

# SPHERE DT Environment for AECOO sector energy efficiency and sustainability optimisation

Mikel Borrás

ORGANIZED BY:



SPHERE is a 4-year, Horizon 2020 project that aims to provide a BIM-based Digital Twin Platform to optimise the building lifecycle, reduce costs and improve energy efficiency in residential buildings.

Sphere project addresses the need for more suitable construction processes, for cost reduction and increase of the energy efficiency of the building by integration of the value chain, from design to end of life, developing interoperable and flexible ICT platform based which will integrate all relevant data of the Real Building and thus creating a Digital Twin of itself which will evolve jointly with the real asset.

Landing page



Core services

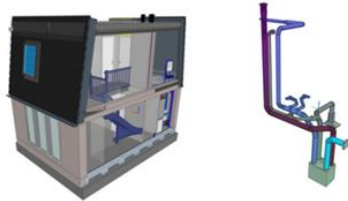
16 services



User Benefits



**Netherlands (New)**  
NZEB row houses for low  
income households

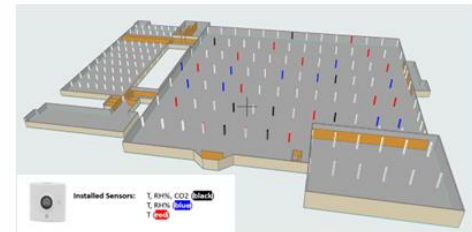


Via Duca degli Abruzzi n° 57, San Salvo (Chieti), Italy

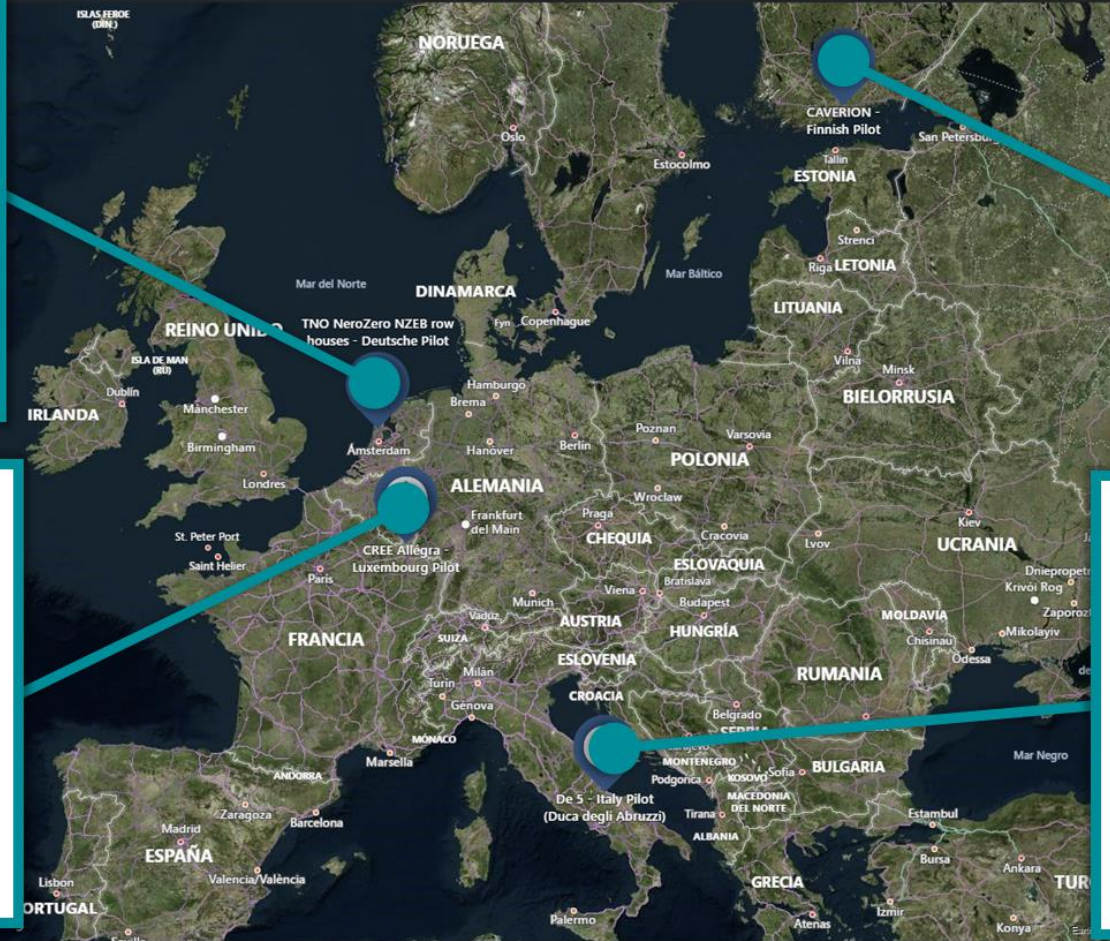
**Luxemburg (New)**  
Prefabricated timber  
smart office building

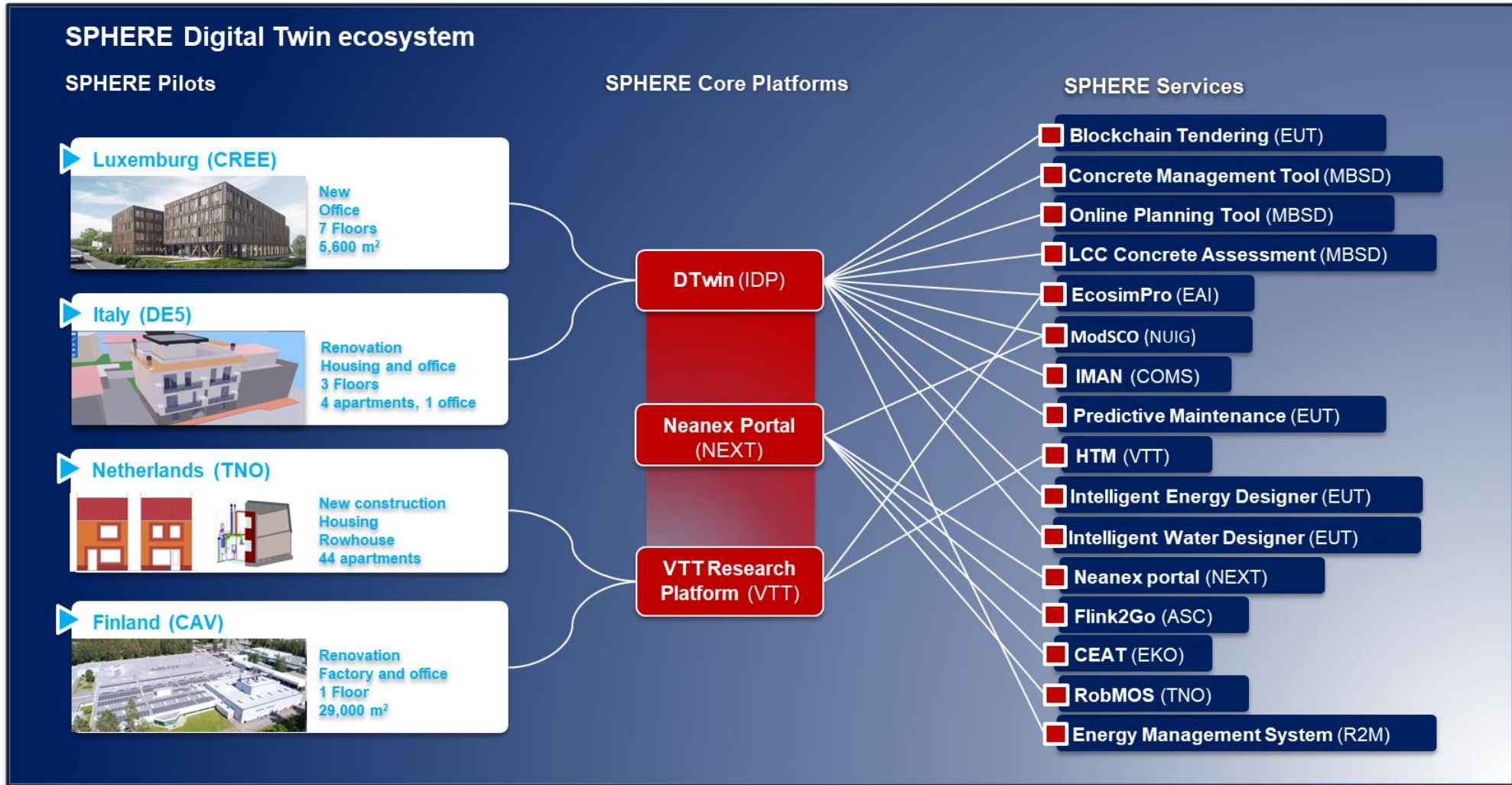


**Finland (Renovation)**  
Energy upgrade for 1960s  
factory and office




**Italy (New)**  
Apartments & office with  
cost and time savings





IDP DTwin Home
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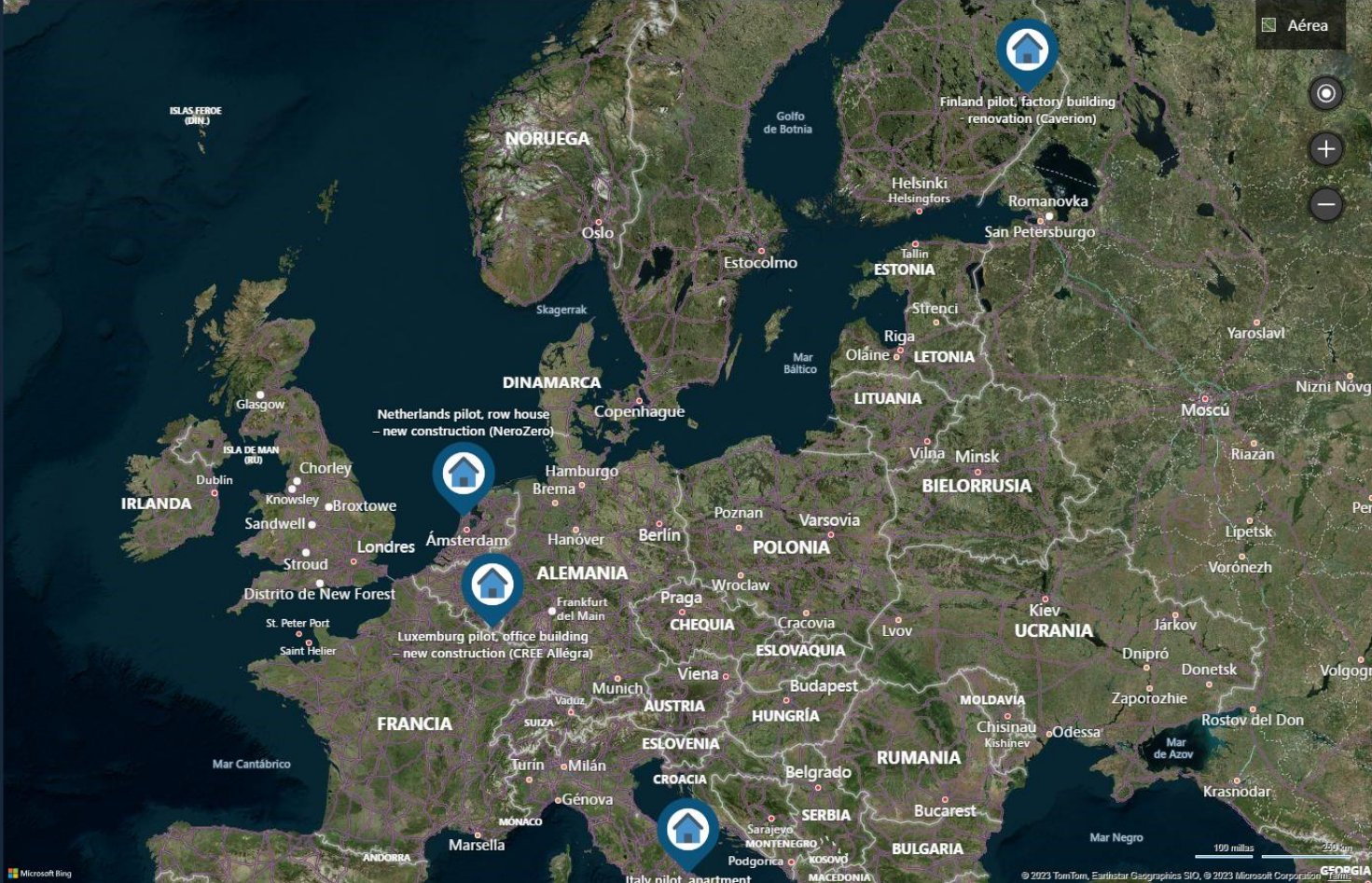


**Client:**  
Italy pilot, apartment building - renovation (DE5)  
**Address:**  
Via Duca degli Abruzzi n° 57, San Salvo (Chieti), Italy  
**Integration:**  
Facility Management & Renewal Monitoring

**Client:**  
Netherlands pilot, row house – new construction (NeroZero)  
**Address:**  
Heerhugowaard, Netherlands  
**Integration:**  
Facility Management & Renewal Monitoring

**Client:**  
Finland pilot, factory building - renovation (Caverion)  
**Address:**  
Joensuu, Finland  
**Integration:**  
Facility Management & Renewal Monitoring

**Client:**  
Luxemburg pilot, office building – new construction (CREE Allégra)  
**Address:**  
Rue Léon Laval, Parcelle 566/7988, L-3372 Leudelange, Luxembourg  
**Integration:**  
Facility Management & Renewal Monitoring



Aérea  
+  
-

IDP DTwin Home Viewer Storage Hello sphere\_admin@sphere.eu! [Logout](#)

## De 5 - Italy Pilot (Duca degli Abruzzi)

[+ New](#)

Models

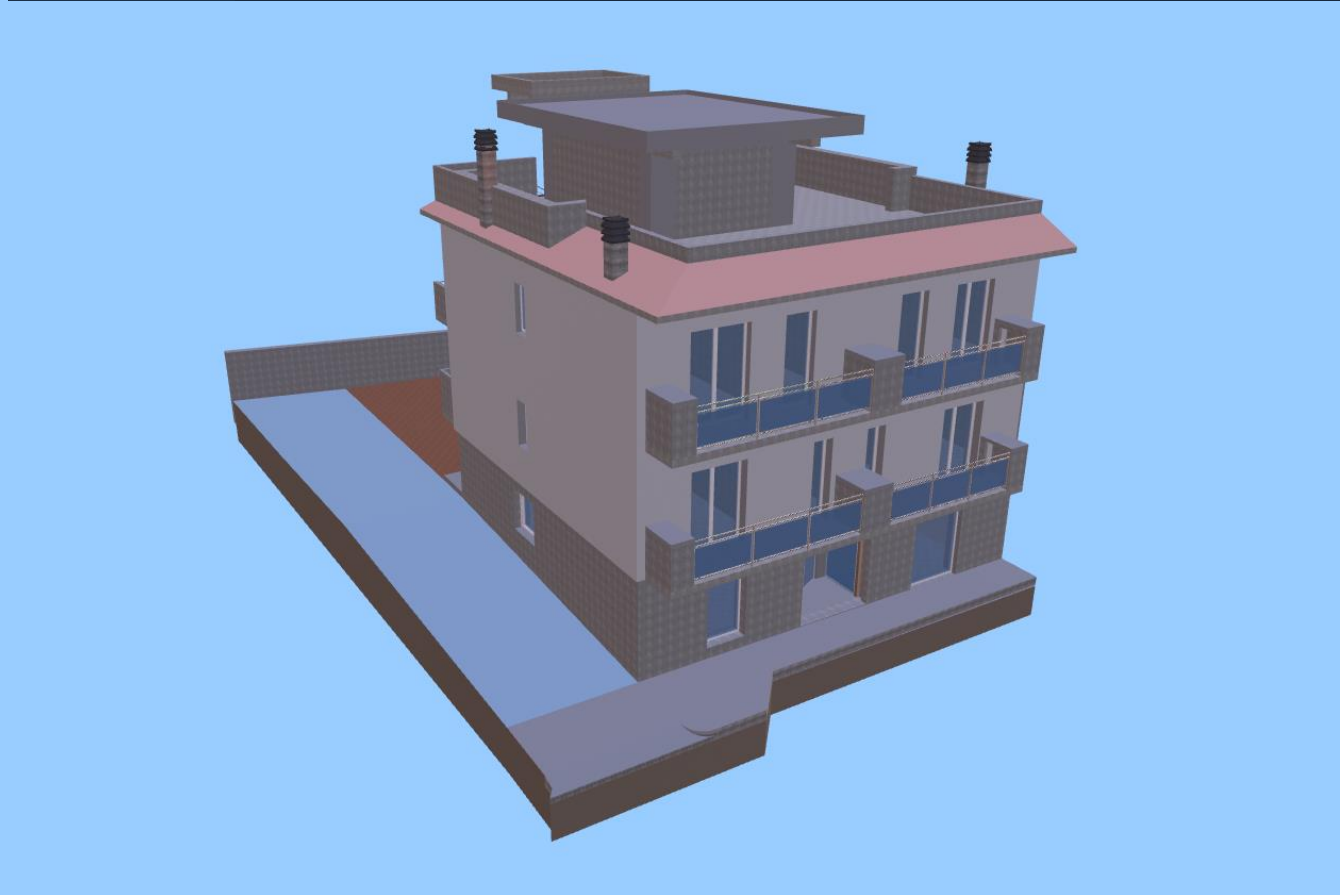
Name	Type	Creation Date	Modified Date	Current Version	Actions
Italy Pilot (Duca degli Abruzzi)_IFC4 (Reference View)	IFC	10/18/2021		1.0	<a href="#">View</a> <a href="#">Download</a>
Italy Pilot (Duca degli Abruzzi)_IFC4 (Design Transfer View)	XLSX	10/18/2021		3.0	<a href="#">View</a> <a href="#">Download</a>

IDP DTwin Home Viewer Storage

**Project Info**

- Project** De 5 - Italy Pilot (Duca degli Abruzzi)
- Client** 01667 - Italy pilot, apartment building - renovation (DE5)
- Project** Facility Management & Renewal Monitoring
- Address** Via Duca degli Abruzzi n° 57, San Salvo (Chieti), Italy

- Assets
- Maintenance
- Monitoring
- MBSD
- EcosimPro
- iPredict



The screenshot displays the DTwin Maintenance software interface. At the top, a navigation bar includes 'Home', 'Viewer', and 'Storage'. The main area shows a 3D model of a building with a 'Schedule - Planning' overlay indicating '2 TUESDAY May - 2023' and 'NO TASK'. A sidebar on the left contains icons for Project, Assets, Maintenance, Schedule, Assigned, Validation, Plans, Monitoring, MBSD, EcosimPro, and iPredict. On the right, a 'Validation Tasks - Reported' panel shows a dropdown for 'Maintenance Type' with options: 'All maintenance', 'Corrective', and 'Preventive'. Below this, a 'Prevention Classes' panel lists:
 

- MR32-AC: Air Filter (Planes: 1, Procedures: 0)
- MR32-AC: Outdoor unit (Planes: 5, Procedures: 3)

 An 'Add Class' button is visible. Two pop-up windows are shown: 'PREVENTION PLANS' for 'MR32-AC : Air Filter' with a task 'Clean with a vacuum or hand wash. Limpieza - Quincenal' and 'PROCEDURES' for 'MR32-AC : Air Filter' with the message 'There's no any prevention plan associated'. A bottom-right footer contains the BDTA logo and text 'BUILDING DIGITAL TWIN ASSOCIATION'.



DTwin Home Viewer Storage

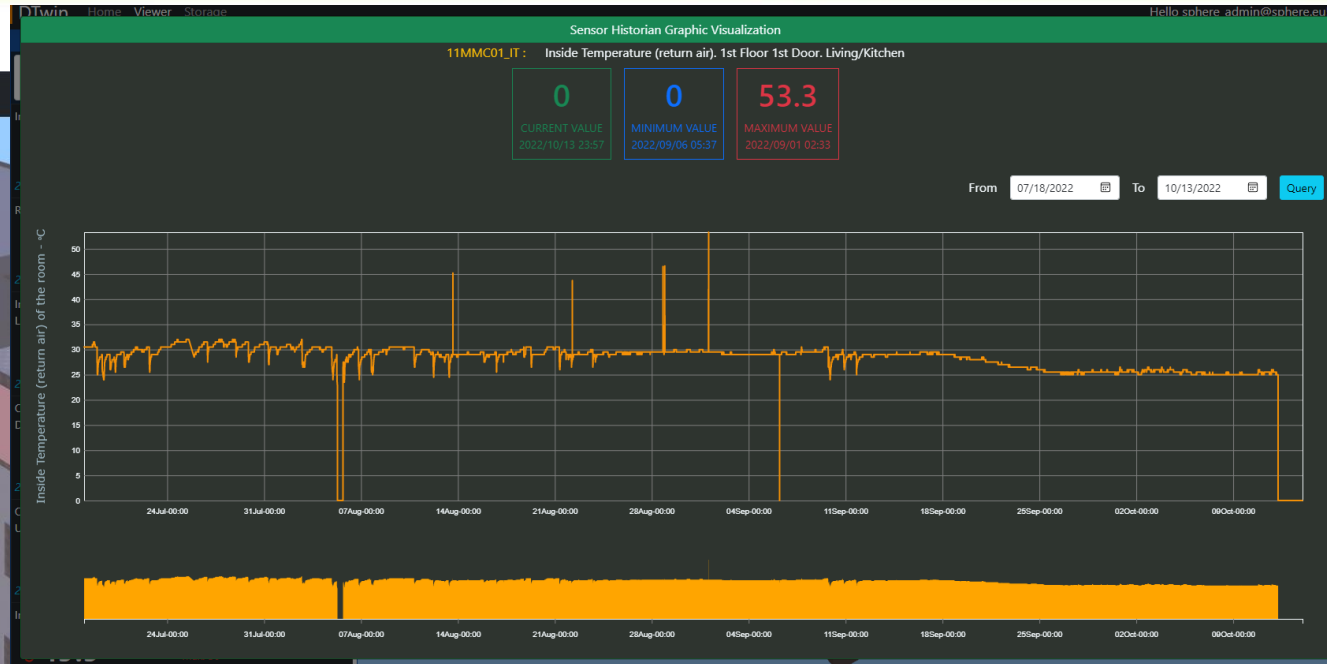
### Monitoring - Sensors

All Levels

- Inside Temperature, Groundfloor, Loc. 4**  
19 °C Min: 0 Max: 50 Tag: 00MMD04\_IT  
 2023-05-02 15:21
- Relative Humidity, Groundfloor, Loc. 4**  
75.8 % Min: 0 Max: 100 Tag: 00MMD04\_RH  
 2023-05-02 15:21
- Inside Temperature (return air), 1st Floor 1st Door, Living/Kitchen**  
22 °C Min: 0 Max: 50 Tag: 11MMC01\_IT  
 2023-05-02 15:21
- Operating Status (ON/OFF) Indoor Unit, 1st Floor 1st Door, Living/Kitchen**  
0 ON/OFF Min: 3 Max: 3 Tag: 11MMC01\_OS  
 2023-05-02 15:21
- Operating Mode (Auto, Heat, Dry, Fan, Cool) Indoor Unit, 1st Floor 1st Door, Living/Kitchen**  
4 Cool/Dry/Fan/Auto/Heat Min: 3 Max: 3 Tag: 11MMC01\_OM  
 2023-05-02 15:21
- Inside Temperature, 1st Floor 1st Door, Bedroom**  
19.9 °C Min: 0 Max: 50 Tag: 11MMD02\_IT  
 2023-05-02 15:21
- Inside Relative Humidity, 1st Floor 1st Door, Bedroom**  
 Min: 0 Max: 100 Tag: 11MMD02\_RH  
 2023-05-02 15:21

### Sensor Details

- Name**  
Inside Temperature (return air), 1st Floor 1st Door, Living/Kitchen
- Unit Description**  
Inside Temperature (return air) of the room
- Mounting System**  
Plug-in mounted
- Tag**  
11MMC01\_IT
- Location Level**  
1st Floor 1st Door
- Location Details**  
Indoor HVAC Unit of Living/Kitchen of apartment 1st floor, 1st door
- Manufacturer**  
LG ELECTRONICS
- Model**  
PDRYCB500
- Serial Number**  
PDRYCB500



**LCC comparison - cost breakdown**

Category	No waterproofing	MasterSeal 531
Initial investment	36,239.85 €	41,893.43 €
Re-application	675,686.77 €	23,762.88 €
Application faults	0	814.66 €
<b>Total Life Cycle Costs</b>	<b>711,926.62 €</b>	<b>66,470.97 €</b>

### Life Cycle Costs - cost breakdown

Product	Initial investment	Re-application	Application faults	Total Life Cycle Costs
<b>No waterproofing</b>	36.239,85 €	675.686,77 €	0	711.926,62 €
<b>MasterSeal 531</b>	41.893,43 €	23.762,88 €	814,66 €	66.470,97 €
<b>MasterSeal M 689</b>	41.129,26 €	4.842,97 €	206,94 €	46.179,17 €
<b>MasterSeal M 808</b>	40.567,00 €	4.342,51 €	0	44.909,51 €

[Display Graphics](#)

### Impact Category - Results

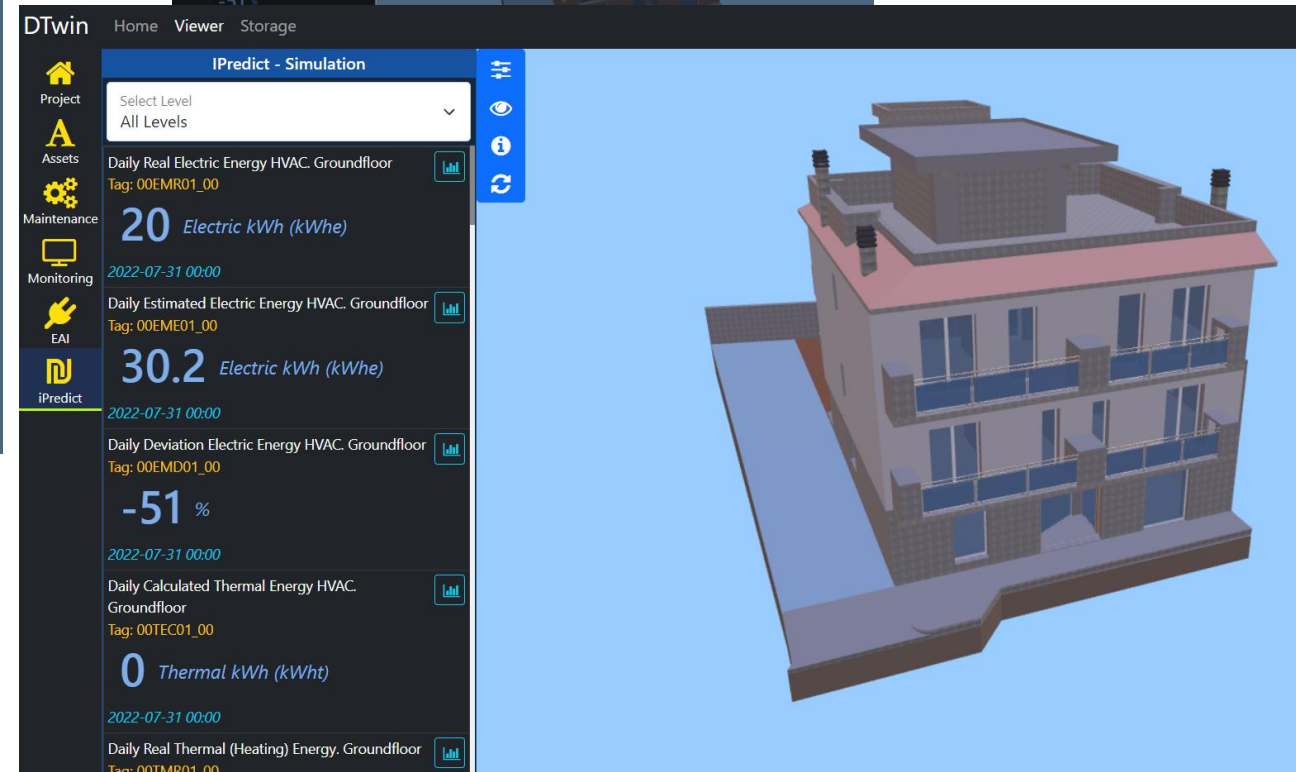
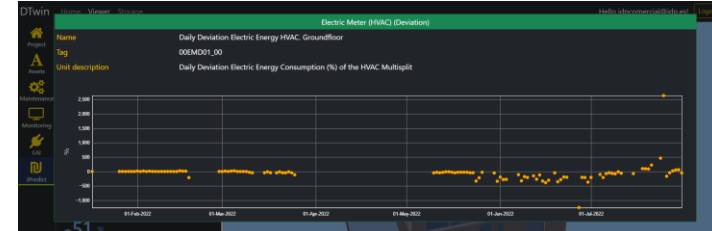
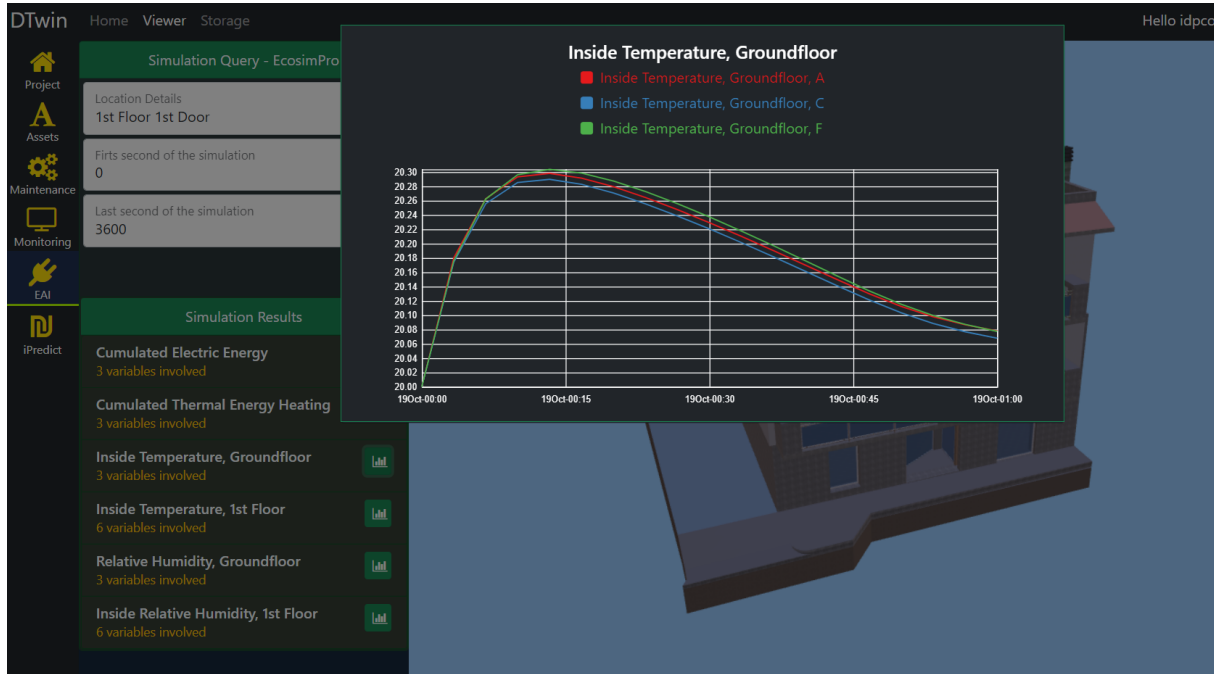
Concrete: 150 m<sup>3</sup>, C25/30 class  
Structure type: Slab/Foundations  
LCA Stage: Product  
Transport Distance Truck: 75km

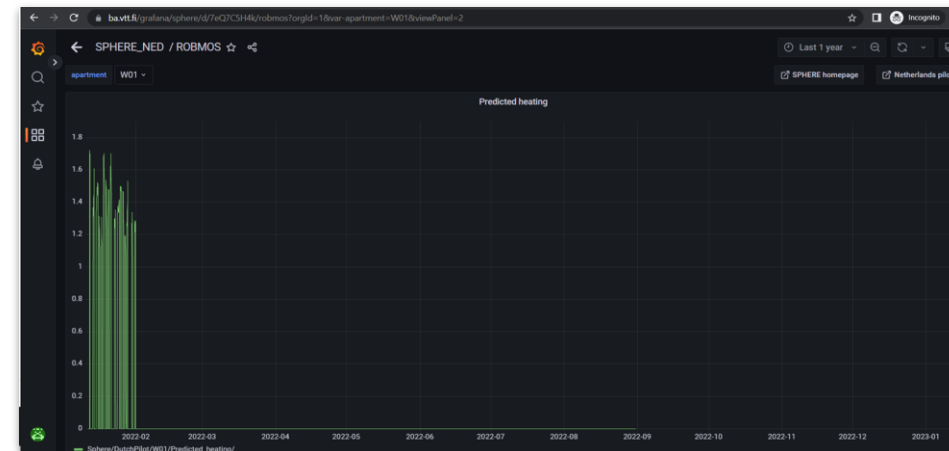
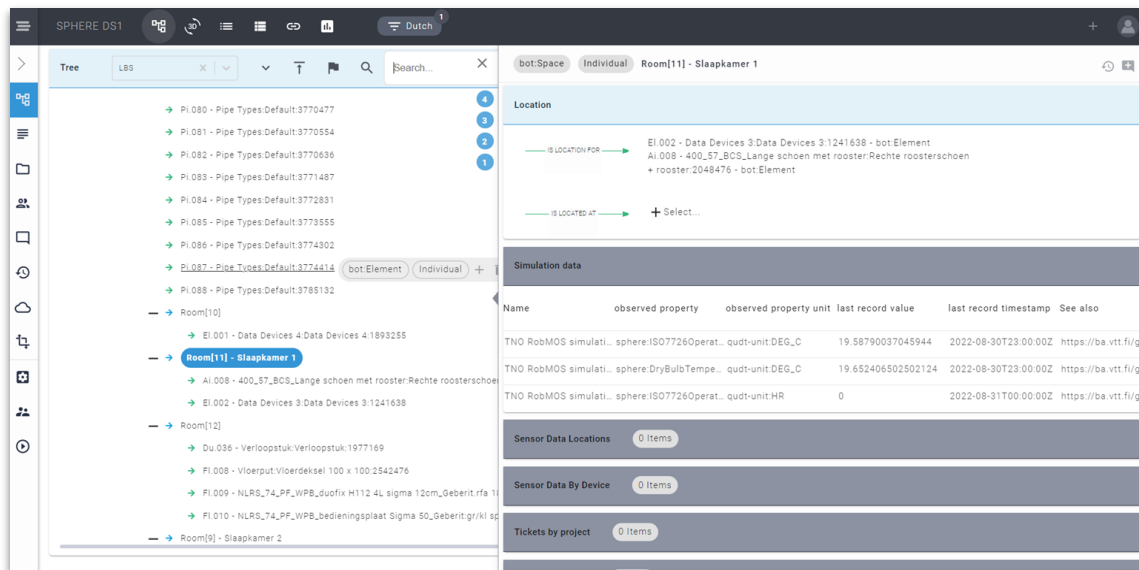
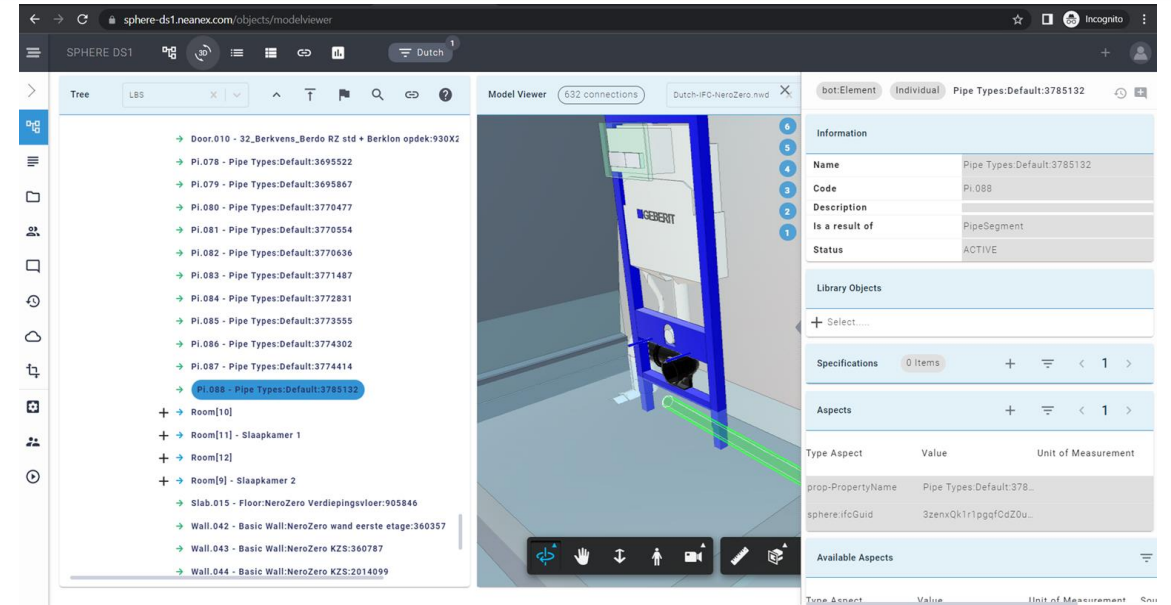
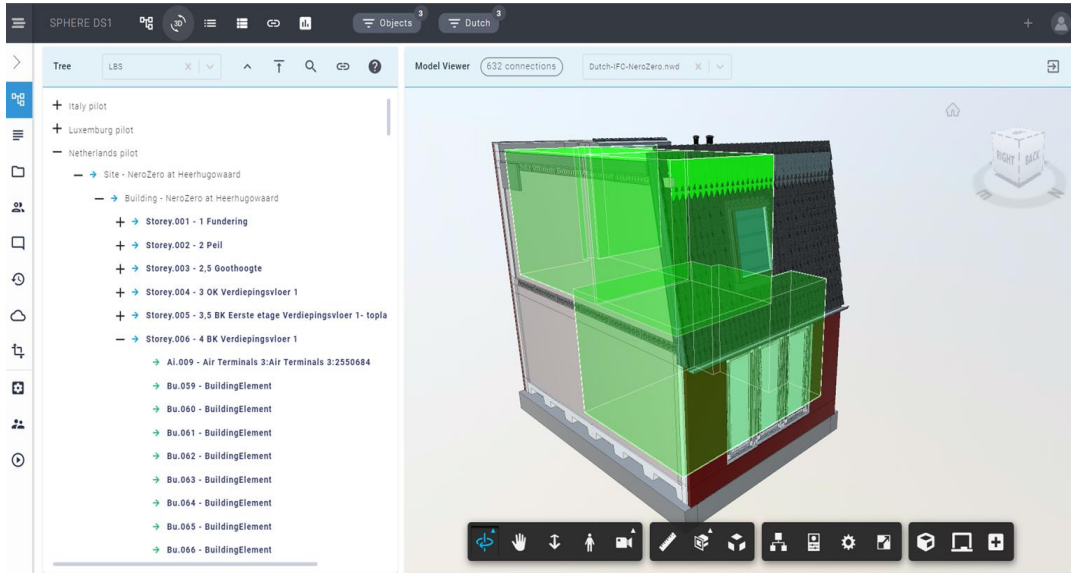
<b>Acidification (kg SO2 eq.)</b>	Base line design mix: 68.55	Low carbon - circular concrete mix: 68.4
<b>Climate change (kg CO2 eq.)</b>	Base line design mix: 40228.5	Low carbon - circular concrete mix: 33325.5
<b>Eutrophication, overall (kg PO4 3- eq.)</b>	Base line design mix: 10.58	Low carbon - circular concrete mix: 9.48
<b>Human Toxicity (toxicity points)</b>	Base line design mix: 1468200	Low carbon - circular concrete mix: 1066200
<b>Ozone depletion potential (kg CFC-11 eq.)</b>	Base line design mix: 1.19E-006	Low carbon - circular concrete mix: 1.21E-006
<b>Photochemical ozone formation (kg ethylene eq.)</b>	Base line design mix: 4.28	Low carbon - circular concrete mix: 4.76
<b>Resource depletion, minerals (kg Sb eq.)</b>	Base line design mix: 5.83E-002	Low carbon - circular concrete mix: 3.73E-002
<b>Resource depletion, fossils (MJ)</b>	Base line design mix: 200314.5	Low carbon - circular concrete mix: 210102

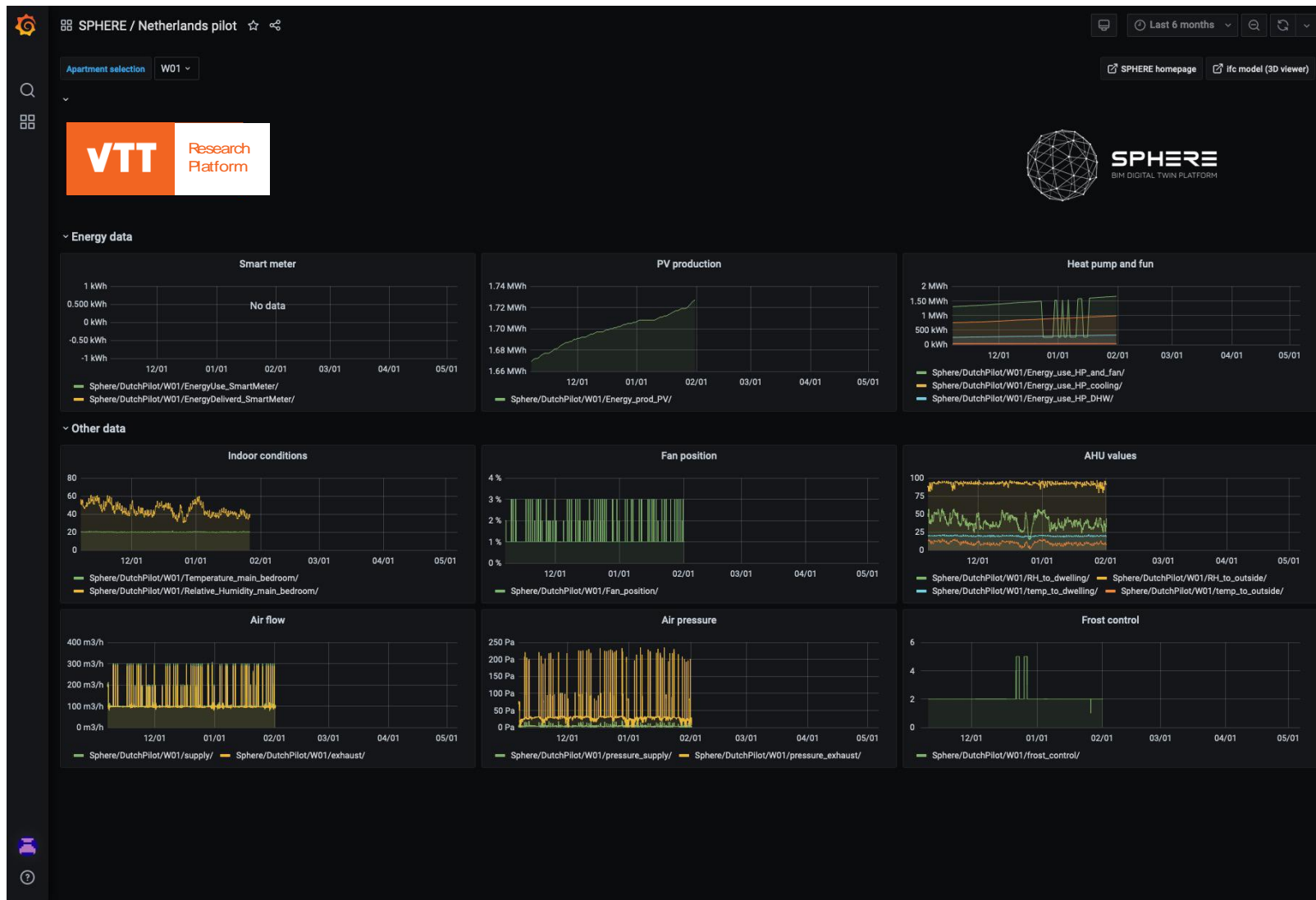
### Acidification

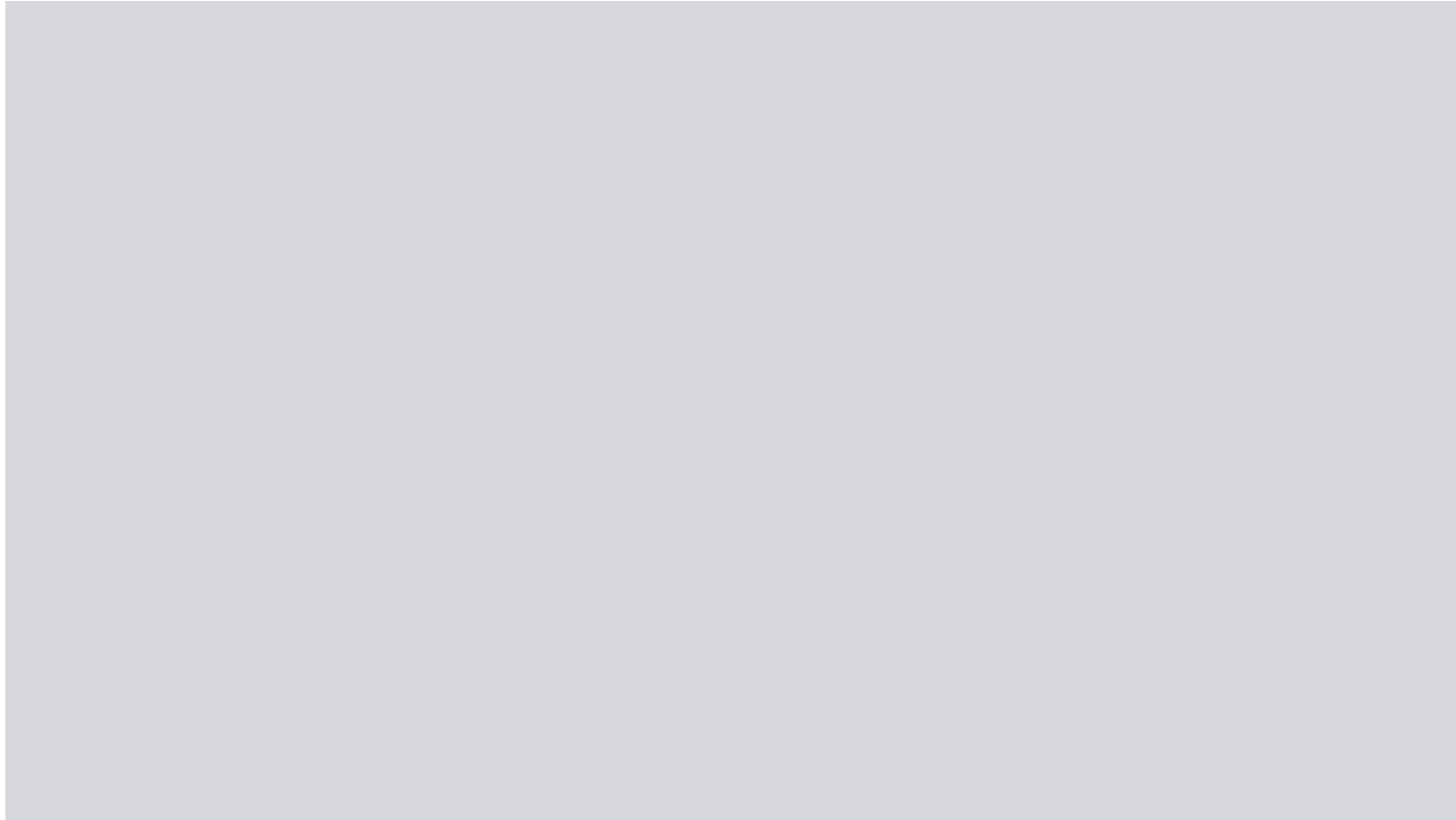
Methods	Base line design mix	Low carbon - circular concrete mix	Savings
BINDERS	55.35	55.5	-0.15
SANDS	2.7	2.7	0
AGGREGATES	3.6	3.45	0.15
WATER	0	0	0
ADMIXTURES	1.65	1.65	0
UTILITIES	1.65	1.65	0
PLACEMENT incl REINFORCEMENT	3.6	3.45	0.15

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International Congress

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