

**BESPARINGEN EN VERDUURZAAMING VAN GEBOUWEN
DANKZIJ SLIMME AANSTURING**

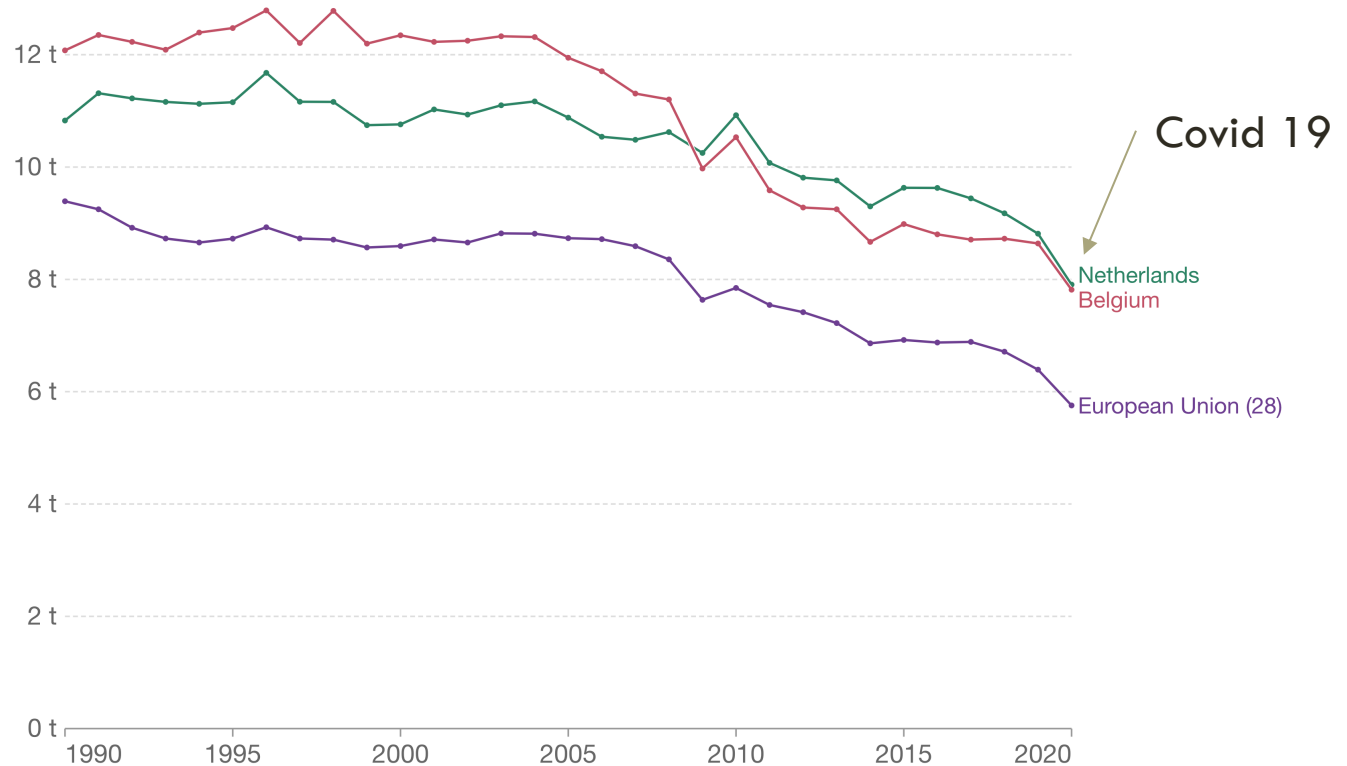
www.builtwins.com
info@builtwins.com



CONTEXT

Per capita CO₂ emissions

Carbon dioxide (CO₂) emissions from fossil fuels and industry¹. Land use change is not included.

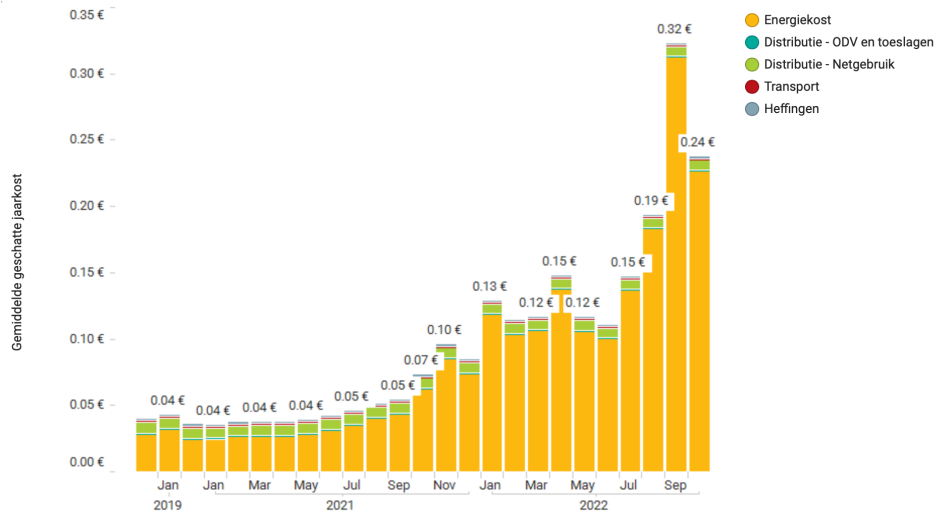


Source: Our World in Data based on the Global Carbon Project (2022) OurWorldInData.org/co2-and-other-greenhouse-gas-emissions/ • CC BY

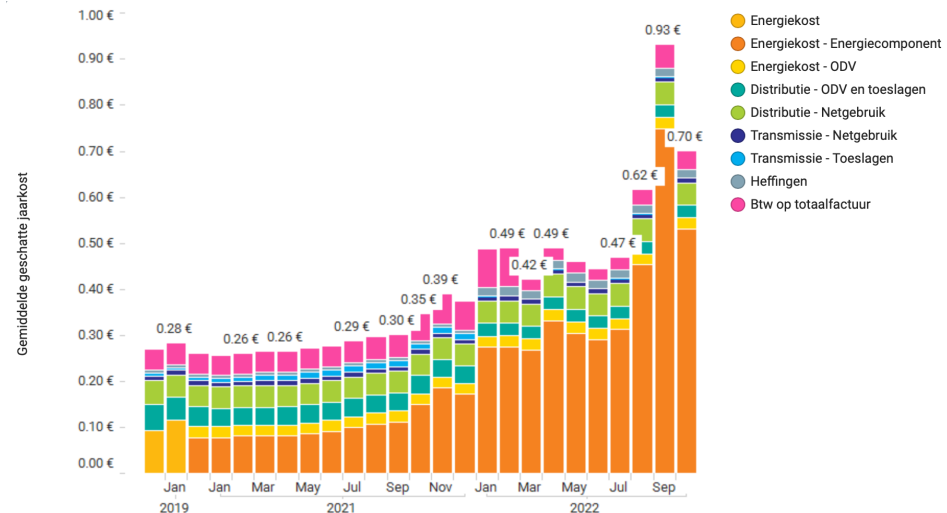
1. Fossil emissions: Fossil emissions measure the quantity of carbon dioxide (CO₂) emitted from the burning of fossil fuels, and directly from industrial processes such as cement and steel production. Fossil CO₂ includes emissions from coal, oil, gas, flaring, cement, steel, and other industrial processes. Fossil emissions do not include land use change, deforestation, soils, or vegetation.

ENERGIEPRIJZEN

Gas (EUR/kWh)



Elektriciteit (EUR/kWh)



Bron: https://dashboard.vreg.be/report/DMR_Prijzen_gas.html

Bron: https://dashboard.vreg.be/report/DMR_Prijzen_elektriciteit.html

CO₂ PRIJS

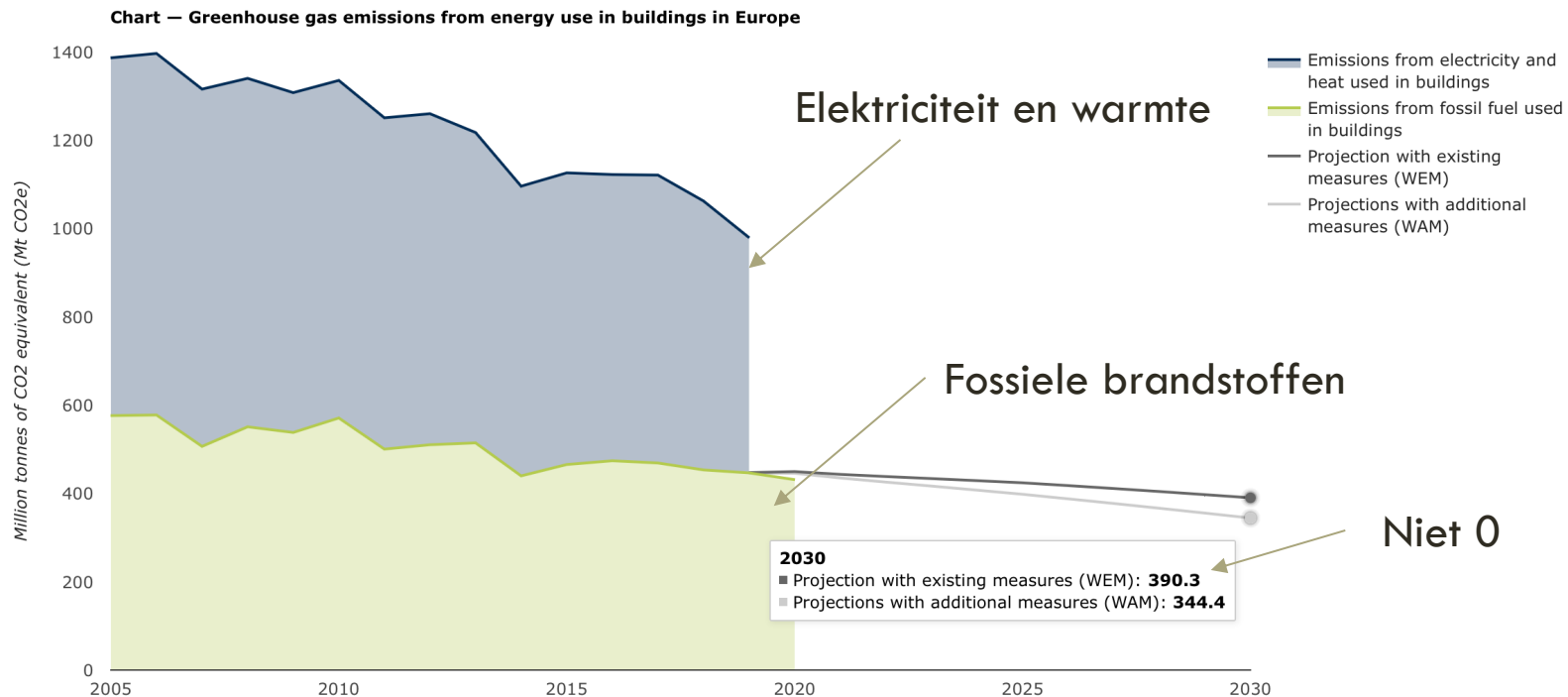
73.5 EUR/ton

Omgerekend:

- 0.016 EUR/kWh gas
- 0.03 EUR/kWh elek.



CO₂ UITSTOOT IN GEBOUWEN



EU ETS

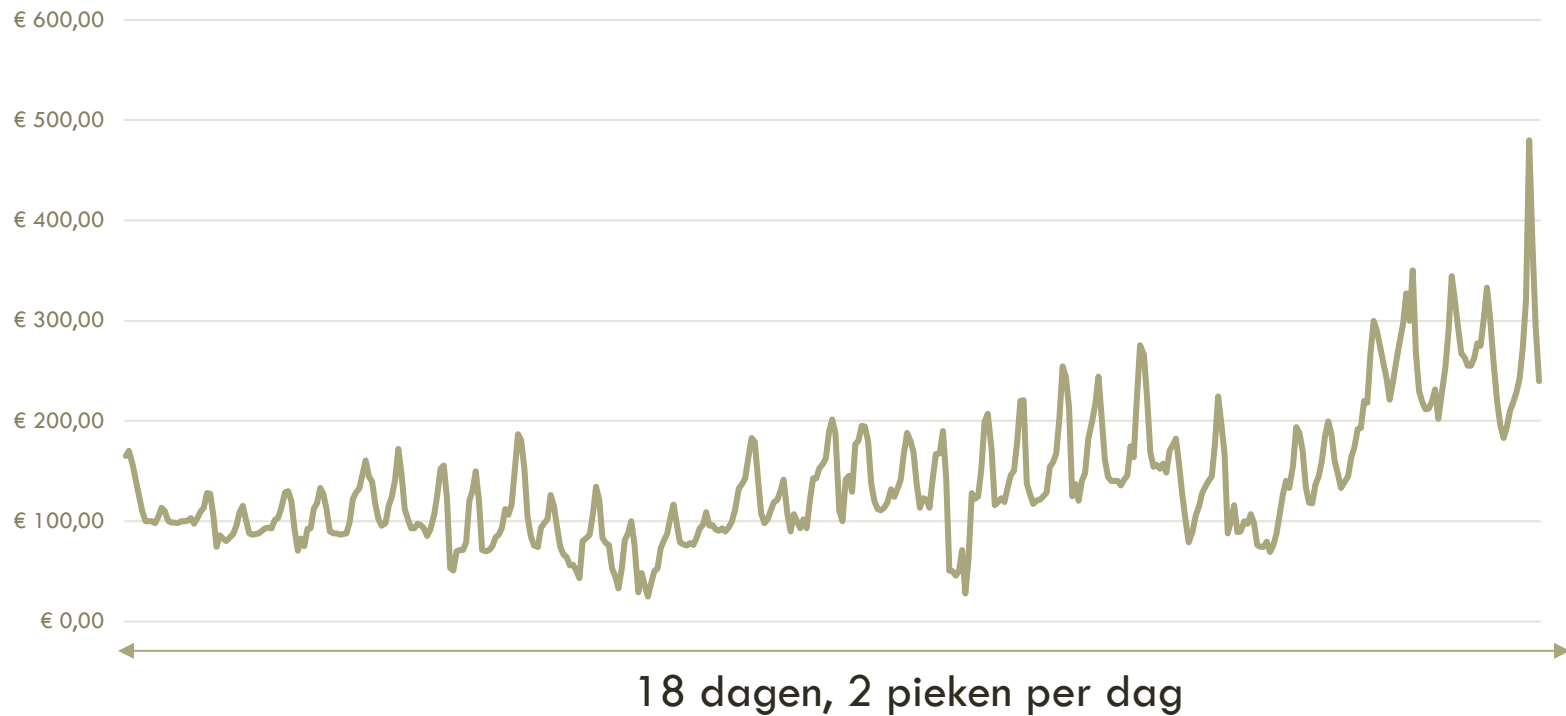
“The Commission is also proposing to apply emissions trading in new sectors where sharper reductions are needed to reach the 2030 target. Under the proposal, emissions from maritime transport will be included in the existing EU ETS, while emissions from fuels used in road transport and building will be covered by a new, separate emissions trading system.

...

It will become operational as of 2025 , with a cap on emissions set from 2026”

OPPORTUNITITEIT

Spot Belpex (EUR/MWh)



UITDAGINGEN

HVAC = 15% energiegebruik

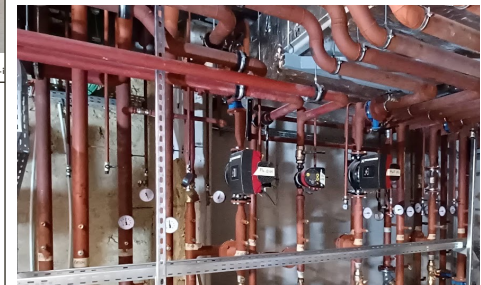


HVAC complexiteit ↑↑



<https://www.boydens.be/our-services/#mep-f>

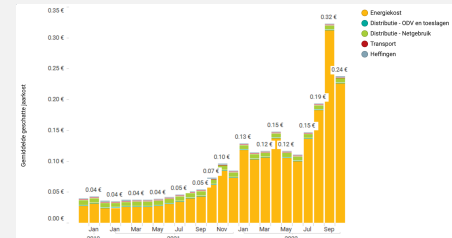
Inregeling ↑↑



Gebrek aan opvolging

Gebrek aan rapportering

Nieuwe randvoorwaarden



ONZE MISSIE

Missie

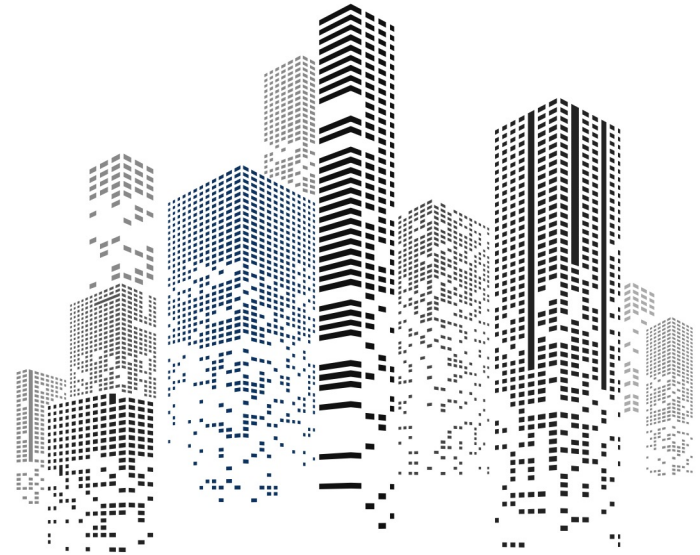
Verhogen duurzaamheid, verbeteren comfort, verlagen kosten en ontzorging binnen gebouwen

Hoe?

Aanbieden diensten en software voor optimalisatie van gebouwen

ACHTERLIGGENDE
TECHNOLOGIE:
MODEL PREDICTIVE
CONTROL (MPC)

KU LEUVEN



THERMAL
SYSTEMS
SIMULATION

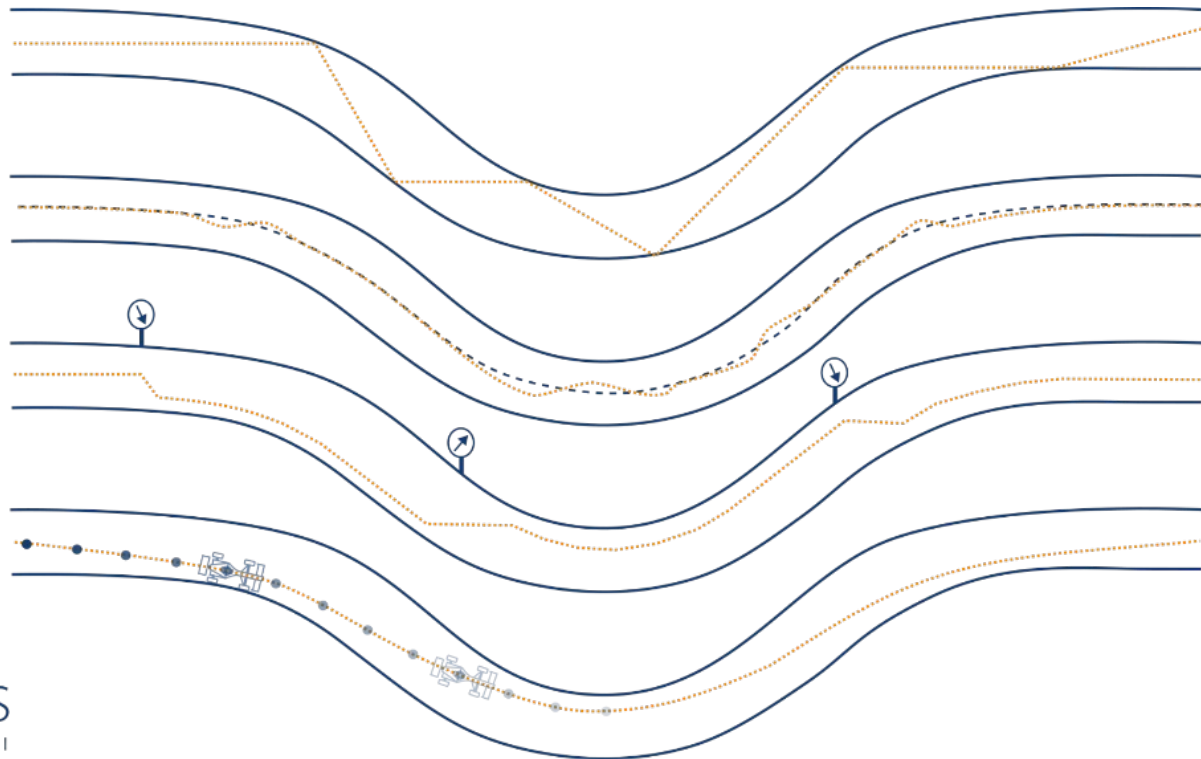
CONCEPTUEEL: ANALOGIE MET RACECIRCUIT

Hysteresis 

PI(D) 

Rules 

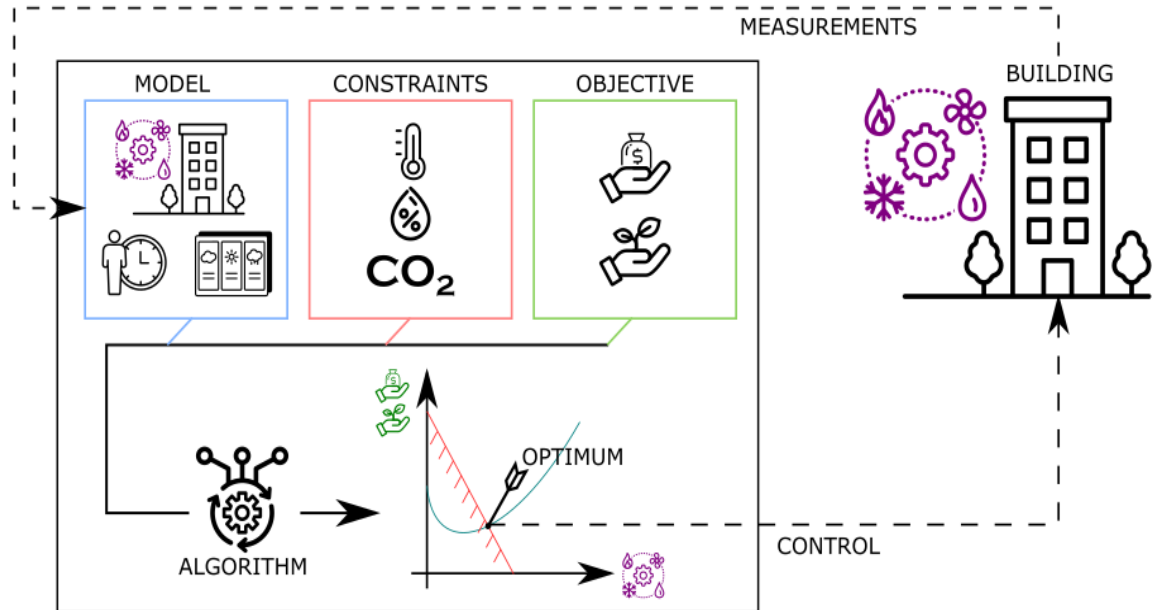
MPC 



MODEL PREDICTIVE CONTROL (MPC)

Innovatieve regelsoftware

- Regelaar op maat: *white box* digital twin
- Optimaliseert, voorspelt en benchmark voor performantie
- Bestaande sensoren en actuatoren
- Flexibel: slimme netten, comfort vs. kost



HISTORIEK



menerga
The energy savers



DeltaQ
Autopilot for your buildings.



mintus
zorg met een plus

fluvius.



StArtto Control

SWECO

THERMAL SYSTEMS SIMULATION

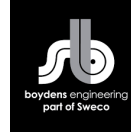
THERMAL SYSTEMS SIMULATION



THERMAL SYSTEMS SIMULATION



THERMAL SYSTEMS SIMULATION



Opstart onderzoekstrack

- Prof. Lieve Helsen
- Clara Verhelst
- Maarten Sourbron
- Roel De Coninck

MPC & GEOTABS

Nieuwe PhD's:

- Filip Jorissen
- Damien Picard

MPC & optimaal ontwerp

hybridGEOTABS
& spin-off mandaat

- EU H2020
- Demonstraties

Builtwins BV

- MPC
- Complementaire diensten

BUILTWIN
Sustainable Building Control

2008



2013



2018



Funded by the European Union

AGENTSCHAP INNOVEREN & ONDERNEMEN



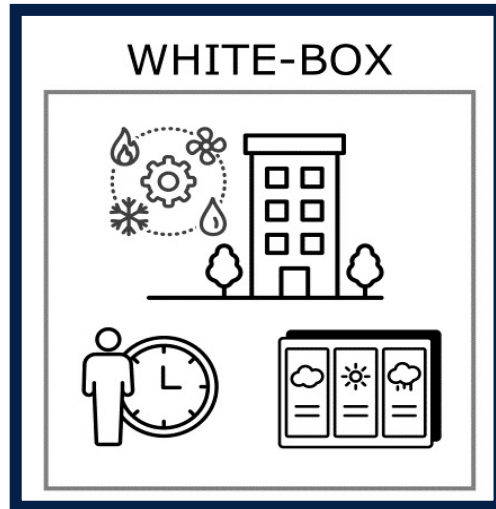
Vlaanderen is ondernemen

2022

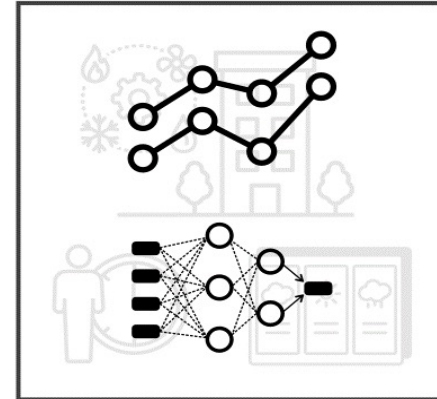
INNOVATIE

State-of-the-art technologie!

- Gedetailleerde optimalisatie van *elke individuele* gebouwcomponent
- Genomineerd voor 'EU Innovation Radar: Innovation in Disruptive Science'

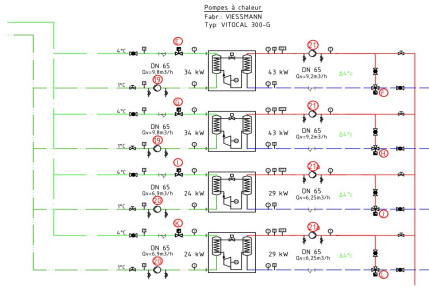


BLACK/GREY-BOX



INNOVATIE: 'DEEP PHYSICS'

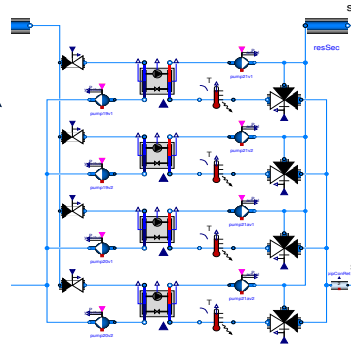
Schema (input)



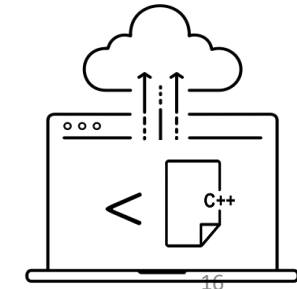
bron: studiebureau boydens

1 op 1 mapping

Model



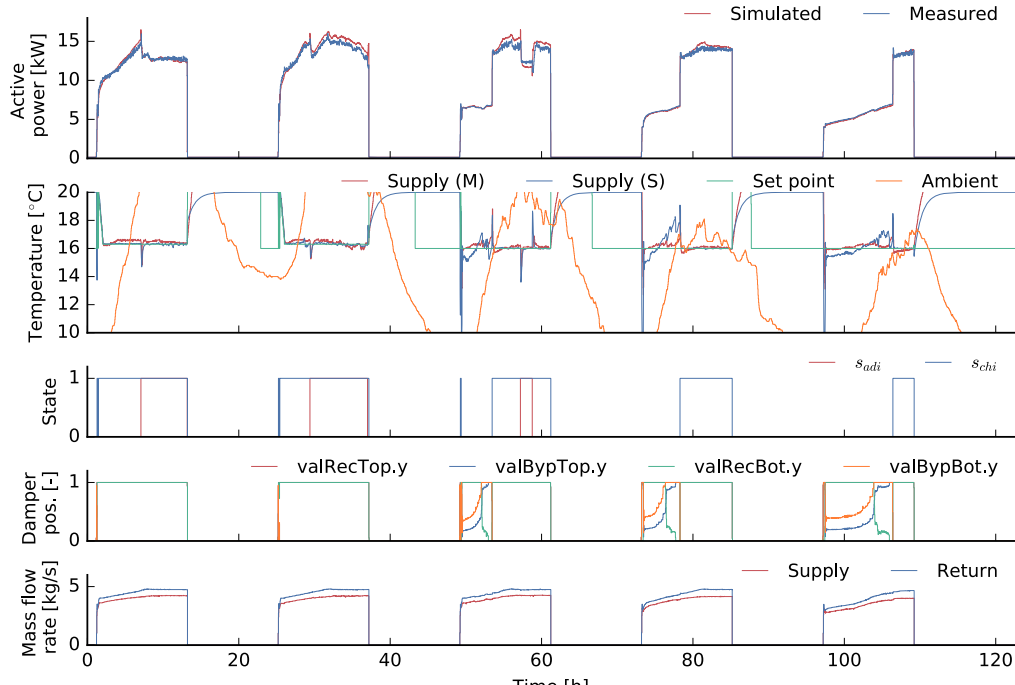
Gebouw



Optimalisatiecode

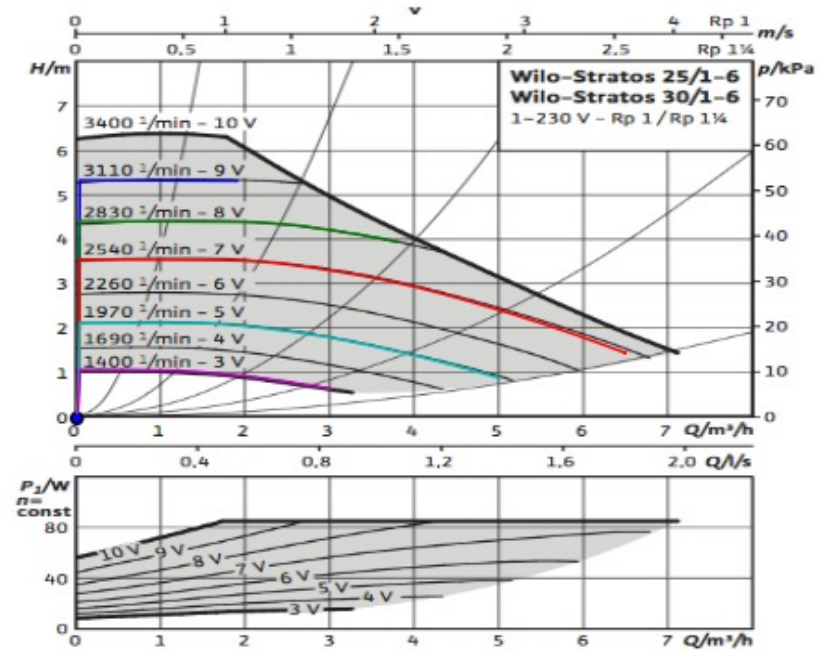
MODELVALIDATIES

Menerga ventilatiegroep (Adsolair)

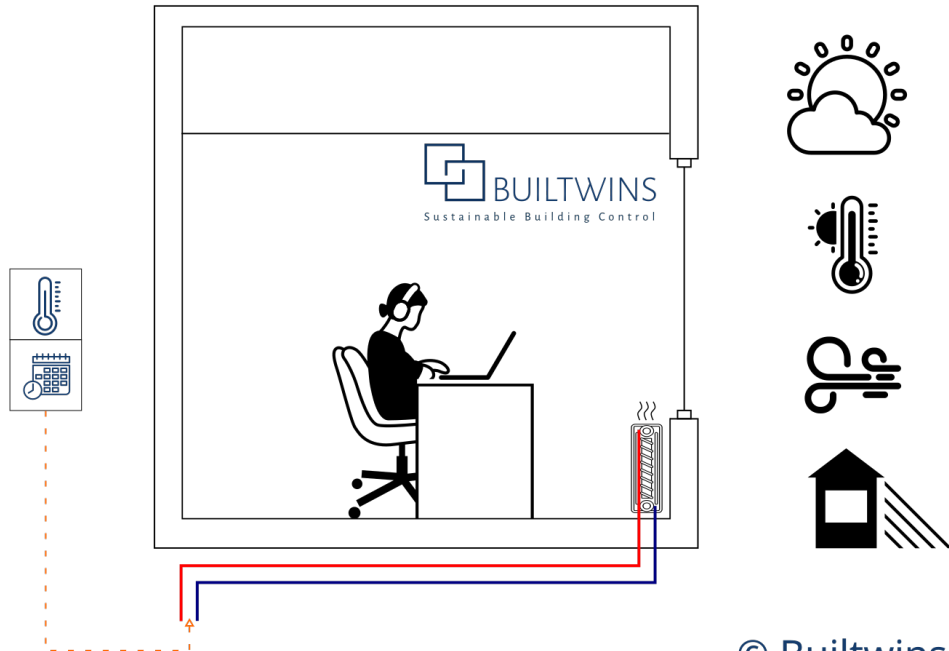


Bron: Doctoraat Filip Jorissen

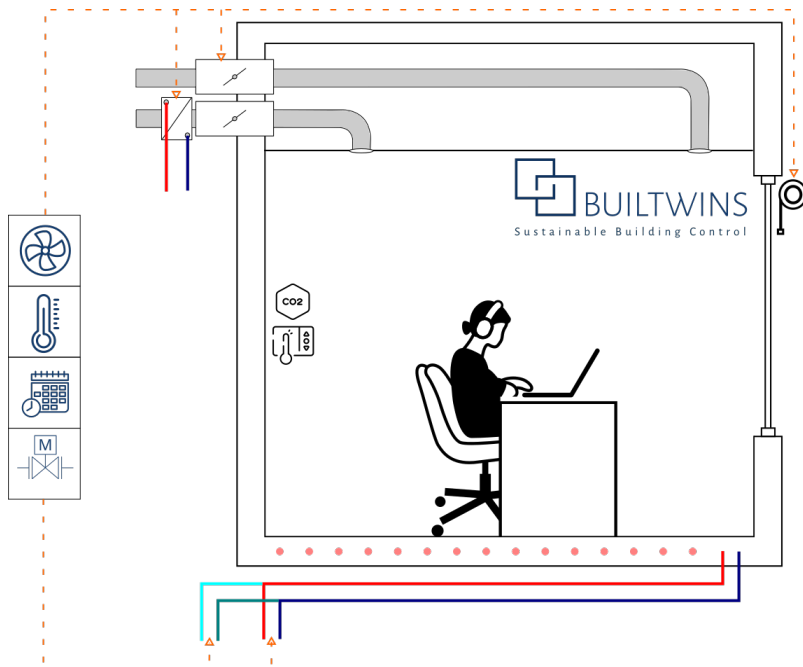
Wilo circulatiepomp



EENVOUDIG GEBOUW



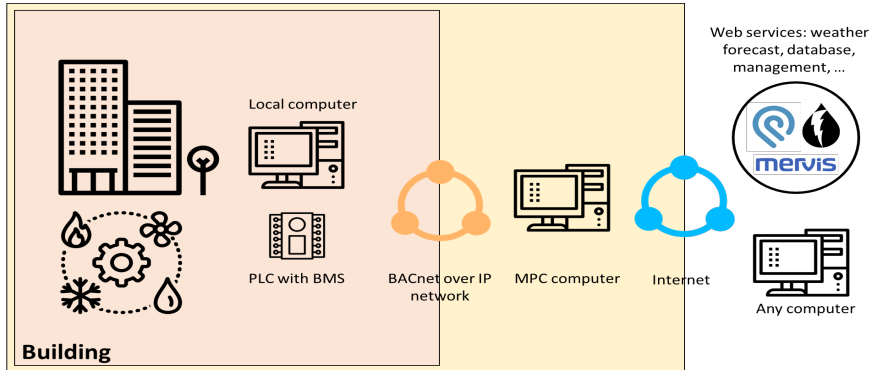
COMPLEX GEBOUW



PRAKTISCHE IMPLEMENTATIE

Bestaande infrastructuur

- Bestaande sensoren
- Lokale 'edge' computer
- BACnet interface



BACnet priority array

Priority 1
Priority 2
...
Priority 13
Priority 14
Priority 15
Priority 16



DEMONSTRATIES

hybridGEOTABS:

- WZC Ter Potterie: Mintus, 10 000 m², Brugge
- Fluvius & Boydens: Kantoor Dilbeek, 3 000 m²
- Solarwind: Kantoor Progroup & Schuler, 10 000 m², Luxembourg
- Hogenheuvelcollege: KU Leuven, 10 000 m²

Fluvius



Ter Potterie



bron: studiebureau boydens

Solarwind



bron: progroup

Hogenheuvel college



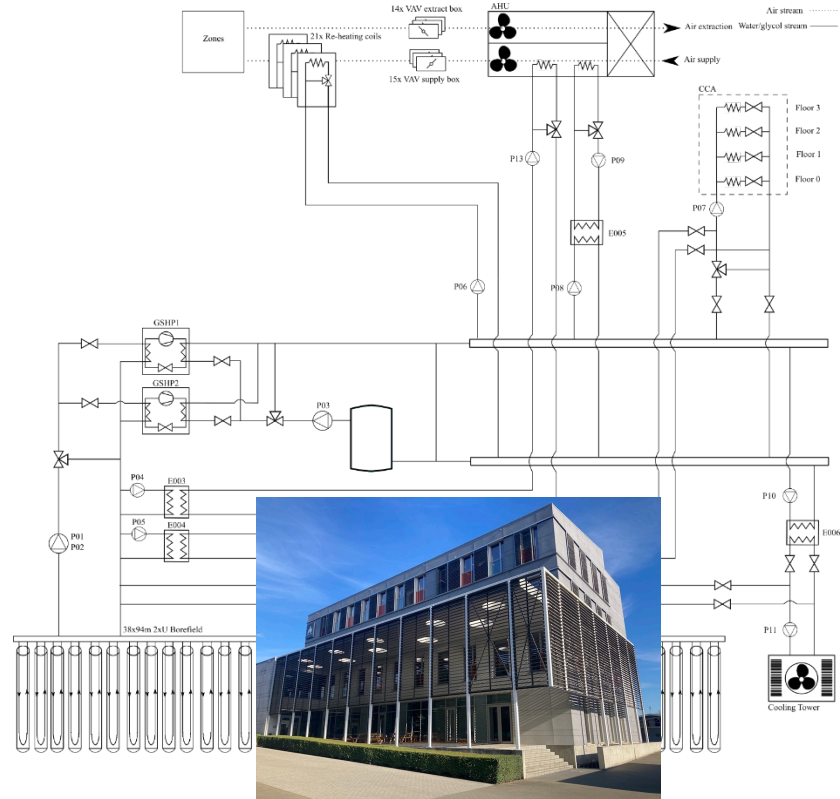
FLUVIUS & BOYDENS ENGINEERING PART OF SWECO

3 jaar operationeel

35% besparing sinds begin der metingen

Voorbije 2 weken:

- Totaal HVAC: 44%
- Warmtepompen: 63%



ONZE DIENSTEN





MODEL PREDICTIVE CONTROL

We implement and install a custom predictive controller, tailored to your building's as built file.



DESIGN FEEDBACK

We offer feedback during the design stage of new buildings to find the best tradeoff between controllability and cost.



COMMISSIONING

We cross-check the measured building behaviour with the expected behaviour during commissioning to detect errors.



MONITORING

We monitor comfort, and the correct operation of MPC and of all components that are controlled by it.



PERIODIC REPORTING

We periodically report the performance (energy use, sustainability and comfort) of your buildings.

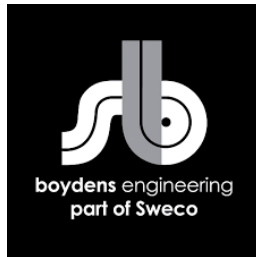
More information: [builtwins.com](https://www.builtwins.com)

VOORUITBLIK



PARTNERS VAN BUILTWINNS

SWECO 



ROADMAP

Opschaling binnen Vlaanderen, samen met Sweco



Doorontwikkeling algoritmen: bijkomende besparingen



Verderzetting onderzoek in samenwerking met The SySi



Gezamenlijk: bundeling krachten, bijdragen aan een duurzamere maatschappij

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