

SPHERE DT Environment for AECOO sector energy efficiency and sustainability optimisation

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ORGANIZED BY:



EUnet4DBP



THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON EUROPE RESEARCH AND INNOVATION PROGRAMME – PROJECT 101058541 – DIGICHECKS

Project objectives

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.

Concept and user benefits



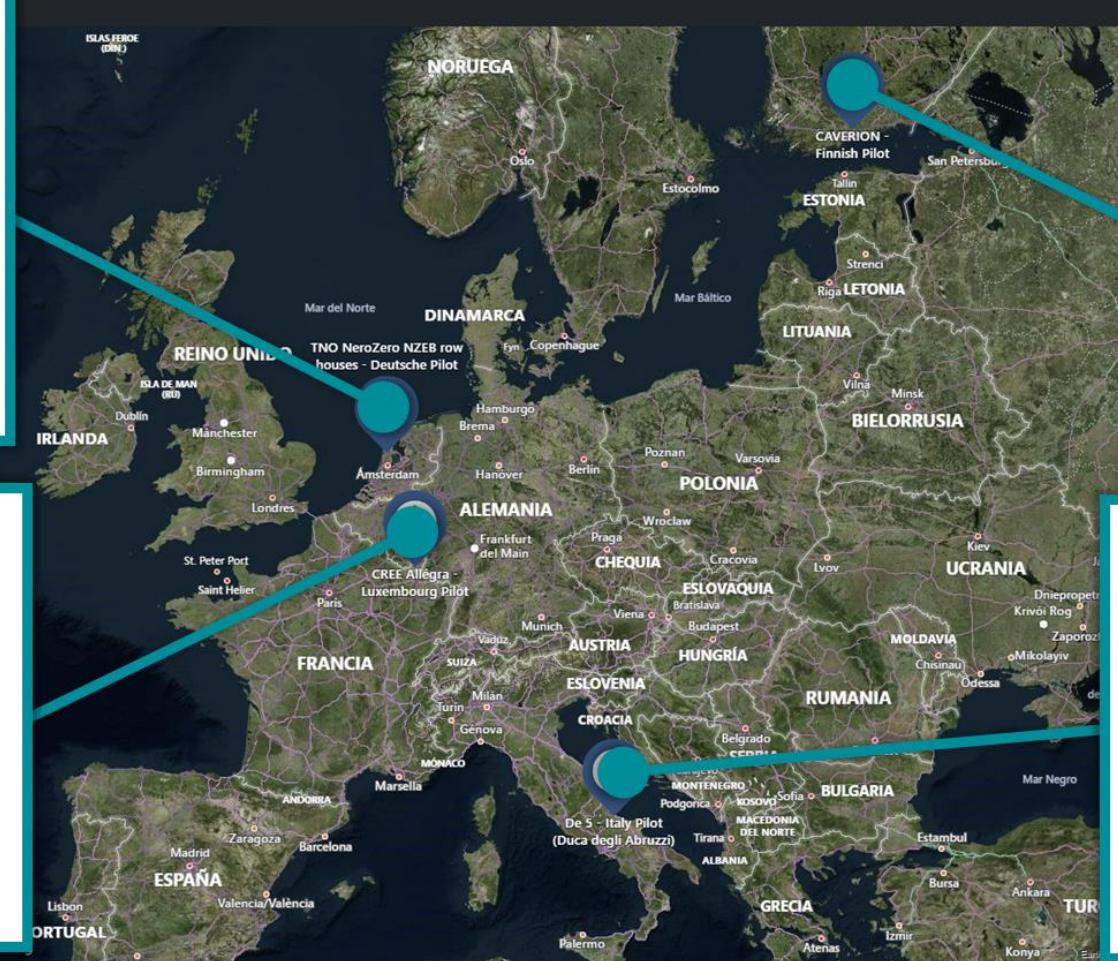
Pilots

Netherlands (New)
NZEB row houses for low income households

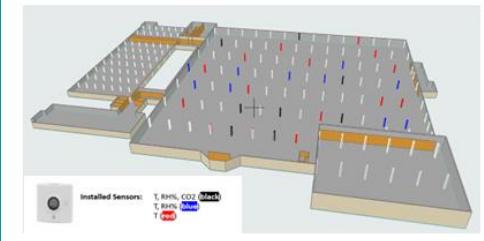


Via Duca degli Abruzzi n° 57, San Salvo (Chieti), Italy

Luxemburg (New)
Prefabricated timber smart office building

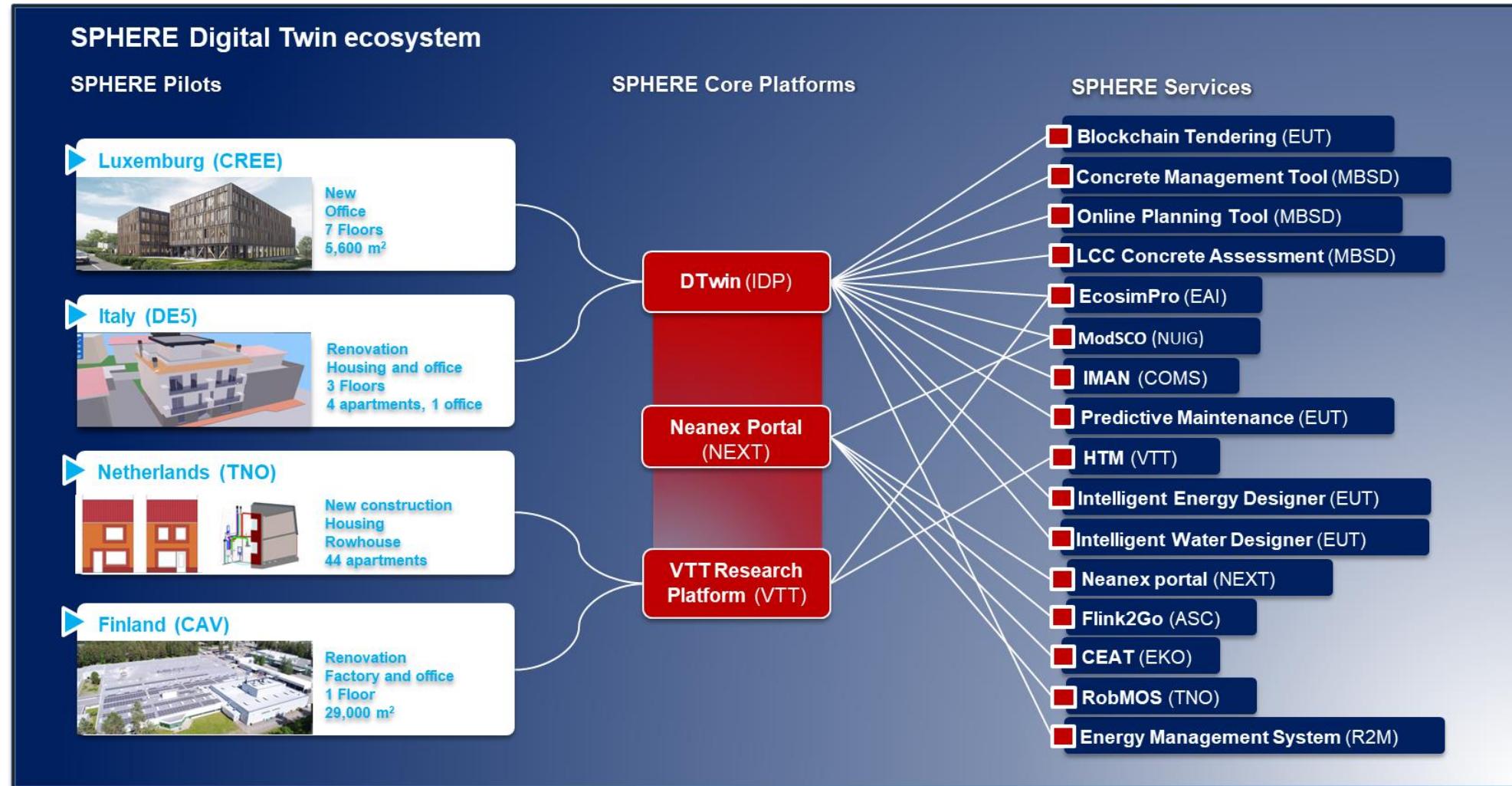


Finland (Renovation)
Energy upgrade for 1960s factory and office



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





The screenshot displays the IDP DTwin interface, featuring a sidebar on the left and a map of Europe on the right.

Left Sidebar (IDP DTwin Home):

- SPHERE BIM DIGITAL TWIN PLATFORM:** Logo and text.
- 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

Map of Europe (Right Side):

- NORUEGA:** Oslo, Estocolmo
- DINAMARCA:** Copenhagen
- IRLANDA:** Dublin, Chorley, Knowsley, Broxtowe, Sandwell, Londres, Stroud, Distrito de New Forest, St. Peter Port, Saint Helier
- FRANCIA:** Marsella, Turin, Milán, Génova, Monaco
- CHEQUIA:** Praga, Wroclaw
- ALEMANIA:** Ámsterdam, Hamburg, Brema, Hanover, Berlin, Poznan, Varsovia, Krakow, Lvov, Wroclaw, Praga, Viena, Budapest, Belgrado, Sarajevo, Podgorica, Montenegro, Kosovo
- ESLOVACIA:** Bratislava
- ESLOVENIA:** Ljubljana
- MONTEVIDEO:** Montevideo
- ESTONIA:** Tallinn, Riga, Olaine
- LITUANIA:** Vilna
- BIELORRUSIA:** Minsk
- UCRANIA:** Kiev, Dnipro, Donetsk, Zaporozhie, Rostov del Don, Krasnodar
- MOLDAVIA:** Chișinău, Odessa
- RUMANIA:** Bucarest
- BULGARIA:** Sofia
- ROMANIA:** Romanova, San Petersburgo
- YUGOSLAVIA:** Yaroslavl, Nizni Novgorod, Lipetsk, Voronezh, Jarkov, Dnipró, Donets, Zaporožie, Rostov del Don, Krasnodar
- ALBANIA:** Tirana
- GRECIA:** Atenas
- ANDORRA:** Andorra la Vella
- ISLAS FEROE (DIN):** Islas Feroe
- ISLA DE MAN (IRL):** Isla de Man
- PAPEST:** Roma
- OTTOMAN EMPIRE:** Istanbul
- OTROS:** Skagerrak, Golfo de Botnia, Mar Báltico, Mar Cantábrico, Mar Negro, Mar de Azov

Map Labels: Hello sphere_admin@sphere.eu!, Logout, Área, +, -, Microsoft Bing, 100 millas, 250 km, © 2023 TomTom, Esri, Cartographia, Geodaten, SIO, © 2023 Microsoft Corporation.

IDP DTwin Home Viewer Storage

Project De 5 - Italy Pilot (Duca degli Abruzzi)

Assets 01667 - Italy pilot, apartment building - renovation (DE5)

Maintenance Facility Management & Renewal Monitoring

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

MBSD EcosimPro

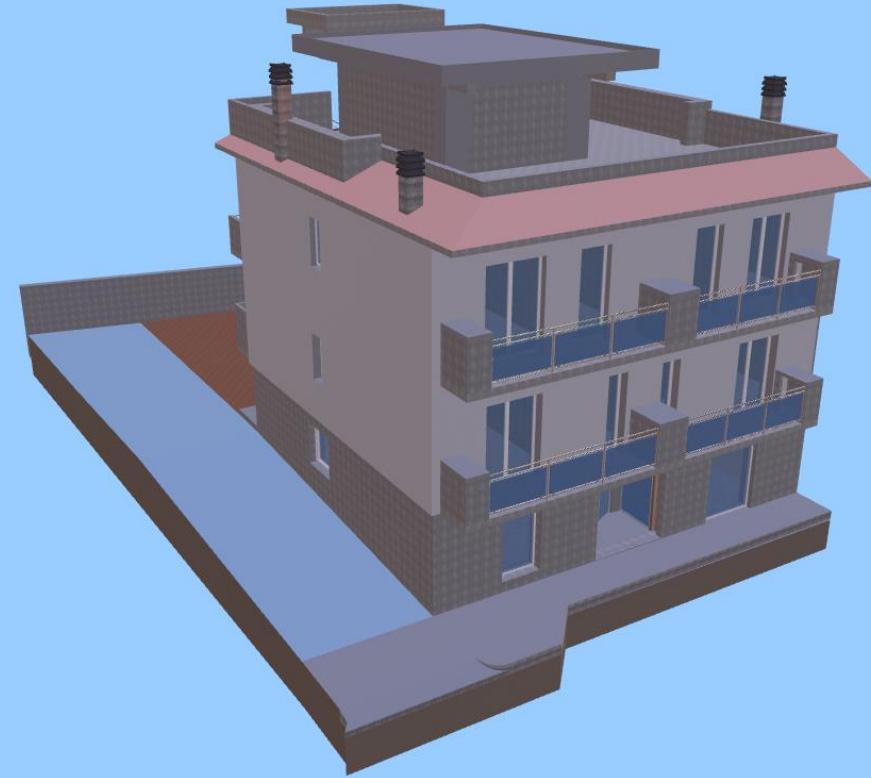
iPredict

IDP DTwin Home Viewer Storage

Project Info

Models

Name	Type	Creation Date	Modified Date	Current Version	Actions
Italy Pilot (Duca degli Abruzzi).IFC4 (Reference View)	IFC	10/18/2021		1.0	
Italy Pilot (Duca degli Abruzzi).IFC4 (Design Transfer View)	XLSX	10/18/2021		3.0	

Viewer


Storage

DTwin Maintenance

The screenshot displays the DTwin Maintenance application interface, featuring a central 3D building model and various maintenance-related modules.

Top Navigation: Home, Viewer, Storage, DTwin (selected), Schedule - Planning, Project, Assets, Maintenance, Schedule, Assigned, Validation, Plans, Monitoring, MBSD, EcosimPro, iPredict.

Schedule - Planning: Shows 2 tasks for Tuesday, May - 2023. A modal window titled "Prevention Classes" lists two entries:

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

Maintenance: A sidebar menu with icons for Project, Assets, Maintenance, Schedule, Assigned, Validation, and Plans.

Validation Tasks - Reported: A dropdown menu showing maintenance types: All maintenance, All maintenance, Corrective, Preventive.

Central Content: A large 3D building model. Overlaid are several windows:

- PREVENTION PLANS** for MR32-AC : Air Filter:
 - 1 Clean with a vacuum or hand wash.
Limpieza - Quincenal
 Buttons: Close, Add Plan.
- PROCEDURES** for MR32-AC : Air Filter:

There's no any prevention plan associated

 Buttons: Close, Add Procedure.

DTwin monitoring

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: **50.0 %** (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

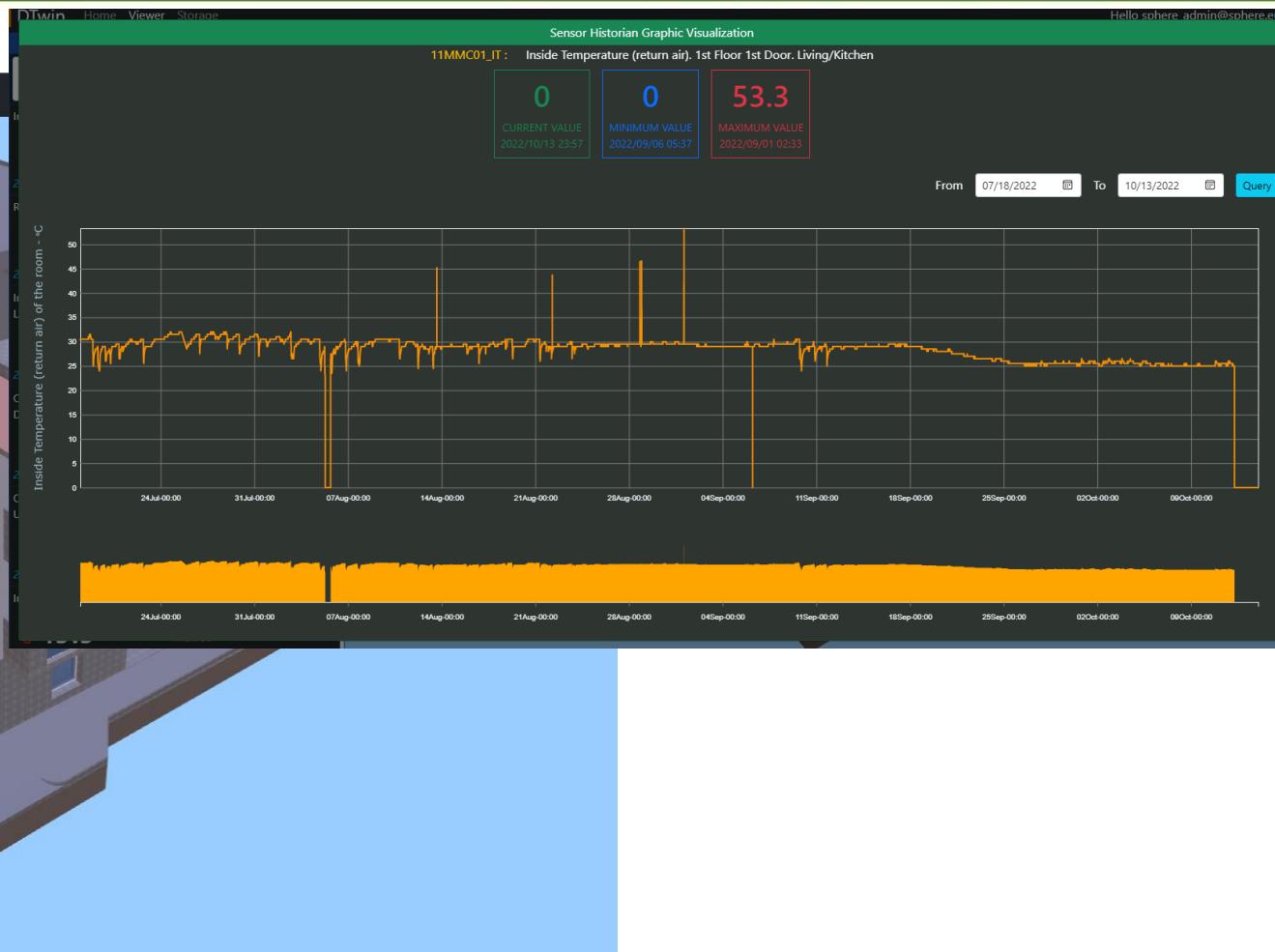
Location Level: 1st Floor 1st Door

Location Details: Indoor HVAC Unit of Living/Kitchen of apartment 1st floor, 1st door

Manufacturer: LG ELECTRONICS

Model: PDRYCB500

Serial Number: PDRYCB500



DTwin CMT & LCCA

Life Cycle Costs - cost breakdown

No waterproofing	MasterSeal 531
Initial investment:	Initial investment: 41.893,43 €
Re-application:	Re-application: 23.762,88 €
Application faults:	Application faults: 814,66 €
Total Life Cycle Costs:	Total Life Cycle Costs: 66.470,97 €

No waterproofing	MasterSeal M 689
Initial investment:	Initial investment: 41.129,26 €
Re-application:	Re-application: 4.842,97 €
Application faults:	Application faults: 206,94 €
Total Life Cycle Costs:	Total Life Cycle Costs: 46.179,17 €

[Display Graphics](#)

LCC comparison - cost breakdown

Impact Category - Results

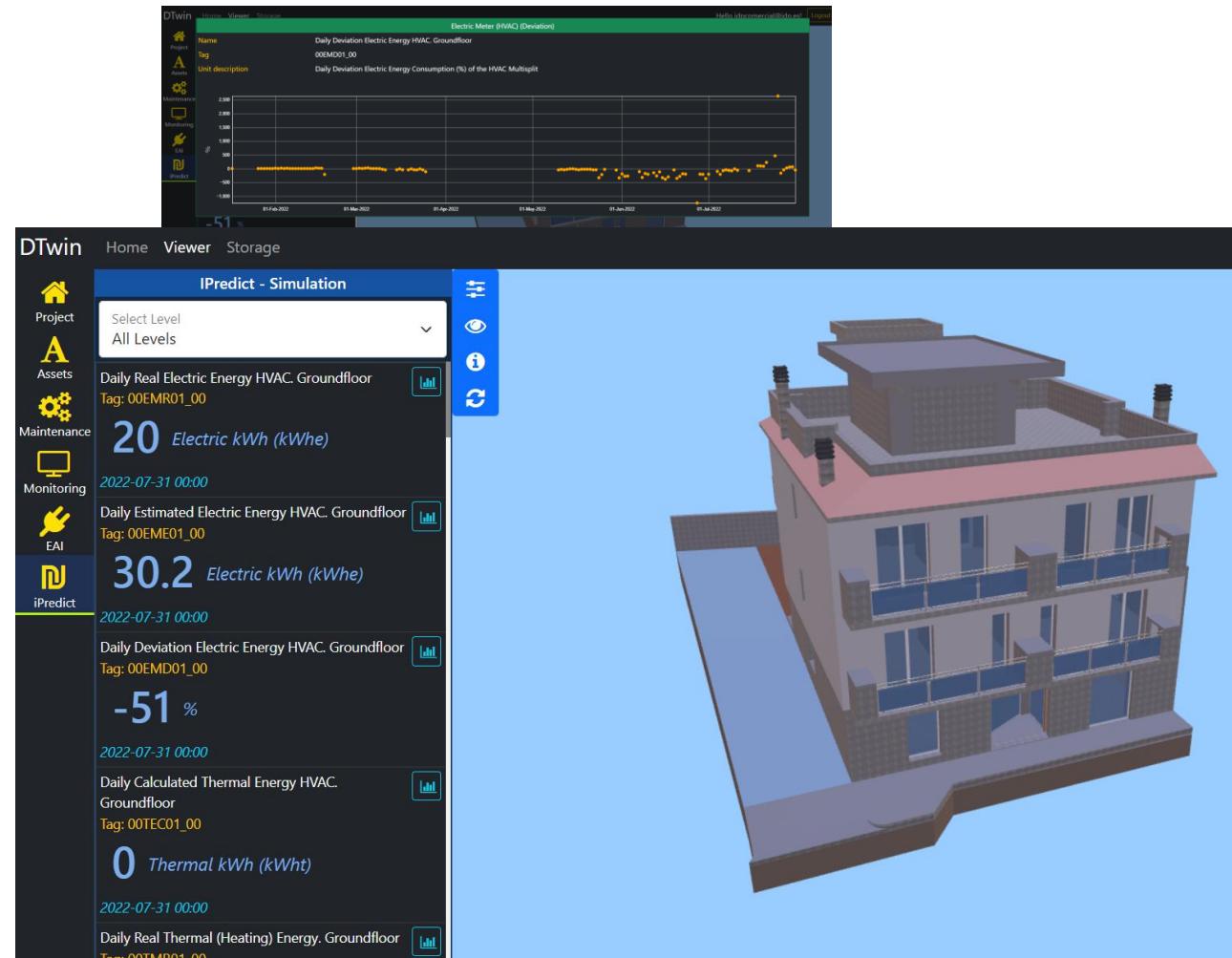
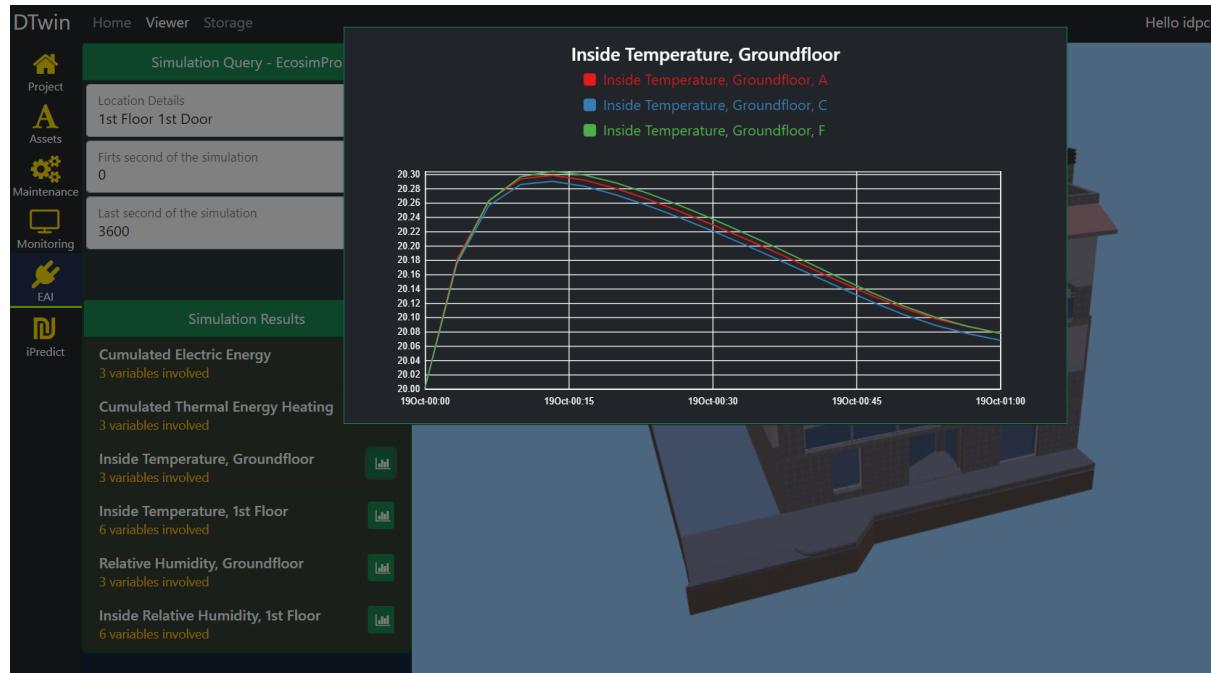
Concrete: 150 m ³ , C25/30 class	Structure Type: Slab/Foundations
LCA Stage: Product	Transport Distance Truck: 75km
Acidification (kg SO2 eq.)	
Base line design mix	68.55
Low carbon - circular concrete mix	68.4
Climate change (kg CO2 eq.)	
Base line design mix	40228.5
Low carbon - circular concrete mix	33325.5
Eutrophication, overall (kg PO4 3- eq.)	
Base line design mix	10.58
Low carbon - circular concrete mix	9.48
Human Toxicity (toxicity points)	
Base line design mix	14682000
Low carbon - circular concrete mix	10662000
Ozone depletion potential (kg CFC-11 eq.)	
Base line design mix	1.19E-006
Low carbon - circular concrete mix	1.21E-006
Photochemical ozone formation (kg ethylene eq.)	
Base line design mix	4.28
Low carbon - circular concrete mix	4.76
Resource depletion, minerals (kg Sb eq.)	
Base line design mix	5.83E-002
Low carbon - circular concrete mix	3.73E-002
Resource depletion, fossils (MJ)	
Base line design mix	200314.5
Low carbon - circular concrete mix	210102

Acidification

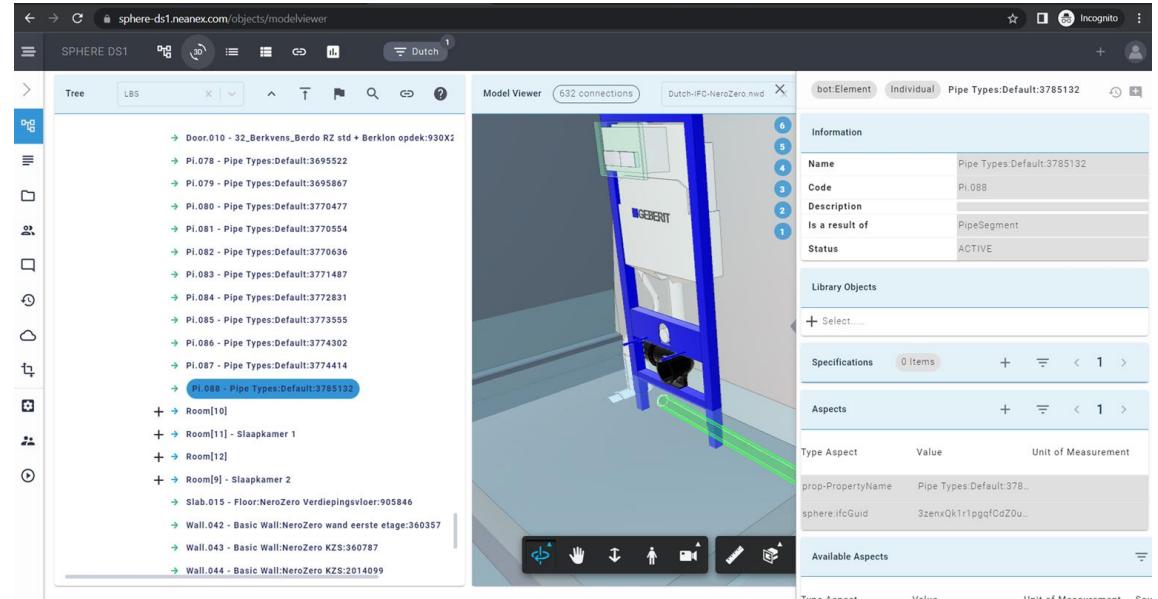
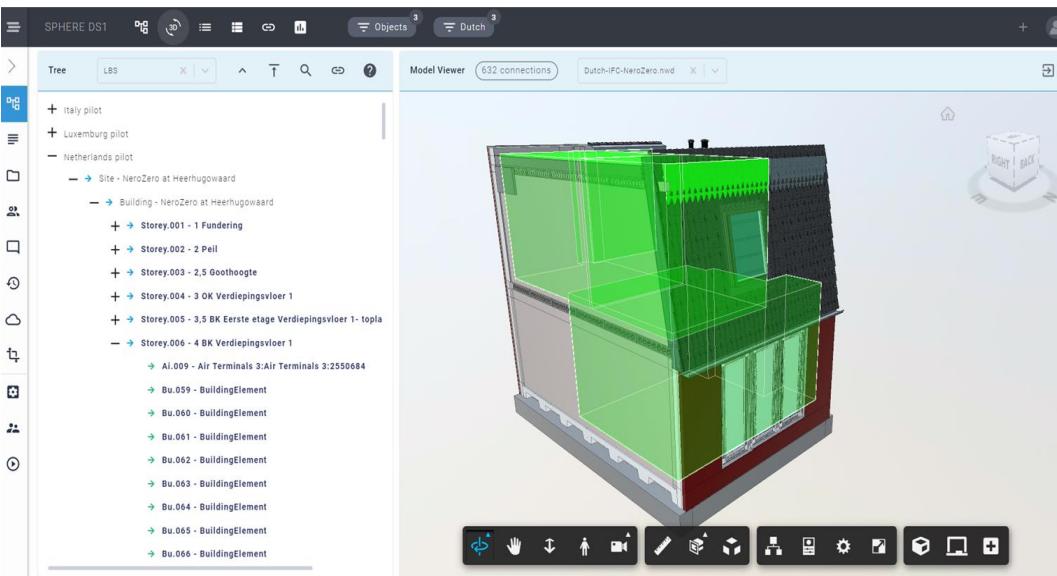
Methods	Base line design mix	Low carbon - circular concrete mix	Savings
BINDERS	55.35	55.5	-0.15
SANDS	2.7	2.7	0
AGGREGATES	3.6	3.45	0.15
WATER	0	0	0
ADMIXTURES	1.65	1.65	0
UTILITIES	1.65	1.65	0
PLACEMENT incl REINFORCEMENT	3.6	3.45	0.15

[Close](#)

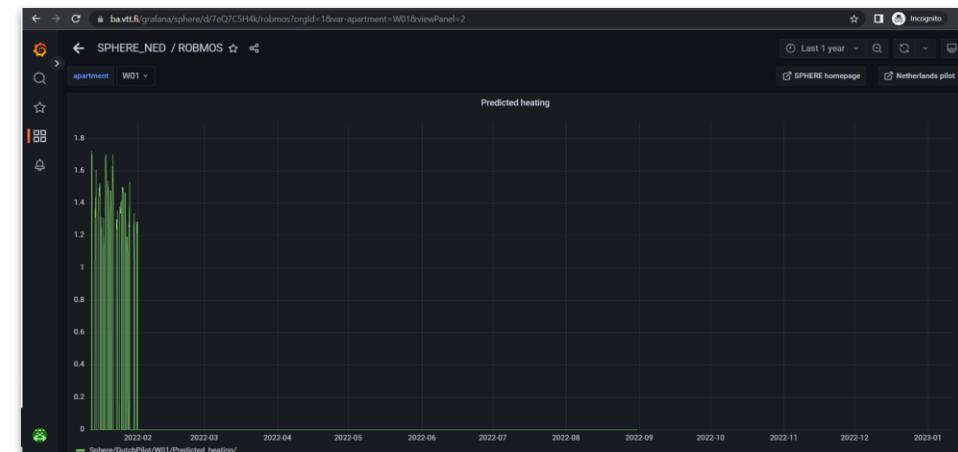
DTwin EcosimPro & iPredict

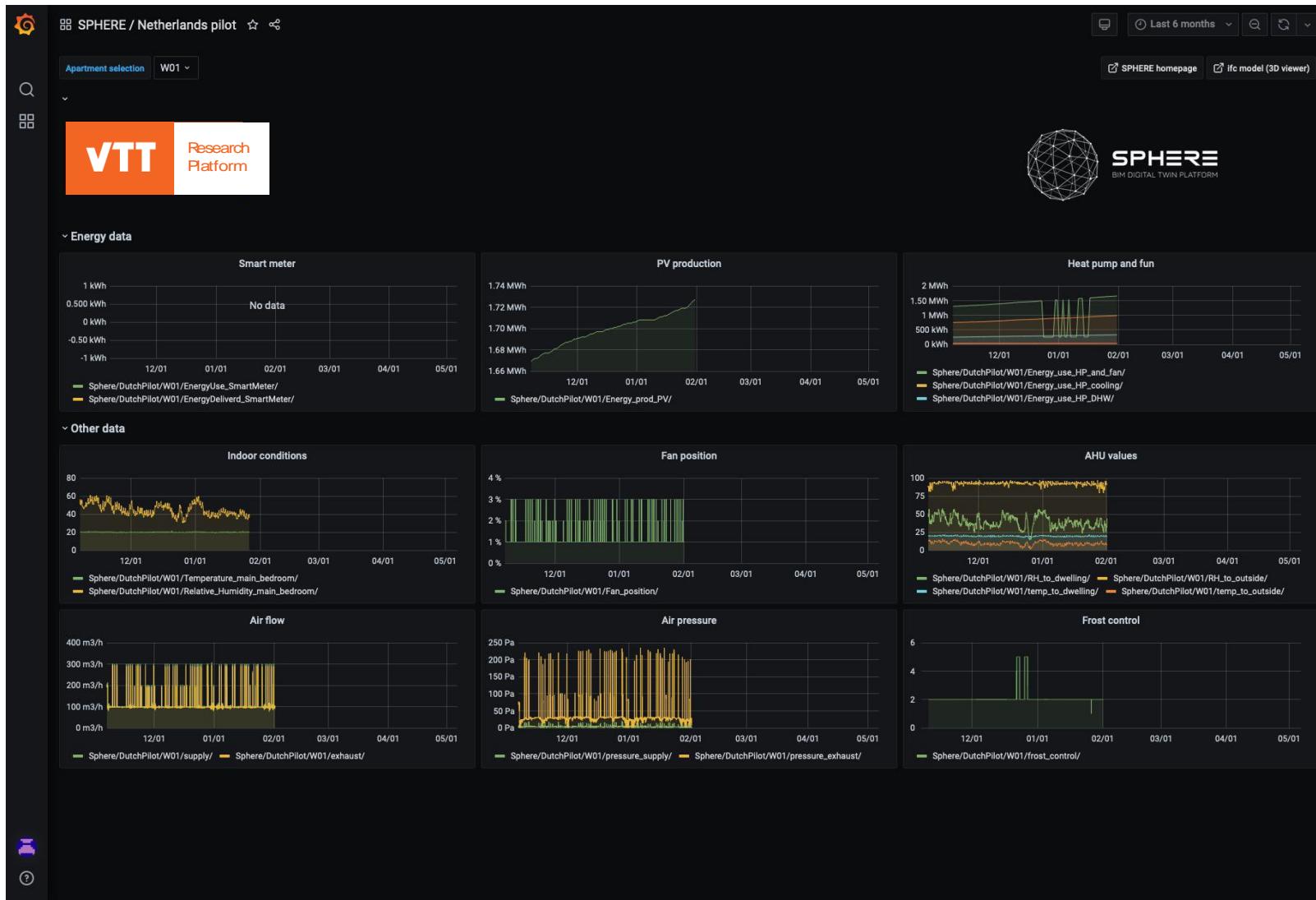


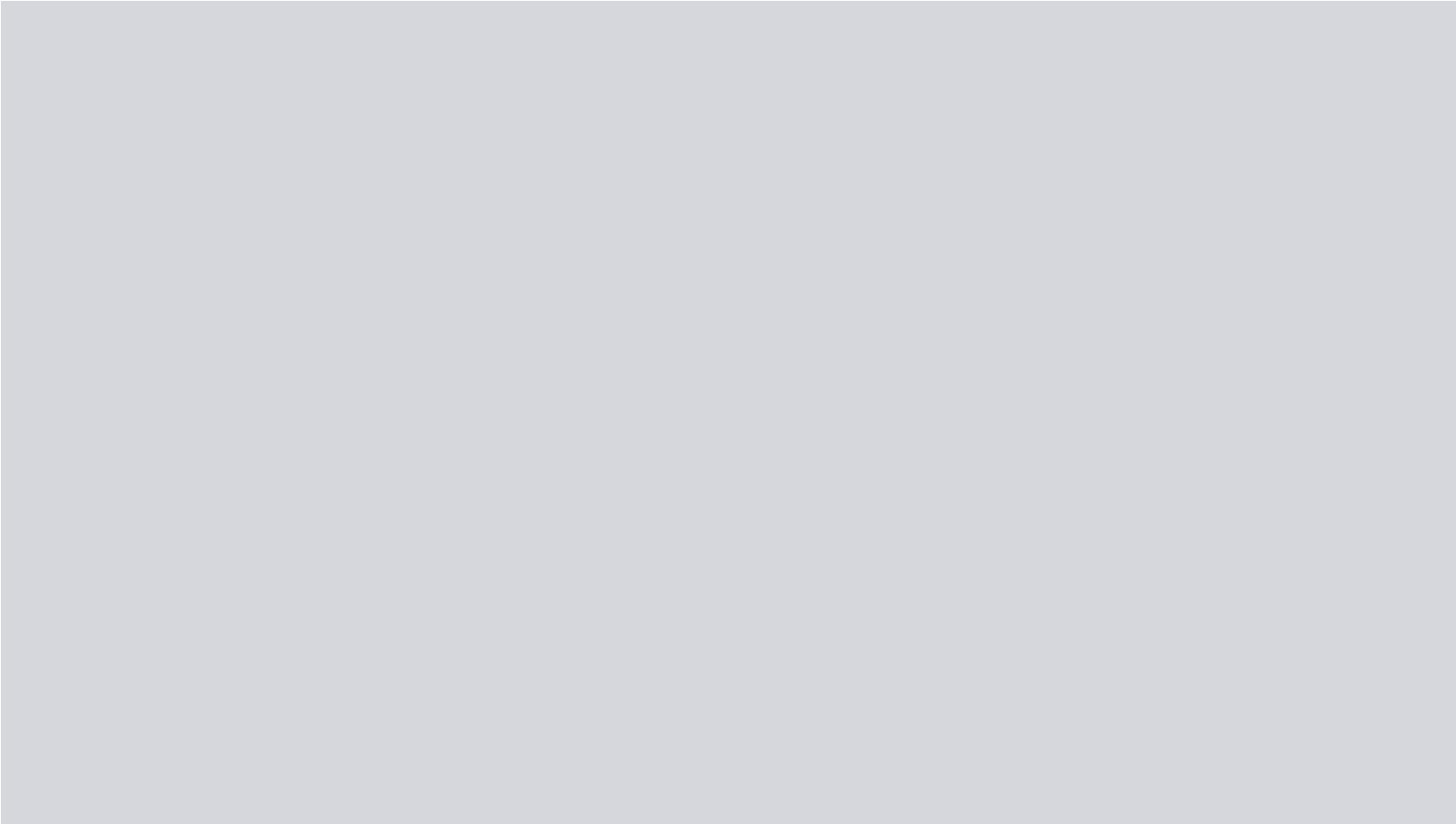
Neanex portal



This screenshot shows a detailed view of a room's location and simulation data in the Neanex portal. The top section shows the location of a pipe segment ('PI.088') within a room ('Room[11] - Slaapkamer 1'). Below this, a table displays simulation data for the pipe, including observed properties like 'sphere:ISO7726Operat.' and their values over time. Other sections include 'Sensor Data Locations' and 'Tickets by project'.









BDTIC

3rd BUILDING DIGITAL TWIN International Congress

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