



# The Seamless Cost Carbon Solution

Your fast portal to optimize building sustainability investments to achieve Paris Proof goals and ESG reporting.

# Seamless Cost Carbon Solution

## Delivering insights to achieve Paris Proof goals

With our Seamless Cost Carbon Solution, you gain insight into your roadmap and optimal solution to make your real estate Paris Proof.

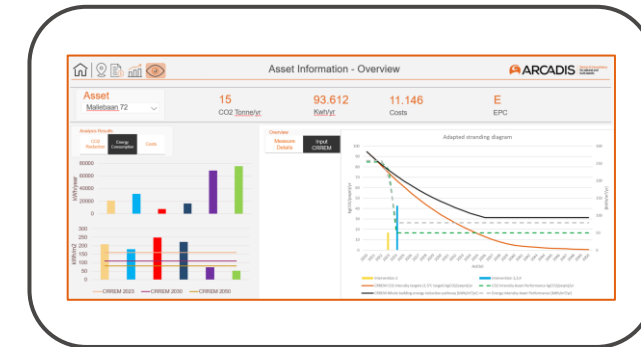
Our Seamless Cost Carbon Solution is based on an easy-to-use platform that gives confidence every step on the way. It comprises complete insights, analytics and strategic thinking, and gives you the tools to make your real estate sustainable, based on your objects, specific location and object characteristics and current energy consumption.

Our solution provides you with reliable, substantiated and object-specific outcomes, tailored to your real estate:

- ✓ Current theoretical energy consumption
- ✓ Optimal package of sustainability measures
- ✓ Required investment costs
- ✓ Future theoretical energy consumption
- ✓ Expected actual energy consumption
- ✓ Realizable energy and carbon reductions
- ✓ Expected payback time
- ✓ Align with TDD Capex

Our Seamless Cost Carbon Solution delivers you accountable and validated input for the sustainability section, ESG and CSRD reporting.

**Arcadis.** Improving quality of life.



### At the right time

- ✓ Your tool for decision-making and multi-year planning
- ✓ Aligned with your business operations, maintenance plan and, construction economic climate

### User-friendly

- ✓ Own control on sustainability
- ✓ Easy access to complex matter with reliable results
- ✓ Connectable with API

# The Seamless **Cost Carbon** Solution

## Structure of Measure Database

- We have different packages of measures
- Within the packages there are (a number) of subjects
- For each subject there is a number of measures
  - The exact number of measures is growing
- Each measure contains the following data
  - Construction costs
  - Replacements costs
  - Maintenance costs
  - Life span
  - Embodied emissions
  - Energetic parameters
- Every measure has a unique ID
- Pricing is depending on location and size.
- Calculations created in COSIS.
- Results of measures are affecting each other.

# Subject	Unit	Abbreviation	Package
1 Floors	BUA	F	
2 Facades	EWNA	G	
3 Facade openings	EWO	O	B
4 Roofs	NRA	D	
5 Roof openings	RO	R	
6 Infiltration	UA	K	
7 Solar control	EWO	S	S
8 Heating	kW	W	
9 Cooling	kW	C	I
10 Tap water	kW	T	
11 Ventilation	m3/h	V	V
12 Lighting	GEFA	L	L
13 PV	Wp	P	P
14 Solar water heater	Wp	Z	Z
15 Heat recovery showe	UA	H	H

# Carbon Footprint Calculation

**Energy Consumption** → Data delivered by Client/ FM/ Partners & Interviews with our experts

**Carbon Emission Factors** → Validated and official data gathered from our regional experts

**Market / Climate Data** → Official climate data / regional regulation data gathered from our regional experts

**Benchmarks** → Our central and our regional experts can deliver energy & carbon benchmarks from a variety of past projects for asset-types per country

**Building Characteristics** → Data delivered by Client / FM/ Partners like GFA, construction year, asset type, renewables, ..

## Data Accuracy

### Expert check & fill

We improve data accuracy & output by:

- Filling data gaps with energy data based on founded benchmarks per asset type per country if no asset data is available example: building-related electricity consumption for a warehouse in the Netherlands [kWh/m<sup>2</sup>a]
- Selecting the qualified & official carbon emission factors
- Defining climate zones to help cluster saving opportunities which differ for different climate zones

## Calculation

### Energy use & Carbon Footprint according to GHG Protocol

absolute kWh/yr  
specific kWh/m<sup>2</sup>/yr

absolute tCO<sub>2</sub>e/yr ; specific kgCO<sub>2</sub>e/yr

Total and specific energy data per asset for:

- Electricity
- Heating
- Cooling
- Renewables

#### SCOPE1

Direct emissions: consumption of fuels

#### SCOPE2

Indirect emissions (company-level): consumption of delivered energy (electricity, district heating, etc)

#### SCOPE3

Emissions not in direct control of the reporting company: Tenant purchased consumption

## Analysis

### Analysis on Performance

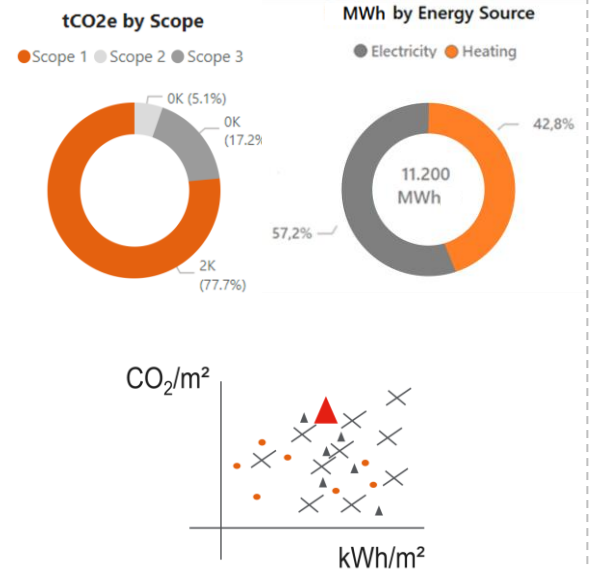
The gathered data will be analyzed on different levels to be able to gain insights on asset-level as well as on country level

- Getting the portfolio benchmarks
- Comparison of each asset to the asset-type specific benchmarks and regulations
- Comparison of country regulations to the carbon footprint of the portfolio
- CRREM-analysis incl. stranded risks regarding the Paris' temperature targets
- Build clusters & archetypes to identify possible saving opportunities and strategies as well as best-practice measures

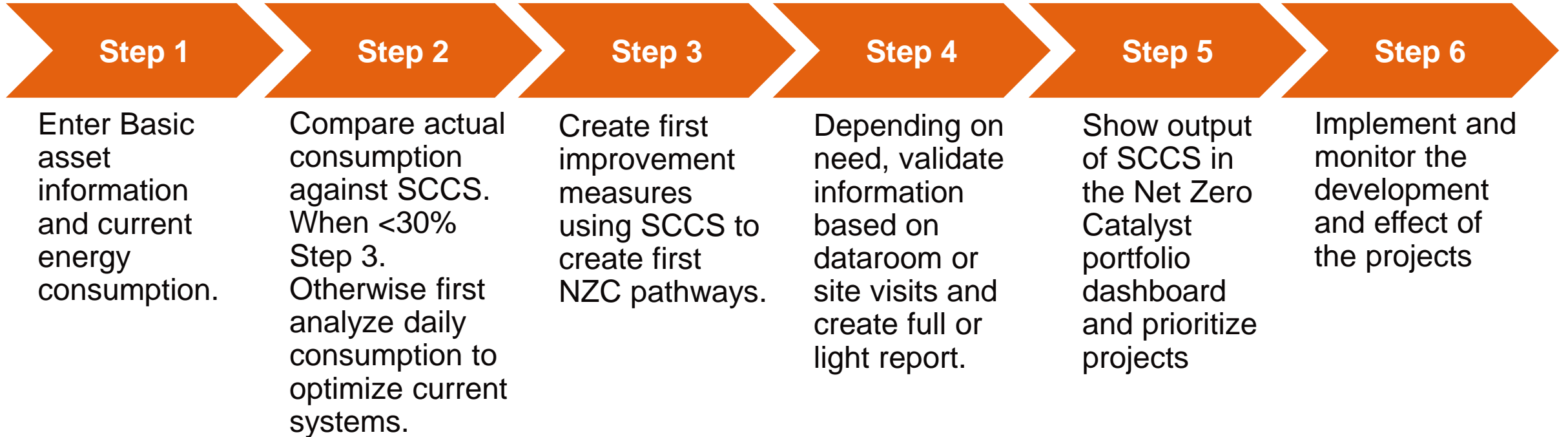
## Visualisation

The results of calculations and the analysis will be visualised in the **interactive dashboard**

Next to easy and comprehensible graphs and diagrams, the dashboard gives the great possibility to filter all results according to the required level: Asset / Asset type / Country / JV Partner / Phase / Scope / Energy performance / ...



# End-to-End Real Estate Decarbonisation



Seamless  
Cost  
Carbon  
Solution

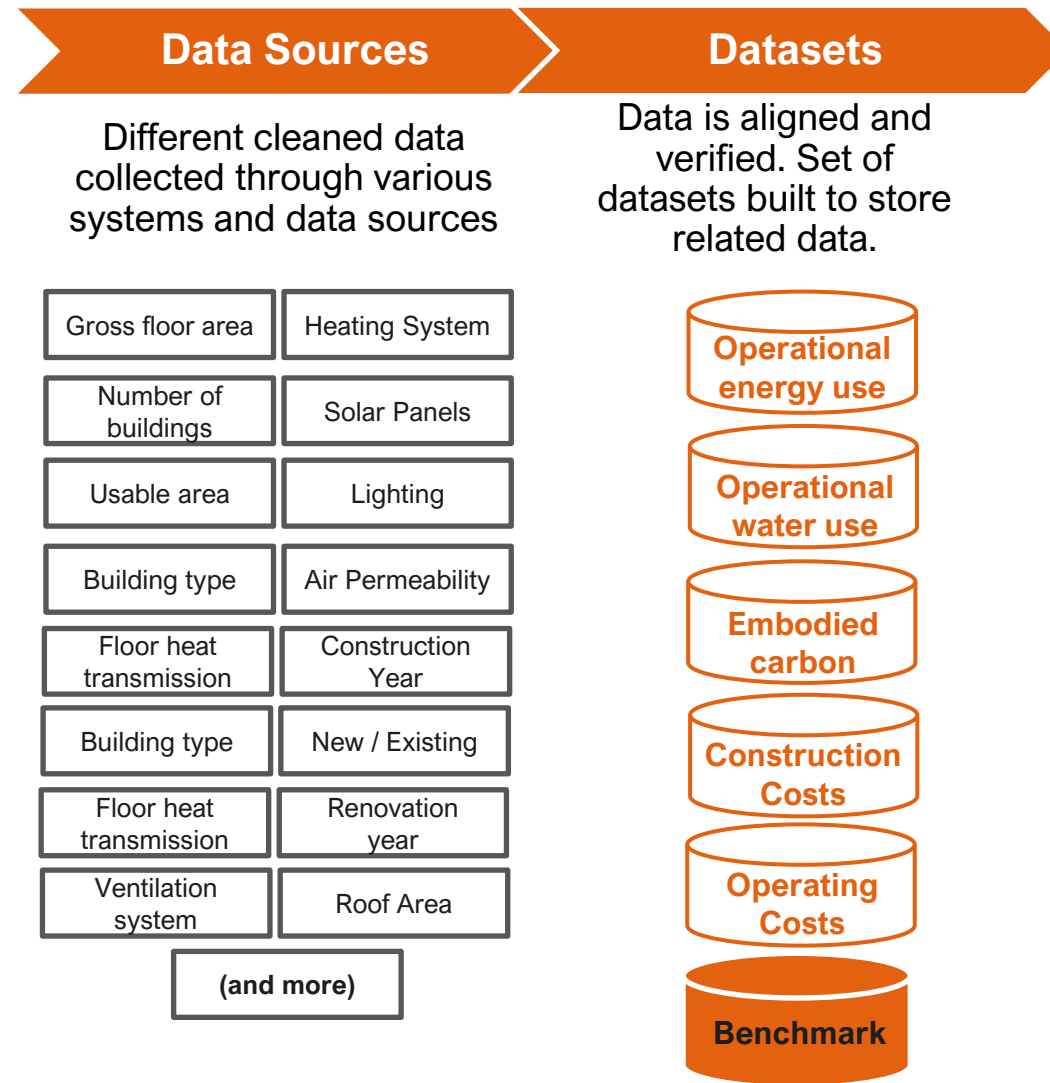
**Net Zero Catalyst**  
Smart Arcadis Solutions

# Options for NZC Audit

NZC Report	Ultra light	Light	Full	Description
Executive Summary		X	X	General summary
Asset Summary		X	X	Asset summary
Current situation description			X	Evaluation of all building components mentioning quality etc. Desktop (TDD review) or site visit
Evaluation of EPC		X	X	Evaluation of the current EPC label when applicable
Evaluation of CRREM	X	X	X	Evaluation based on yearly energy consumption
Evaluation of electricity consumption			X	Evaluation based on daily energy consumption
Evaluation of heating consumption			X	Evaluation based on daily energy consumption
Summary of improvement measures		X	X	Description of possible measures
Energy saving measures			X	Full description of possible measures, effect of each measure.
Proposed Capex measures	X	X	X	Table with possible measures
Net zero potential roadmap			X	Graph covering the implementation of the selected option
Conclusion and next steps			X	Conclusion if NZC is feasible and how

# Information needed

	Mandatory	"nice to have"	Desktop / site visit
Location	x		Desktop
Construction year	x		Desktop
Building type	x		Desktop
Gross floor area	x		Desktop
Usage hours		x	
Build up area		x	Desktop
Roof area		x	Desktop
Facade area		x	Desktop
Open facade area		x	Desktop
Open roof area		x	Desktop
Electricity consumption (yearly)		x	Desktop for CRREM analyses
Gas consumption (yearly)		x	Desktop for CRREM analyses
Heatnet consumption (yearly)		x	Desktop for CRREM analyses
Electricity consumption (daily)		x	Desktop, for full report
Gas consumption (daily)		x	Desktop, for full report
Heatnet consumption (daily)		x	Desktop, for full report
Facade insulation rate		x	Desktop, when full report site visit
Roof insulation rate		x	Desktop, when full report site visit
Window/glass insulation rate		x	Desktop, when full report site visit
Suncreens yes/no		x	Desktop, when full report site visit
Heating system		x	Desktop, when full report site visit
Cooling system		x	Desktop, when full report site visit
Ventilation system		x	Desktop, when full report site visit
Lighting type		x	Desktop, when full report site visit
PV cells		x	Desktop, when full report site visit



# Net zero Carbon report “ultra light”

45055 sqm		CAPEX	TDD Capex	kWh/m2	Kwh %			Estimated CO2 reduction			Savings Kwh			Estimated Costs			Financial KPIs			Recommended Timing		EPC	
					Gas	Heat	Electricity	(tonne)/yr	kgCO2/psqm/yr	(% of total)/yr	(Kwh)/yr	(Kwh/psq/yr)	(% of total)/yr	Est. Total €	€ psqm GFA Property	Savings (€) yr	Cost to Carbon Saving Ratio (€/tCO2e-yr)	Cost to Energy Saving Ratio (€/tCO2e-yr)	Simple Payback	Timeframe	*Optimal Year of Intervention		
Current situation	Base case taking into account the current construction and system of the building	€		123,28	0,0%	45,4%	54,6%	407,86	9,05		5.554.317												C
Led lights	Adding LED lights to the whole building	€ 491.400		77,40	0,0%	67,1%	32,9%	170,32	3,78	42%	2.066.963	45,88	37%	€ 491.400	€ 10,91	411.501,64	€ 2.885	€ 2.416	1	Short Term	2024	B	
LED incl motion detect	Adding LED lights with motion detection to the whole building	€ 529.200		74,94	0,0%	69,3%	30,7%	179,93	3,99	44%	2.177.701	48,33	39%	€ 529.200	€ 11,75	435.728,70	€ 2.941	€ 2.422	1	Short Term	2023	B	
LED incl motion detect + PV	Adding LED lights with motion detection to the whole building. + Adding PV Panels to 10% of the roof	€ 1.839.600		45,20	0,0%	98,0%	2,0%	289,58	6,43	71%	3.517.781	78,08	63%	€ 1.839.600	€ 40,83	710.757,26	€ 6.353	€ 2.454	3	Short Term	2028	A2010	
Heat recovery AHU	Replace the Air Handling unit for a new version with heat recovery.	€ 1.436.400		119,66	0,0%	41,9%	58,1%	7,88	0,17	2%	163.089	3,62	3%	€ 1.436.400	€ 31,88	7.223,14	€ 182.284	€ 917	199	Long Term	2028	C	
PV Panels 10%	Adding PV Panels to 10% of the roof	€ 1.297.800		93,54	0,0%	56,7%	43,3%	109,64	2,43	27%	1.340.080	29,74	24%	€ 1.297.800	€ 28,80	262.976,47	€ 11.837	€ 2.399	5	Mid Term	2024	B	
Roof new RC8	Create a new layer of roof with an insulation rate of RC8	€ 4.926.600		111,97	0,0%	37,8%	62,2%	29,31	0,65	7%	509.378	11,31	9%	€ 4.926.600	€ 109,35	43.845,52	€ 168.086	€ 1.496	112	Short Term	2024	C	
LED+PV	Adding LED lights to the whole building + Adding PV Panels to 10% of the roof	€ 1.789.200		47,66	0,0%	94,1%	5,9%	279,96	6,21	69%	3.407.043	75,62	61%	€ 1.789.200	€ 39,71	674.478,10	€ 6.391	€ 2.409	3	Short Term	2024	A2010	
Roof new + LED + PV + Heat recovery	Create a new layer of roof with an insulation rate of RC8 + Adding LED lights with motion detection to the whole building. + Adding PV Panels to 10% of the roof + Replace the Air Handling unit for a new version with heat recovery.	€ 8.215.200		30,14	0,0%	94,2%	5,8%	327,12	7,26	80%	4.196.315	93,14	76%	€ 8.215.200	€ 182,34	750.864,31	€ 25.114	€ 2.295	11	Long Term	2028	A2020	



# Net zero Carbon report “light”

## Contents

Version Control.....	ii
Contents .....	iii
1 Executive Summary.....	4
2 Asset Summary and Data Inputs .....	5
3 Assessment.....	6
3.1 Evaluation of EPC .....	6
3.2 Evaluation of CRREM .....	7
3.2.1 Decarbonisation Pathway 1.5°C – As-Is .....	7
3.2.2 Energy Use Intensity Pathway 1.5°C – As-Is.....	7
3.2.3 Decarbonisation Pathway 1.5°C – Post-Measures (Scenario 1) .....	8
3.2.4 Energy Use Intensity Pathway 1.5°C – Post-Measures (Scenario 1).....	8
3.3 Summary of Improvement Measures.....	9
4 Analysis Approach .....	10
5 Proposed CAPEX Measures .....	11

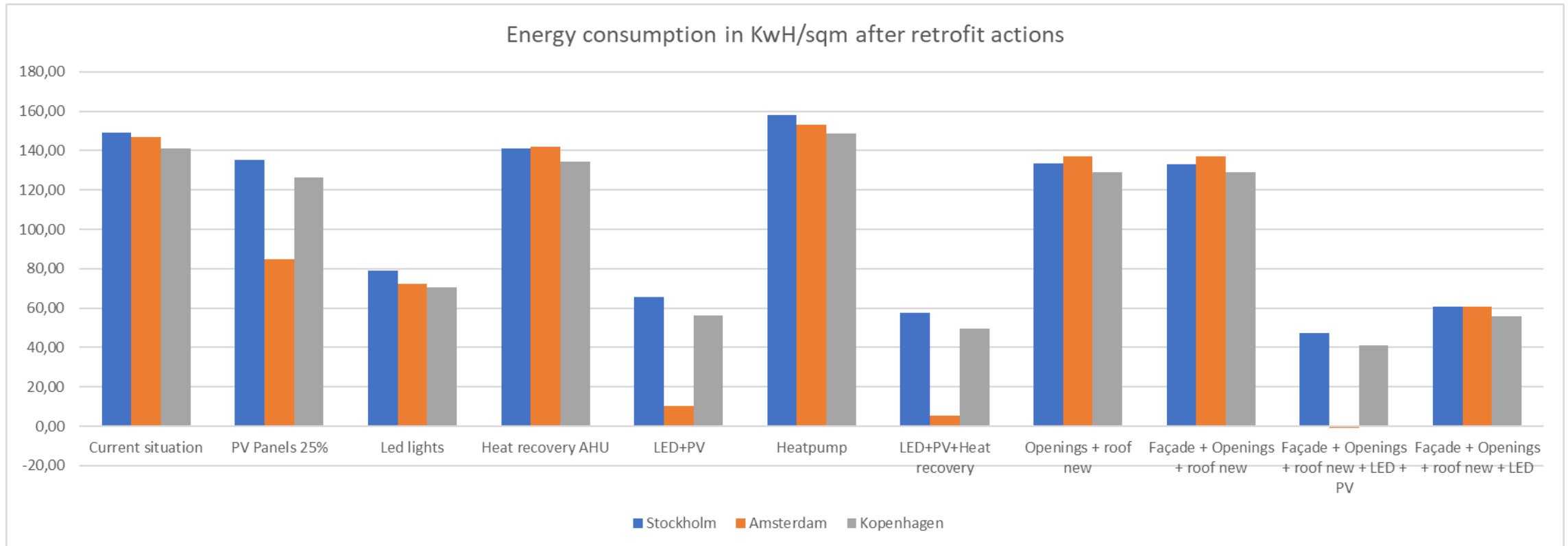
## 1 Executive Summary

Key Findings	
<b>Energy Intensity</b>	XXX kWh/m <sup>2</sup> /yr <span style="color: red;">■</span> (Insert comment on benchmarking if applicable)
<b>Carbon Emissions</b>	XXX kg/CO <sub>2</sub> e <span style="color: green;">■</span> (Insert comment on benchmarking if applicable)
<b>EPC</b>	A (12) expiring XXXXX. If the asset was to be assessed as it stands today, we predict that it would achieve a rating of B (43) which is the base case in our assessment.
<b>CRREM</b>	<i>Emissions: stranding year 2022</i> <i>Energy: stranding year 2022</i>
<b>Capex</b>	Capex to achieve Minimum Energy Efficiency Standards (MEES) for EPC: £100,000 (£50,000 for lighting replacement already included in TDD).  Capex to further improve overall energy and carbon performance and defer carbon stranding: £100,000  Total capex of £200,000, however the TDD report has already made allowance of £50,000 for comparable lifecycle upgrades, therefore net EPC, carbon & CRREM capex £150,000 is required.
<b>Summary</b>	We have applied the following measures to seek achievement of further carbon savings, seeking the most optimal measures with acknowledgement to the capex accounted for in the TDD report: <ul style="list-style-type: none"> <li>• Upgrade single-glazed windows to double-glazed where not currently present.</li> <li>• Conduct an air tightness test to identify areas of leakage and apply draught proofing measures e.g. sealing gaps through caulking, weather stripping.</li> <li>• Conduct a thermal imaging test to identify areas where thermal bridging occurs and apply minor insulation improvements e.g. implementing thermal breaks.</li> <li>• Replace 25% of existing lighting to new LED, including lighting controls such as presence sensors / daylight linked dimming.</li> <li>• Replace gas-fired domestic hot water (DHW) system with heat pumps.</li> </ul>

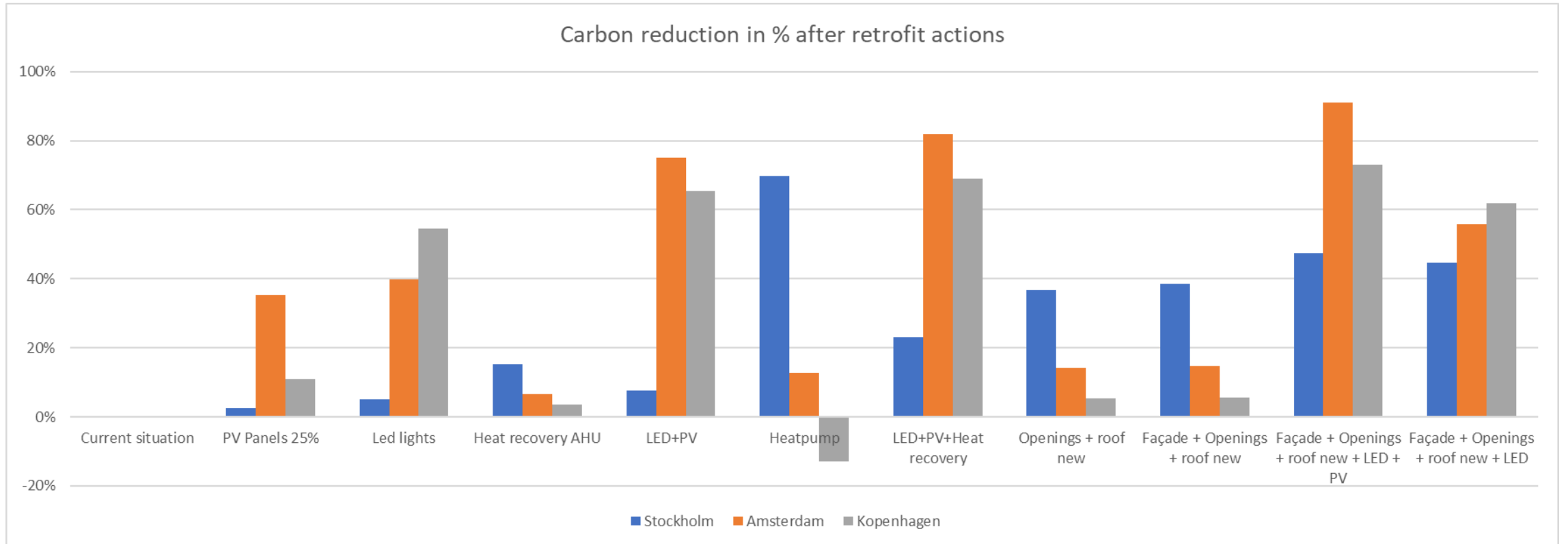


# Local effects

# Energy consumption from country to country



# Carbon reduction from country to country



# Contact us



**Jeroen Hartman**

Sustainable Investment Manager  
Product Owner, SCCS

[Jeroen.Hartman@arcadis.com](mailto:Jeroen.Hartman@arcadis.com)



**Ted Peek**

Commercial & Innovation Manager

[Ted.Peek@arcadis.com](mailto:Ted.Peek@arcadis.com)

# Thank you

Arcadis. Improving quality of life.