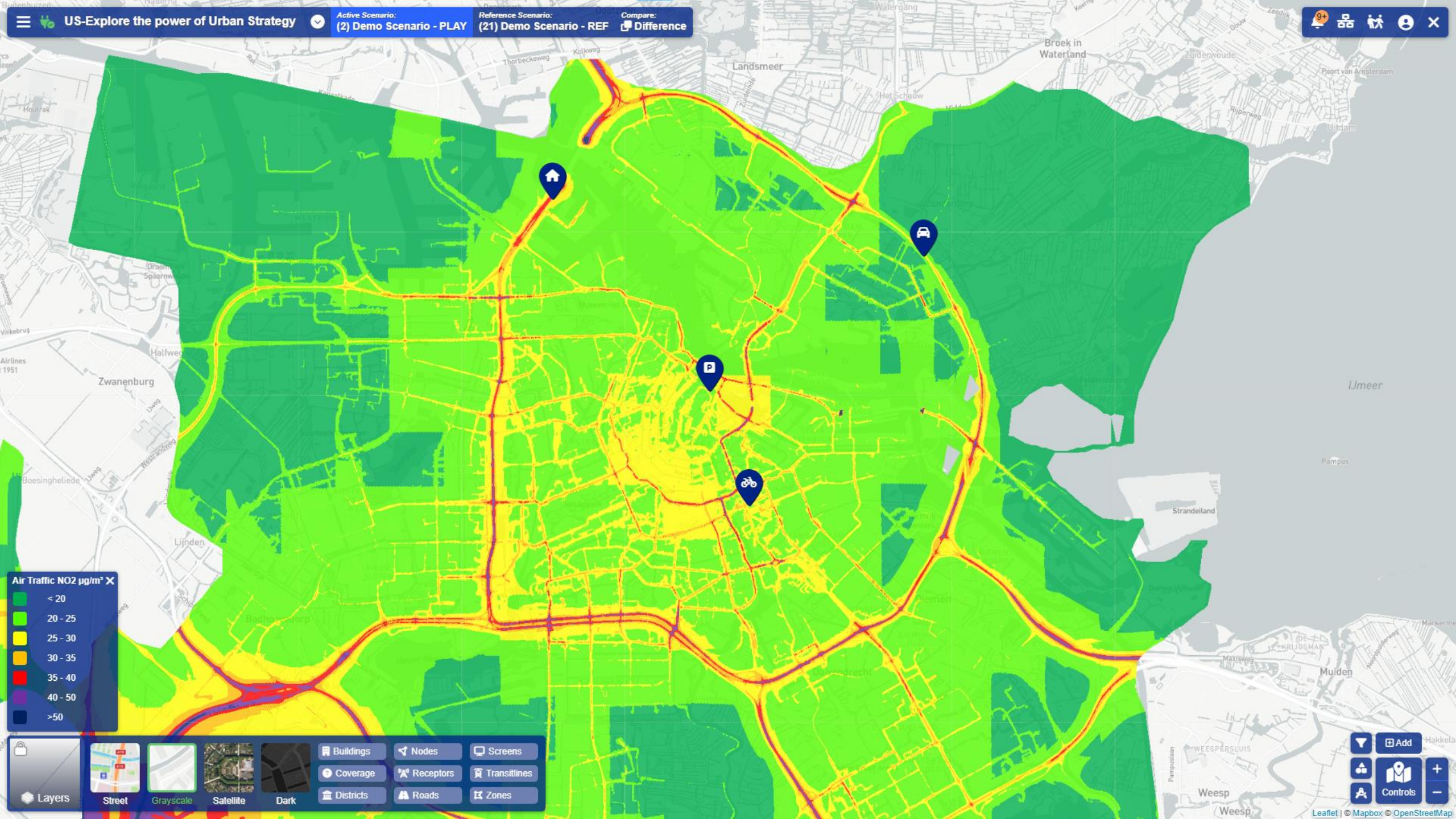

US-Explore the power of Urban Strategy
Active Scenario:
(2) Demo Scenario - PLAY
Reference Scenario:
(21) Demo Scenario - REF
Compare:
Difference
Zaandam
Oostzaan
Landsmeer
Broek in Waterland
Zuiderwoude
Uitdam
Zunderdorp
Ransdorp
Durgerdam
Holysloot
Nauerna
Buitenhuizen
Westzaner-Overtoom
Ruigoord
Westpoort
Halfweg
Zwanenburg
Boesingheliede
Lijnden
Badhoevedorp
Amsterdam-Noord
Amsterdam-West
Amsterdam Nieuw West
Amsterdam-Oost
Diemen
Duivendrecht
Rijksmuseum
Vondelpark
Olympic Stadium
Netherlands Cancer Institute
Amsterdam UMC - locatie VUMC
Nieuwe Meer
Sloterplas
Strandeiland
IJmeer
Pampus
Layers
Add
Controls
Leaflet | © Mapbox © OpenStreetMap


US-Explore the power of Urban Strategy
Active Scenario:
(2) Demo Scenario - PLAY
Reference Scenario:
(21) Demo Scenario - REF
+10.000 homes
Ring road closure
Increase P-tariffs
Add bicycle street
Layers
Street
Grayscale
Satellite
Dark
Buildings
Nodes
Screens
Coverage
Receptors
Transitlines
Districts
Roads
Zones
Add
Controls
Leaflet | © Mapbox © OpenStreetMap


US-Explore the power of Urban Strategy
Active Scenario:
(2) Demo Scenario - PLAY
Reference Scenario:
(21) Demo Scenario - REF
Compare:
Difference
Domain Filters:
Air
Basic structures
Controls
Global
Mobility
Noise
Maps
Charts
Views
Coverage
IC ratio
Intensity Bike
Intensity Car
Intensity Freight
Intensity Public Transp...
Intensity Shared car
Intensity Totaal (Car + F...
Lden Road
NO2 Road
Ongevallen dodelijk
Ongevallen slachtoffer
PM10 Road
Traffic Intensity Ochtendspits Auto 7:00 - 9:00h
0 - 100
100 - 500
500 - 1000
1000 - 2000
2000 - 3000
3000 - 4000
4000 - 5000
>5000
Modules
Setups - 6 running
Air ~*# (IMB5) - 1
ready
ConversionMode
Demand (IMB5) - 1
ready
DokDataSafety
DUETGateway
InReach
MobilityHub
modalsplit
NewMM
NewMM-legacy - 1
ready
Noise5(Road) - 1
ready
NoiseIndustry
PTIndic
PublicTransport
RealtimeTraffic
Tiler - 1
ready
Traffic (IMB5)
Traffic+ - 1
ready
Layers
Street
Grayscale
Satellite
Dark
Buildings
Nodes
Screens
Coverage
Receptors
Transitlines
Districts
Roads
Zones
Add
Controls
Leaflet | © Mapbox © OpenStreetMap


US-Explore the power of Urban Strategy
Active Scenario:
(2) Demo Scenario - PLAY
Reference Scenario:
(21) Demo Scenario - REF
Compare:
Difference
difference, Traffic Intensity Ochtendspits Totaal 7:00 - 9:00h
Increase
Neutral
Decrease
Layers
Street
Grayscale
Satellite
Dark
Buildings
Nodes
Screens
Coverage
Receptors
Transitlines
Districts
Roads
Zones
Add
Controls
Leaflet | © Mapbox © OpenStreetMap


US-Explore the power of Urban Strategy
Active Scenario:
(2) Demo Scenario - PLAY
Reference Scenario:
(21) Demo Scenario - REF
Compare:
Difference
Air Traffic NO2 µg/m³
< 20
20 - 25
25 - 30
30 - 35
35 - 40
40 - 50
>50
Layers
Street
Grayscale
Satellite
Dark
Buildings
Nodes
Screens
Coverage
Receptors
Transitlines
Districts
Roads
Zones
Add
Controls
Leaflet | © Mapbox © OpenStreetMap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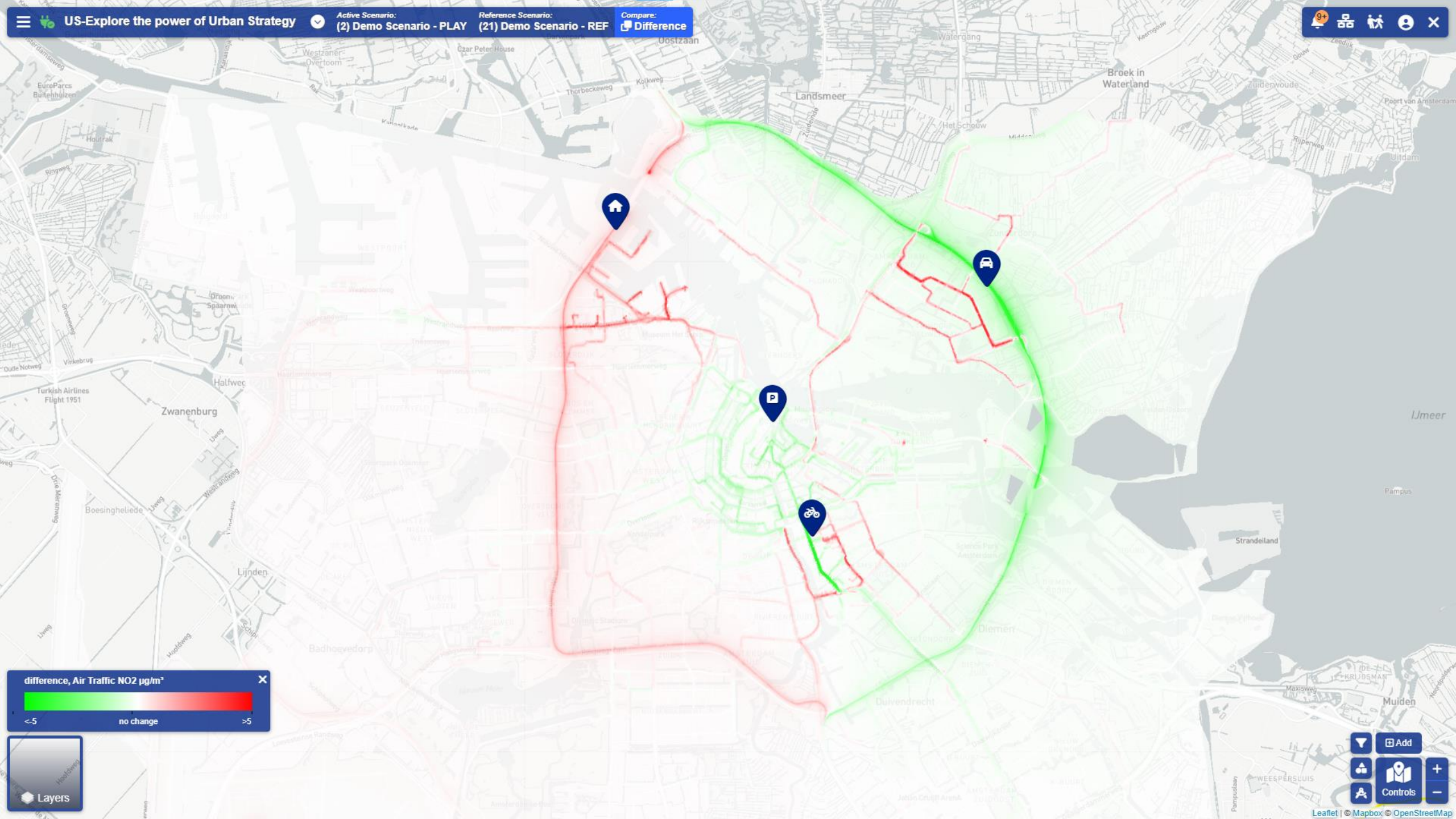
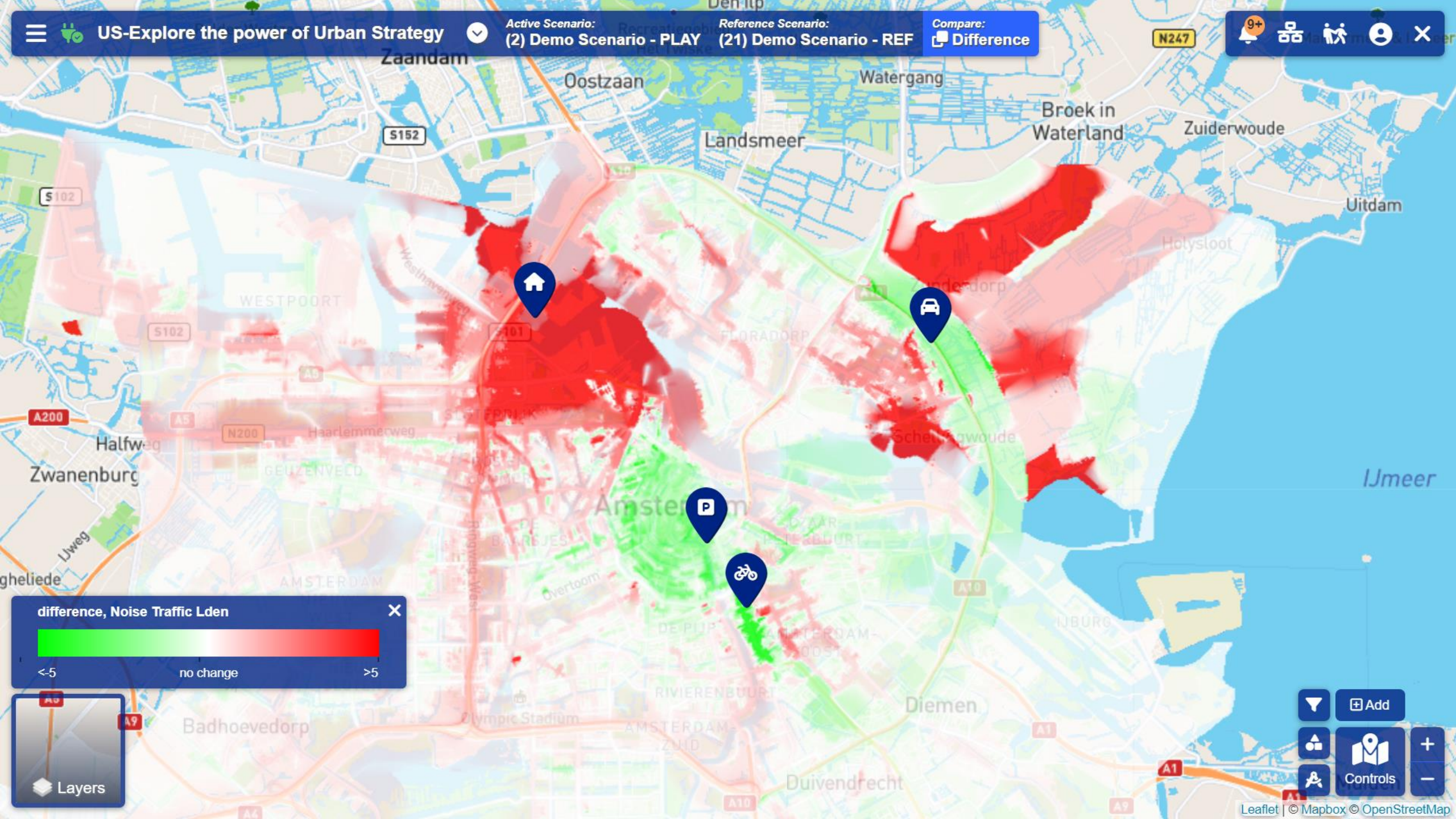
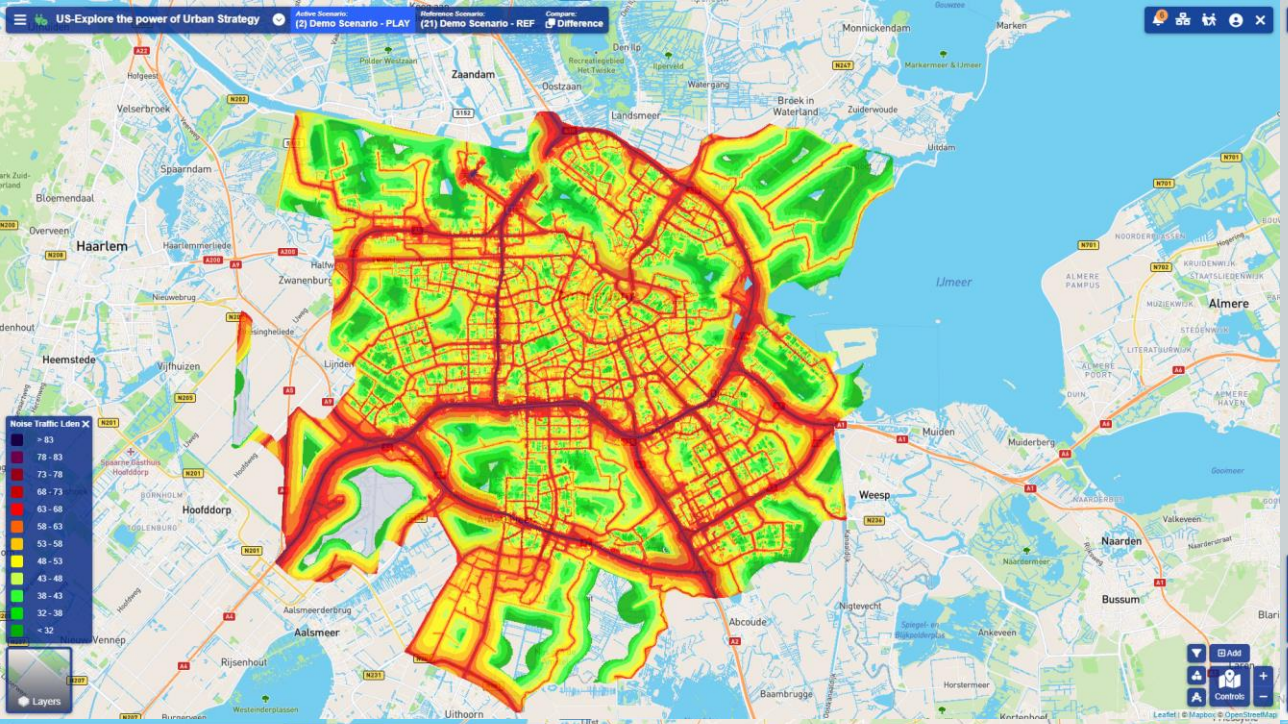
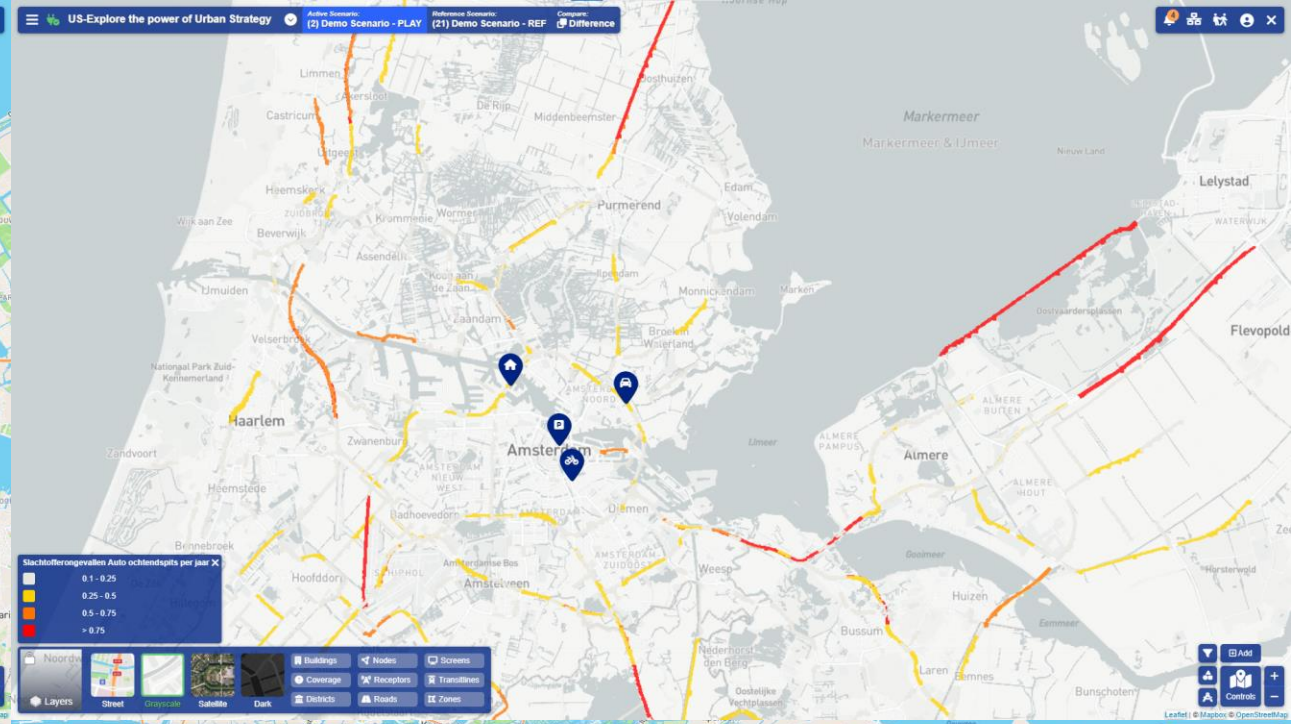
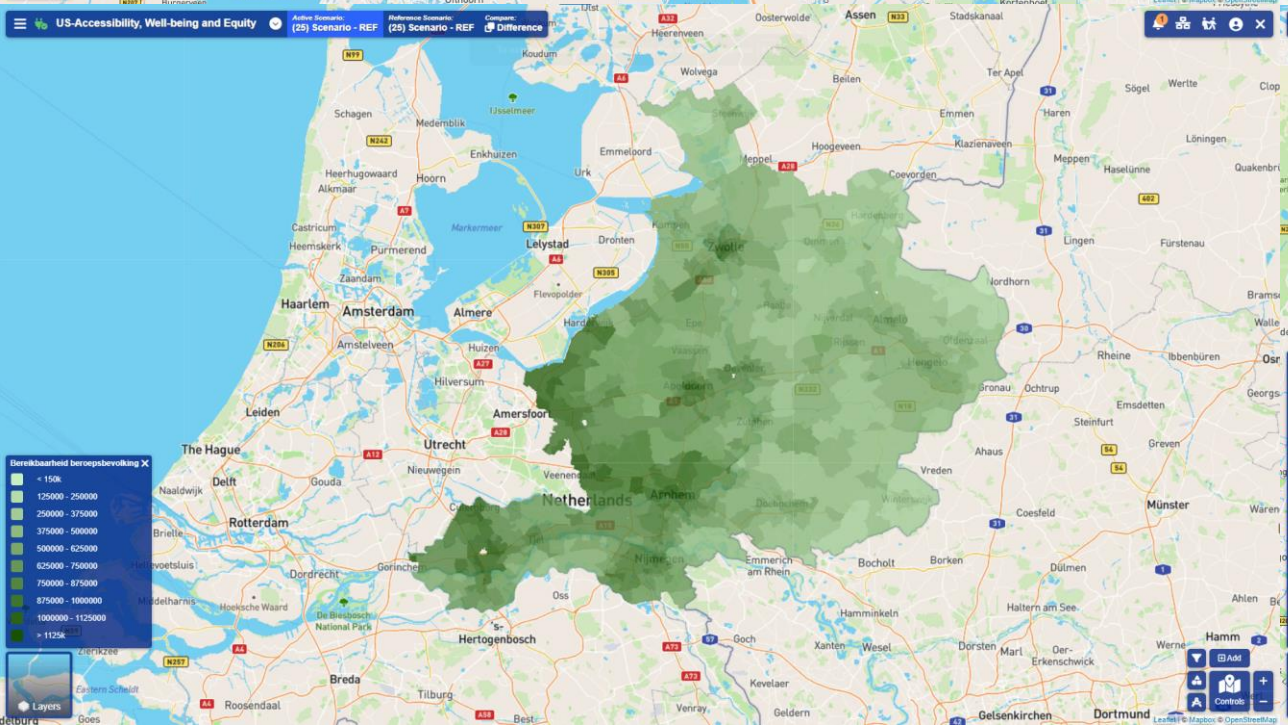
Compare:
Difference
Air Traffic NO2 µg/m³
< 20
20 - 25
25 - 30
30 - 35
35 - 40
40 - 50
>50
Layers
Street
Grayscale
Satellite
Dark
Buildings
Nodes
Screens
Coverage
Receptors
Transitlines
Districts
Roads
Zones
Add
Controls
Leaflet | © Mapbox © OpenStreetMap
Zwanenburg
Landsmeer
Broek in Waterland
IJmeer
Strandeiland
Muiden
Weesp

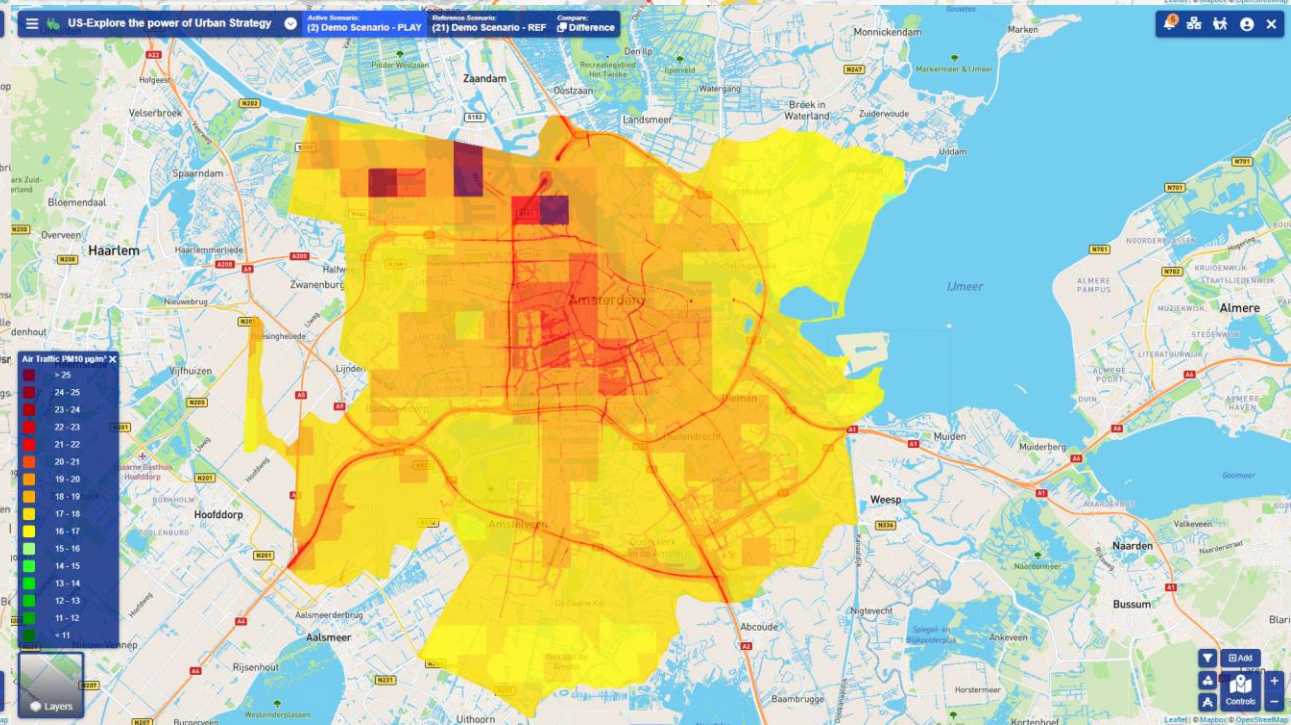

US-Explore the power of Urban Strategy
Active Scenario:
(2) Demo Scenario - PLAY
Reference Scenario:
(21) Demo Scenario - REF
Compare:
Difference
9+
difference, Air Traffic NO2 µg/m³
<-5
no change
>5
Layers
Add
Controls
Leaflet | © Mapbox © OpenStreetMap
Oostzaan
Landsmeer
Broek in Waterland
Zwanenburg
Lijnden
Boesingheliede
Badhoevedorp
Diemen
Duivendrecht
Muiden
IJmeer
Strandeiland
Pampus
Uitdam
Halfweg


US-Explore the power of Urban Strategy
Active Scenario:
(2) Demo Scenario - PLAY
Reference Scenario:
(21) Demo Scenario - REF
Compare:
Difference
9+
difference, Noise Traffic Lden
<-5
no change
>5
Layers
Add
Controls
Zaandam
Oostzaan
Watergang
Broek in Waterland
Zuiderwoude
Landsmeer
Uitdam
Holysloot
Zwanenburg
Halfweg
Amsterdam
Diemen
Badhoevedorp
Duivendrecht
IJmeer
Leaflet | © Mapbox © OpenStreetMap


US-Explore the power of Urban Strategy
Active Scenario: (2) Demo Scenario - PLAY
Reference Scenario: (21) Demo Scenario - REF
Compare: Difference
Noise Traffic Lden
> 83
78 - 83
73 - 78
68 - 73
63 - 68
58 - 63
53 - 58
48 - 53
43 - 48
38 - 43
32 - 38
< 32
Layers
Add
Controls
Leaflet | © Mapbox © OpenStreetMap


US-Explore the power of Urban Strategy
Active Scenario: (2) Demo Scenario - PLAY
Reference Scenario: (21) Demo Scenario - REF
Compare: Difference
Slachtofferongevallen Auto ochtendspits per jaar
0.1 - 0.25
0.25 - 0.5
0.5 - 0.75
> 0.75
Layers
Street
Grayscale
Satellite
Dark
Buildings
Nodes
Screens
Coverage
Receptors
Transitlines
Districts
Roads
Zones
Add
Controls
Leaflet | © Mapbox © OpenStreetMap


US-Accessibility, Well-being and Equity
Active Scenario: (25) Scenario - REF
Reference Scenario: (25) Scenario - REF
Compare: Difference
Bereikbaarheid beroepsbevolking
< 150k
125000 - 250000
250000 - 375000
375000 - 500000
500000 - 625000
625000 - 750000
750000 - 875000
875000 - 1000000
1000000 - 1125000
> 1125k
Layers
Add
Controls
Leaflet | © Mapbox © OpenStreetMap


US-Explore the power of Urban Strategy
Active Scenario: (2) Demo Scenario - PLAY
Reference Scenario: (21) Demo Scenario - REF
Compare: Difference
Air Traffic PM10 pg/m³
> 25
24 - 25
23 - 24
22 - 23
21 - 22
20 - 21
19 - 20
18 - 19
17 - 18
16 - 17
15 - 16
14 - 15
13 - 14
12 - 13
11 - 12
< 11
Layers
Add
Controls
Leaflet | © Mapbox © OpenStreetMap

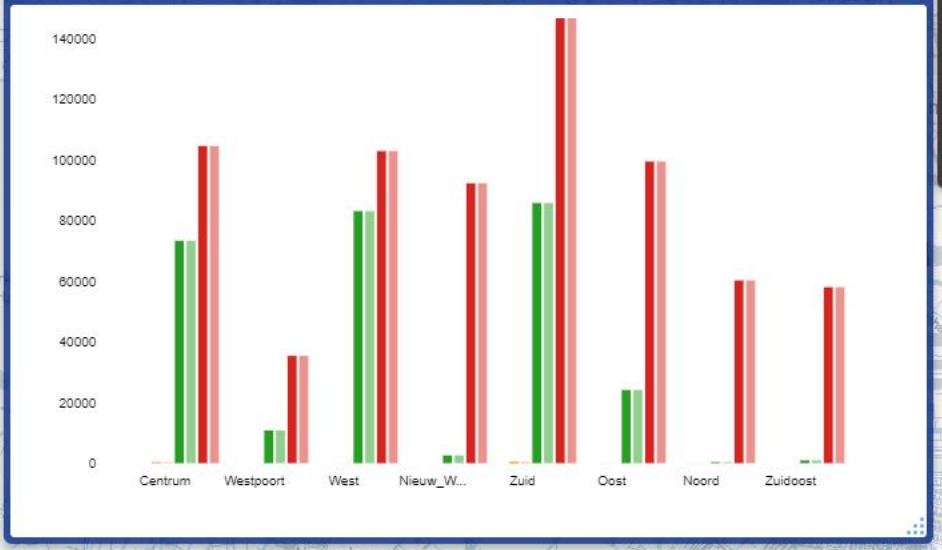
US-Explore the power of Urban Strategy

Active Scenario: (2) Demo Scenario - PLAY

Reference Scenario: (21) Demo Scenario - REF

Compare: Difference

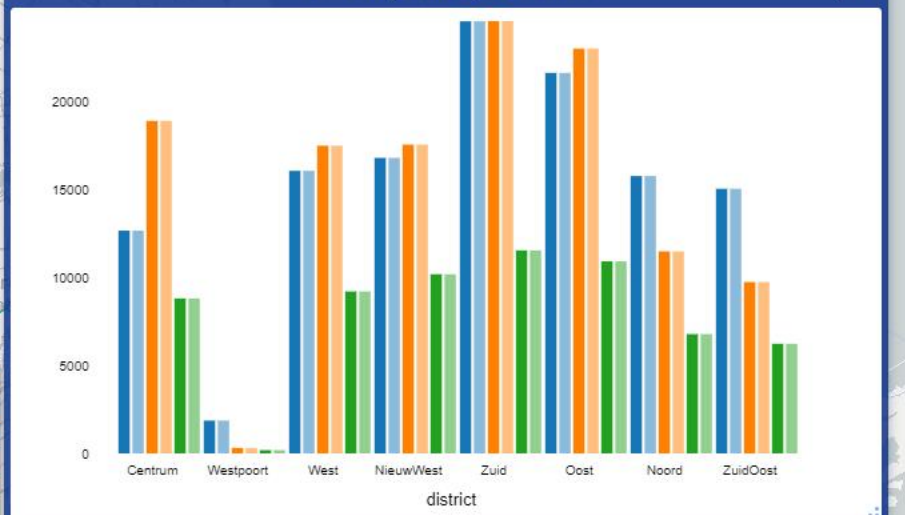
Air indicators



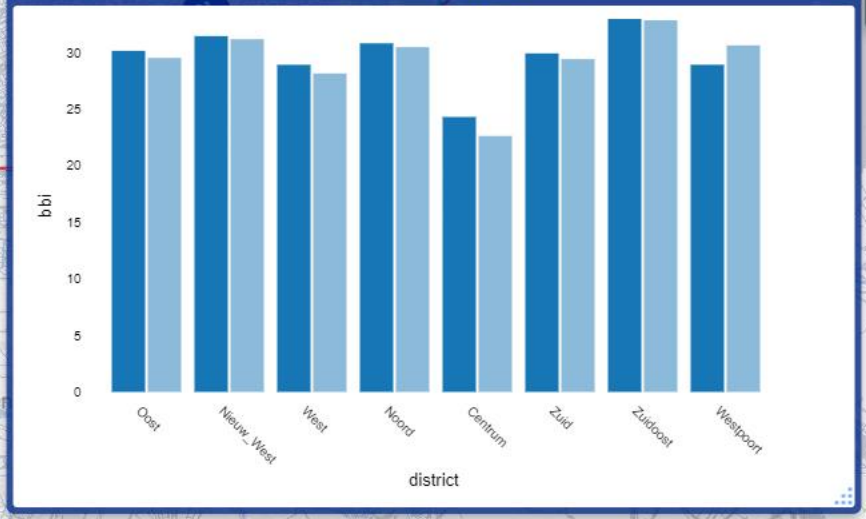
Inhabitants above EC threshold
Reference Inhabitants above EC threshold
Inhabitants above NO2 threshold
Reference Inhabitants above NO2 threshold
Inhabitants above PM10 threshold
Reference Inhabitants above PM10 threshold
Inhabitants above PM2.5 threshold
Reference Inhabitants above PM2.5 threshold

Auto
Reference Auto
Fiets
Reference Fiets
Openbaar vervoer
Reference Openbaar vervoer

Vervoerwijzekeuze per stadsdeel



Bereikbaarheid (BBI)



BBI
Reference BBI

difference, Traffic Ochtendspits 7:00 - 9:00h
Intensity/Capacity
Increase
Neutral
Decrease

Layers
Street
Grayscale
Satellite
Dark
Buildings
Nodes
Screens
Coverage
Receptors
Transitlines
Districts
Roads
Zones

Add
Controls

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World Cafe

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Lets ask ourselves….

What is the potential of a digital twin to help design and assess the impact of low car interventions?

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PITCH FOR ZUIDAS

[30 minutes]

What indicators/interventions do you need to consider in designing a car low Zuidas?

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PITCH FOR ZUIDAS

[30min]
Come up with a Digital Twin [federation] for Zuidas

What does your Digital Twin offer?

What can your Digital Twin do for the City?

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Two Topic Areas

Focus on Strategic Planning

for low car cities

Focus on the monitoring and short term actions

for a low car cities

Using Zuidas as your focus area

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TOPIC 1: Strategic Planning

Focus on Strategic Planning for low car cities
Use Zuidas as your focus area

Some Tips:

- *What KPI's do we need?*
- *What Interventions should be considered ?*
- *Look at the role of Digital Twins*
- *What requirements should a digital twin meet? (e.g. in terms of accessibility, equity, etc….)*
- *How can a digital twin be used in co-designing low-car areas?*

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TOPIC 2: Monitoring

Focus on the monitoring and short term actions for a low car cities

Use Zuidas as your focus area

Some Tips:

- *What KPI's do we need?*
- *What Interventions should be considered?*
- *Action orientated from results!*
- *Look at the role of Digital Twins*
- *What requirements should a digital twin meet?*
- *How can a digital twin be used in monitoring and short term application in low-car areas?*

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Wrap Up

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Thank you!

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