

PROCESS-RELATED RISKS IN REFURBISHMENT OF DWELLINGS USING PREFABRICATED WALL ELEMENTS WITH INTEGRATED PV AND VENTILATION DUCTS

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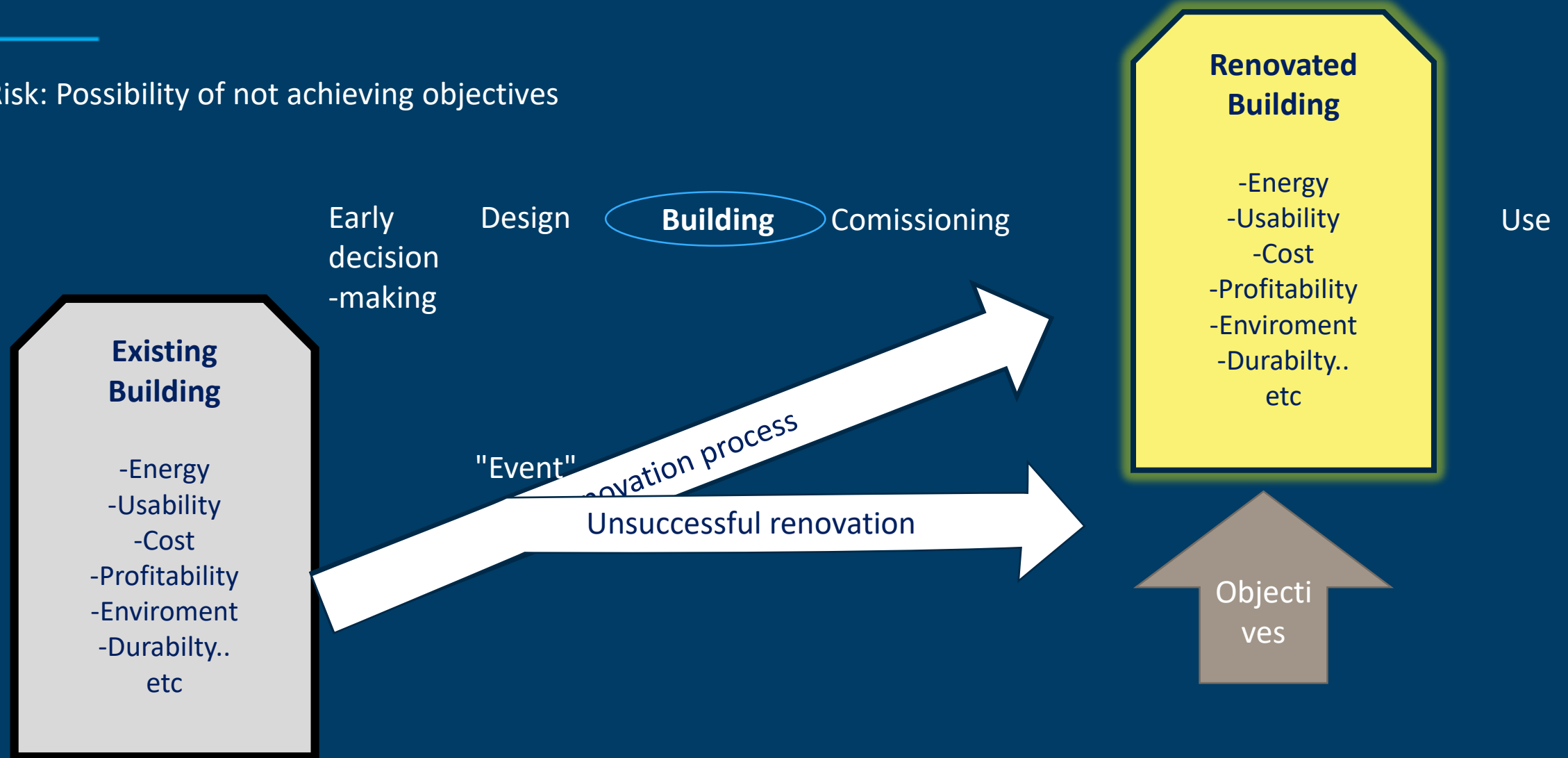
Norway: Haugerudsenteret 17-19

- Owned by Boligbygg, Oslo municipality
- Two floor apartment building from 1971
- Total 8 dwellings, ca 40 m²
- Electric heating
- Natural ventilation
- Small and easy building
- Social housing- Robust solutions needed

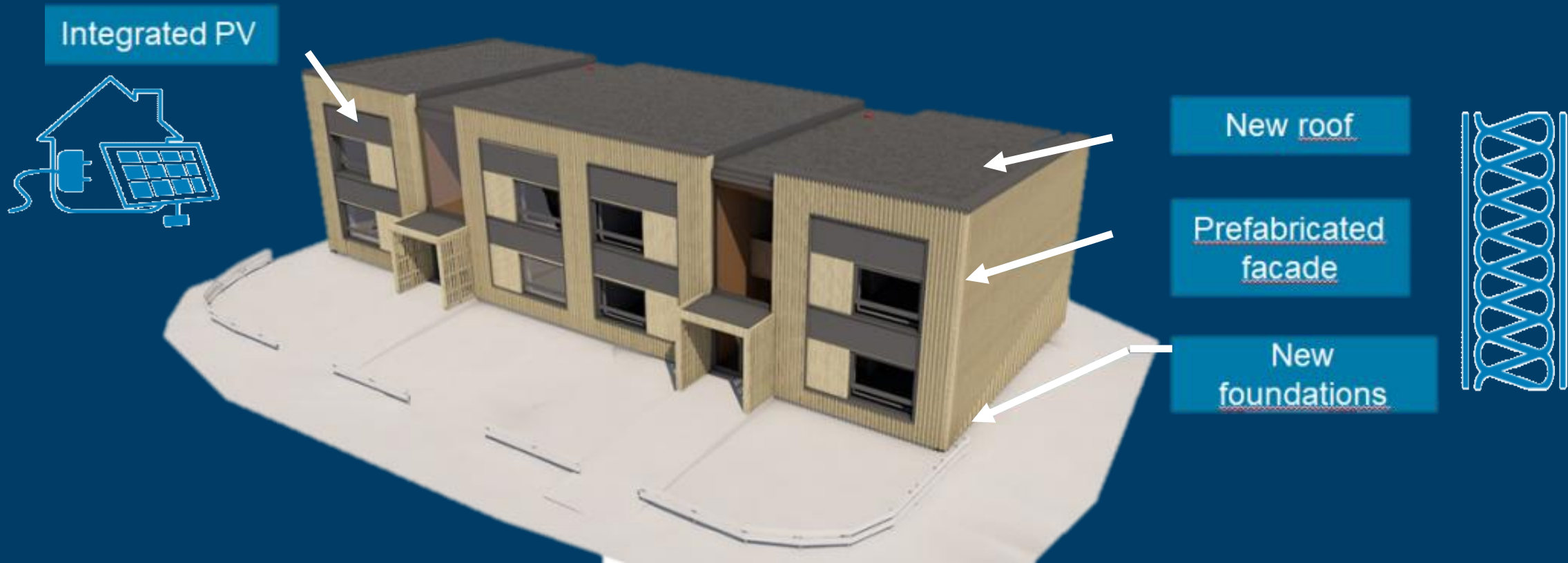


Renovation risks

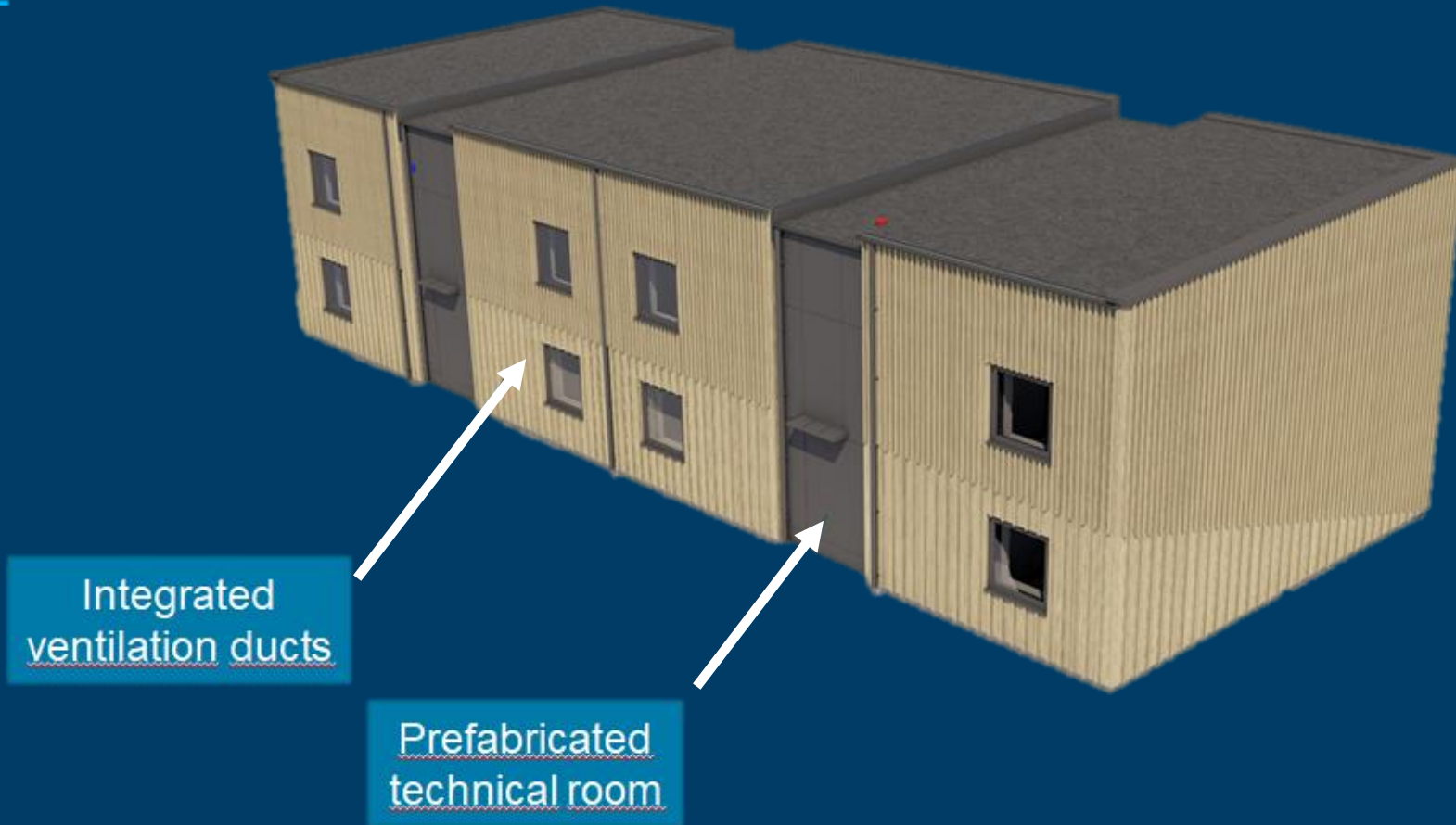
Risk: Possibility of not achieving objectives



Technical solutions, South facade



Technical solutions, North facade



Risk reducing activities prior to implementation

- High focus on risks and countermeasures from the start – what are critical factors?
- High skilled experts and design team
- Including of manufacturer at design stage
- Advisory meeting designgroup, G&M, SINTEF
- Transfer of knowledge from design/production to implementation at site

Old + new solution = Safe and healthy?

Deep renovation = change of concept!

State of existing construction?

Are we adding new problems?

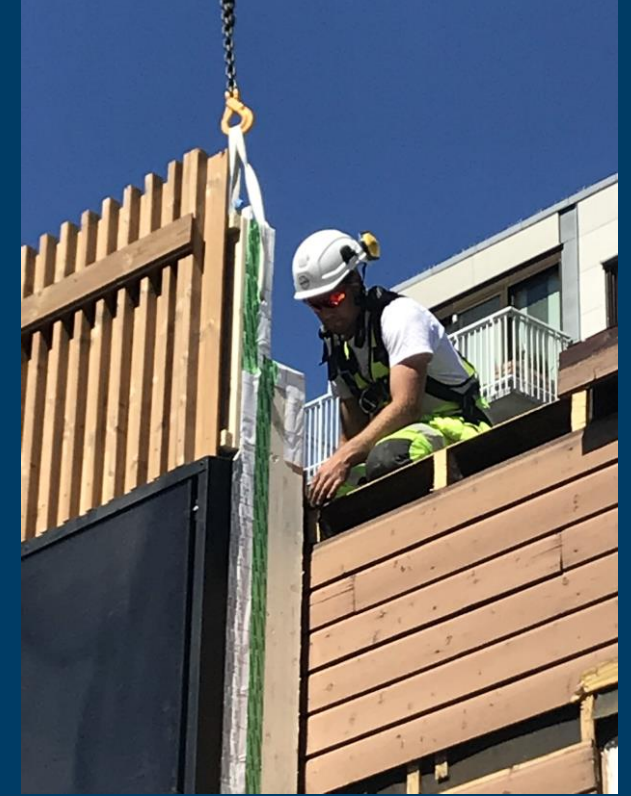
What regulations to fulfil?

- Air tightness and vapour-barriers
- Ventilation
- Snow load + load of new elements
- Energy performance
- Insulation of cold attic
- Fire regulations and escape rout
- **Keep existing cladding and insulation?**



Important details:

- Tolerances
- Joints
- Connection old and new constructions
- Fit to existing openings
- Integration of PV
- Integration of ducts and joints
- Able to produce, transport and install by crane
- Prefabrication = early decisions and orders
- Tenant safety





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HIA

Gjennomføring
elt. planen

FORMAN OG
MØTTEFORMAN
SERLØSNEN

Boligbygg er
så fornøyd at
de vil null ut
løsningen på
alle eierdammene

MONTASJE
AT AET GÅR
ETTER PLANEN

Løst på
TID OG BUDGET

Feit var

Skaden (person)
under monteringen

PERSONLIG:
FARE IKKE SAT
AV TID TIL
INFORMASJON
TIL RISIKORAPPORT

OVREHJERT AV
BUDGETTIL...

Personale

Vegge
konst
i...

Method: Evaluation workshop and focus group interview

- Semi-structured group interview AFTER implementation.

PRODUKSJON / MONTERING
+ ELEMENTENE STIKK PÅ!
LÆRT Å MONTERE SOLCELLER (+FANNE)
EFFEKTIV MONTERING LETT RIGG (KJØN)
- LITTE SKADE
NESTEN INGEN BEBOERE FLYTTET
BLE FERDIG
O-MMS - SKADEN
OK FRAMDRIFEN
FELLES MÅL - GOD KAMPUNIKASJON
- INNE ØRØYFRA OG NET

Selected Results

- Several risk factors identified in pre-building workshop, e.g.:
 - Tenant behaviour
 - Hazardous materials and moisture damage
 - Logistics
 - Weather
- Risk management plan did not fully prevent all identified undesirable events, but reduced consequences.
 - On-site presence to follow up tenants and neighbours
 - Capacity to replace elements with transport damage
 - Capacity for preliminary weather shielding (but still leakage due to rainstorm)
 - Insufficient ability to prevent damage on asbestos-containing material

From drafty 1970' conditions to energy efficient building with energy production within weeks!



Success?

- YES!!
- Low disturbance, short time at site
- Lowered risk by expert guidance
- Market acceptable

Recommendations

- Assess technical condition as early and thoroughly as possible
- Include design team, contractor, owner and end-user representatives in risk assessment
- Post-monitoring and commissioning ongoing





Teknologi for et bedre samfunn

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