

# INDU-ZERO

## Innovative Dämmtechniken 18.Fachforum

**Dipl. Ing. Ulla-Britt Krämer**

07 September 2023



**Smart  
Renovation  
Factory**  
by INDU-ZERO

**Interreg**  
North Sea Region  
INDU-ZERO

European Regional Development Fund



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# Green Deal Europa

## *Renovation wave*

- 2030 – 55% CO<sub>2</sub> Reduktion
- 2050 – CO<sub>2</sub> Neutral

Gebäude verantwortlich für:

- 40% Energieverbrauch
- 36% Treibhausgasemissionen

- 2030 – Ziel: 35 Mio. Gebäude saniert
- 2050 – Ziel: 152 Mio. Gebäude saniert

➤ **Bedarf eines industriellen Ansatzes zu geringeren Kosten!**



# Das Projekt

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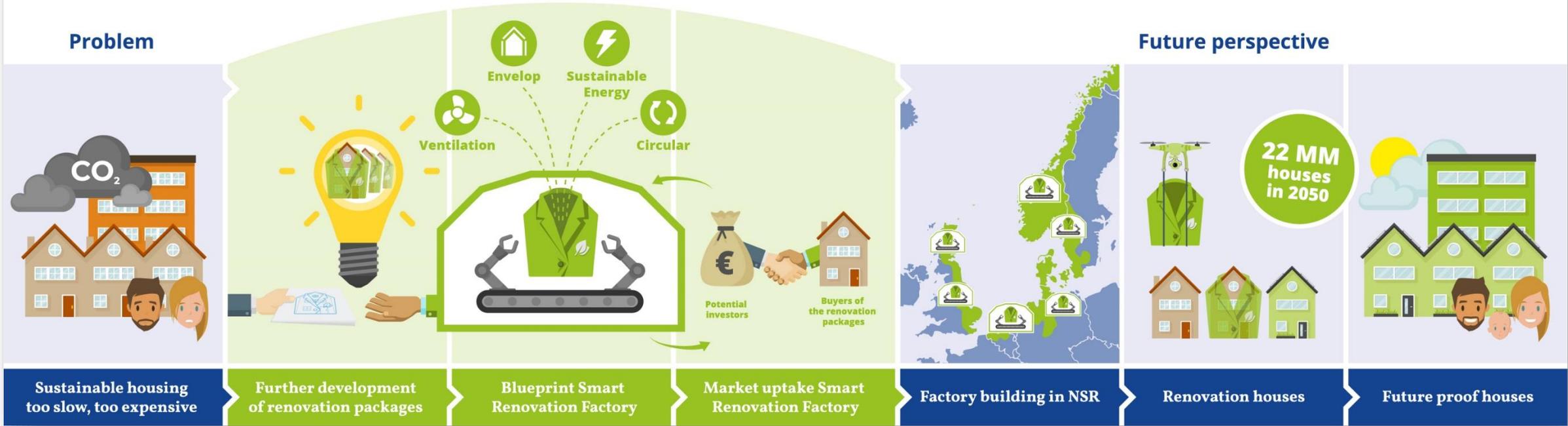
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## THE SOLUTION WITH INDU-ZERO



[Interreg INDU-ZERO project - YouTube](#)

# INDU-ZERO im kurz zusammengefasst

- **Blaudruck für ein High-Tech Fabrik**
- **50%** Reduktion der heutigen (Stand 2022) Preise für eine **NetZero-Standard Sanierung → bezahlbare Sanierungskosten**
- **Produktion von 15.000 Sanierungspakete pro Jahr pro Fabrik**  
→ **hohe Qualität**

# Partner und Beirat



# Unternehmen die mitgedacht haben



# Logistik

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# Logistik Prozesse

## Intralogistics

### Inbound-Logistik

- Lkw-Entladung
- Warentrennung
- Material Transport zum Lager

### Lager

- Berechnung der Lagerfläche
- Speichertypen
- Transport Methoden

### Outbound-Logistik

- Transport des fertigen Produkts zum Lager
- Berechnung der Außenlagerfläche
- Lkw-Beladung

## Cross-company

### Transport zur Fabrik

### Transport zum Bauplatz

### Retourlogistik

# Sanierungspakete

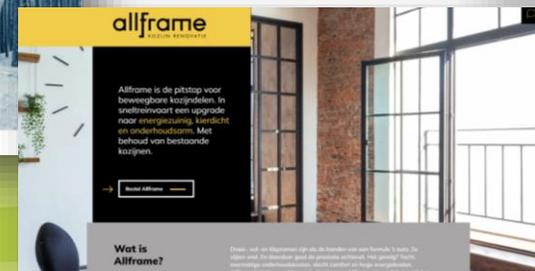
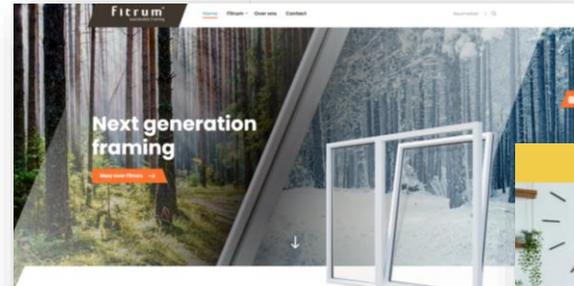
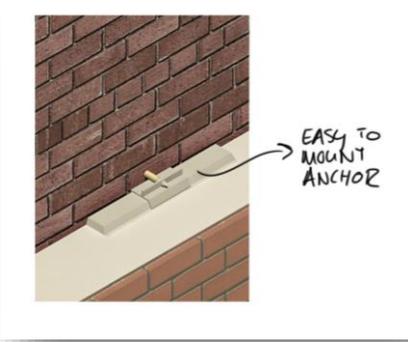
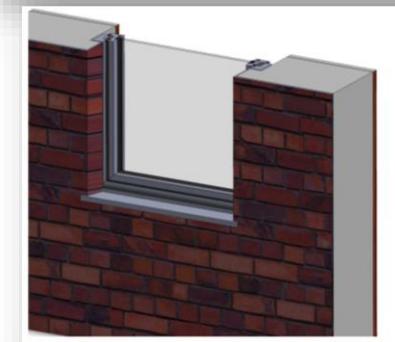
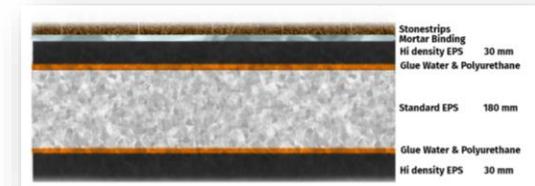
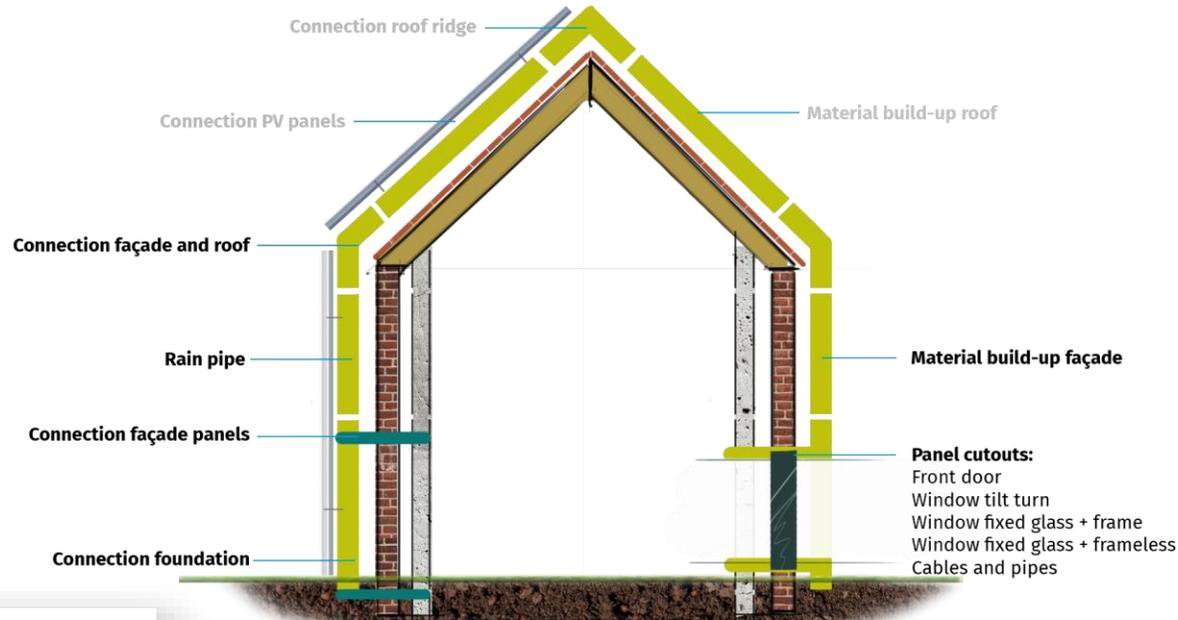
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# Neues Produkt entwickelt



# Impression der Smart Fabrik

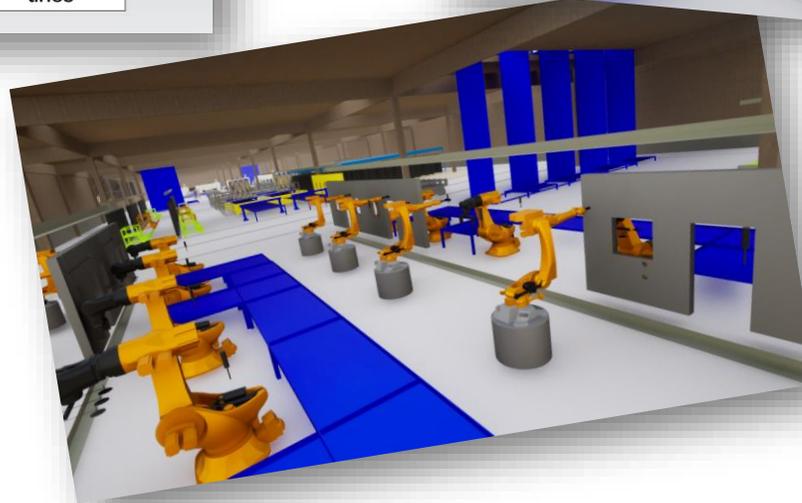
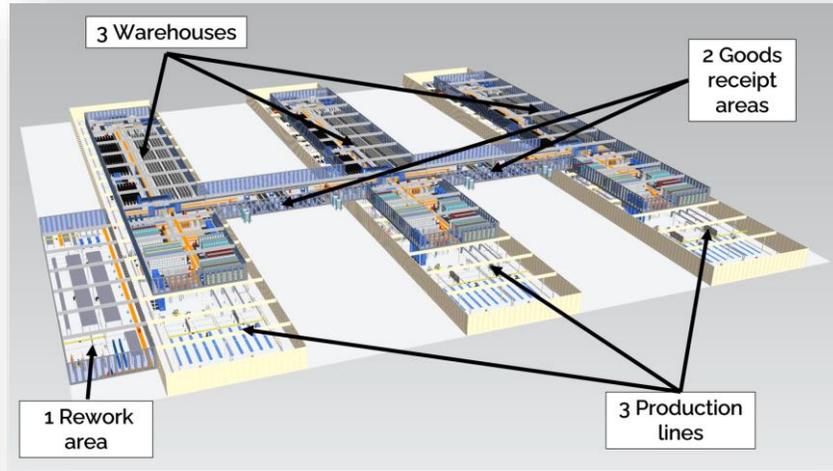
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# Blaudruck der INDU-ZERO Smart Fabrik



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# INDU-ZERO Smart Fabrik



- **Fabrik: ca. 26 ha**
- **Total: 31 ha**
  
- **Taktzeit 2 Minuten**
- **614 Elemente pro Tag**
  
- **Inbound & Outbound Logistik**
- **≈ 150 Lkws pro Tag**
  
- **440 Mitarbeiter**

# INDU-ZERO Video Smart Fabrik



# Montage vor Ort

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# Montage vor Ort



Source pictures renovation Domijn, Rc panels

- Ziel: Totale Sanierungszeit innerhalb von 3 Tagen mit 5 Mitarbeiter (Reihenhaus)
- 1022 Mitarbeiter pro Jahr
- Bewohner können zu Hause bleiben

**pioneering**  
vernieuwt de bouw

**REINBOUW**



**domijn**

**comfort partners** | TBI

**SAXION**  
HOGESCHOOL

**BURO DE HAAN**

**RCPANELS**

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# Showcase Sanierung

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# Reihenhaussanierung bei Domijn in Enschede / NL

- NetZero Standard Sanierung
- 3 verschiedene Installationen (Wärmepumpen / PV oder PVT)
- Neuentwicklungen integriert



# Geschäftsmodell

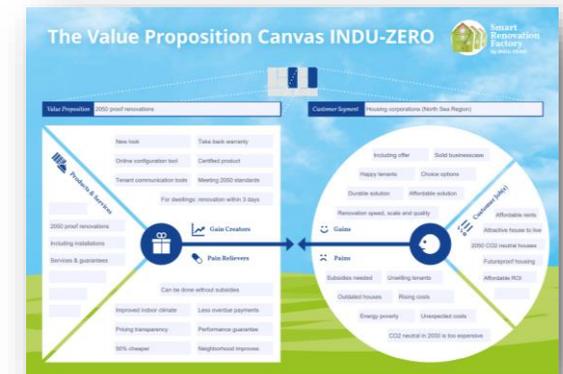
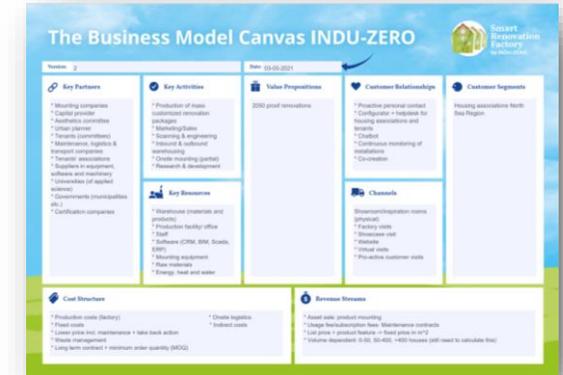
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# Geschäftsmodell des gesamten Prozesses

- Business Model Canvas
- Nutzenversprechen „Value propositions“
- Kundenmarktforschung (NL/D)
- Produkt-Service-Empfehlung
- Break-Even-Berechnung
- Total Cost of Ownership Berechnung



# Theoretische Angebotsunterlage für das INDU-ZERO Produkt




**Bidbook project INDU-ZERO**  
**Net Zero renovation**

<b>Building type</b>		<ul style="list-style-type: none"> <li>Terraced house rice houses; Corner house - 1965 - 1975 (110 m<sup>2</sup>, size 5.7 m)</li> </ul>
<b>Price</b>		<ul style="list-style-type: none"> <li>€58,000 terraced house; €65,000 corner house excl. VAT</li> </ul> <p>The costs include:</p> <ul style="list-style-type: none"> <li>Design costs, process costs recordings</li> <li>Demolition costs of chimney, removal of old roof tiles, glass and internal parts of windows and doors, removal of central heating boiler</li> <li>Applying the facade and roof panels, including windows and doors</li> <li>Connecting and adjusting all mentioned installations</li> <li>Resident guidance preparation (3 sessions, 1 visit building site)</li> <li>Resident instructions, use installations</li> <li>Permit application preparation</li> <li>Construction and assembly insurance</li> <li>Grant advice</li> <li>Notification Authorities, start renovation</li> </ul>
<b>Panels</b>		<ul style="list-style-type: none"> <li>Sandwich panels for the facade, Rc value of 7 m<sup>2</sup>/K/W</li> <li>Sandwich panels for the roof, Rc value of 8 m<sup>2</sup>/K/W</li> <li>Airtight, airtight (QV 10 value per m<sup>3</sup> = 0,15 litres/m<sup>3</sup>)</li> <li>Sill connection / transition</li> <li>Facilities suitable for the conservation law (birds &amp; bats)</li> <li>Comply with the requirements of the Building Decree (fire resistance requirements, etc.)</li> <li>Ready for connections for outdoor fixtures and blinds/screens</li> </ul>
<b>Installations</b>	<b>Central unit</b>	<ul style="list-style-type: none"> <li>3-phase meter box + connection induction hob</li> <li>Air/water heat pump</li> <li>Boiler vessel</li> <li>2 expansion vessels</li> <li>Central ventilation system with heat recovery (WTW)</li> <li>Water-side balancing</li> <li>Infrared radiator bathroom</li> <li>Kitchen hood recirculation</li> </ul>
	<b>Solar panels</b>	<ul style="list-style-type: none"> <li>22 PV panels; 330 WP + inverter; on average about 6,170 kWh/year</li> </ul>
	<b>Monitoring's system</b>	<ul style="list-style-type: none"> <li>Monitoring's system</li> </ul>
	<b>Glazing and exterior doors</b>	<ul style="list-style-type: none"> <li>Window frames with triple glass</li> <li>Skylight</li> <li>Insulated new doors U-value of up to 0.8 W/m<sup>2</sup>K</li> <li>0 = Net Zero standard</li> </ul>
<b>Standard</b>		<ul style="list-style-type: none"> <li>10 year performance guarantees</li> </ul>
<b>Guarantee</b>		<ul style="list-style-type: none"> <li>Entire renovation ready within 4 working days</li> <li>Tenant stays at home during renovation</li> <li>Resident calendar: planning incl. (clean up) tasks resident</li> </ul>
<b>Building time</b>		

<b>Project dependent (additional costs)</b>	Product costs	<ul style="list-style-type: none"> <li>Floor insulation ground floor RC 3.5 m<sup>2</sup>/K/W</li> <li>Electric</li> <li>Safety glass according to NEN 3569 (costs in accordance with reference types)</li> <li>Vacuum Glass</li> <li>Sun protection (starting point; sun protection kitchen/living room on the south; slatce facility)</li> <li>Induction Cooker</li> <li>Radiators (slightly larger than existing due to heating)</li> <li>Fan 50 m<sup>3</sup>/h if not yet present</li> <li>Fan 25 m<sup>3</sup>/h if not yet present</li> <li>Additional offer for common ZAVs</li> <li>Replace/move outside tap</li> <li>Replace/move water well</li> <li>New fences garden walls</li> <li>Pipes sewer, fibre optic/cable</li> <li>Pan set</li> <li>Air conditioning</li> <li>Conservation law - exclusion flaps, mitigating measures</li> </ul>
<b>Project dependent (additional costs)</b>	Process costs	<ul style="list-style-type: none"> <li>Full resident guidance</li> <li>Permit application and fees</li> <li>Asbestos removal costs</li> <li>Expense and nuisance allowances for residents; wallpaper curtains carpeting etc.</li> <li>Grants (applications)</li> </ul>
<b>Cheaper alternatives</b>	Product costs	<ul style="list-style-type: none"> <li>2 decentralized ventilation systems (CO2 controlled) with WTW (alternative to central WTW) in addition to the use of existing mechanical ventilation and natural ventilation in bedrooms</li> <li>Mailbox outside</li> </ul>

# Blaudruck – Online Zeitschrift

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# Online Zeitschrift <https://northsearegion.eu/indu-zero/about-the-blueprint/>

CONTENT

## Blueprint Smart Factory by INDU-ZERO

This is how we renovate 22 million houses towards energy-neutral

- The Renovation Package**
  - The INDU-ZERO product
  - Wall and Roof Panel Materials
  - The installation systems
- Business case**
  - Several scenarios
- Prepare renovation packages**
  - The 8 steps of INDU-ZERO renovation
- Produce renovation packages**
  - Production
  - The architectural ingredients of the sustainable INDU-ZERO factory
  - INDU-ZERO as a landscape
- Deliver renovation packages**
  - Transportation to the construction site
  - On-site mounting
- Life cycle**
  - Use stage
  - Maintenance
  - Material Disposal

# Zusammenfassungsvideo

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# Zusammenfassungsvideo

## The INDU-ZERO project

This is how we renovate Net Zero houses.  
Join us!



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# Nachrichten zum Mitnehmen

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# Nachrichten zum Mitnehmen

**Industrielle NetZero Standard Sanierung zum  
halben Preis ist möglich!**

➤ <https://northsearegion.eu/indu-zero/>



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# Fragen?

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