

WHOLE LIFE COSTING OF A FRENCH SINGLE FAMILY HOUSE REFURBISHMENT : THE BAT ECO² CASE STUDY

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CONTEXT



Call to Regional Projects – November 2014 « Life Cycle Assessment and New Economical Models »

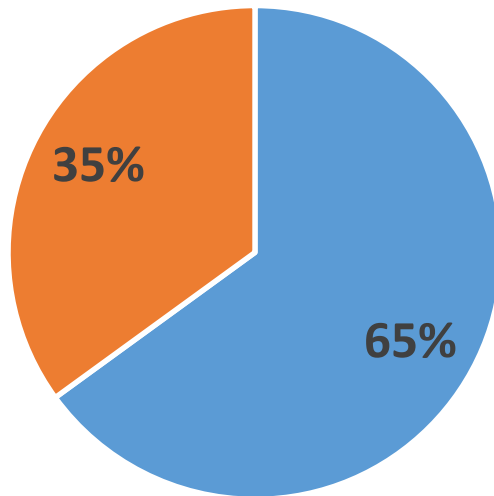
Bat eco2
Environmental and Economical Strategy
through building eco-efficiency



CONTEXT



French Building Stock (30 million dwellings)



■ Before 1975 ■ After 1975



Average energy consumption of 300 kWh_{PE}/m².yr

Building Sector : 20% of GHG emission in France



Energetic transition for green development French law
→ Decrease in 75% GHG between 1990 and 2050.

PROJECT APPROACH



↳ Environmental & Economical Indicators

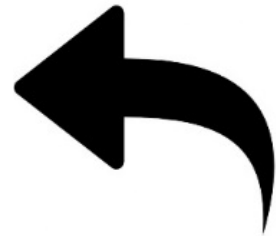
↳ Simplified tool for decision making

↳ Case study LCA & WLC

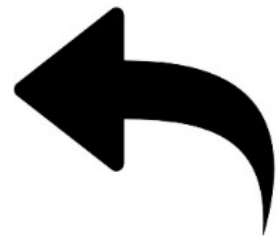
PROJECT GOAL



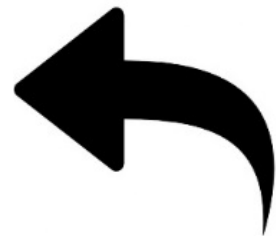
Compute economical results along life cycle



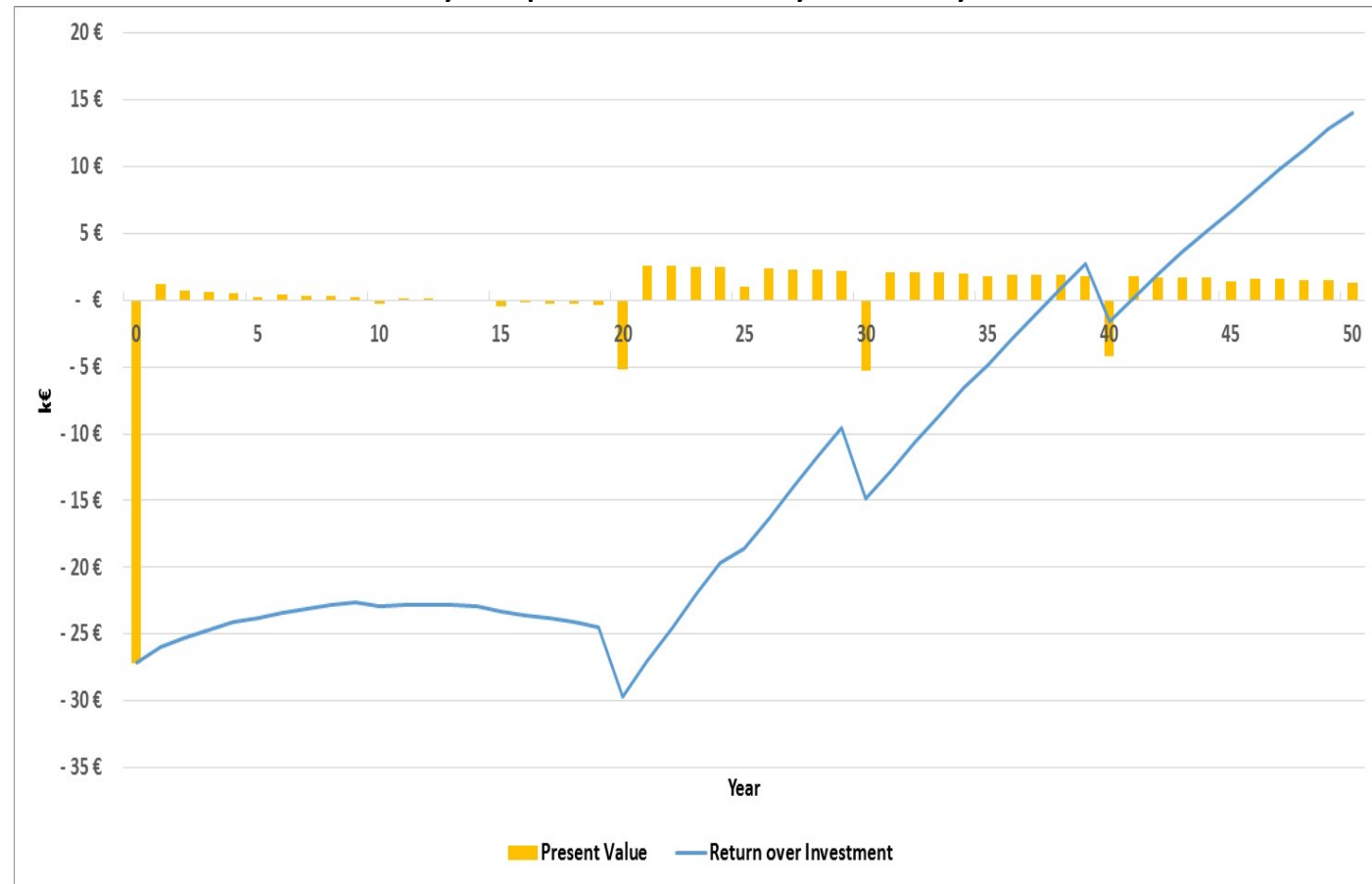
Tool
economical specifications



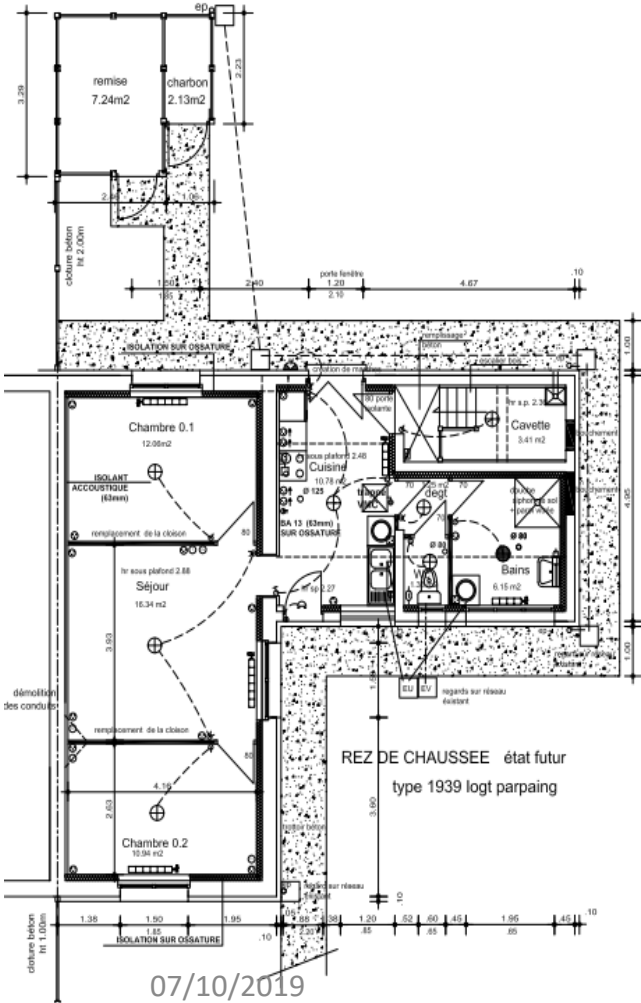
Sensitivity analysis



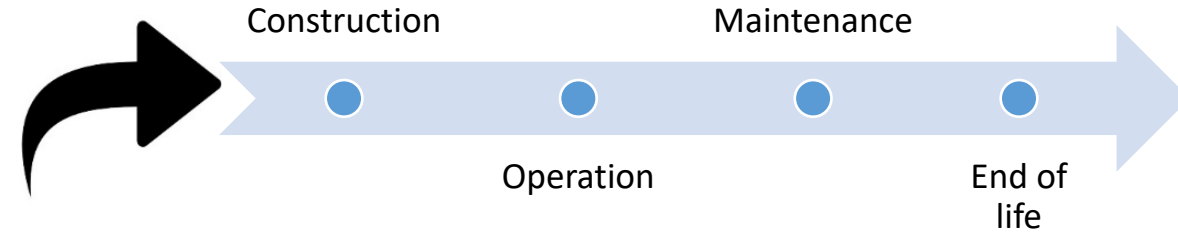
Life cycle period of analysis : 50 years



THE CASE STUDY & WLC PARAMETERS



~59 m²




International Organization for Standardization
ISO 15686-5

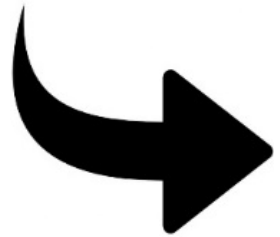
Bâtir ensemble l'avenir de nos cités



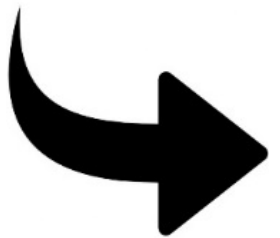
$$X_{NPV} = \sum_{n=1}^p \frac{C_n}{(1+d)^n}$$

Reference year : 2016

PROJECT WLC PARAMETERS



Real Value or Nominal Value



Discount Rate :

Replacements



Maintenances



Property tax



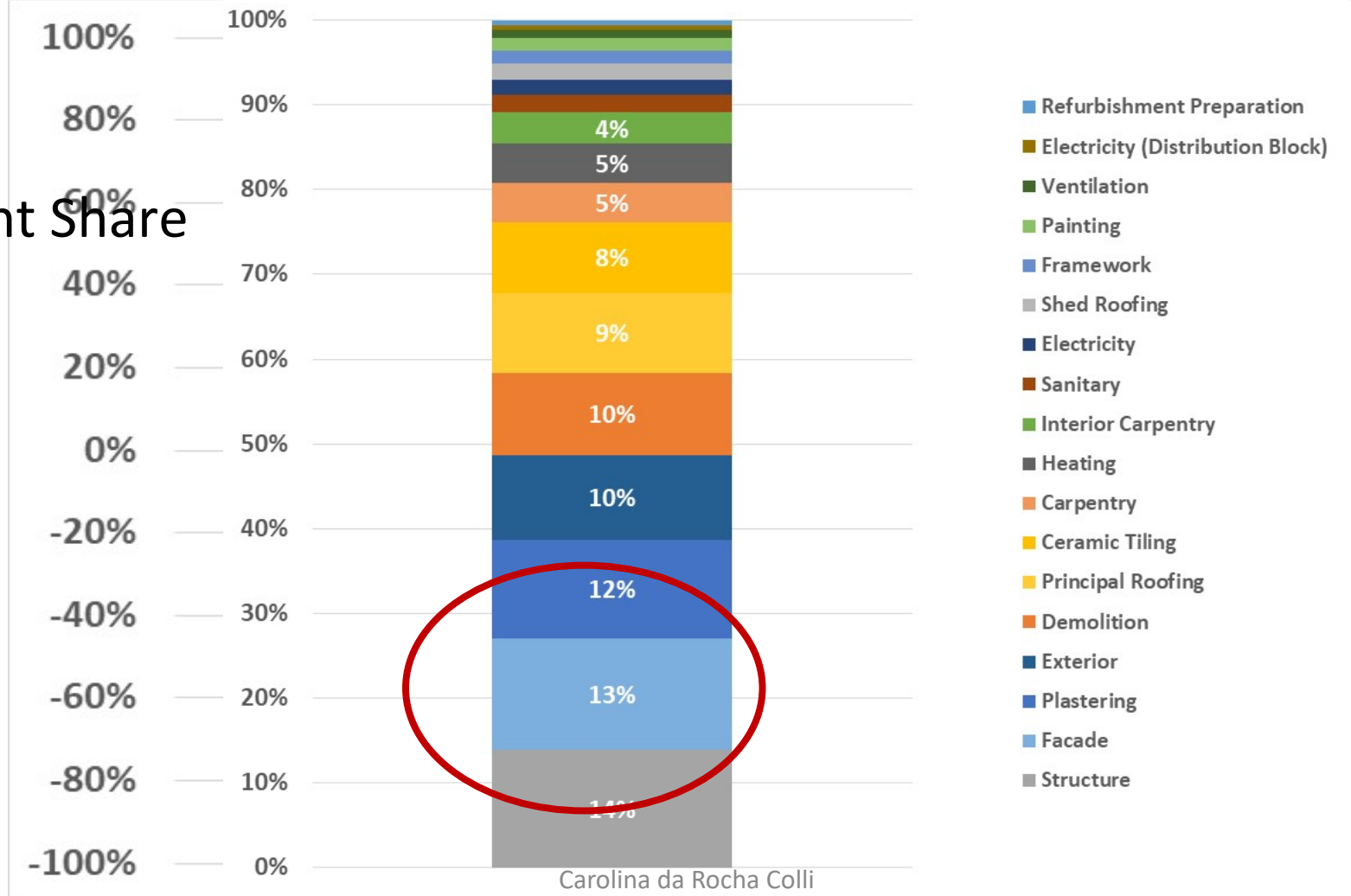
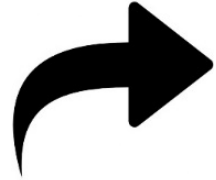
Rent



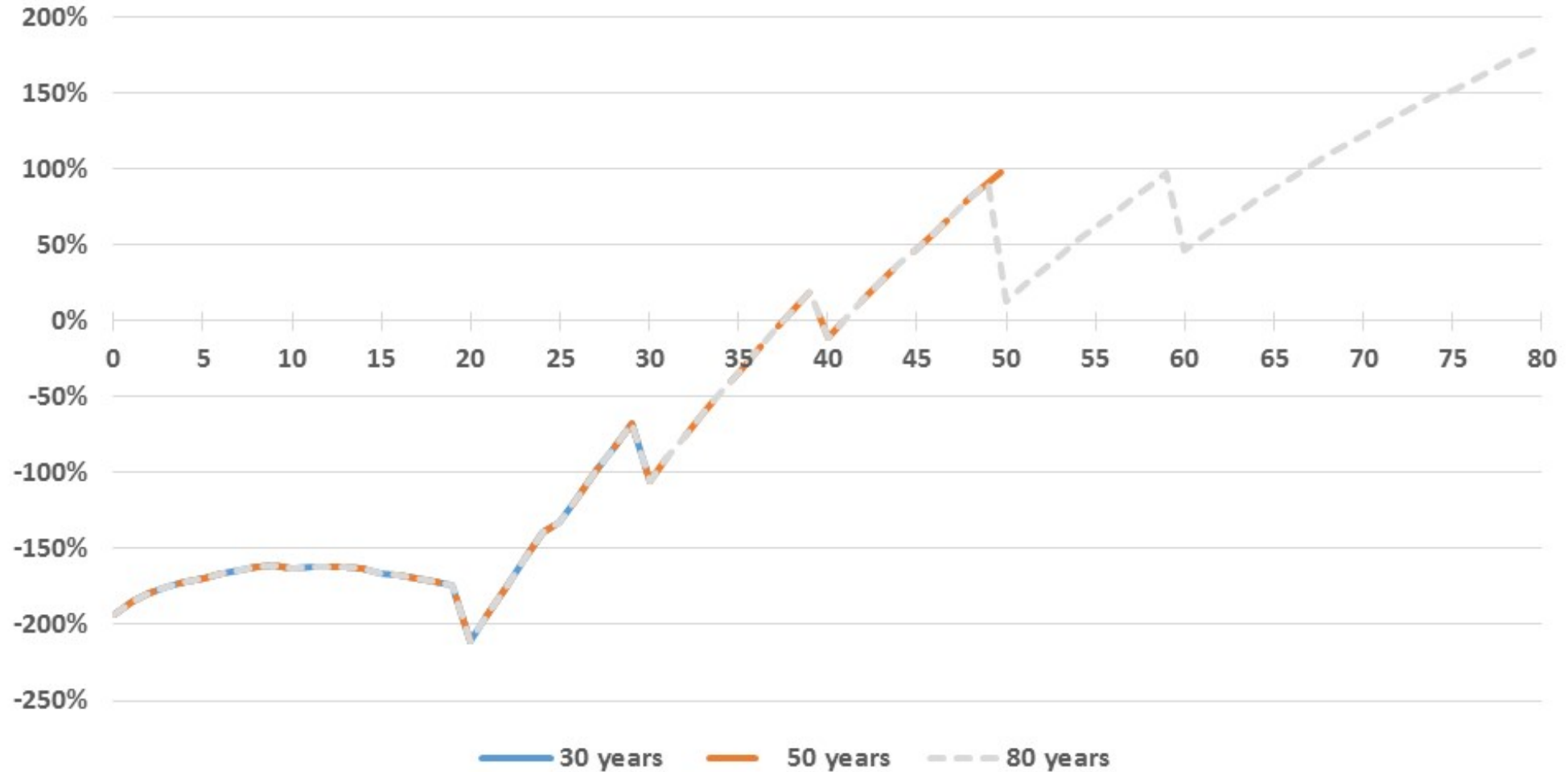
RELATIVE NET PRESENT VALUE



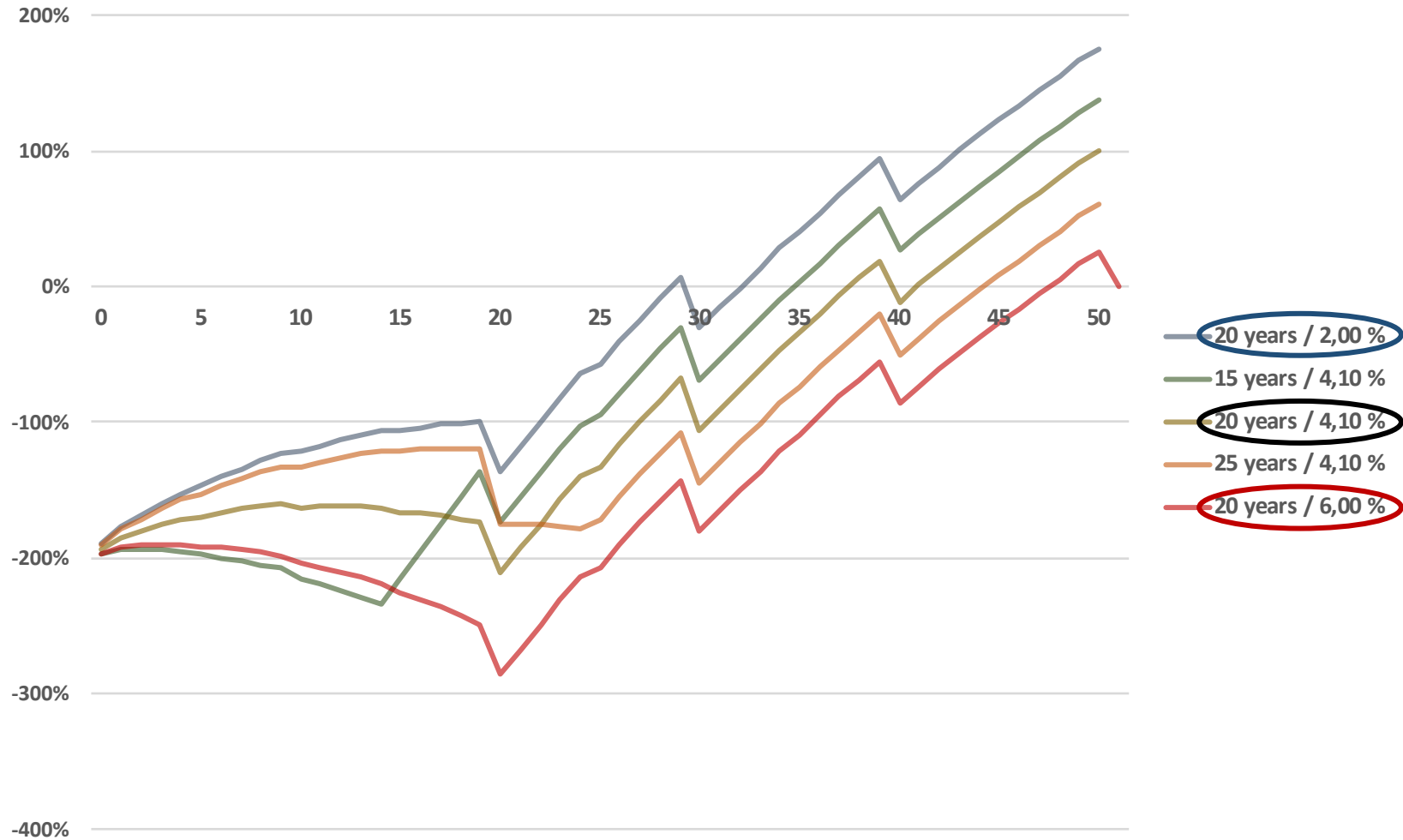
Initial Investment Share



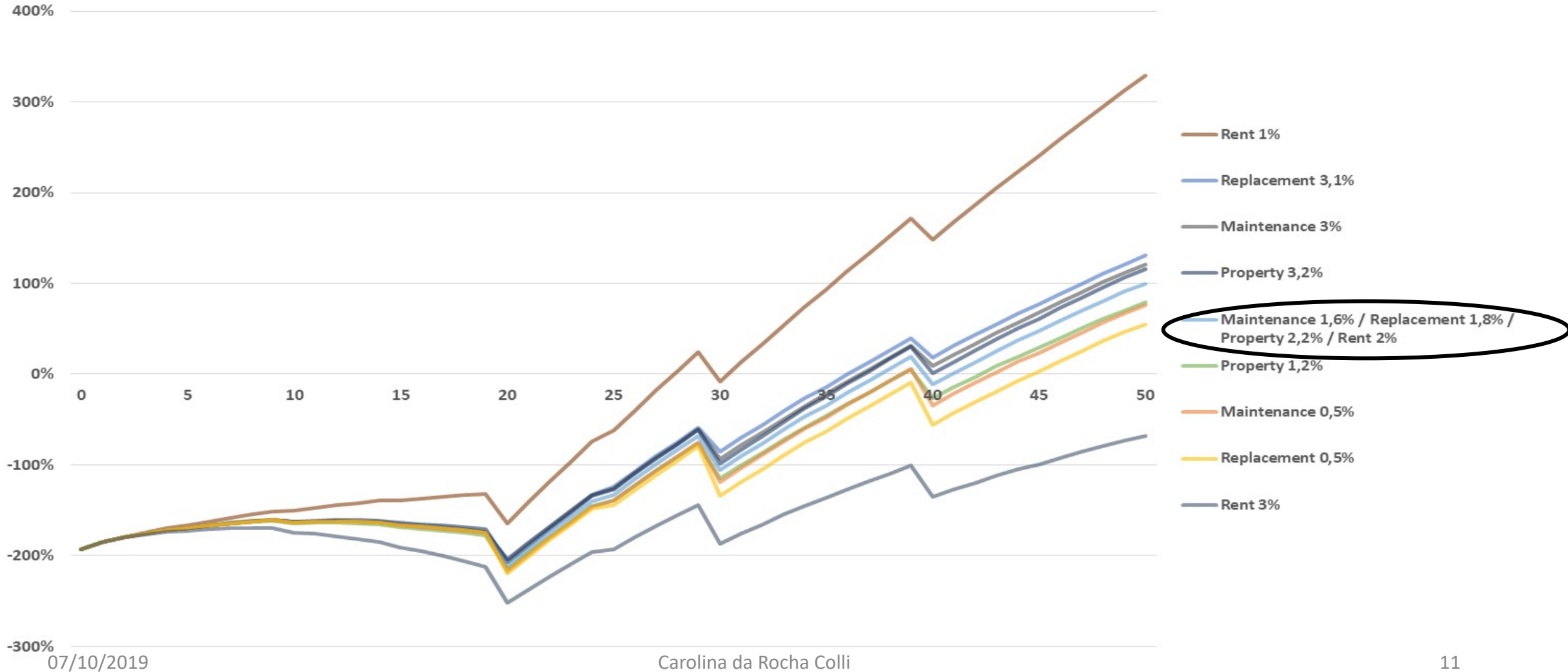
SENSITIVITY: PERIOD OF ANALYSIS



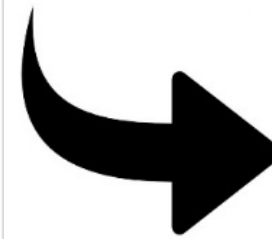
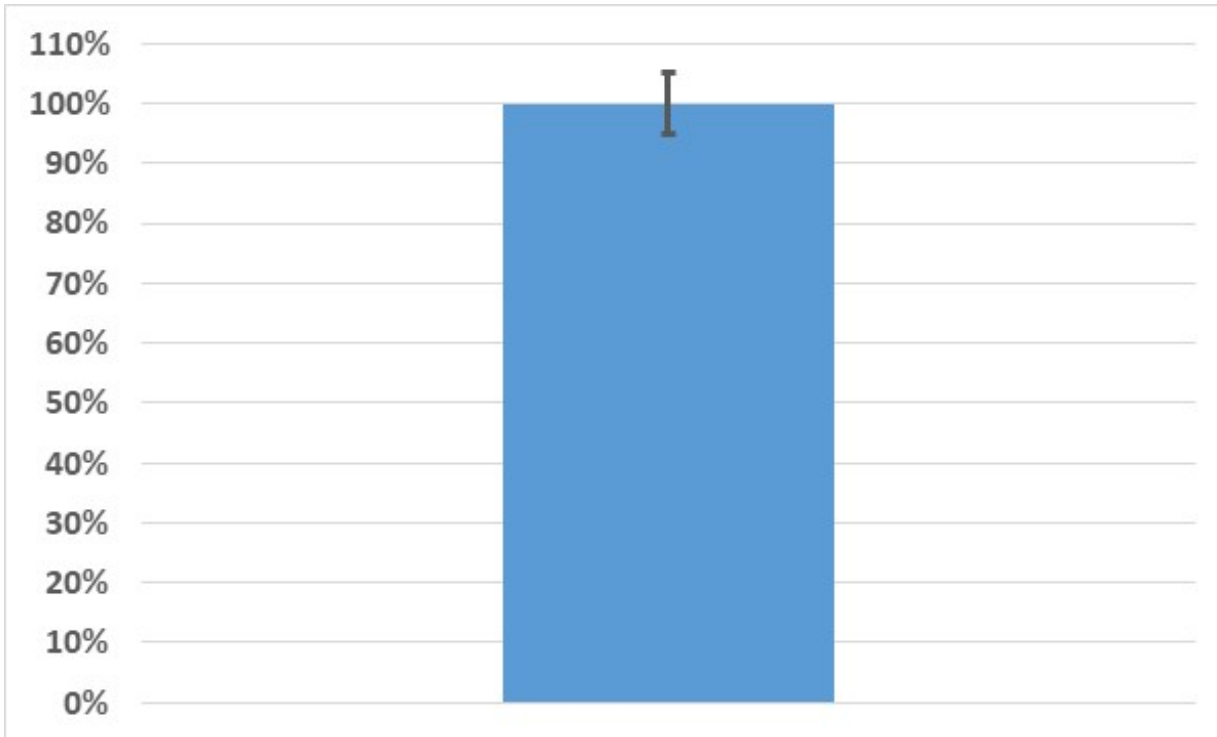
SENSITIVITY: LOAN PERIOD & LOAN RATE



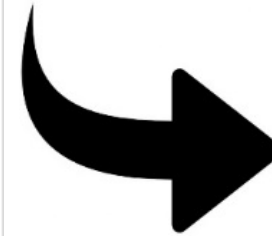
SENSITIVITY: OTHER RATES



SENSITIVITY: UNPAID RATE AND VACANCY RATE



VARIATION DUE TO +/- 0,5% ON RATES
ARE +/- 5% ON NET PRESENT VALUE



THERE IS A LITTLE DIFFERENCE IN PAYBACK
TIME (LESS THAN 1 YR)

CONCLUSIONS



Hotspots

- ✓ Refurbishment Investment
 - Structure
 - Façade
 - Plastering
 - Exterior
 - Demolition
- ✓ Rent
- ✓ Replacements and Property Tax

Sensitivity Results

- ✓ Best Period of Analysis : 80 years
- ✓ Loan discount rate decrease by 2% achieves 180% of reference NPV
- ✓ Most important NPV variation due to rent rates

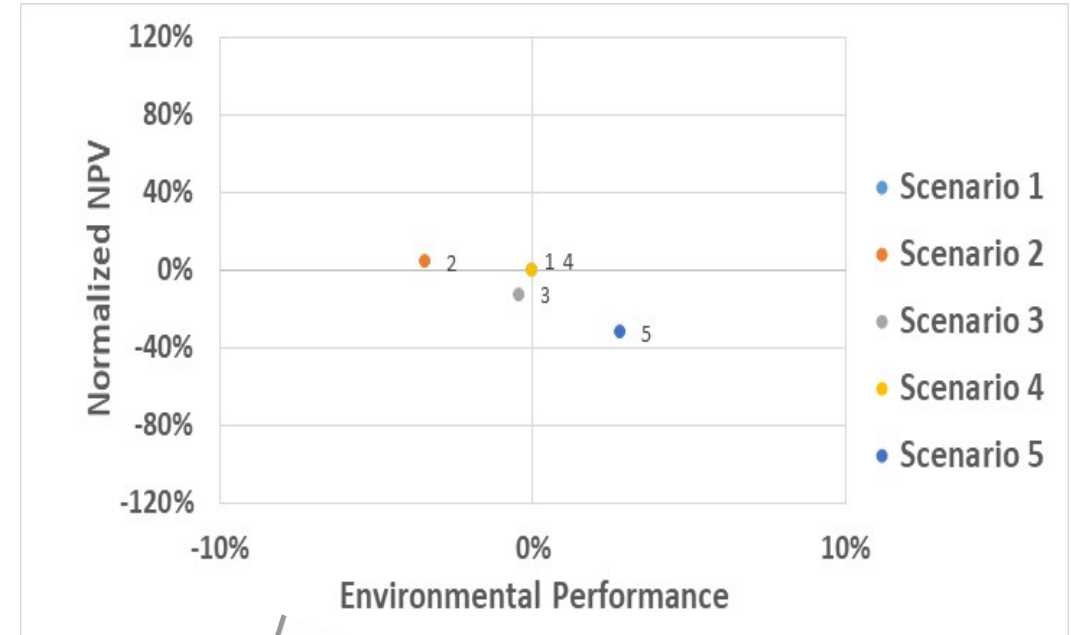
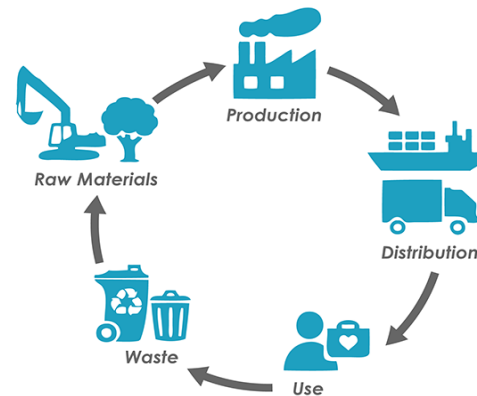
PERSPECTIVES

First version of a simplified tool:

❑ LCA and WLC results crossed



❑ Eco-efficiency



Ready for the associated social landlord next November



THANK YOU!

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