

INDU-ZERO

First product designs for Dutch housing associations

Presented by Tom Evers & Rutger Vrielink



**Smart
Renovation
Factory**
by INDU-ZERO

Interreg
North Sea Region
INDU-ZERO

European Regional Development Fund



EUROPEAN UNION

Program

1. Introduction
2. INDU-ZERO background and goals
3. Productdesign for the Dutch housing associations
4. Showcases
5. Next steps

Introduction

Industrial design



Tom Evers
D'Andrea & Evers Design

Feel at home!



- ❖ Housing association
- ❖ Eastern Netherlands
- ❖ 15,500 Social homes
- ❖ 400 sustainable renovations a year
- ❖ Investment: 12 mln a year



Rutger Vrielink
Manager Strategy & Innovation

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Starting points project INDU-ZERO

1. € 40.000 for zero on the meter renovations – performance based
2. 15,000 renovation packages per year per factory
3. Factory investment around € 200 million

Main steps in the project

1. Assessment of the housing stock
- 2. Development of the renovation packages**
3. Development of the factory blueprint
4. VR and AR visualization
- 5. Showcases**

Development of the renovation packages

Low Cost

- Less labour on site
- Improving integration of functionality
- Efficient transportation
- In the factory: less time-consuming + less manual labour
- Using low cost materials

Sustainable

- Good insulation
- Smart solutions connecting points panels (no airgaps, thermal bridge, etc)
- Using less different types materials
- Focus on reusability
- Circular end of life



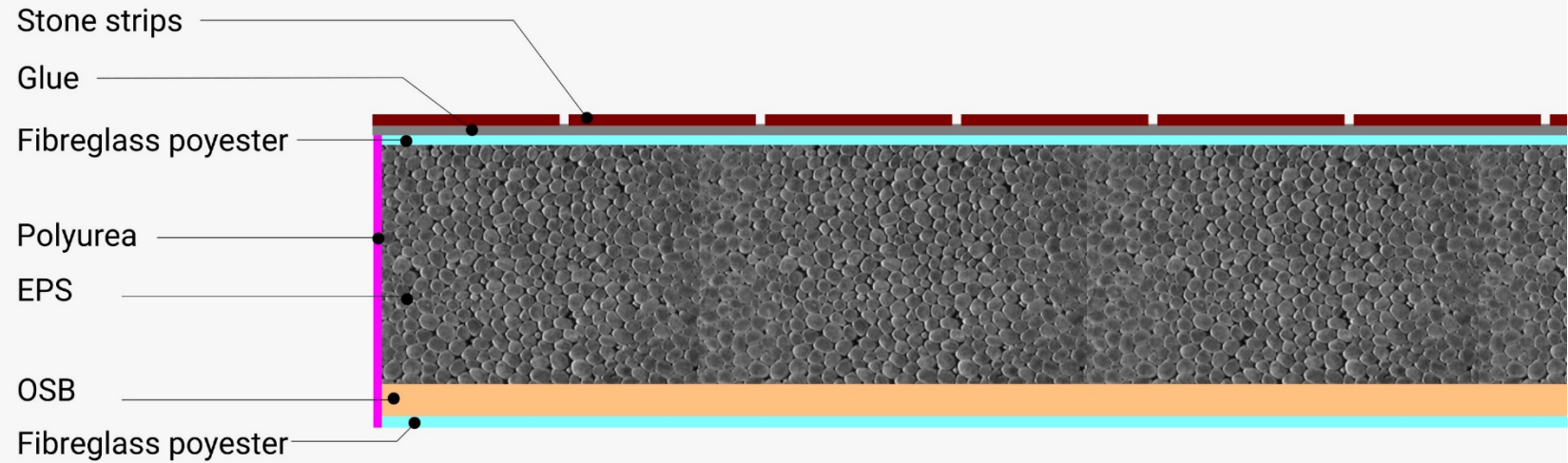
**Cost saving by
implementing smart
solutions in
production process.**

Opportunities to innovate and implement features into the panel

- Windows & doors without frame
- Implementation channels for air and conduit
- Implementation of heating system
- Implementation of rain drainage and downspout
- Mounting implementation for PV Panels
- Connection wall with roof

Panel / Current panel

CURRENT RC PANEL



IMPROVE

- Customization through 3D scanning, 3D CAD engineering, 3D milling
- Integration of all functionalities (construction, electricity, air, water, windows)
- Use less different materials and production steps

CONCEPT 1

Chop spray:

- Polyester glasfiber spray
- Done by robot.
- Strenght needs to be tested
- Polyester spray will react with the EPS, so we need an extra barier layer. Or we can use Epoxy (is more expensive than Polyester)
- Fire resistant is good.
- Production challanges need to be investigated (PolySolv, etc)

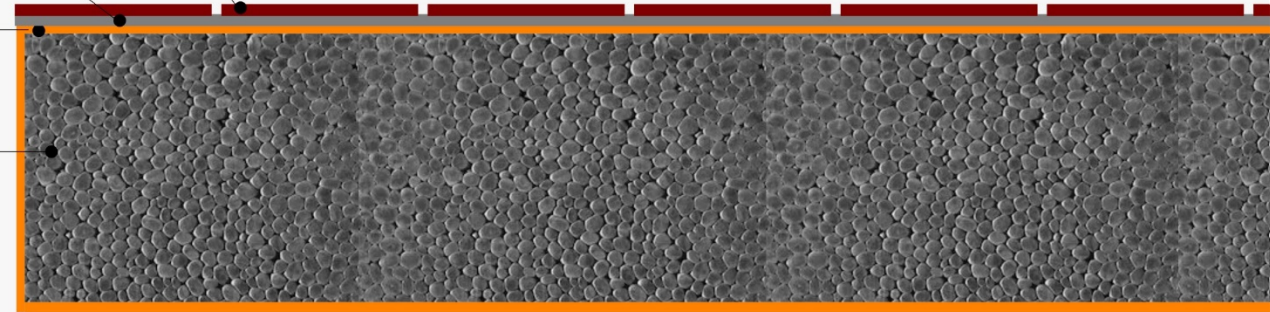
Stone strips

Glue

Fibreglass chop

Polyester spray

EPS

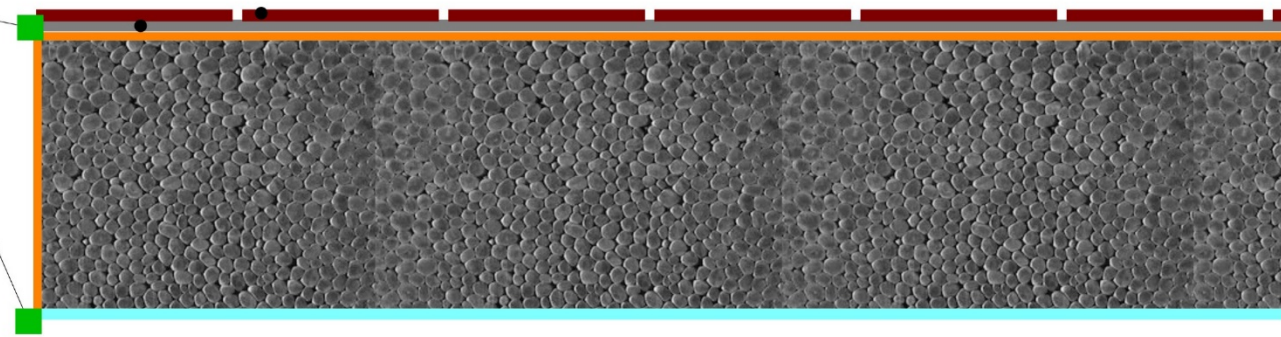


Panel / Recycle

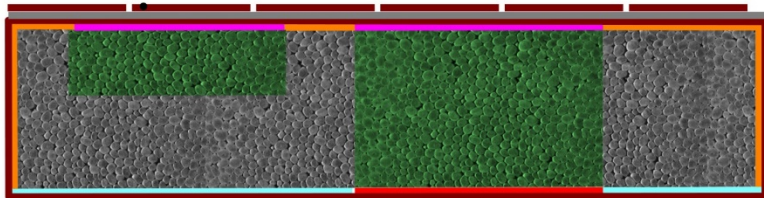
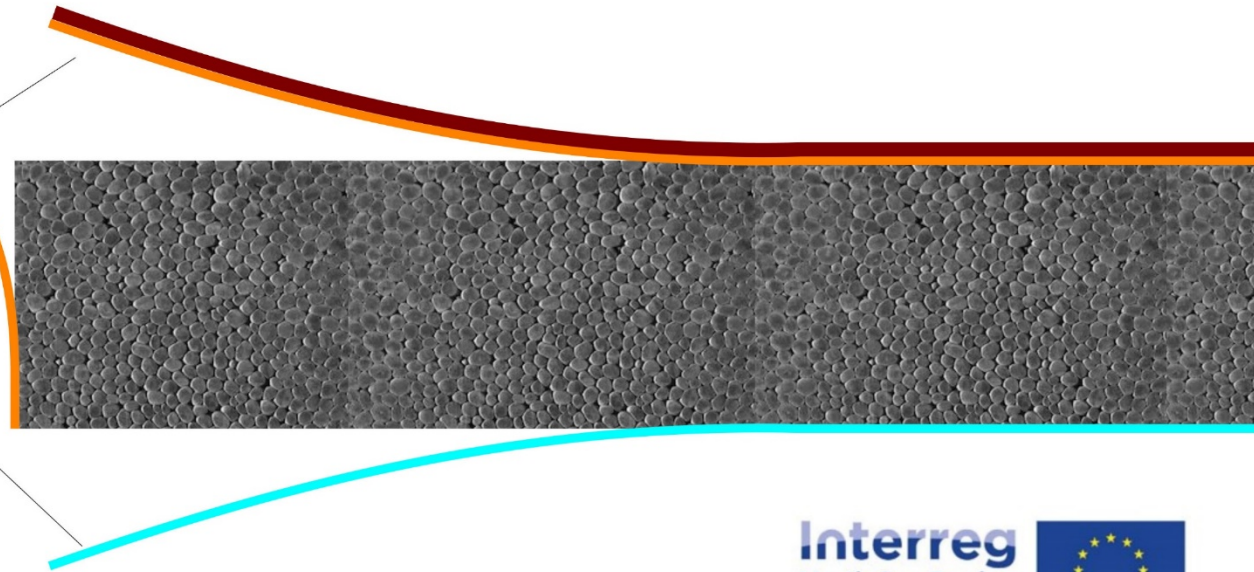
Recycle possibilitie

1. Reuse the material in the same production proces
2. Easy to seperate materials
 - Mill out edges
 - Peel off hard material

Mill out edges



Peel off hard material





Wood



Plastic





Stone



Stucco





Windows & Doors

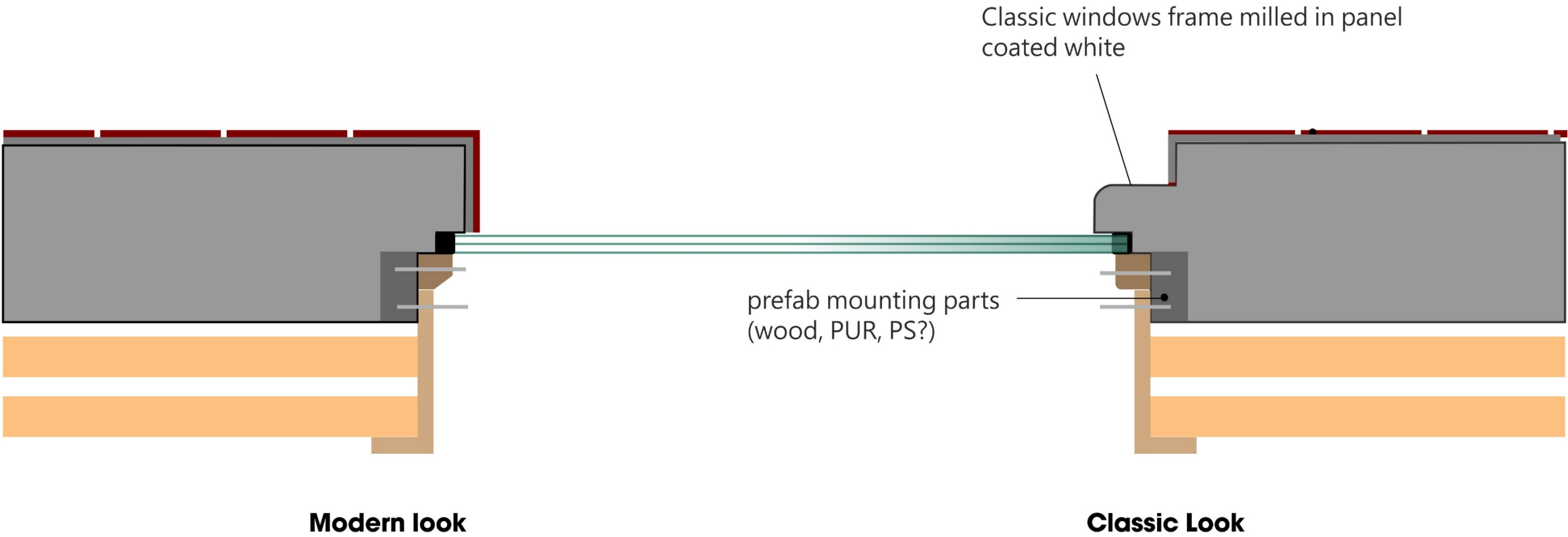
Window frame / Classic



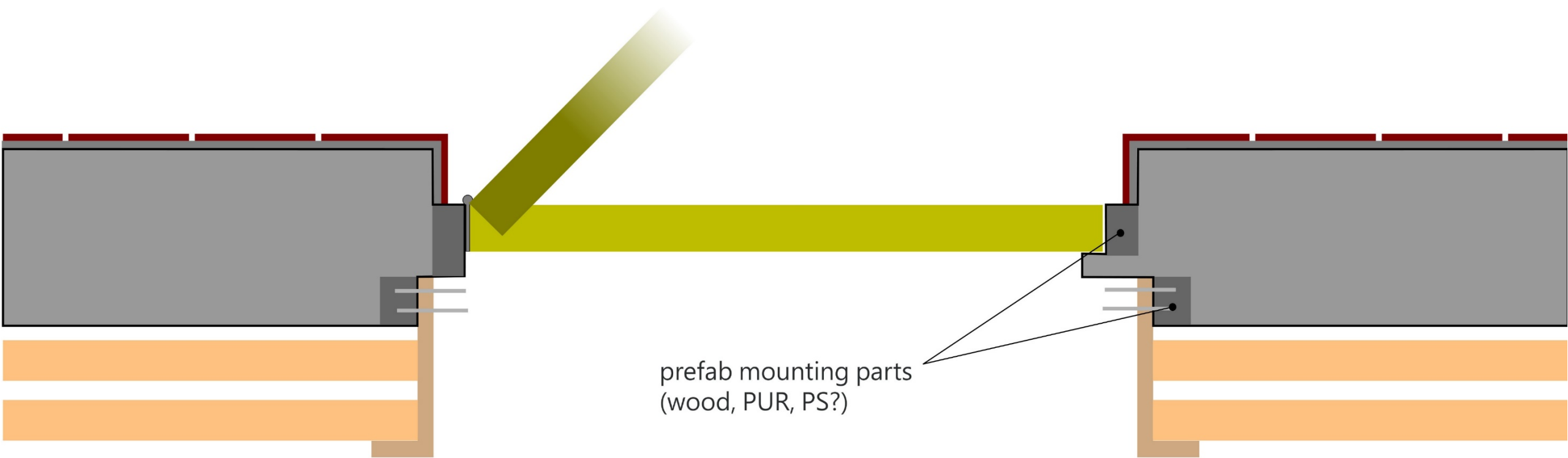
Window frame / Modern

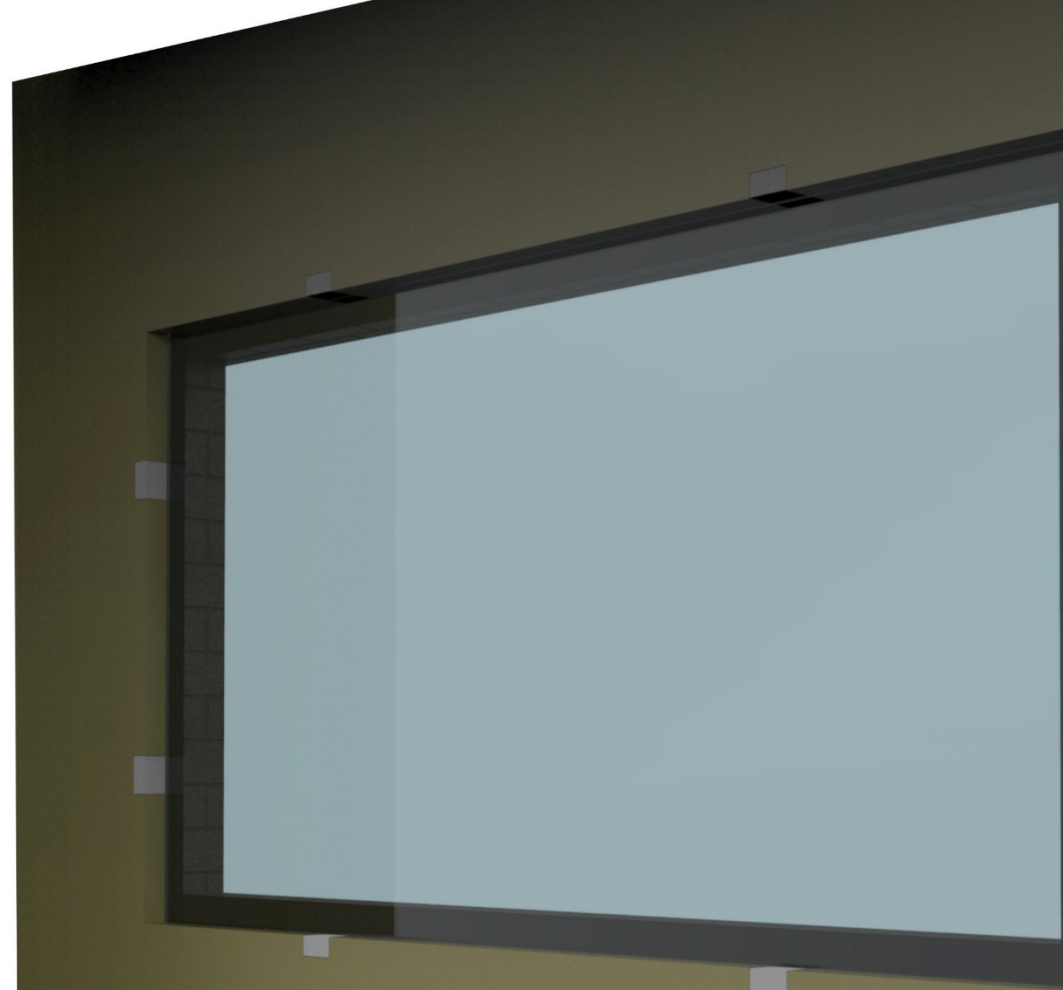


Window / Construction



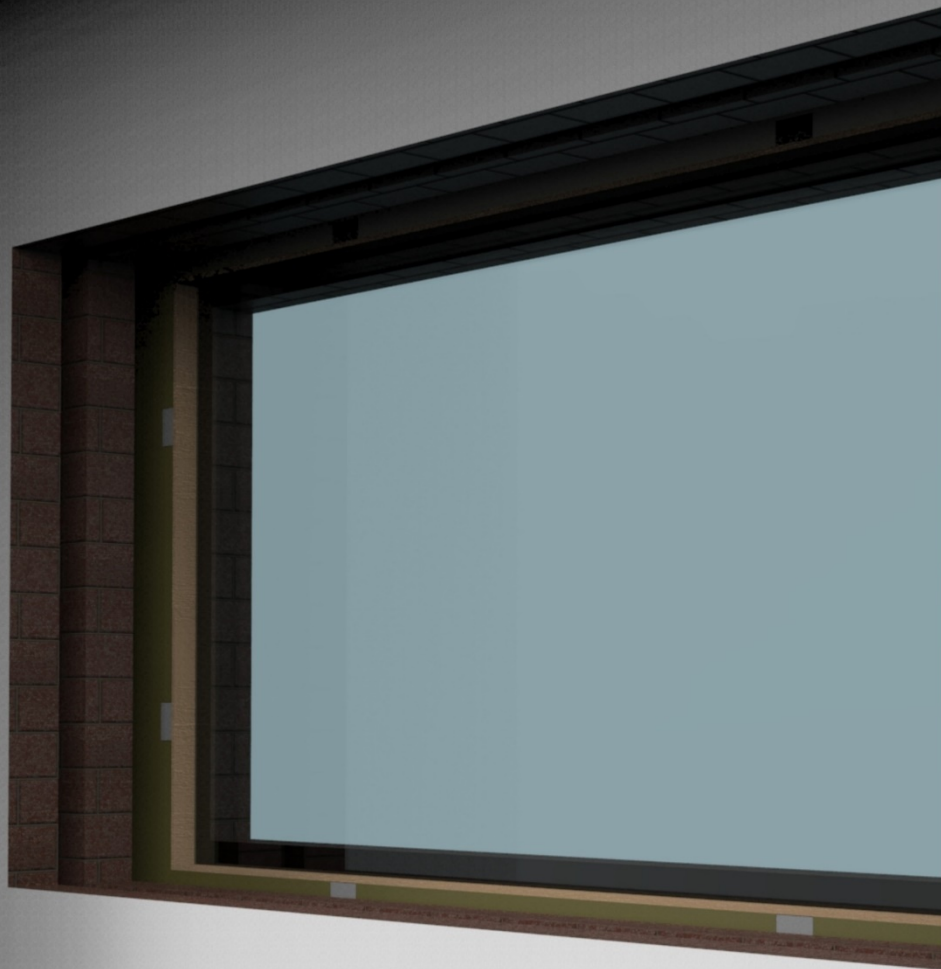
Door / Construction



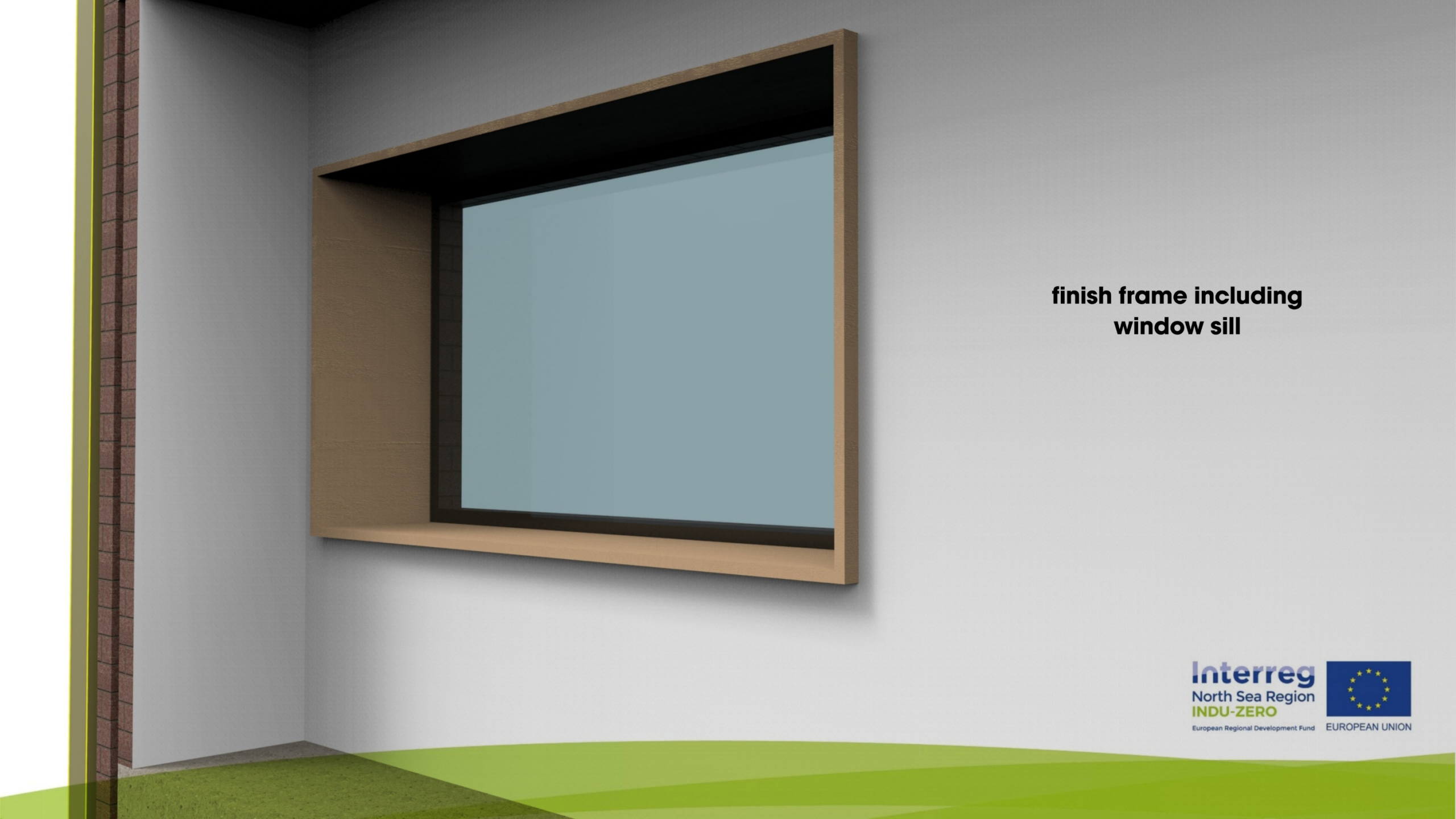


Window placed in wall

prefab mounting parts



**Window Mounted and
fixated with frame
screwed in insert block**



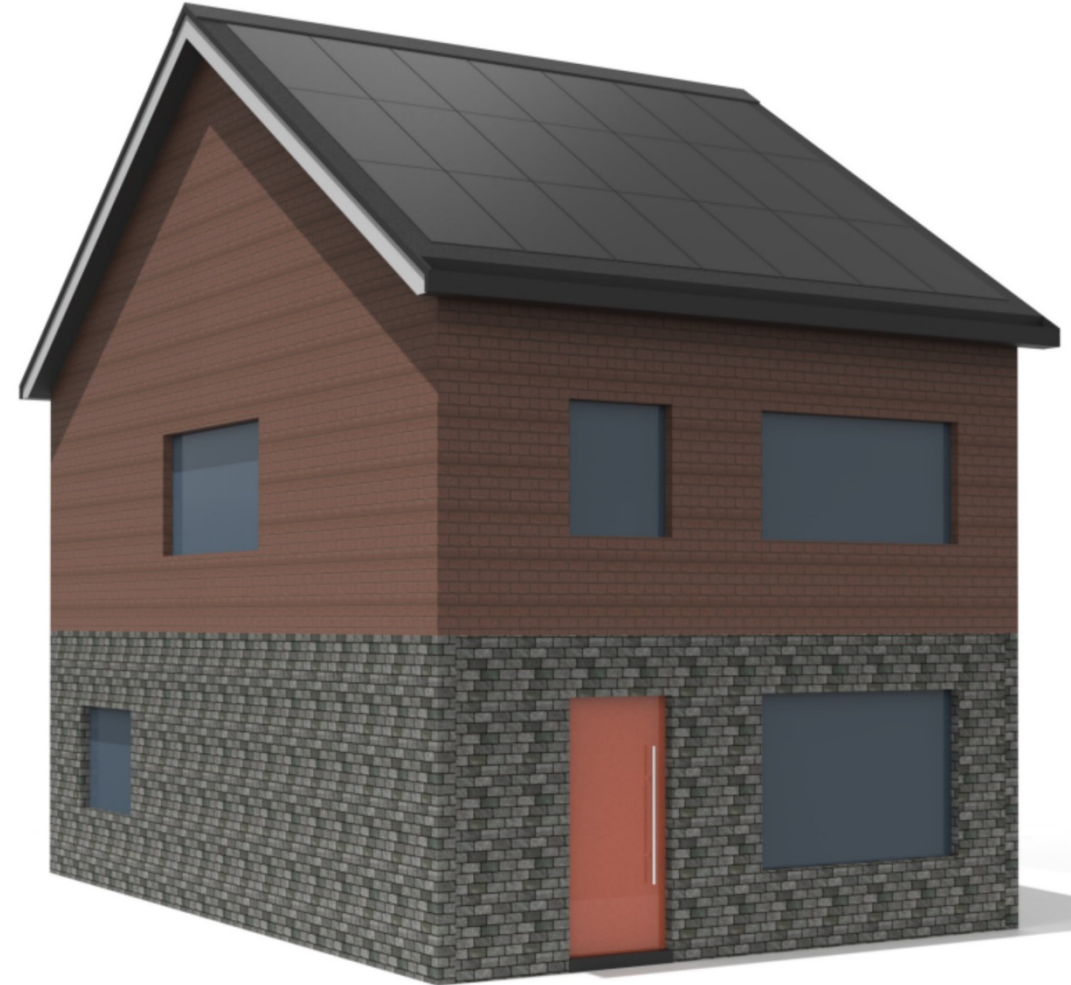
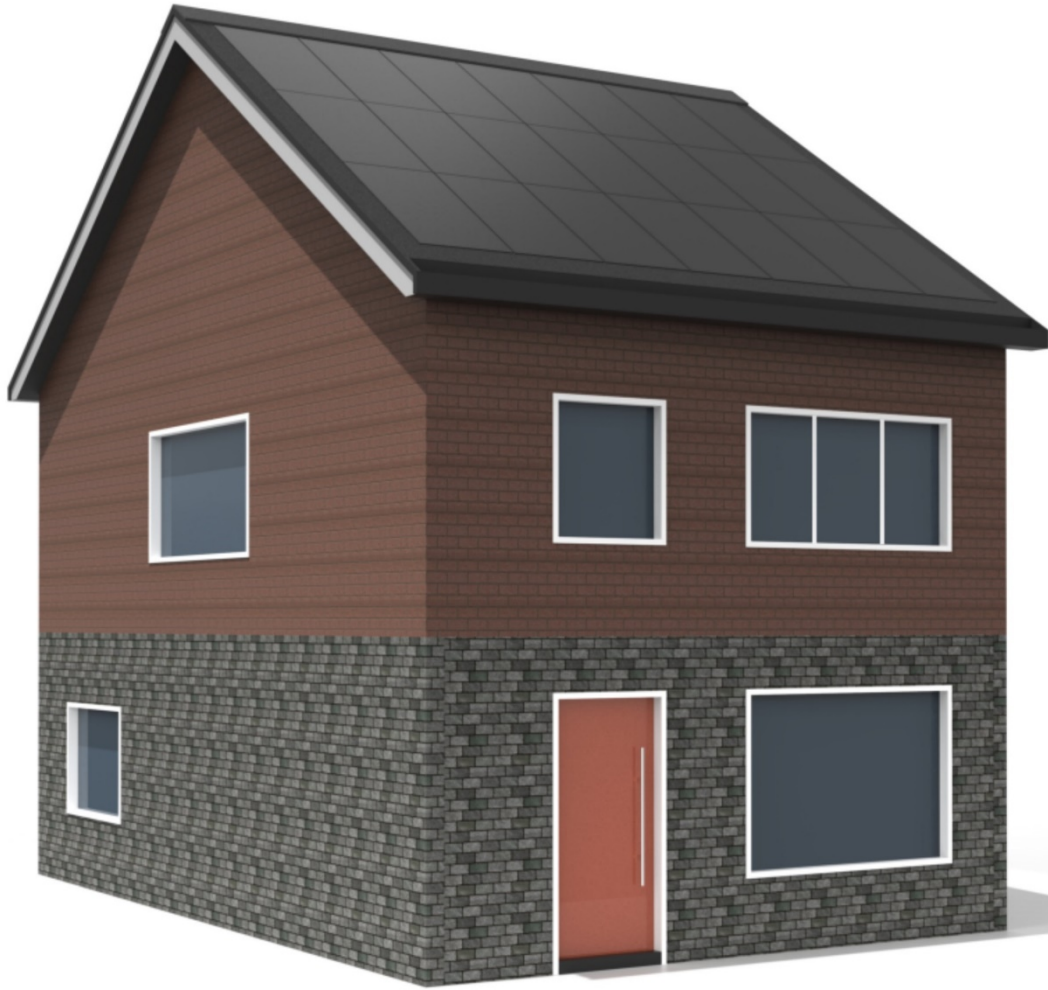
**finish frame including
window sill**



Mounting of the door



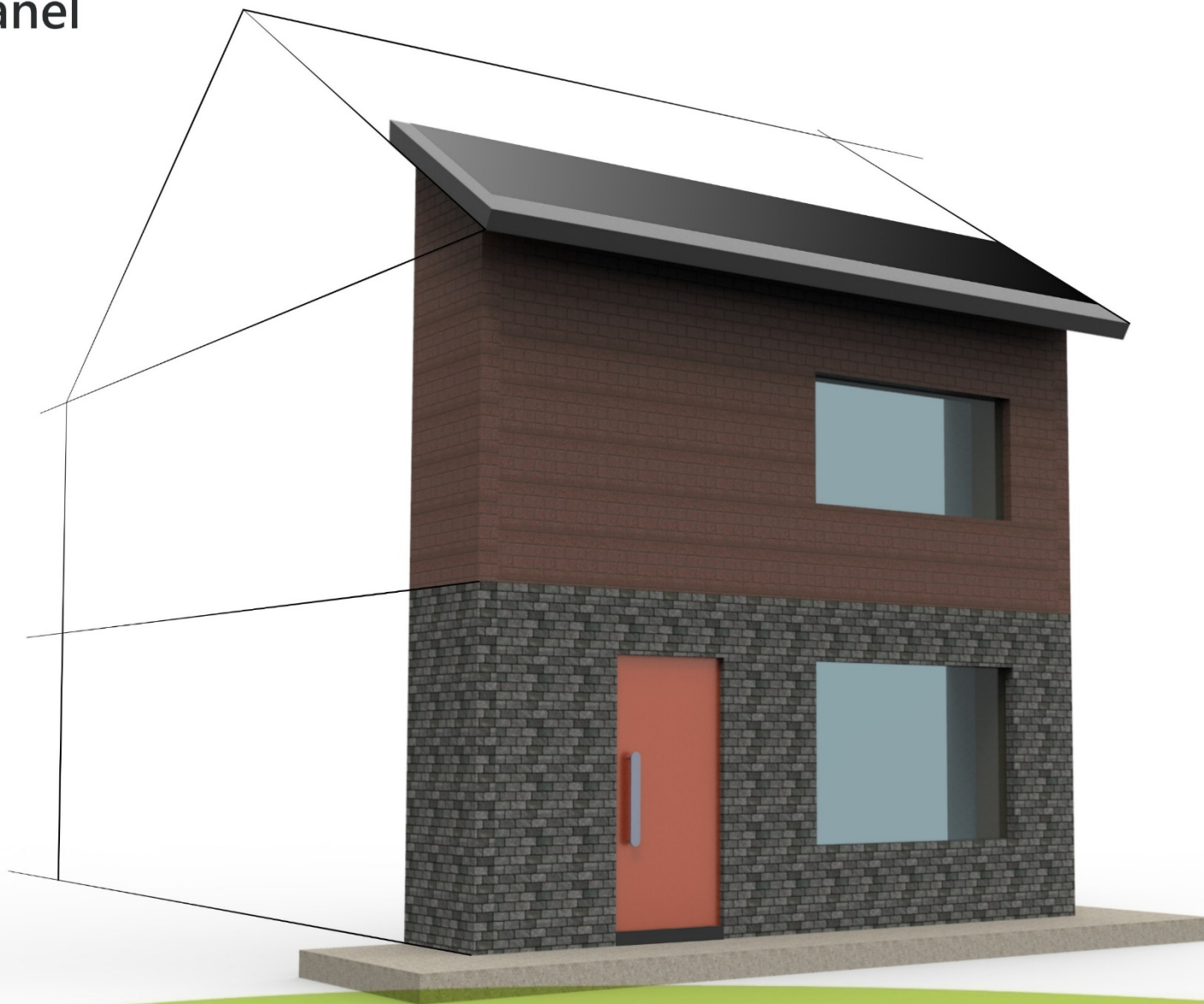
End result / Framing - extra cost

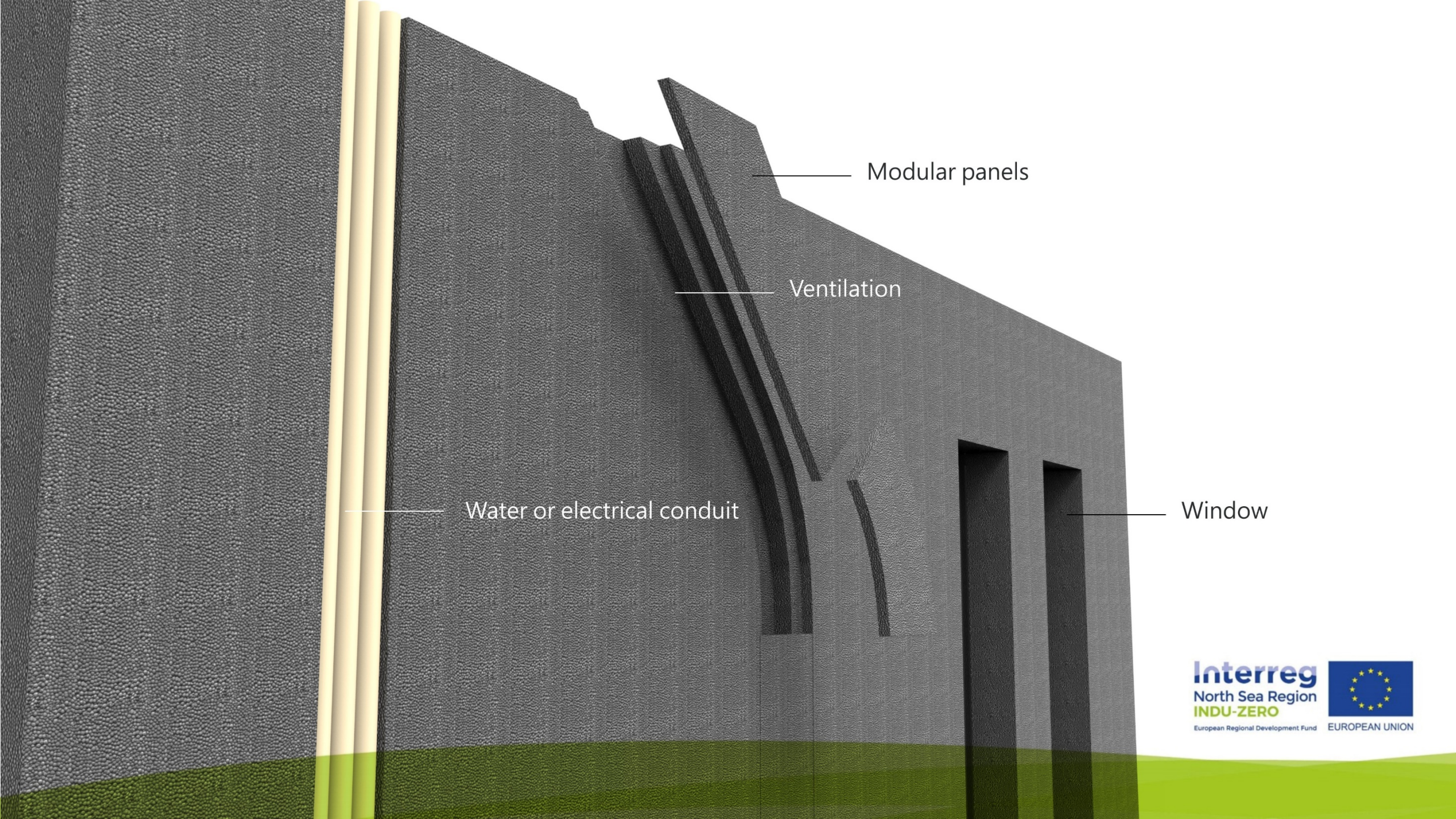


The background of the slide is a photograph of industrial machinery, possibly a conveyor system or a large pipe, with a green overlay. The overlay is a semi-transparent green rectangle that covers the right side of the image. The text is white and bold, positioned on the right side of the slide.

Implementation conduits, ventilation and heating

Renovation panel



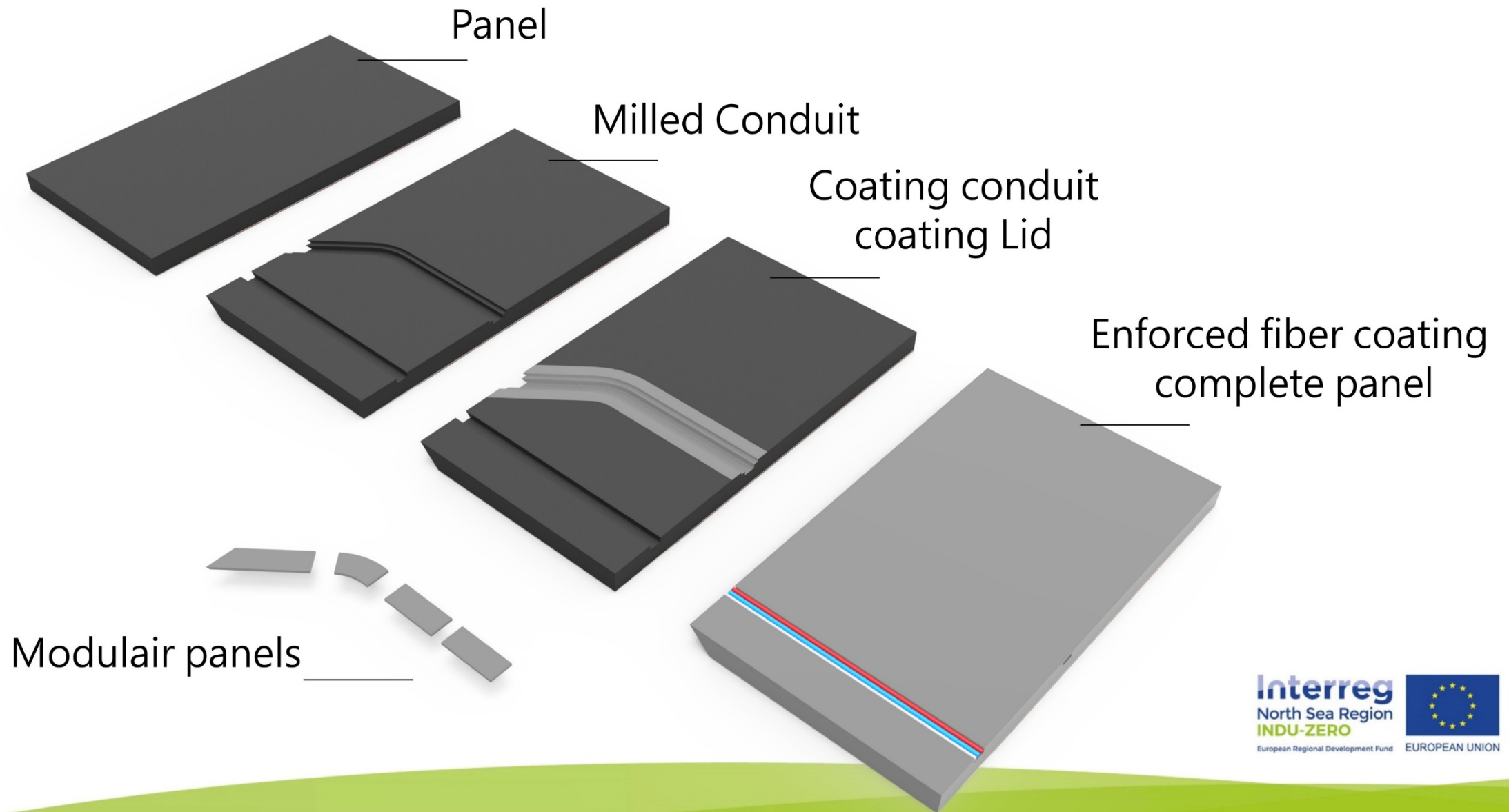


Modular panels

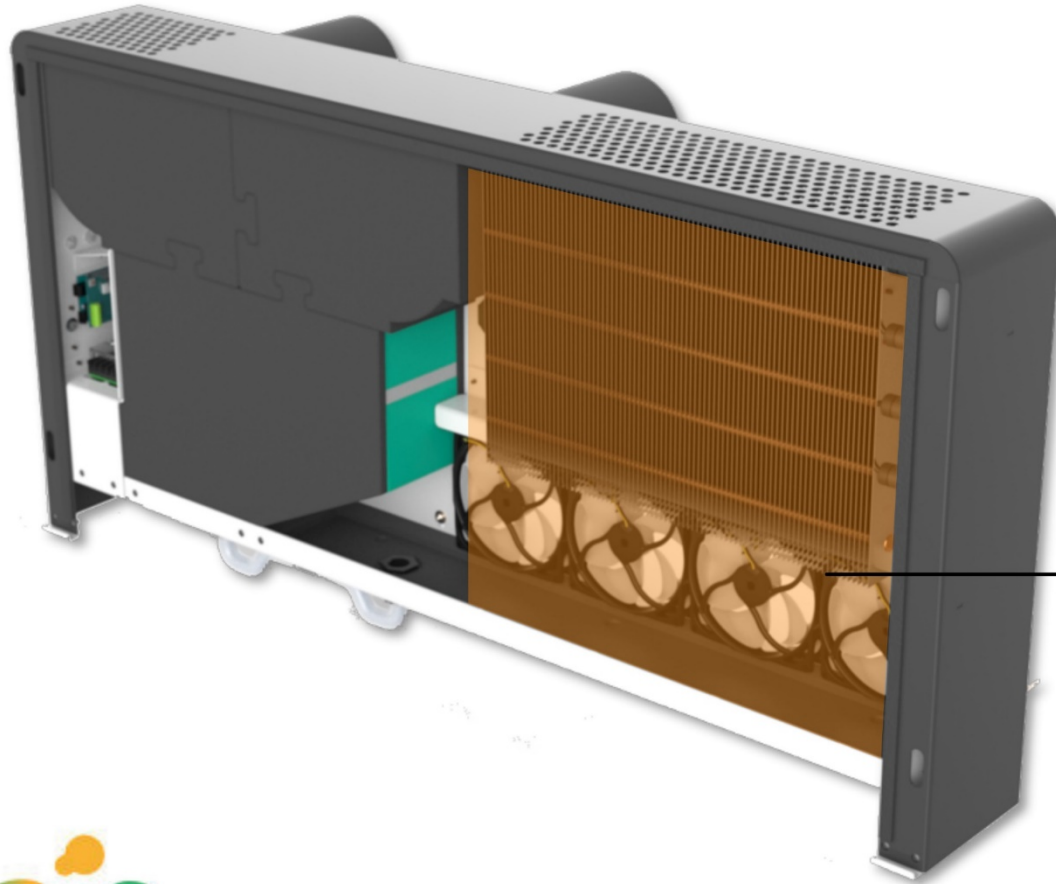
Ventilation

Water or electrical conduit

Window



Panel / Build in Heating



Decentral ventilation

- Less problems of mold, no filter problems
- Less connection problems (les airgaps)
- Higher efficiency towards central ventilation
- Better air quality
- No fine dust through ionisation process

Heating

- Electrical heating element
- Heatpump
- City heating

Cooling

- Passive cooling
- Airco, active cooling

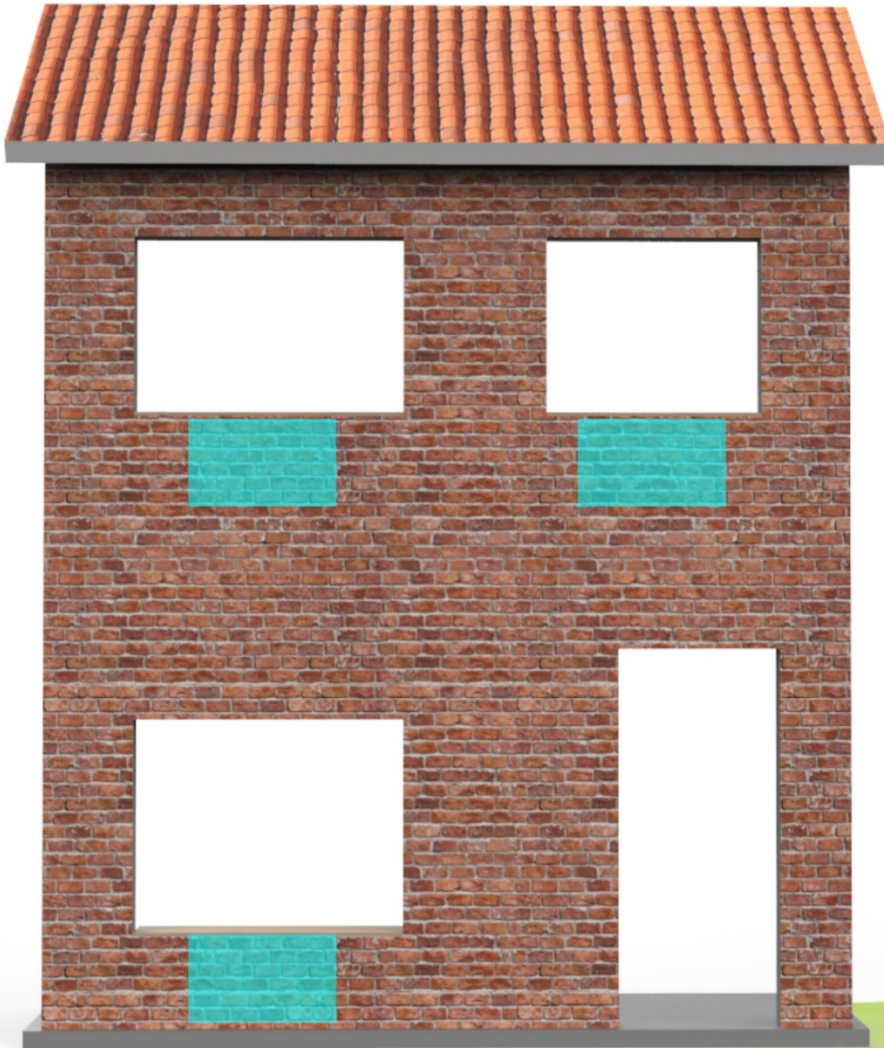
Panel / Build in Heating

Enough electricity

- Because of we have the whole roof with solar panels we have enough power for the heating elements, ventilation and hot water ("flowheater").
- This needs more research and calculation.

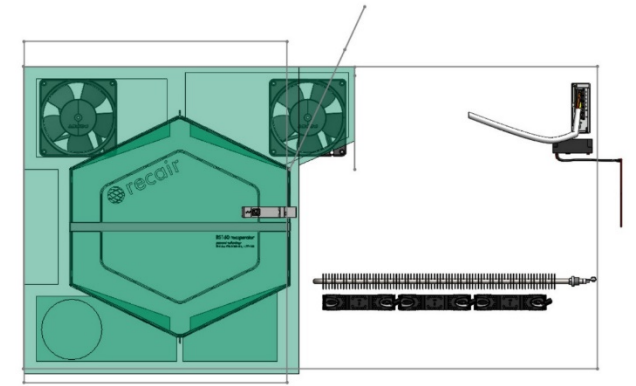


Panel / Build in Heating



Heating + ventilation

- Electrical heating element
- 5 DCU units pro house
- IR bathroom,
- Hot water with flowheater
- Bathroom and toilet conventional ventilation

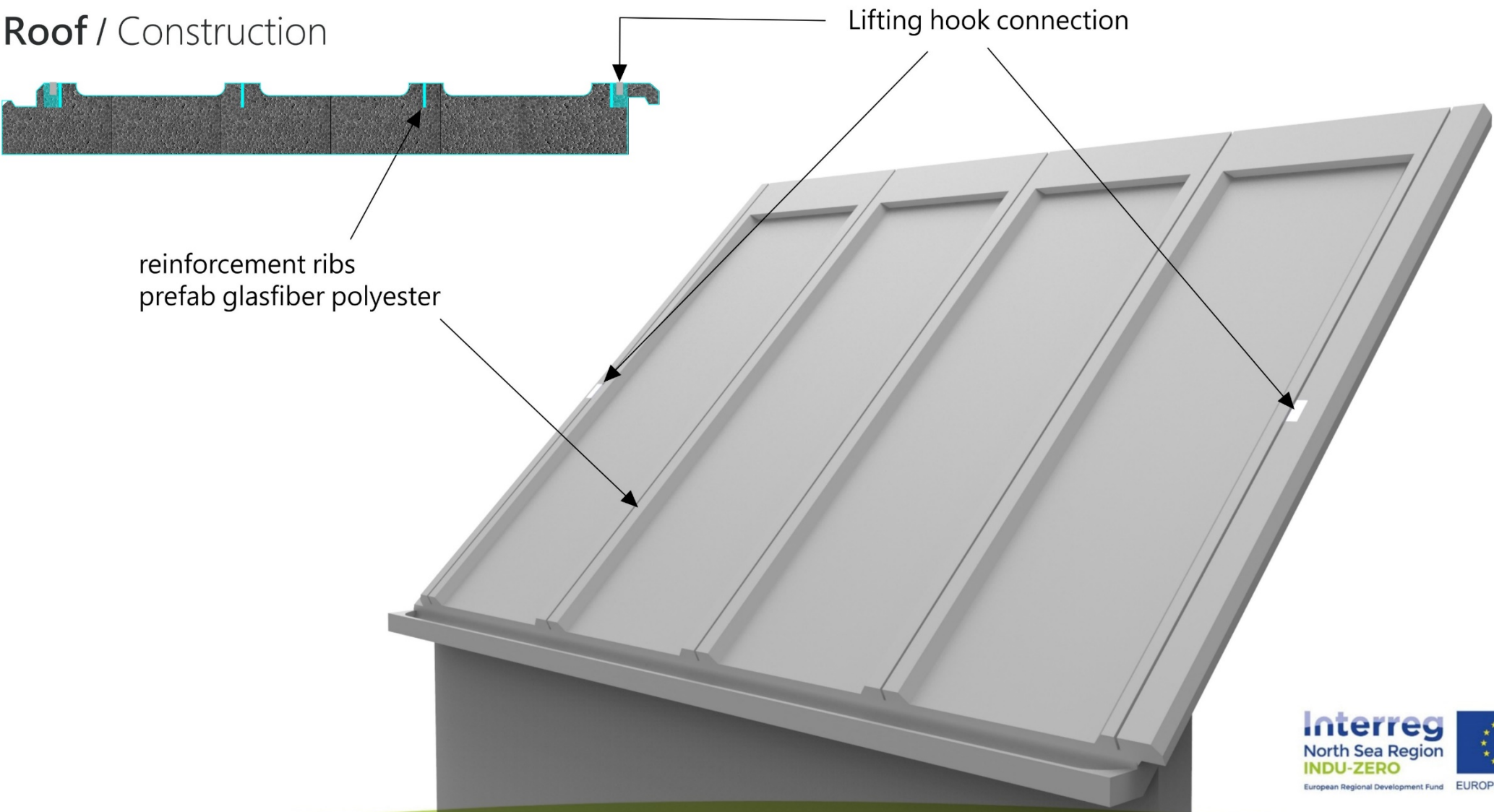






Roof

Roof / Construction

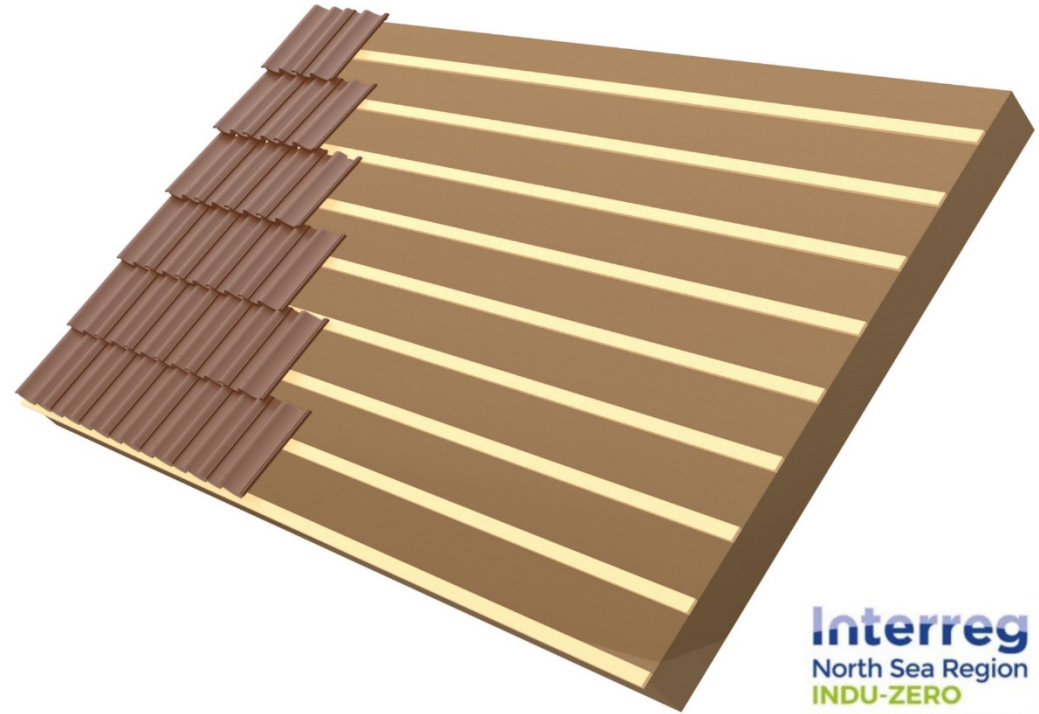




PV Integration into panel

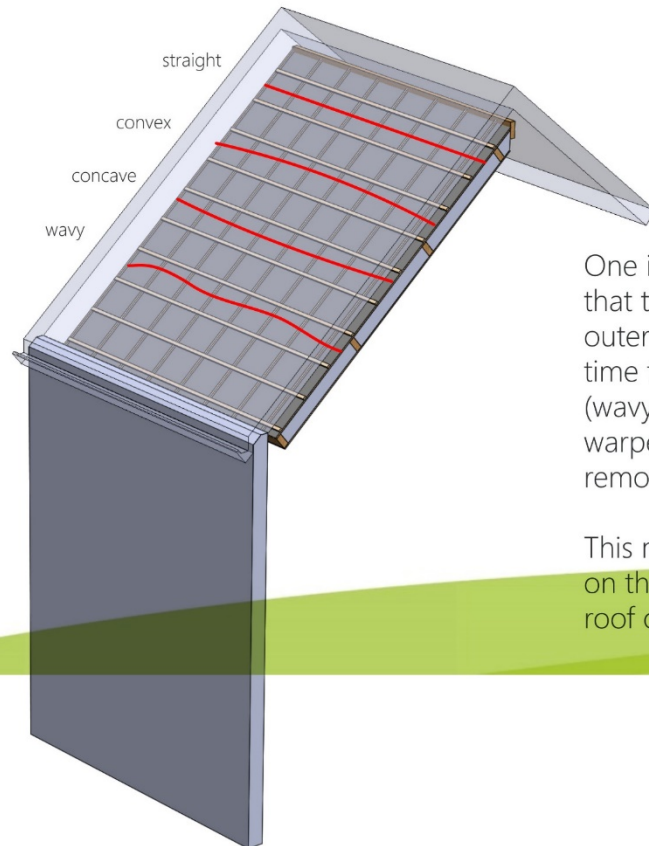
- PV panel mounting
- PV panel ventilation
- Rain wall drainage
- Rain gutter

Remove all the rooftiles



Roof / unknown

several of the current renovation packages partially or fully remove the old roof to have a good surface to mount their renovation package.
In this example new wood is used to space out the old construction



One inherent issue with the roofs that need renovation is that they are most likely not straight (in respect to their outer walls) Usually through weight and warpage over time the roofs have sunken (concave) in or warped (wavy). Also the (counter)battens themselves could be warped, or be damaged/missing/stick out from the removal of the roofing tiles, remaining nails, etc.

This means that resting the renovation package straight on the roof could be hard without removing parts of the roof or spacing out the bumps



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Roof / Reaching Heights

“Verrijker” crane



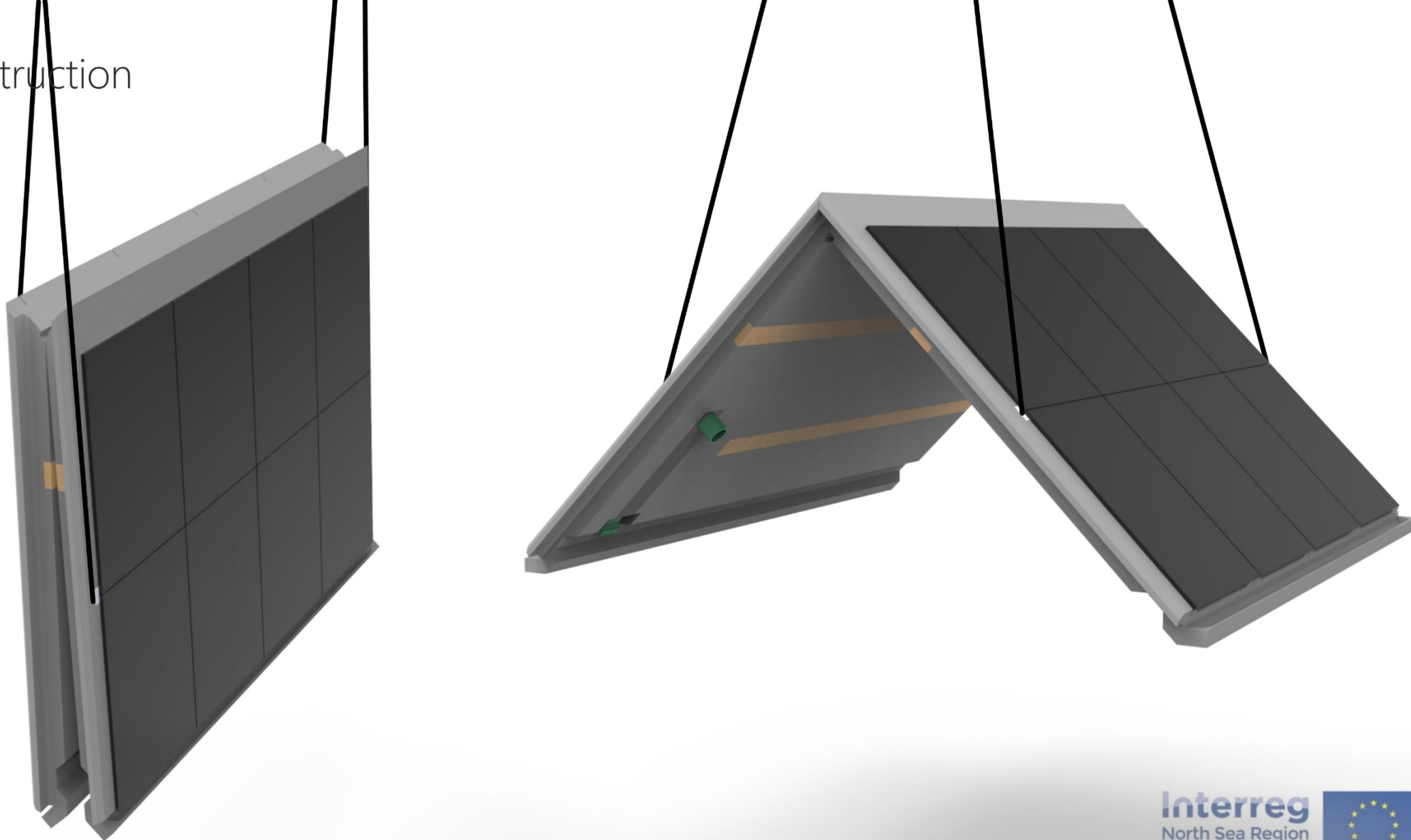
Roof / Reaching Heights



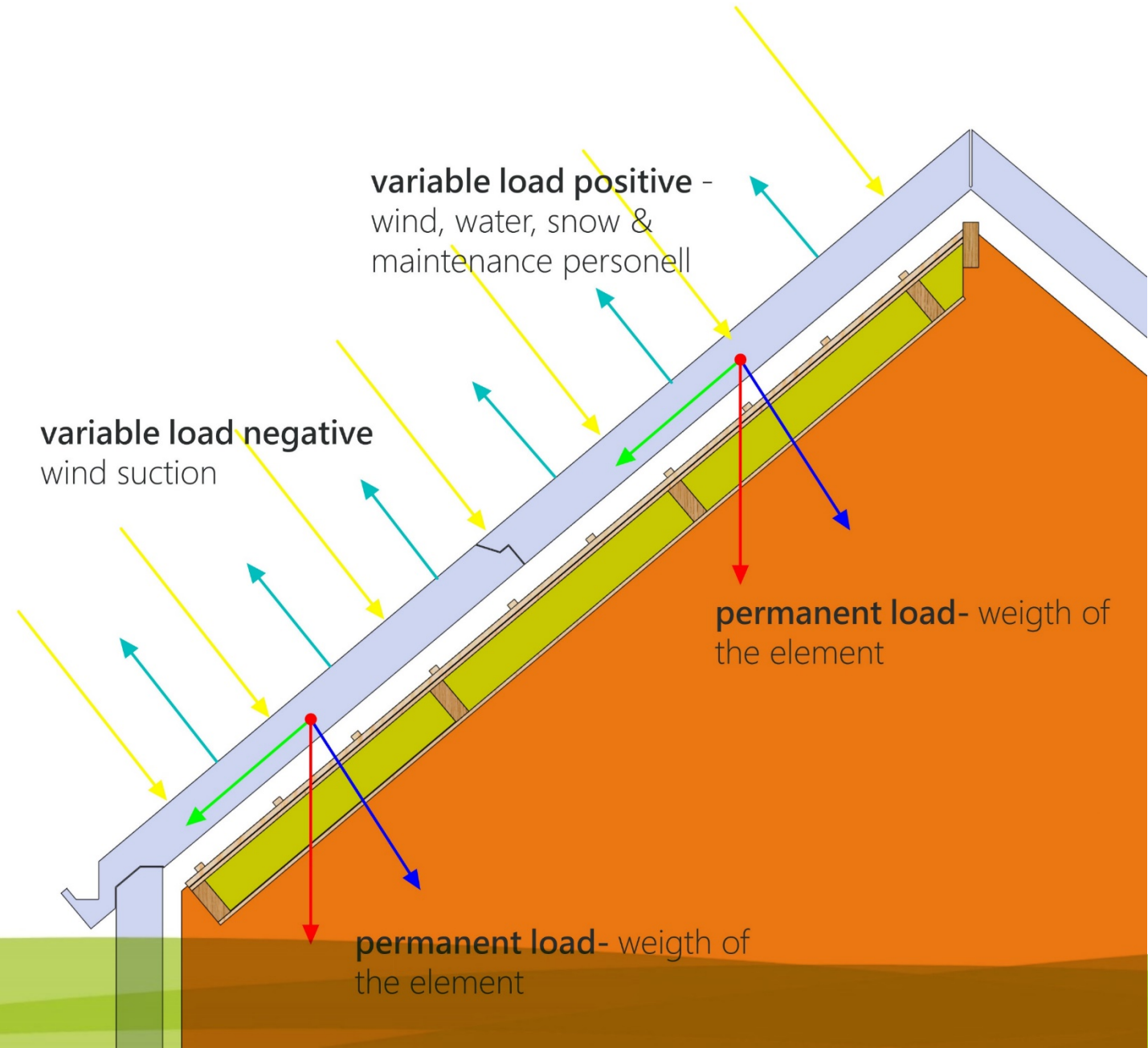
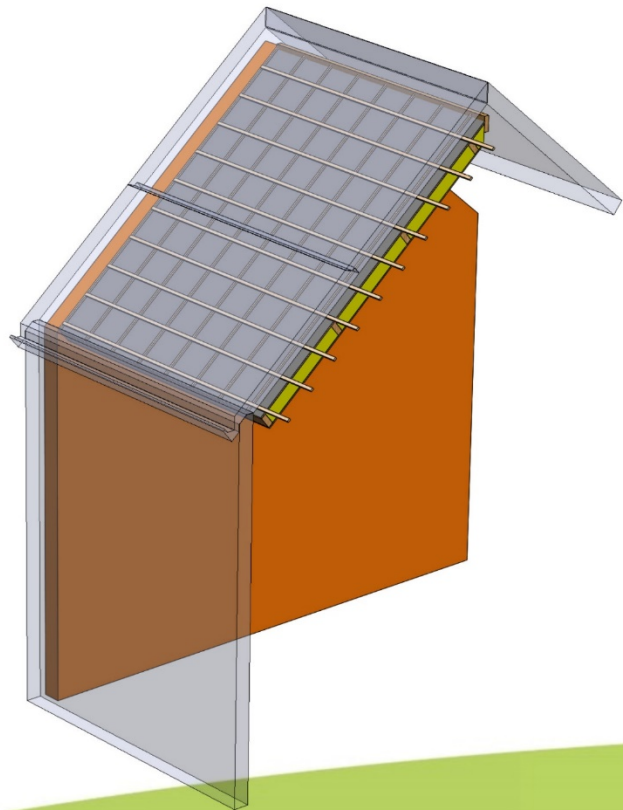
Triangle platform



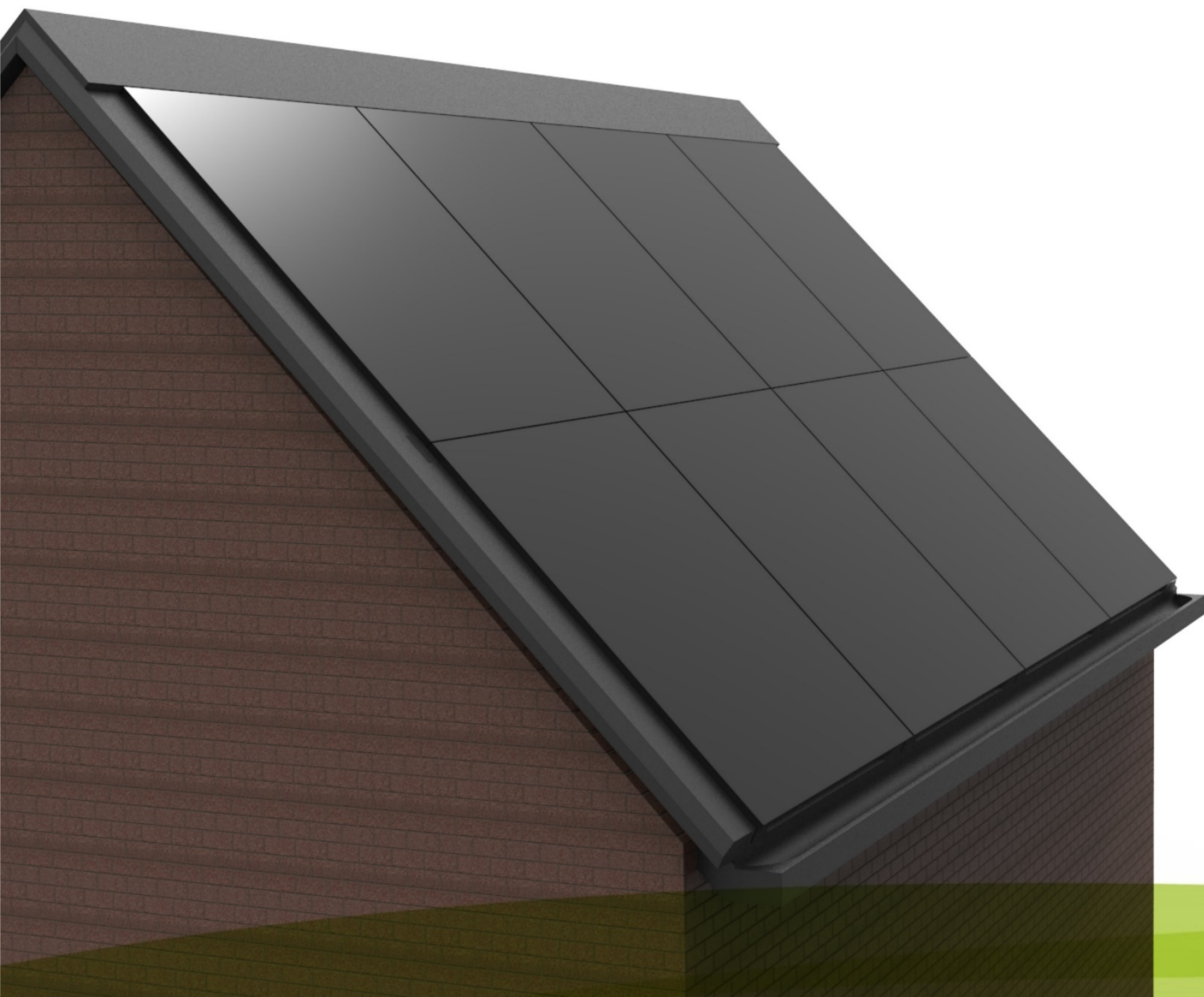
Roof / Construction



Roof / horizontal segmented



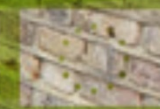
Roof / end result





Anticipate on changing demands and expectations of future living enviroments

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Contemporary
upgrading by playing
with windows

Option to create better
climate control and
comfort.



**Smart
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Showcases



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Conditions showcases Domijn

General principles for productdesign

- 3 different properties as a showcase in the same row.
- Performance based design principles
- Prototype budget excluding any special circumstances (*i.e. asbestos removal*)
- Renovation in an inhabited state

Selection of potential assets

- ❖ Year of construction between 1965-1974
- ❖ End of economic life > 2050
- ❖ Sales objective and strategy
- ❖ Complete housing blocks for efficiency reasons



Terraced



Semi-detached



Appartement



Showcase Domijn

- ❖ Location selected
- ❖ Challenging showcase to show opportunity's
- ❖ Preparations are started, Realization Q4 2020
- ❖ Multiple goals



Timescale

All LOIs should be signed before 1st quarter 2020

GROUP 1 - Netherlands/Belgium

- Proposal Stage in 2nd quarter 2020
- Manufacturing Stage in 4th quarter 2020
- Showcases finished in 4th quarter 2020

GROUP 2 – UK/Sweden/Norway/Germany

- Proposal Stage in 3rd quarter 2020
- Manufacturing Stage in 1st quarter 2021
- Showcases finished in 1st quarter 2021

Next steps

Main steps in the project

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Next external webinar

- **When:** Thursday 28 november, 14.00 tot 15.00 uur (CET!)
- **Theme:** Integration in the production process/the digital factory
- **Presented by:** Arjan de Haan & Lianda Sjerps
- **Registration:** at the website INDU-ZERO

Take home message

**Industrial Net Zero renovations for half the
current price!**

- <https://northsearegion.eu/indu-zero/>
- *INDU-ZERO newsletter*
- *Webinars*
- *Reports*