

The effect of the Estimated Service Life on the sustainability of vacancy strategies.

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Research question:

What effect does the **Estimated Service Life (ESL)** have on the measurement of the **sustainability** of possible real estate **strategies** for **vacant office buildings**?

Framework:

- No financial considerations
- No social considerations
- All strategies as equal as possible: same location, constructor, project manager, etc.
- All strategies as equal as possible to the reference building

Relevance:

**'ACTIEPROGRAMMA
LEEGSTAANDE KANTOREN'**

Vacancy rate: 14% =
± 7.000.000 M² vacant office space

Strategies:

Redevelopment Transformation Demolition

But what strategy is most sustainable?

Bias previous research:

Standard reference service life for all strategies
No regard for the qualities or shortcomings of the building or strategies

Unequal comparison of design
No design for the new-build strategy compared to a low quality design for transformation

Replacing the design with ambition levels:

Traditional:

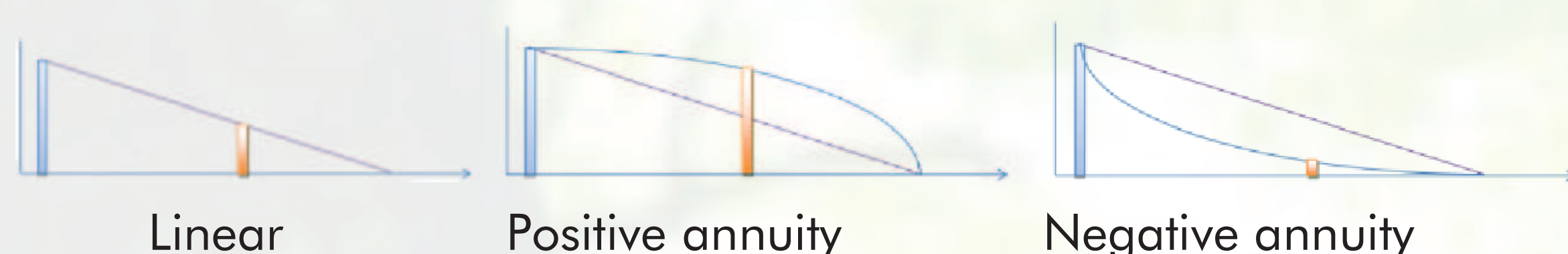
In line with the building decree 2012

Sustainable:

At least an A++ energy label or BREEAM excellent label

Deduction method

Can you just assume a linear decrease?
When comparing with a mortgage an annuity could also be used. What would be the effect of this?



Score tables

There is no literature on assigning ESL factors to existing buildings
A new method has been developed: score tables

Component	Up-to-date with:	0	1-2	3	4-5	6	7-8	9	10
Structure (incl. foundation)	Current building decree	No	No	Adaptable	Yes	Significantly better	There are distinguishing features (e.g. listed as a monument) that assure a longer lifetime		This score can only be assigned in retrospect
	degree of the building year	No	Adaptable	Yes	Yes	Yes			

S³ Model:

Sustainable Strategy Selection Model

GreenCalc+ → Environmental load all strategies

Lifespan accounting model → Remaining Environmental load
Van Den Dobbsteven (2004)

Improved factor method → Estimated service life
Van Nunen (2010)

$Env. L. \frac{P}{y} strategy x =$

$$\frac{Remaining\ Env.\ L. + Total\ once\ off\ load}{ESL} + Env.\ L.\ Energy \frac{P}{y} + Env.\ L.\ Water \frac{P}{y}$$

Fictive case A:

Strategy		Greencalc+ Results	S ³ Results
Consolidation	Off	40.100	62.944
Renovation	Off	29.860	46.222
Extensive renovation	Off	29.013	41.064
Transformation	TR DW	28.367	32.332
Transformation	SUS DW	26.227	24.521
Demolition & New-build	TR Off	32.897	39.081
Demolition & New-build	SUS DW	29.400	32.741
Demolition & New-build	TR Off	28.860	26.909
Demolition & New-build	SUS DW	26.287	24.066

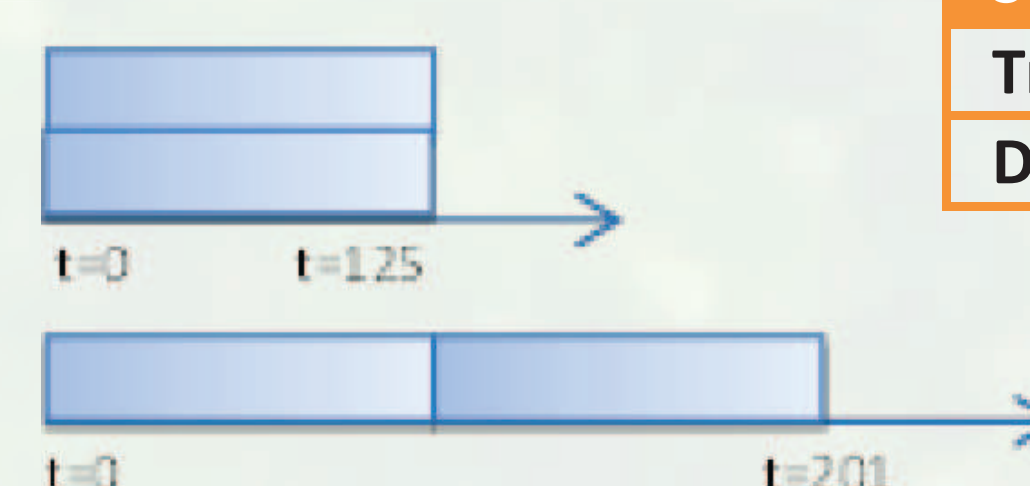
Including the ESL:

Demolition new/build of sustainable dwellings

becomes more sustainable than

transformation to sustainable dwellings

Why?



Strategies		ESL	RSL
Transformation	TR	125	75
Demolition & new-build	D&N	201	75

Large difference in the ESL of the strategies

Because D&N has a much longer ESL than TR the 'environmental load caused by materials' can be deducted over a longer period of time. This makes the load per year much lower.

This means that, the higher the materials load is, the more strategies with a longer estimated service life will be advantaged.

Effect of the remaining environmental load and deduction method

The remaining environmental load is an extra 'Penalty' for strategies with a lower ESL

The remaining environmental load amplifies the effect of the ESL because it increases the 'environmental load caused by materials'

The chosen deduction method has a large influence on the final results

A positive annuity will increase the effect of the ESL, a negative annuity will decrease the effect.