

High Performance Building Envelopes

Learning from Groningen
Scaling up from Solution to Typology

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introduction

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PROGETONE

Proactive synergy of inteGrated
Efficient Technologies on
buildings' Envelopes

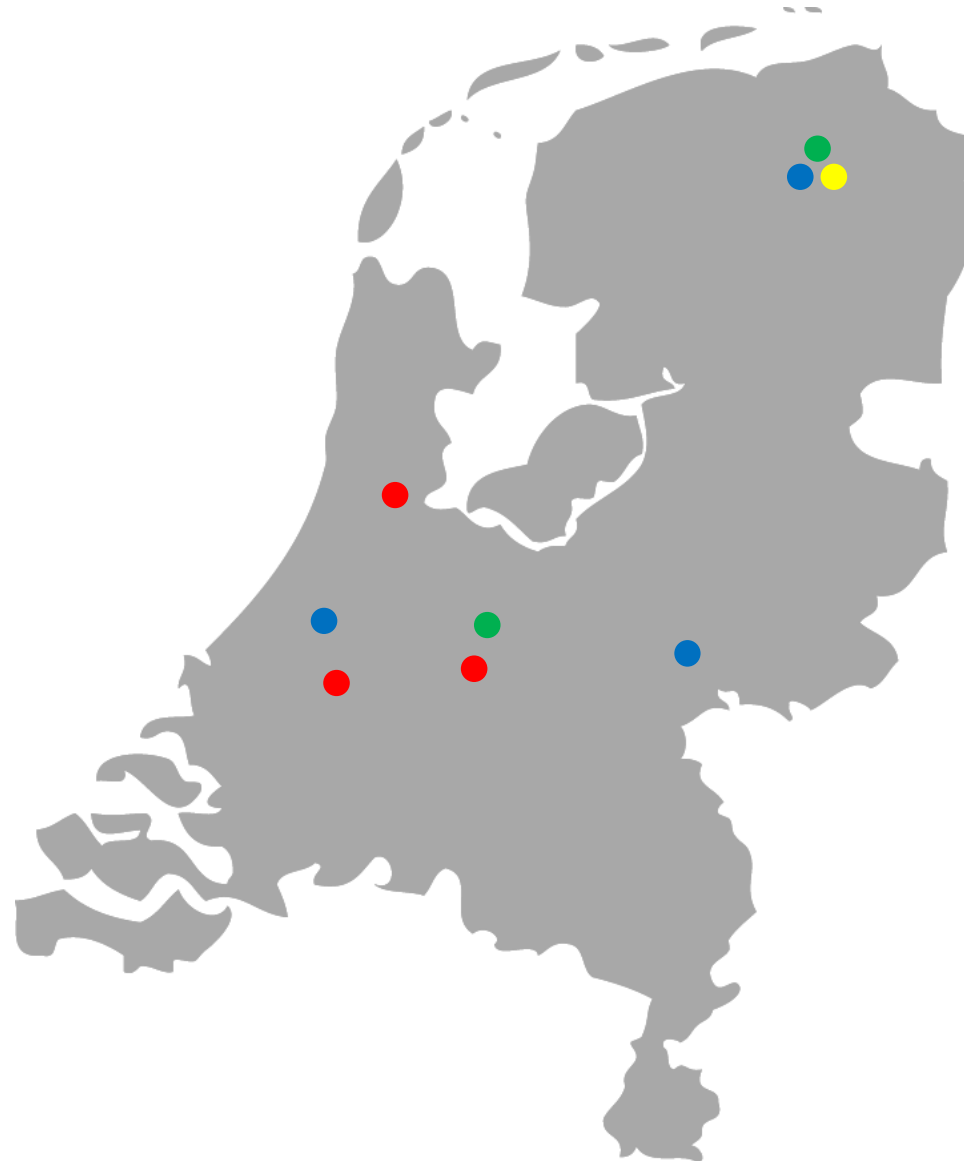
www.progetone.eu



ENERGY
IMPROVE
MENT

SEISMIC
STRENGTH
ENING

FACADE
ADDITION



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abtWassenaar

bbn
adviseurs

bam



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strengthening program

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MJP 2017:



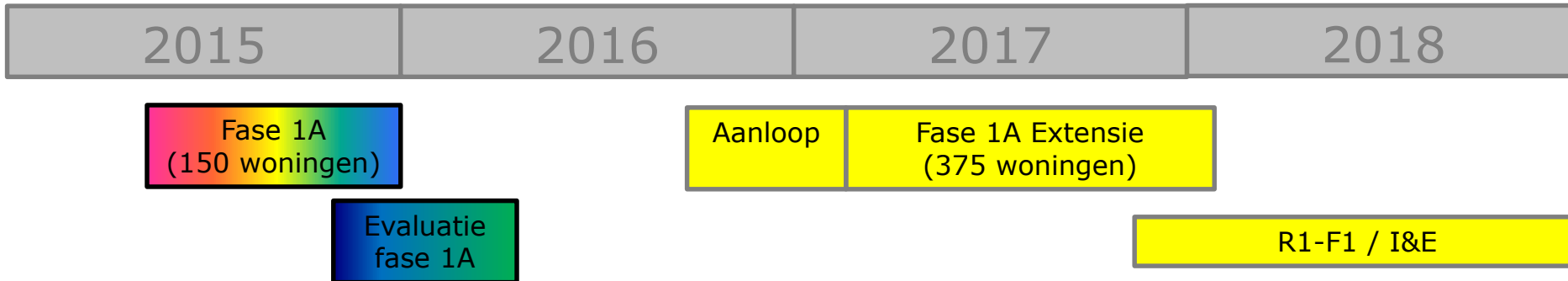
kern
aardbevingsgebied



22.000
woningen



strengthening program



- **Strengthening program**

- 22.000 houses
- Inspections
- Strengthening advice (if necessary)
- Execution of works (if necessary)

- **Pilot 1A, 2015**

- 165 buildings completed
- 7 contractors
- 7 seismic / structural engineers

- **Extension 1A, 2017**

- 375 buildings up to completion
- 7 contractors
- 3 seismic engineers
- 7 structural engineers

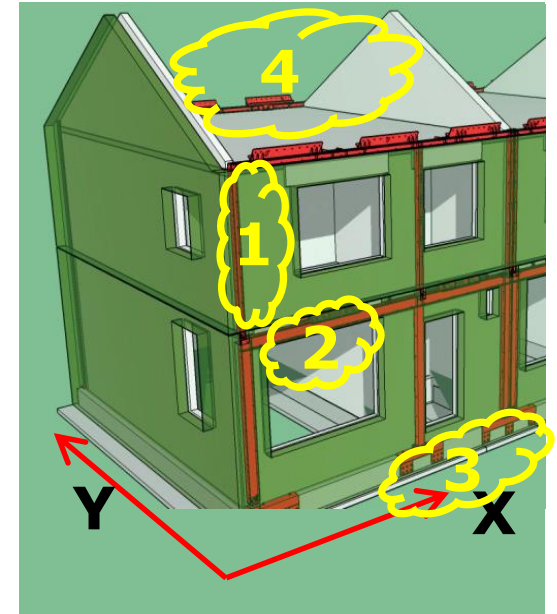
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Waarman 1-11 Farmsum



typical strengthening



typical strengthening

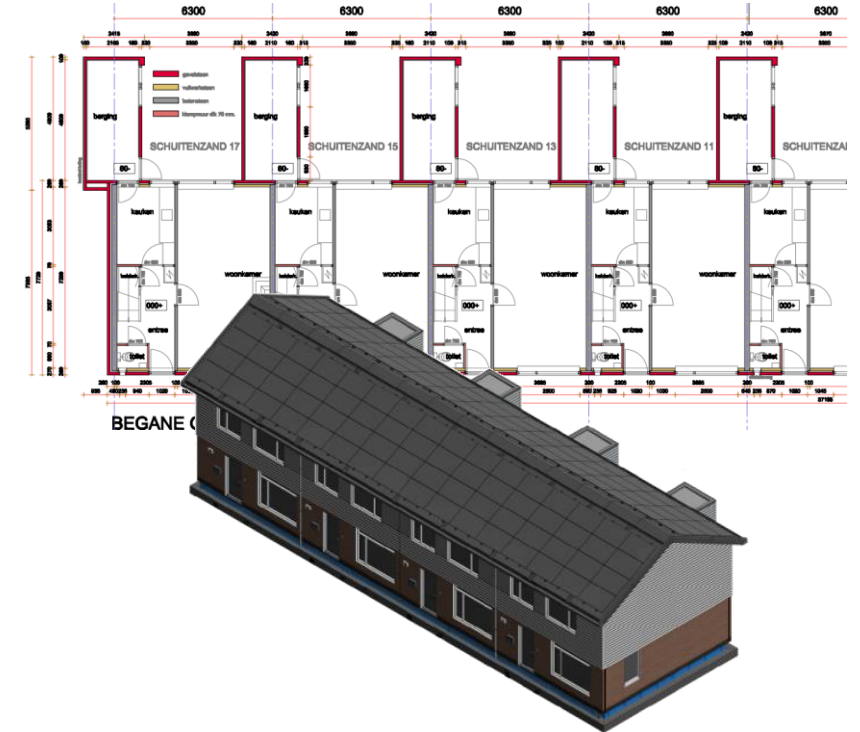


- strengthening has a big impact on residents
- pay a lot of attention to safety
- do people stay at home, or leave the houses?

- is renovation needed or wanted??
- is it well organized??
- who decides for the renovation?



differences & variations



- Every house is different
- You can't trust the original drawings
- Initial surveys are extremely important
- Pay a lot of attention to connection details
- Allow for tolerances!

differences & variations

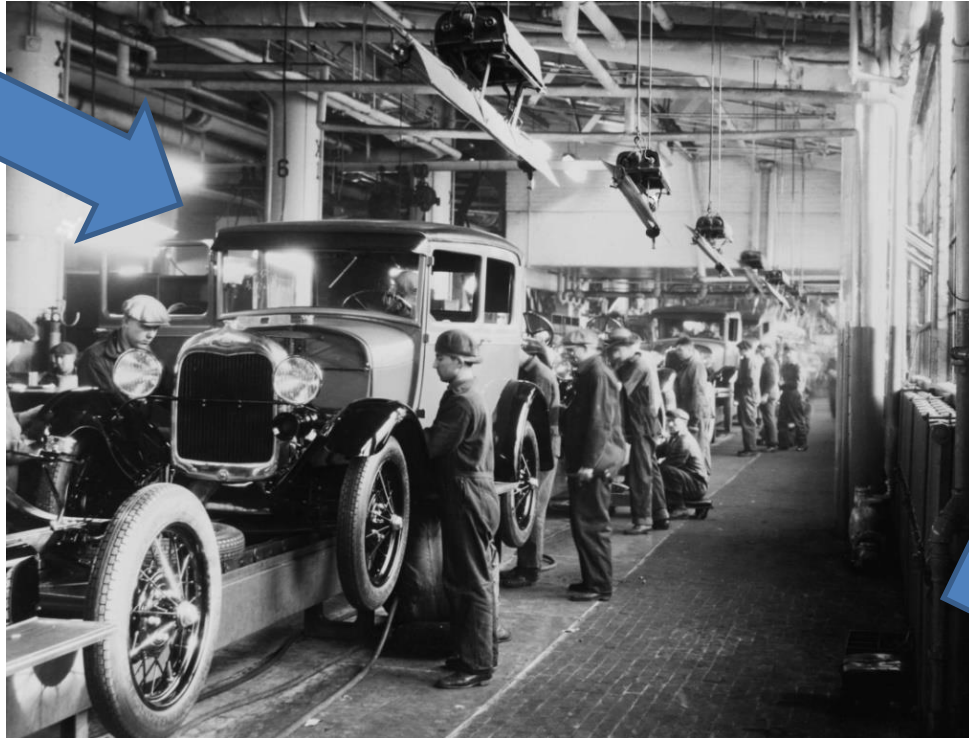




prefabrication & standard solutions



- Standard solutions
- Standard details
- Prefabrication



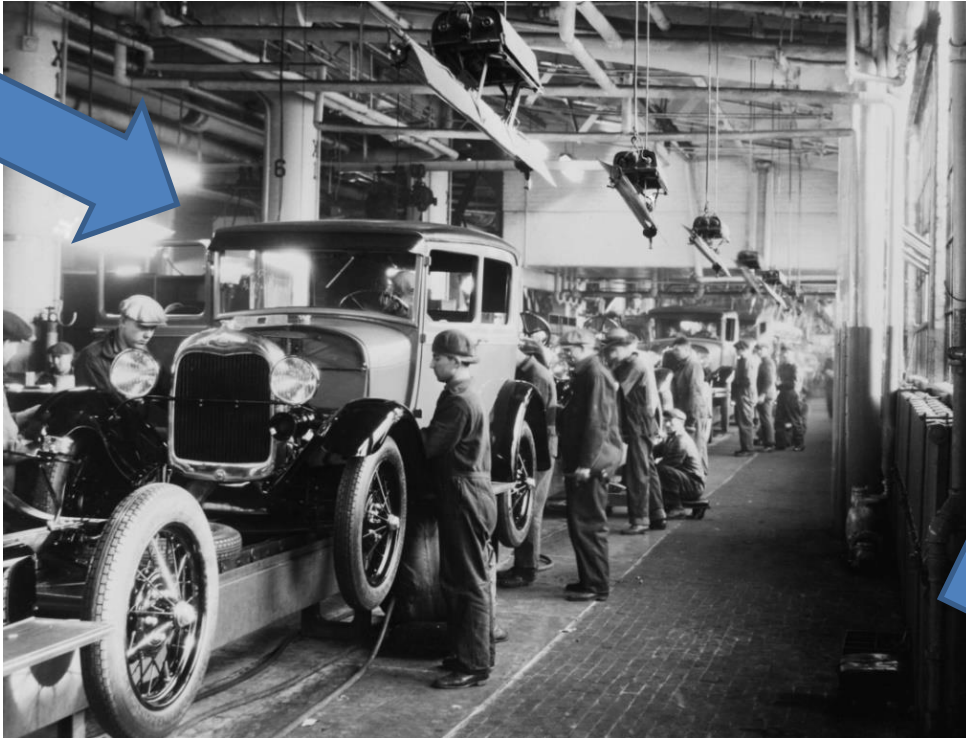
- Standard calculation
- Standard drawings
- Standard reports



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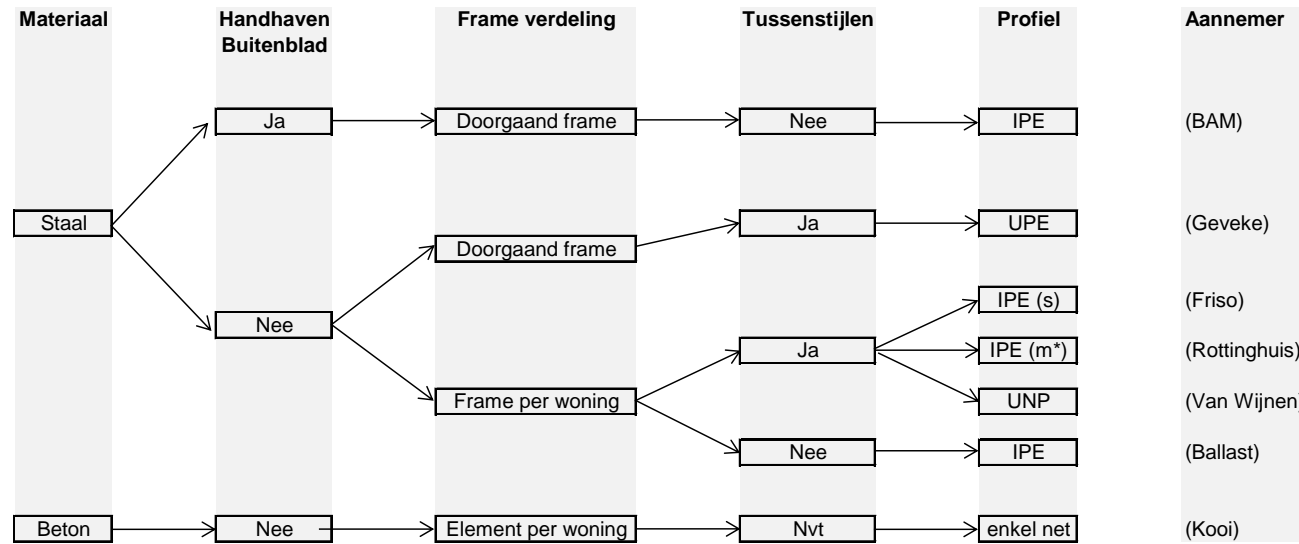
prefabrication & standard solutions

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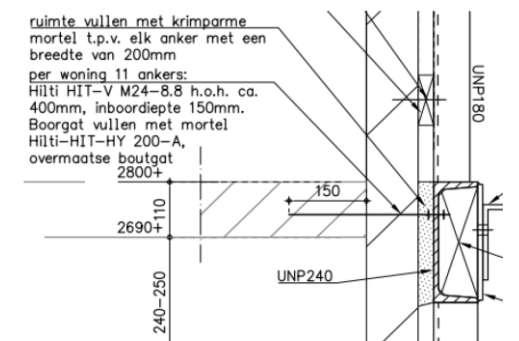
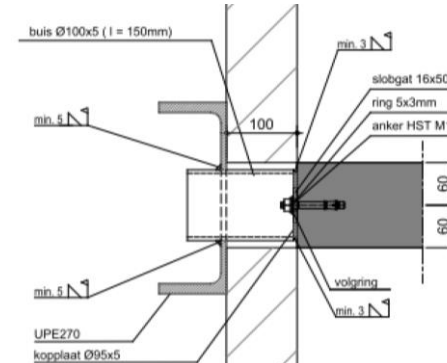
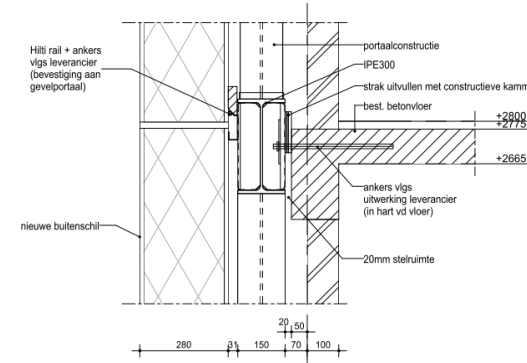
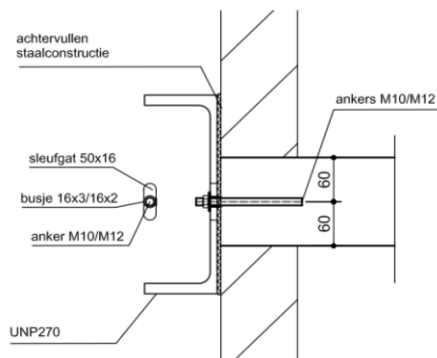
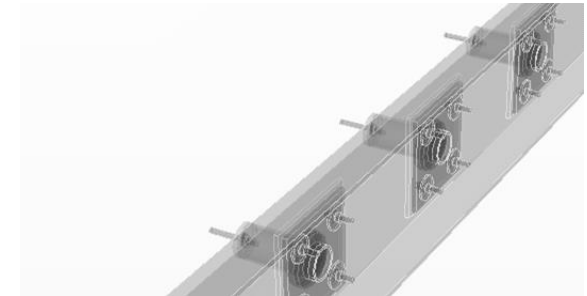
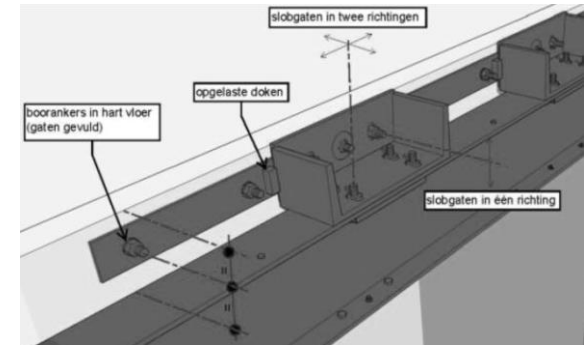


File to Factory:
Bring design and production together!!

1 problem = ∞ solutions

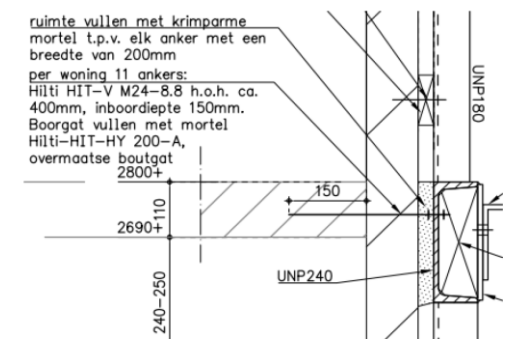
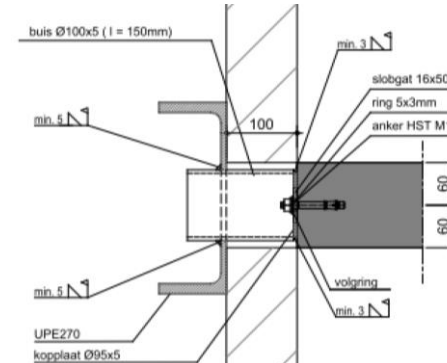
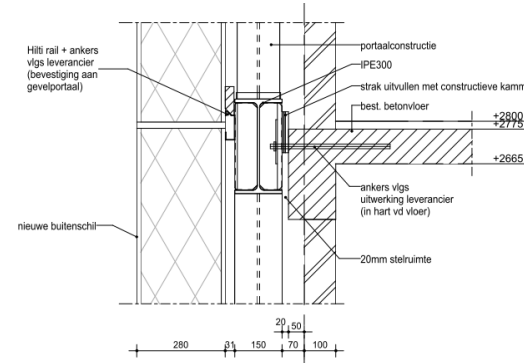
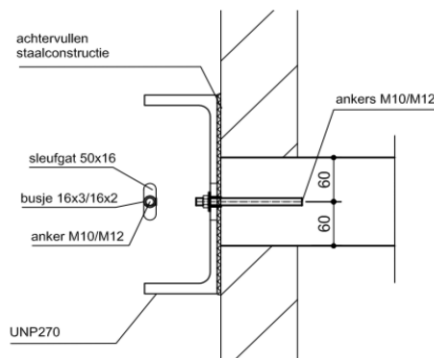
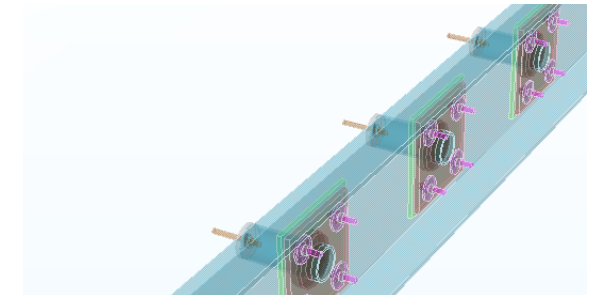
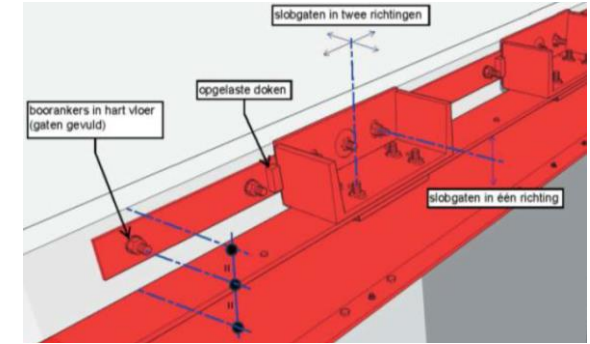


(s) = scharnierende aansluiting frames begane grond en verdieping
 (m*) = momentvaste aansluitingen frames begane grond en verdieping



learn from the mistakes of each other

	Directe koppeling frame - vloer	Directe koppeling betonelement - vloer	Buskoppeling (gebout)	Buskoppeling (gelast)	Console lang	Console kort	Afstandsmontage	Nylon kam
Veiligheid	o	o	o	-	o	o	o	o
Hinder (Indien bewoners in woning)					o			
Gevoeligheid afwijking woning								
Doorlopend binnenblad	-	-	+	+	-	-	-	-
Behoud buitenblad	-	-	-	-	+	+	-	-
Verwijderen bu-blad + niet doorlopend bi-blad	o	o	-	-	-	+	o	o
Uitvoering								
Bouwsnelheid	+	+	-	-	o	o	+	o
Kwaliteit	o	o	+	-	+	+	o	o
Maatgevoeligheid	-	o	+	-	+	+	o	o
Aantal handelingen	+	+	-	-	o	o	+	o
Engineering								
Benodigde seismische kennis	o	o	o	o	o	o	o	o
Zekerheid capaciteit detail	+	+	+	+	o	+	-	o
Eindoordeel								
Doorlopend binnenblad	-	-	+	-	-	-	-	-
Niet-doorlopend binnenblad	o	o	-	-	o	+	-	o

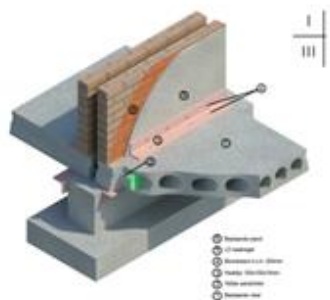


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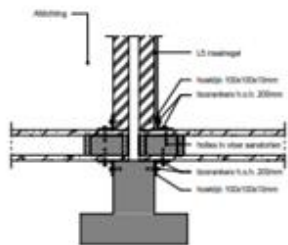
Catalogue of solutions



centrum
veilig
wonen

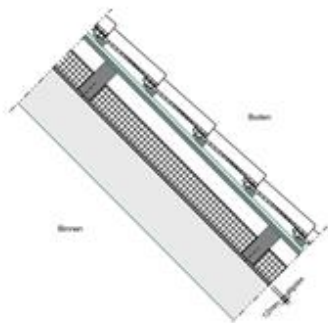
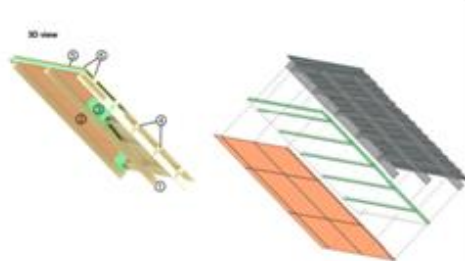


- 1. Betonvloer
- 2. L-profiel
- 3. Houten vloer
- 4. Houten vloer
- 5. Houten vloer



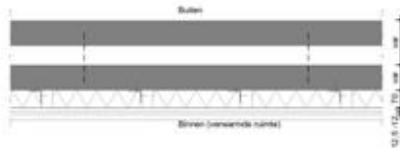
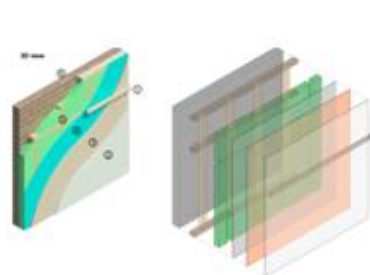
L2

Connections



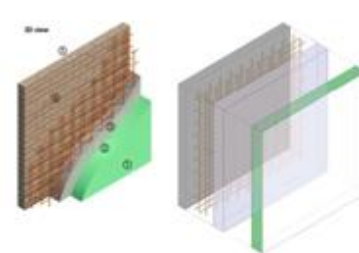
L3

Roofs and floors



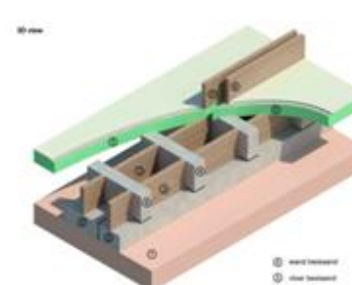
L4

Walls out of plane

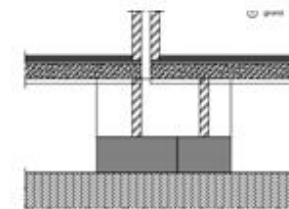


L5

Walls in plane



- 1. wand isolatie
- 2. vloer isolatie



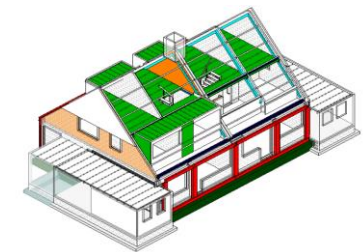
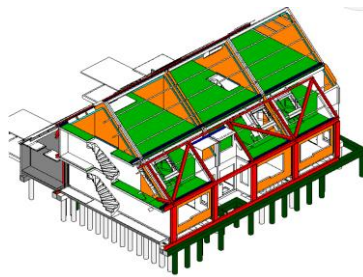
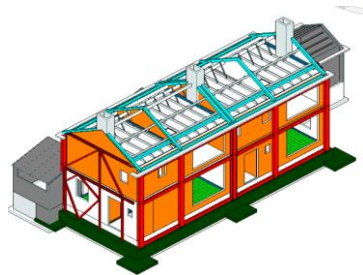
L6

Foundations

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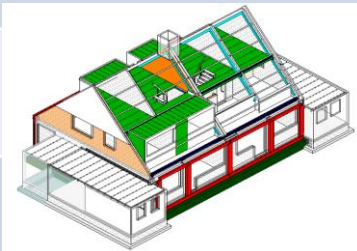
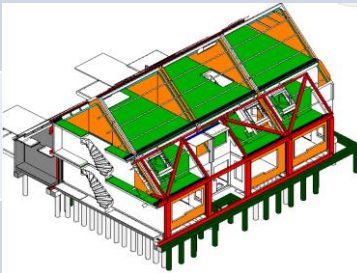
all buildings

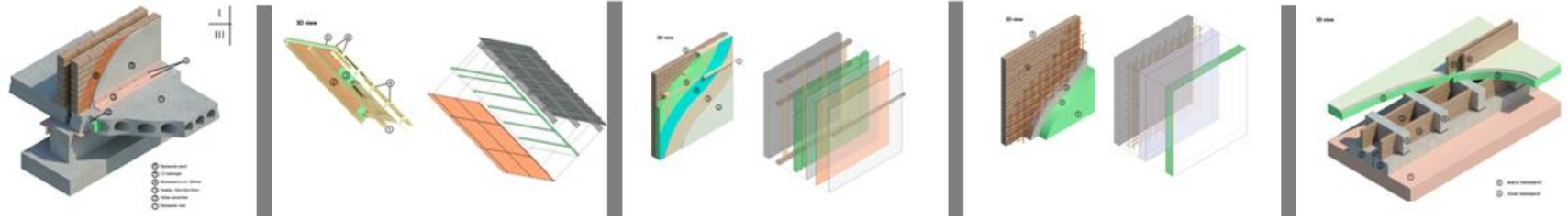
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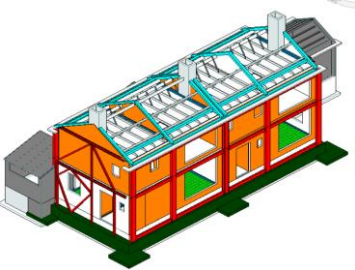
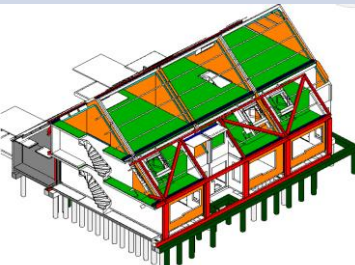



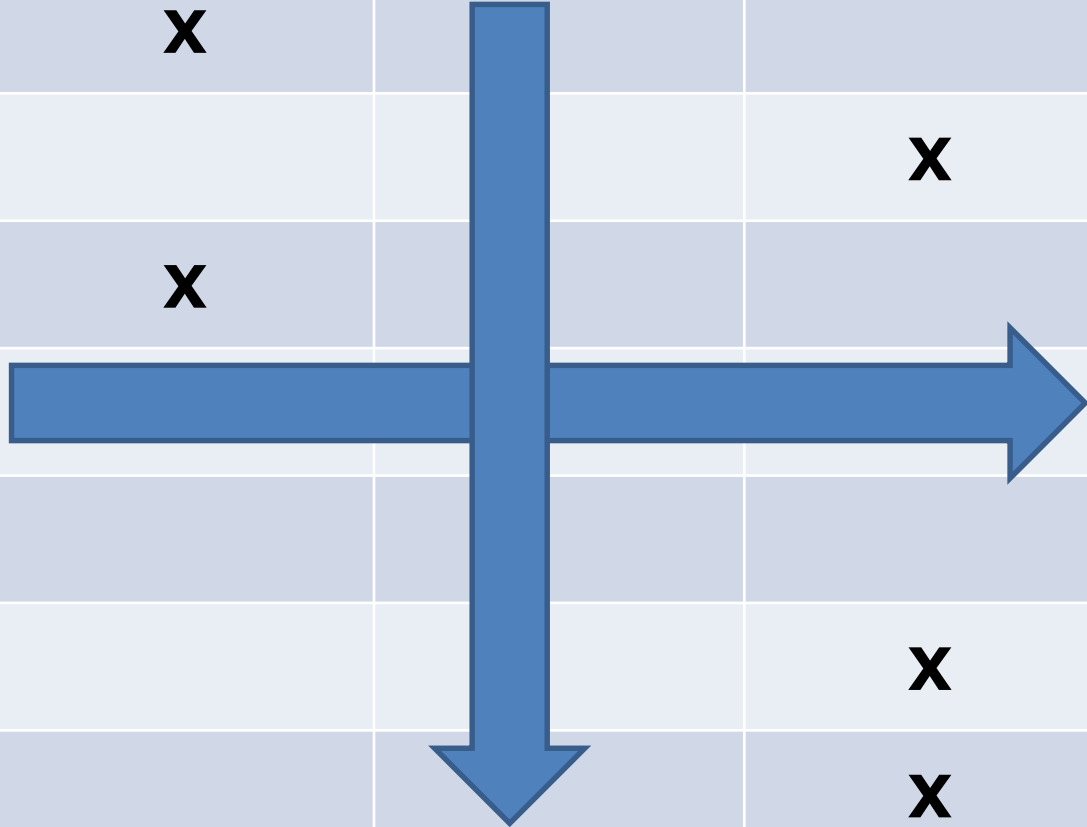
sort into typologies

typologies

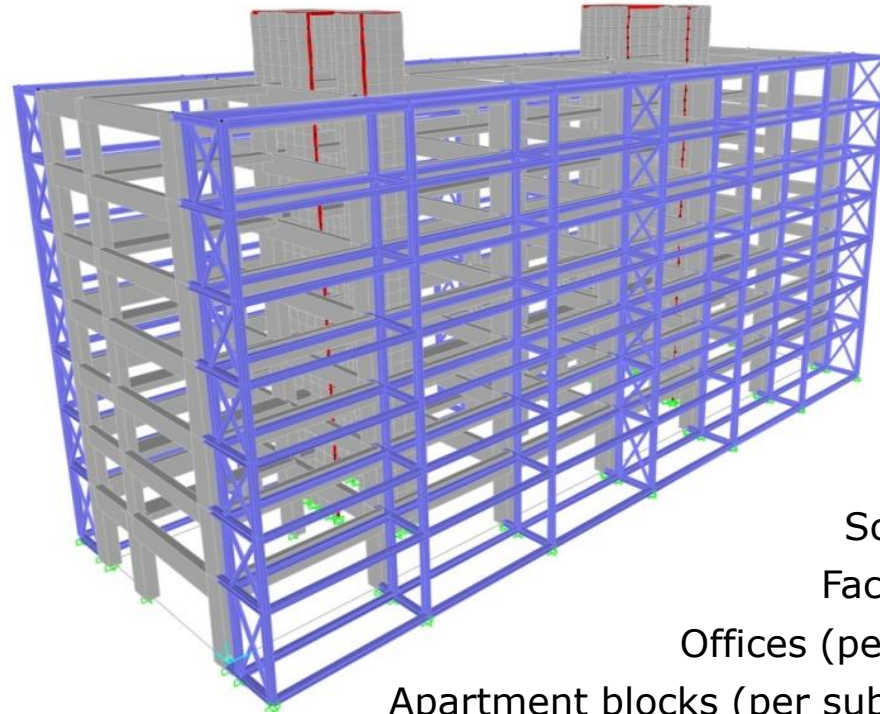
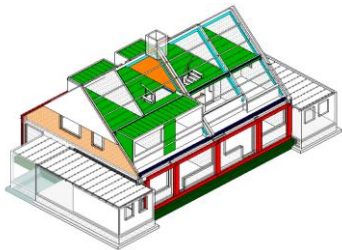
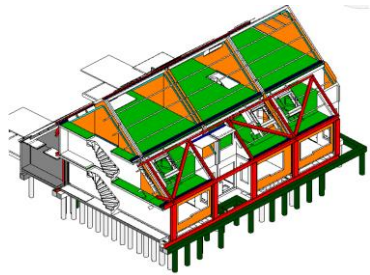
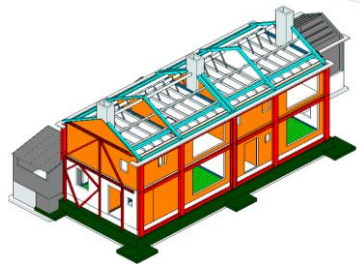




typologies	solutions				
		X			
		X		X	X
	X			X	
				X	



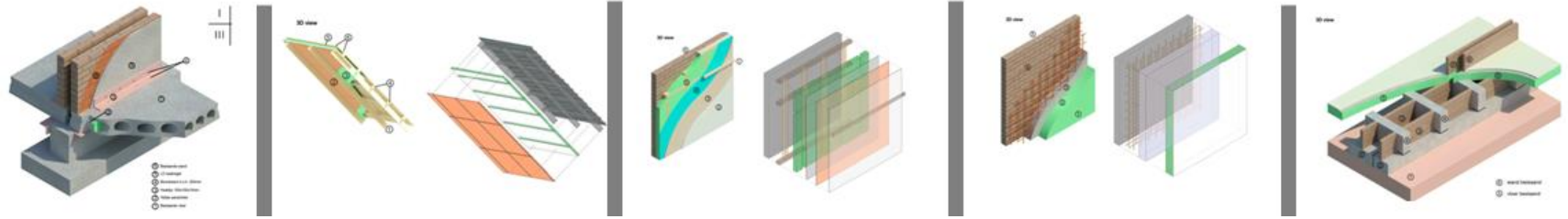
other typologies



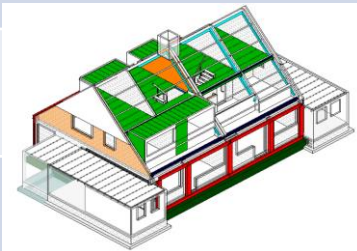
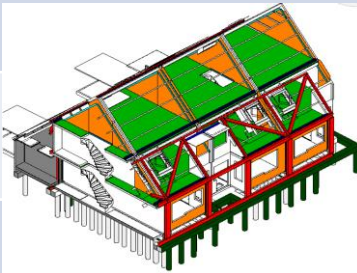
Schools
Factories
Offices (per era)
Apartment blocks (per subtype)
Etc.



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lead?



typologies	solutions				
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??



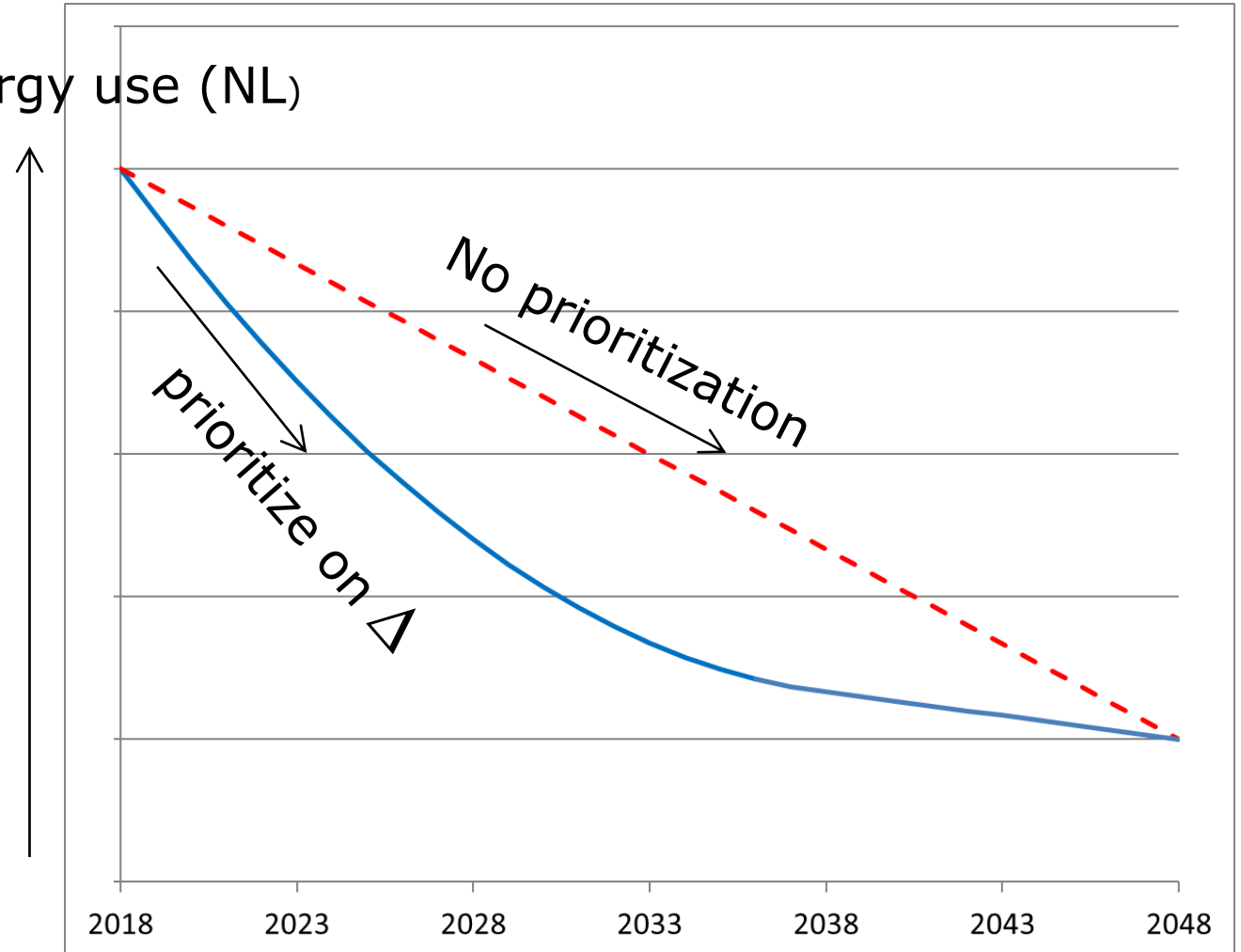
Δ Energy (instead of seismic hazard)

Δ Depends on:

- Possible reduction in energy consumption
- Possible gain in energy production



Σ Energy use (NL)

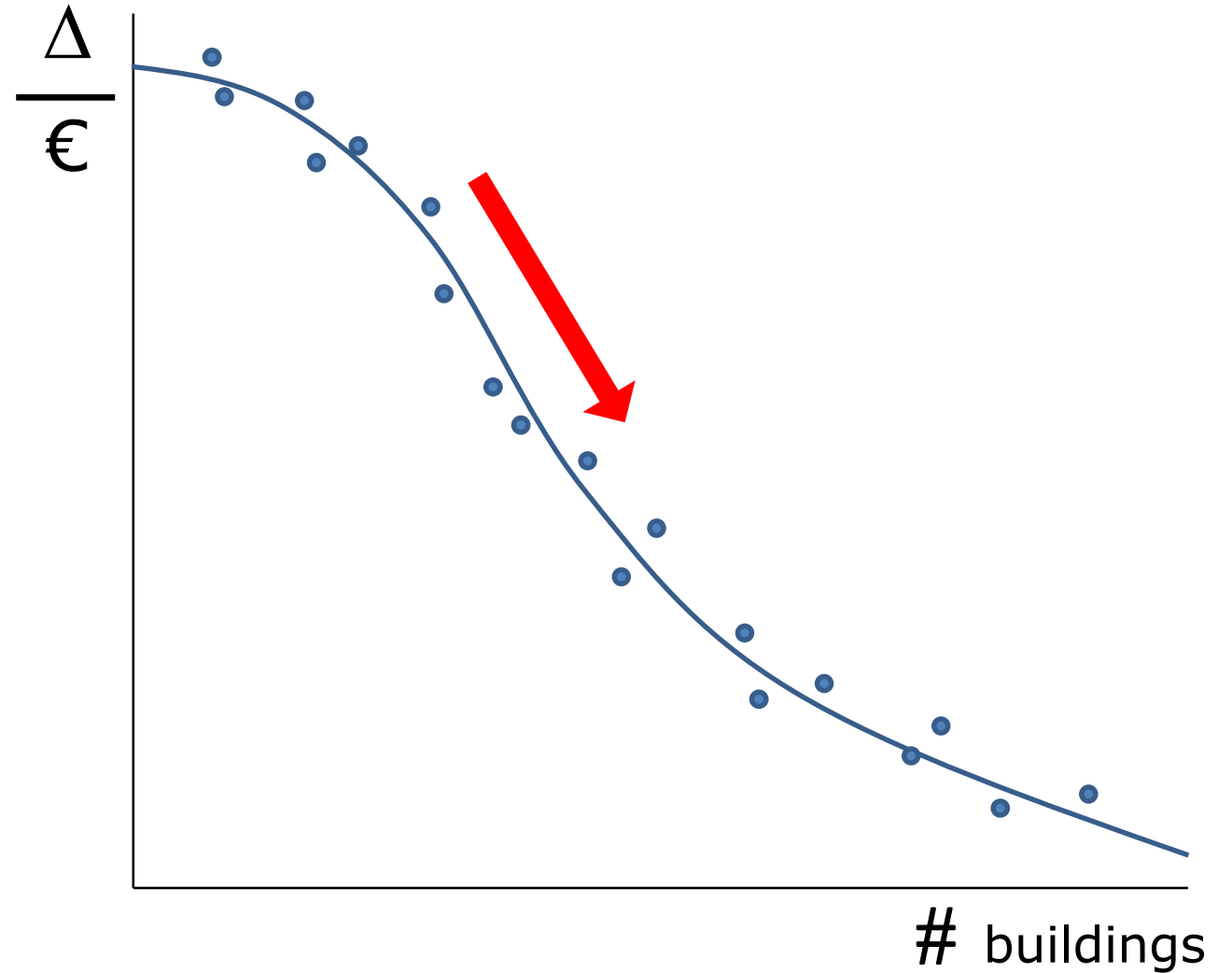
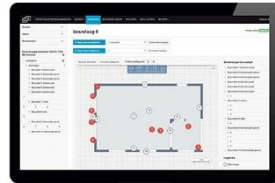


prioritize on high $\Delta/\text{€}$

Use data analysis to search for:

- highest savings
- against lowest costs

In specific building stock





MJP 2017:



kern
aardbevingsgebied



22.000
woningen

Biggest issues:

≠ Technologies

≠ Solutions

= Sharing information

= Funding

= Lead

= Local support!



Startdocument Nationaal Programma Groningen

Bouwstenen voor een Nationaal Programma



De provincie Groningen, de tien gemeenten in het aardbevingsgebied en het kabinet hebben vandaag het startschot gegeven voor het Nationaal Programma Groningen. Met dit programma werken regio en Rijk samen aan de economische versterking en de kwaliteit van de leefomgeving in het gebied. Ook krijgt Groningen een prominente rol op het gebied van energietransitie en duurzaamheid. Voor het nationaal programma is een investeringsbudget van 1,15 miljard euro beschikbaar.

- Openbaar vervoer per bus is CO2 neutraal uiterlijk in 2030 en per regionaal spoor uiterlijk in 2035.
- De Groninger landbouw is duurzaam in 2030 en draagt bij aan klimaatadaptatie.
- Groningse woningen zijn aardgasvrij in 2035.
- Groningen is zelfvoorzienend op het terrein van duurzame energie en 'exporteert' groene energie in de jaren na 2040
- De industrie, inclusief het chemische complex, is CO2 negatief in 2050.
- Een (inter)nationale positie als innovatieve koploper in energietransitie-vraagstukken.
- Klimaatbestendig inrichten van vooral laaggelegen gebieden waardoor droogte en wateroverlast voorkomen worden

Startdocument Nationaal Programma Groningen

Bouwstenen voor een Nationaal Programma

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this is possible today in Groningen



could this be possible in the Netherlands tomorrow?

