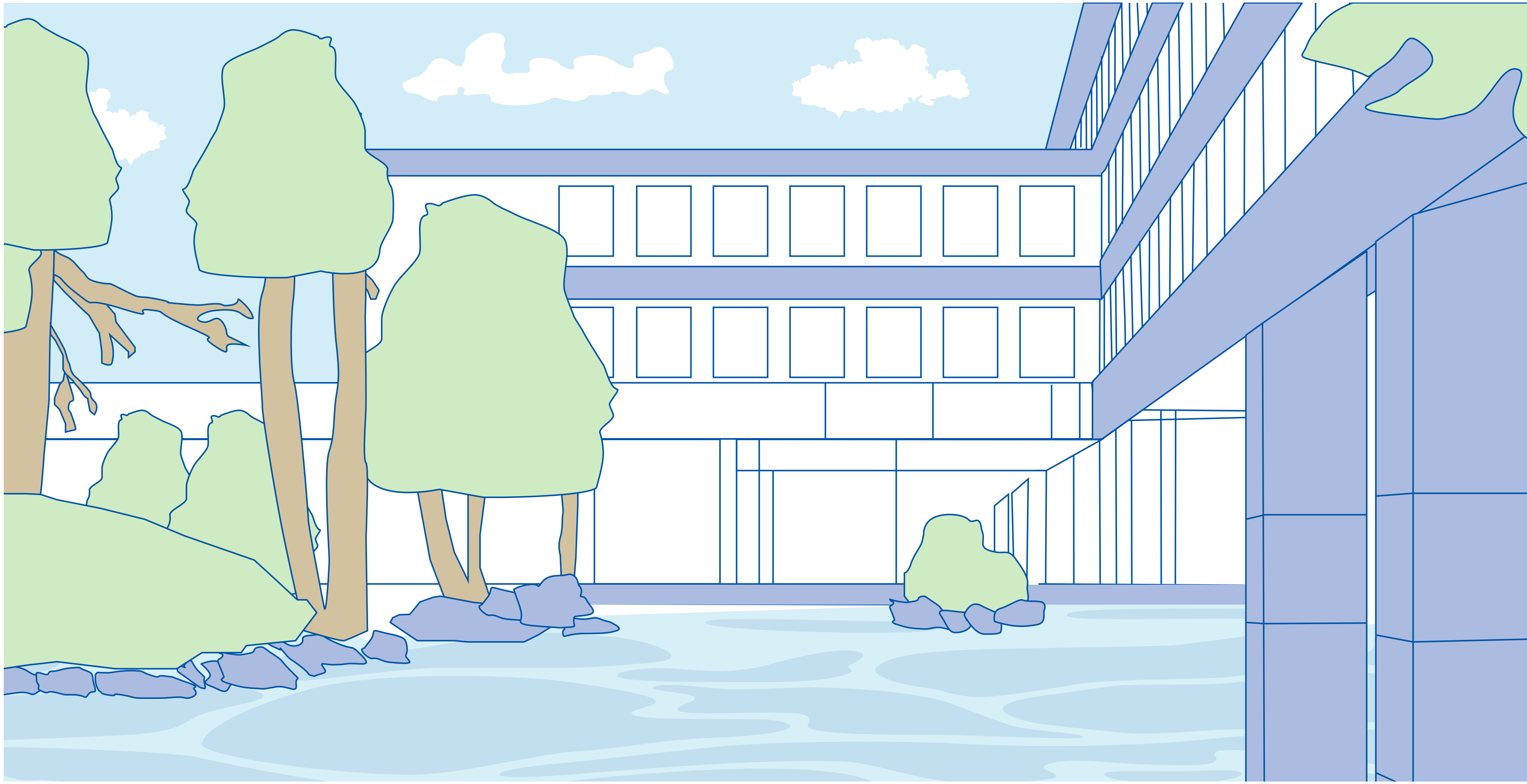
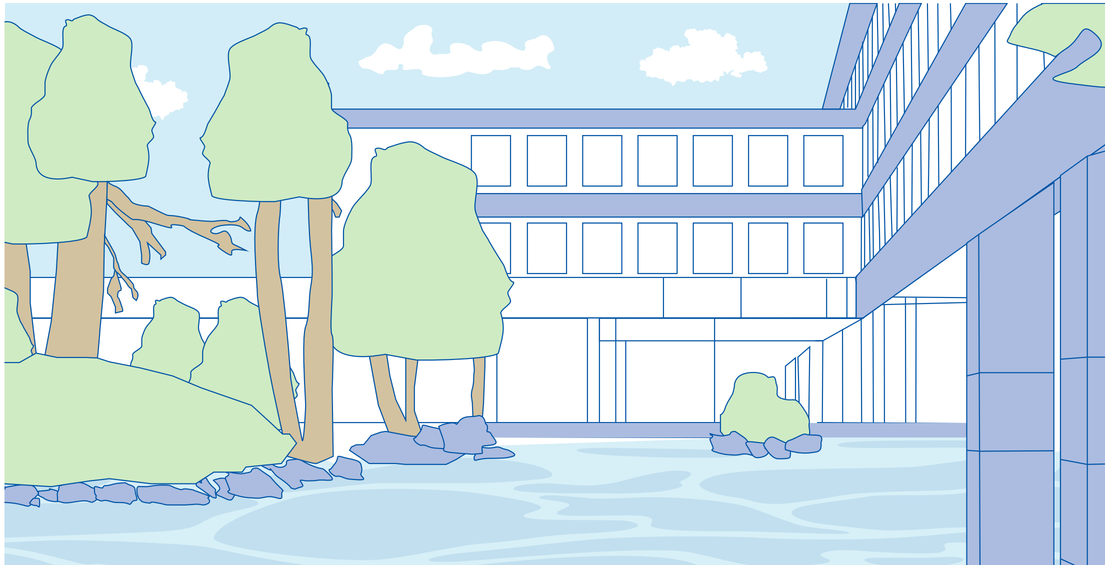


Integrating environmental considerations in real estate underwriting

Phase 2: Assessing impacts on value and returns

Professional Standards Paper

Contents



Key highlights

- This paper investigates, for a limited number of assets, whether there was an identifiable relationship between specific environmental data inputs and financial outcomes using a standard DCF methodology, and if there were any broader implications
- Among the tested factors, energy efficiency showed the clearest payback effects. Changes in asset value as a result of investment programmes reflected a combination of environmental assumptions and broader market dynamics, making it difficult to isolate value shifts to environmental interventions alone
- Gaps in ESG data and limitations in assumptions regarding factors such as yield movements and Opex savings were primary constraints; separating environmental Capex proved challenging, as many upgrades serve multiple purposes
- Five principles were identified: engaging valuers on key environmental factors, estimating sustainability-linked Capex and assessing payback, defining testing scenarios, prioritising interventions to mitigate ESG risks, and enhancing transparency of assumptions.
- More consistent definitions, better data collection and exchange, and greater transparency around assumptions can be promoted by strengthening the collaboration between investors, managers, and valuers

Introduction

Environmental factors are receiving more attention in real estate investment underwriting as they start influencing pricing, bid levels, and business plans. Yet, industry practice is fragmented, with wide variation in how these factors are evaluated and applied. Regulatory pressures and evolving reporting requirements are increasing the need for consistency, making it a higher priority for investment managers. Clear evidence of the direct impact of environmental interventions on value remains limited, with few comparable transactions or observed pricing outcomes.

The depth and precision to which this type of investment analysis is performed vary depending on the overall investment strategy (eg buy-and-hold, build-to-sell) and may also be influenced by project timelines.

Earlier this year, INREV launched an industry initiative to examine how environmental factors are reflected in investment decisions, with the aim of promoting a more consistent approach that enhances transparency and comparability for investors in non-listed real estate.

Phase I of this project, published in April 2025, identified six environmental factors as most relevant for real estate underwriting: energy consumption, energy ratings, GHG emissions, stranded / misaligned (climate transition) year, physical climate risks, and building certifications.

It also highlighted ongoing challenges such as data gaps, inconsistent measurement methods, and a lack of clarity on what qualifies as environmental Capex.

Phase II builds on these findings through a quantitative testing of real-life cases to illustrate practical underwriting: what environmental data and assumptions are required, what influences payback, and which interventions can materially impact value across multiple scenarios. The approach taken was intentionally simple and used a flexible framework that does not depend on advanced software or complex modelling tools.

The objective was to show, step by step, how environmental data can be integrated into underwriting. First, by taking a specific set of environmental factors from the INREV ESG SDDS and applying it to underwriting through a simple, adaptable DCF model. Second, by testing the impact of these factors on asset management decisions.

> INREV's Sustainability module offers guidance on how to define and integrate ESG goals into real estate vehicle strategies. It links these goals directly to the Property Valuations and Reporting Guidelines, ensuring that environmental data is consistently considered in valuation outcomes and reported transparently to investors.

While underwriting in practice is more complex, this simplified approach addresses the industry's demand for clearer quantification and transparency around how environmental factors may affect value and performance. Still, adding environmental inputs to a DCF methodology does not solve the underlying structural issues: data gaps, inconsistent methods, varying ESG regulations across countries, and unclear investment needs for environmental upgrades. This work should be seen as a step toward more transparent, evidence-based underwriting, rather than a complete solution.

Who should consider this paper?

This paper is intended for investors, investment managers, and valuation professionals who seek insights into how environmental factors can be integrated into underwriting.

As the real estate industry is currently at different levels of maturity in incorporating environmental considerations into valuation and underwriting practices[1], this paper helps by outlining how such analysis can be applied and the data it requires.

The project is guided by a focus group of senior industry experts, including institutional investors, investment managers, valuers, and representatives from the advisory community. EY Luxembourg was appointed to support the project. Further details on the project and focus group are available on the INREV website.

1 See Appendix D for more information.

Description of the testing model, assumptions and scenarios

A DCF-based Excel model was developed to analyse the impact of environmental factors on operational metrics, projected values[2], and performance over a 10-year horizon.

Five case studies drawn from proprietary datasets, provided by contributing investment managers, were tested. The information, reflecting real Capex interventions across sectors, was received in non-standardised formats and included based on availability rather than predefined selection criteria.

The build-up of the DCF model comprises the following components (see Figure 1):

Inputs

Inputs mirrored the typical data required for the valuation of office, logistics, retail, and residential properties. These include tenant lists, current and projected vacancy rates, lettable areas, rents, Opex items, and exit yield assumptions reflecting growth expectations (ie the margin between exit yield and discount rate). A comprehensive list of inputs is provided in Appendix B.

Figure 1: Build-up of the DCF model

2 The focus has been on the investment value rather than the market value at a specific point in time. See Appendix A for definitions.

Scenario and pathway selection

The model incorporates two scenarios: "A. Do Nothing" and "B. Improvement".

Scenario "A. Do Nothing" assumes no defined environmental goals and no upgrades, with potential regulatory or operational risks. Scenario B considers three improvement pathways defined in Phase I paper ('1. Ambitious environmental goals', '2. Economically feasible environmental goals', '3. Compliance-only limited environmental goals'). These pathways reflect different levels of environmental intervention, from basic compliance to high-ambition sustainability strategies. Table 1 summarises their practical application.

Table 1 - Scenarios and pathways

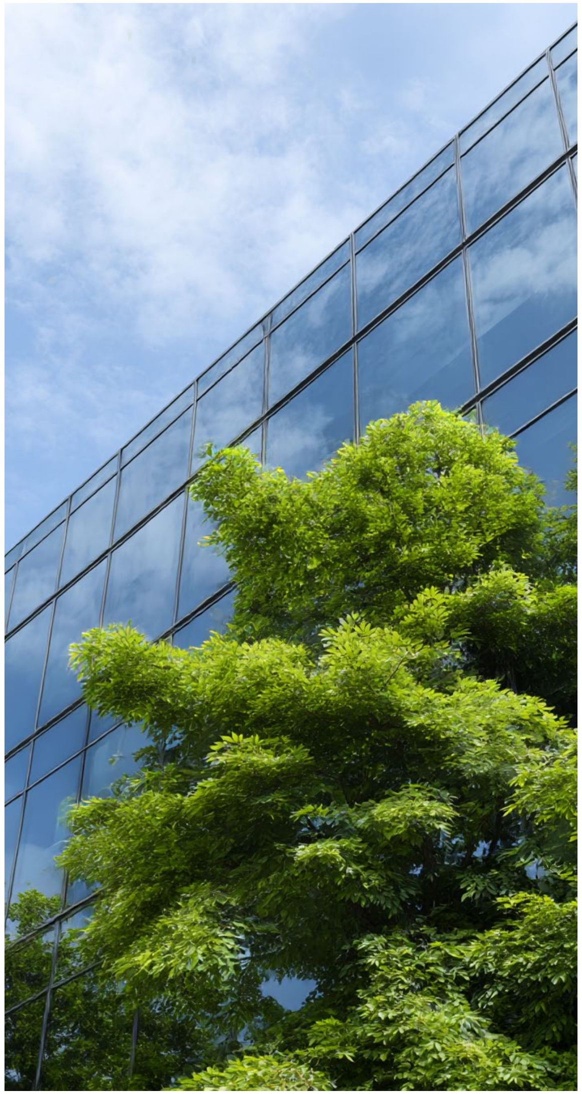
Scenario	Pathways	Practical application
Do nothing	**4.** No defined environmental goals	No sustainability-related upgrades or regulatory adjustments are planned. The aim is to maintain current operational and financial performance without pursuing environmental improvements.
Improvement	**3.** Compliance-only limited environmental goals	Capex is limited to meeting environmental compliance requirements in a specific jurisdiction. The aim is to keep the asset operational and avoid penalties through cost-effective environmental upgrades.
	2. Economically feasible environmental goals	Capex decisions follow standard project finance principles, using metrics like NOI change, payback period, and NPV. Pass/fail criteria (eg payback within lease term) apply. The aim is to maximise returns by pursuing only those environmental upgrades that are financially justified.
	1. Ambitious environmental goals	Capex is allocated to achieve best-in-class ESG standards, prioritising environmental ambition over short-term financial return. The aim is to attain the highest sustainability objectives (eg net zero) and future-proof the asset.

Approach to environmental assessment

The model was designed to capture inputs for the six environmental factors identified in Phase I, aligned with the INREV ESG SDDS framework. Of these, only energy consumption/intensity, energy ratings, and GHG emissions were tested using real data. The remaining factors (stranded / misaligned year, physical climate risks, and building certifications) could not be tested in this phase due to insufficient information provided by participating managers.

The model allowed for detailed specification of Capex plans and timing (from year 1 to year 10). All Capex was assumed to be tied to environmental objectives and categorised as:

- **Immediate Capex (within 12 months):** assumed to deliver earlier environmental improvements, potentially impacting asset valuation positively through compliance with future regulations, tenant demand and green premiums, but with the risk of missing future technology advances if implemented too early.
- **Deferred Capex:** assumed to preserve liquidity in the short term with the ability to adopt more advanced technology later, but with potential exposure to brown discounts, higher future retrofit costs, and regulatory risk.



The level of environmental Capex and its expected operational and financial impacts (eg rent increase, Opex decrease, vacancy reduction, yield compression) were taken from the case study information, where available. Where case studies had incomplete or unavailable data, assumptions were developed by the EY Luxembourg financial modelling team based on market research and professional judgement and applied across scenarios. These inputs were used to reconcile asset values before and after intervention.

Outputs

Outputs included the "as-is" or baseline valuation, the post-environmental investment valuation, and a summary table detailing the magnitude of impacts for underwriting under the selected scenario[3].

The model allowed to create additional scenarios, linked to the corresponding impacts and value changes in the "Scenario analysis".

Impact analysis

The final section of the model included an impact analysis table that consolidated all scenarios, enabling comparison with each other and with the baseline valuation.

3 See Appendix B for more information.

Investment analysis approach

One of the criteria to measure the financial feasibility of an investment is the payback period. For environmental-related investments, this metric is particularly important, as these improvements could be driven by regulatory requirements and fall outside traditional asset business planning.

Payback period

The payback period is the length of time required for an investment to recover its initial costs through accumulated savings or income (eg rent increase, Opex reduction). It is commonly used as an indicator of financial viability and for comparing alternative investment options.

Payback calculations typically ignore costs and benefits occurring after the payback point. Consequently, a shorter payback period does not necessarily indicate a superior long-term option.[4]

Scope of analysis

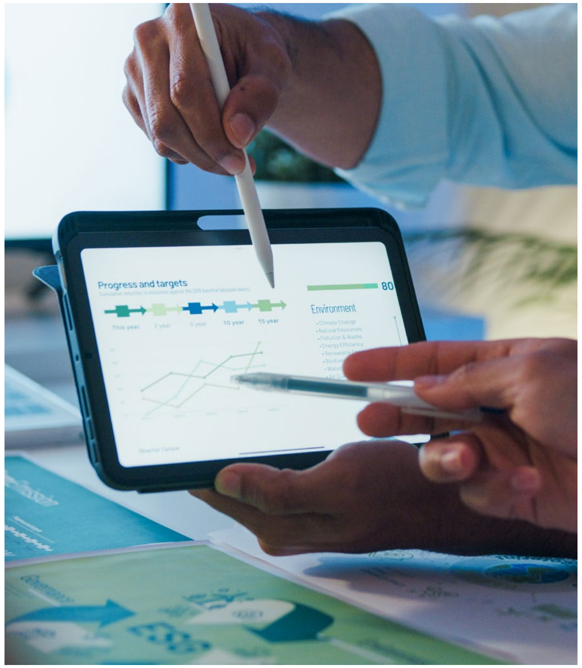
The analysis was conducted using information from the five case studies provided by investment managers. The first step consisted of calculating, based on available data, a simple payback from cashflows attributable to environmental interventions.

The analysis then extended to understanding how these investments influenced asset value. A backtesting exercise was conducted using the DCF method. The cases were linked to either Pathway 1 or 2, reflecting different investment objectives, payback timelines, and value outcomes.

While payback focuses on recovering costs through rental uplifts and operating expense reductions, valuation outcomes reflect broader market dynamics, investor sentiment, and external factors such as yield movements and economic conditions.

Important limitations:
This exercise was intended as an illustrative analysis to highlight practical observations. Findings should be viewed as indicative rather than definitive and should not be generalised beyond the specific scenarios and datasets used.

Information on Capex classifications, valuation methodologies, and comparable transactional evidence were not consistently available. Valuation inputs were limited, primarily to reported market values before and after Capex interventions. As a result, the observed value changes in these case studies cannot be



attributed solely to environmental upgrades, as they are also influenced by market conditions, asset-specific characteristics, timing effects, and broader economic context. For instance, during the analysis period, yield decompression and market cycle may have also materially affected valuation outcomes, independent of environmental interventions.

Further detail and an illustration of the scenario analysis for one of the assets can be found in Appendix C.

4 Two calculation methods are commonly recognised. Simple Payback (SPB) based on non-discounted future costs and savings, estimating the point at which cumulative savings exceed the initial investment; Discounted Payback (DPB) accounts for the time value of money by using discounted cash flows, providing a more accurate measure of when the present value of savings offsets the present value of the investment. Adapted from RICS. (2016). Life cycle costing and RICS. (2021). NRM-3 New rules of measurement, Why you should invest in making buildings smart | Journals | RICS

5 Pathway 4 (No environmental goals) served as the baseline, with no planned upgrades to meet future ESG regulations.

Observations	Findings: Key Results	Findings: Pathway considered
ASSET TYPE Office **LOCATION** Italy **ENVIRONMENTAL CONSIDERATION** € 13.7M invested to improve energy efficiency, refurbish the façade, and enhance wellbeing.	> Initial value: €40.9M (Apr 2022) > Capex: €13.7M over 29 months > Rental impact: From non-operational/fully vacant status (no rental income) to €2.0M current rent and €4.4M ERV level > Final value: €56.7M (Jun 2025)	**Pathway 2** Economically feasible environmental goals (focused on energy efficiency and rental uplift)

Case 1

An investment of €13.7M was made over 29 months to improve energy efficiency, refurbish the façade, incorporate wellbeing-oriented design, and create green outdoor spaces with ESG playing an important role in the investment strategy. The asset, built 15 years ago, was acquired vacant and non-operational, and the renovation aimed to reposition it as a Grade A office and future-proof performance. The asset's value increased from €40.9M (Apr 2022) to €56.7M (Jun 2025).

Payback

Expected to be achieved in approximately 4.3 years through rental cashflows (€13.7M Capex divided by the average ERV of €3.2M, calculated as €2.0M plus €4.4M divided by 2) and operating costs savings, assuming occupancy increases from current levels of 47% to 100% within 2-3 years.

Conclusion

The investment focused on upgrading the asset to Grade A standards and future-proofing it. While the value uplift likely reflects improved energy ratings and stronger market positioning, it may also depend on market-related factors. This case aligns with Pathway 2, as the upgrades prioritised energy efficiency and asset repositioning supported by clear economic rationale.

Limitations

Details such as the full valuation breakdown, the estimated rental value before renovation, and the yields applied in both valuation reports were not provided.

Observations	Findings: Key Results	Findings: Pathway considered
ASSET TYPE Logistics **LOCATION** France **ENVIRONMENTAL CONSIDERATION** €2.0M invested in environmental upgrades.	> Initial value: €40.9M (Mar 2024) > Capex: €2.0M over 14 months > Final value: €42.5M (Sep 2025) > Rental impact: +4% (€0.1M p.a.) > Energy impact: Gas ↓32% > Energy Performance Certificate (EPC) rating: Improved from C to B	**Pathway 1** Ambitious environmental goals (targeted higher energy label and reduction in gas usage).

Case 2

An investment of €2.0M was made over 14 months to implement environmental upgrades aimed at reducing gas consumption, in partnership with the tenant. The upgrades included the installation of a geothermal system and reflective painting on the roof and were driven by the goal of improving the ESG credentials of the asset. The works achieved an improved EPC rating from C to B, a 32% reduction in gas usage, and led to a 4% rental increase. The operating costs are borne by the tenant. The asset's value increased from €40.9M (Mar 2024) to €42.5M (Sep 2025).

Payback

Not achieved during the short-term. It would take 20 years to fully recover the investment through rental cashflows alone (€2.0M Capex divided by €0.1M annual rent).

Conclusion

The investment focused on improving the environmental credentials of the asset over the long term. While the value uplift may be influenced by improved energy ratings and stronger positioning, it cannot be attributed solely to the environmental upgrades and may also reflect broader market factors. The case appears to align more with Pathway 1, as the upgrades prioritised longer-term environmental ambition rather than immediate financial returns.

Limitations

A detailed breakdown of the environmental measures and corresponding financial effects was not provided.

Observations	Findings: Key Results	Findings: Pathway considered
ASSET TYPE Logistics **LOCATION** Poland **ENVIRONMENTAL CONSIDERATION** €0.4M invested to reduce energy consumption.	> Initial value: €60.7M (Sep 2024) > Capex: €0.4M (Sep 2024) > Final value: €60.7M (Sep 2025) > Rental impact: +3.2% (€0.1M p.a.) > Energy impact: Consumption ↓23%	**Pathway 2** Economically feasible environmental goals (focused on energy efficiency, reduced consumption and rental uplift).

Case 3

An investment of €0.4M was made over 5 months to improve energy efficiency and reduce consumption by 23%. The tenant agreed to a 3.2% rental increase following completion of the works. The rental increase was agreed based on Opex savings and energy efficiency improvements. The asset's value remained stable at €60.7M (Sep 2025).

Payback

Expected to be achieved in 4 years through rental cashflows (€0.4M Capex divided by €0.1M annual rent). This is driven by the tenant's agreement to increase rent following energy efficiency improvements.

Conclusion

The investment focused on delivering operational savings for the tenant in exchange for higher rental income. This case aligns with Pathway 2, as the upgrades focused on improving energy efficiency supported by clear economic rationale.

Limitations

Only limited valuation information was available, and no details were provided on the valuation assumptions used.

Observations	Findings: Key Results	Findings: Pathway considered
ASSET TYPE Residential **LOCATION** Netherlands **ENVIRONMENTAL CONSIDERATION** €10.8M invested in energy efficiency and sustainable refurbishment.	> Initial value: €43.0M (Q1 2024) > Capex: €10.8M (70% of €15.4M classified as genuine green Capex) > Final value: €63.8M (Q3 2025) > Rental impact: Contractual Rent +15.59% (€0.3M p.a.), Market Rent: +22.59% (€0.5M p.a.) > No change in occupancy > Exit yield: -1.34% > Discount rate: -0.26%	**Pathway 1** Ambitious environmental goals (deep retrofit and upgrading the quality of the portfolio).

Case 4

An investment of €15.4M, of which 70% was genuine green Capex, was made over 18 months for a major refurbishment of a residential portfolio, improving energy efficiency and sustainability levels. The portfolio's value increased from €43.0M (Q1 2024) to €63.8M (Q3 2025), supported by rental growth and yield compression.

Payback

Not achieved during the short-term. It would take 36 years to fully recover the investment through rental cashflows alone (€10.8M Capex divided by €0.3M annual rent). However, the manager highlighted that the payback period is challenging to estimate, as this would depend upon the asset holding strategy.

Conclusion

The investment focused on performing a deep retrofit and upgrading the quality of the residential portfolio. In this case, the manager believed that exit yields and market rents are assessed significantly more favourably for refurbished assets than for non-refurbished stock. Following completion, higher contractual and market rents as well as reassessment of yields were observed, while tenant turnover remained unchanged. This case appears to align more with Pathway 1, as the upgrades prioritised longer-term environmental goals and extending the life cycle of the assets, rather than immediate financial returns.

Limitations

No detailed data was provided on realised energy savings. The value uplift from €43.0M to €63.8M over almost two years, was significant and may also have been influenced by broader market movements; therefore, the increase cannot be attributed solely to the environmental interventions.

Observations	Findings: Key Results	Findings: Pathway considered
ASSET TYPE Retail **LOCATION** Netherlands **ENVIRONMENTAL CONSIDERATION** €1.3M was spent to achieve highest level of energy label, and reduce energy consumption and CO_2 emissions	> Initial value: €19.0M (Q1 2025) > Capex: €1.3M (Q2 2025) > Rental impact: No rental impact was achieved, occupancy was at 100% before and after the renovation > Final value: €19.3M or +€0.4M uplift (Q2 2025) > Energy impact: Consumption ↓48%, CO_2 ↓57% > Opex savings: €0.01M p.a.	**Pathway 1** Ambitious environmental goals (targeted highest energy label and major CO_2 reduction).

Case 5

An investment of €1.3M was made to achieve the highest energy label, reduce energy consumption by 48%, and cut CO_2 emissions by 57%. The asset's value increased from €19.0M to €19.3M, with additional annual Opex savings of €0.01M.

Payback

Not achieved during the short-term due to no increase in rental income and only very limited impact from Opex savings.

Conclusion

The investment focused on achieving the highest energy label and significantly reducing energy consumption and CO_2 emissions. This case would appear to align more with Pathway 1, as the upgrades prioritised longer-term environmental ambition rather than immediate financial return.

Limitations

The observation period is very short, which limited the ability to make precise financial conclusions. No explanation was provided for the modest value increase which may also reflect external market factors.

Data challenges and market assumptions

As evidenced in the prior chapter, data gaps, quality issues, and unclear Capex classifications, make it difficult to conduct consistent and comparable financial analysis of environmental factors across markets and asset types.
Each asset has its own unique set of physical circumstances and related asset management strategies. This highlights the importance of a detailed case-by-case analysis to understand the impact of sustainability-related investments in the overall financial analysis. In many cases, these impacts are deeply embedded in the overall investment programmes and can be difficult to isolate.

Fragmented and incomplete data

Across the case studies, the valuation information provided was limited. In most instances, only the asset's market value before the investment and its market value after the investment were available, without detailed breakdowns of assumptions, operational metrics, or regulatory drivers. The lack of complete and structured data makes it difficult to compare environmental performance across jurisdictions.

Reliance on assumptions and inconsistent pricing

Due to limited and fragmented environmental-related evidence, investors often rely on assumptions when pricing environmental factors. This leads to inconsistent valuation outcomes. For example, in Cases 2 and 4, the rent uplift was insufficient to cover Capex, yet the valuation increased significantly despite the absence of measurable cash flow impact. Conversely, Case 3 achieved payback through rental uplift alone, with no observable change in asset value, underscoring the variability in how markets price environmental upgrades.

Financial analysis limitations

Observed payback periods from the case studies varied significantly, ranging from 4 years to no evident payback in the short term, depending on whether returns were generated through rental income or operational savings.

In the absence of comparable datasets detailing cash flow components, investors cannot reliably benchmark performance or assess with precision the financial feasibility of environmental investments.

Difficulty in defining environmental Capex

A key challenge, identified in Phase I and reinforced by the case studies, is the lack of a clear and universally accepted definition of what qualifies as environmental Capex.

Many interventions (eg replacing boilers, LED lighting, new HVAC systems) can serve various purposes: regulatory compliance, tenant comfort, energy efficiency, or simple replacement of old equipment. This ambiguity makes it difficult to attribute spending directly to environmental goals. For example, in Case 1, significant façade and technical upgrades were undertaken; however, it was unclear whether the Capex amounts were earmarked for environmental goals alone or also as part of standard expenditures.

In multi-tenant assets, unclear cost-sharing arrangements further complicate planning and execution, even when upgrades are technically justified. Environmental works are often classified retrospectively and inconsistently across markets, weakening investor reporting and limiting the ability to demonstrate value impact.

Operational benefits are also difficult to demonstrate when systems are not properly commissioned or maintained, leading to lower-than-expected energy savings and unreliable forward-looking cashflows.

Five principles to follow when integrating environmental factors in underwriting

Incorporating environmental factors into underwriting requires careful consideration as well as access to reliable and high-quality datasets. Building on Phase I of this project, the following principles can support a more consistent and effective integration of environmental data into underwriting.

1 **Engage with external valuers and identify most relevant environmental factors**

Investment managers should consider the six key environmental factors outlined in Phase I paper during underwriting, select those most relevant (in line with the asset's business plan and portfolio strategy), and confirm with external valuers whether these are already reflected in market values[6].

The sources and detailed data points to be collected and analysed, in line with the RICS ESG data list for real estate valuations, are presented in Appendix E.

Recognising that gaps in environmental data continue to present significant challenges in the market for reliable attribution, information may be supplemented using market averages, like-for-like comparables, or estimates provided by third-party data platforms.

2 **Estimate environmental Capex and assess impact on performance**

Investment managers should try to identify as far as possible the Capex specifically attributable to environmental upgrades or interventions to enable a more precise evaluation of their economic feasibility. This step may require significant judgement and is generally asset specific. This is important when assessing if payback can be achieved from increased rental income, improved occupancy, or Opex savings.

3 **Define and test scenarios**

Investment managers should consider applying a DCF methodology to test various environmental improvement scenarios. As discussed in this paper, this can be used as a framework for incorporating environmental factors (subject to data availability) into underwriting alongside planned Capex and sector and geography adjustments, to assess impacts on asset value.

4 **Monitor ongoing performance and reduce ESG risk**

Investment managers should monitor ongoing performance and anticipate ESG regulations, enabling them to prioritise assets requiring retrofitting, mitigation, or adaptation measures to reduce exposure to ESG risks.

5 **Improve transparency for key market assumptions**

Investors should have visibility on how environmental factors are reflected in market values and, where applicable, in the underwriting assumptions within business plans. Adoption of the INREV Property Valuations and Reporting Guidelines by investment managers supports consideration of environmental data into valuations and more transparent reporting.

6 When sharing their opinion of market value with clients, external valuers are obliged to disclose whether environmental factors have already been reflected in the market value amount provided. RICS. (2025). RICS Valuation – Global Standards (Red Book)

Takeaways and next steps

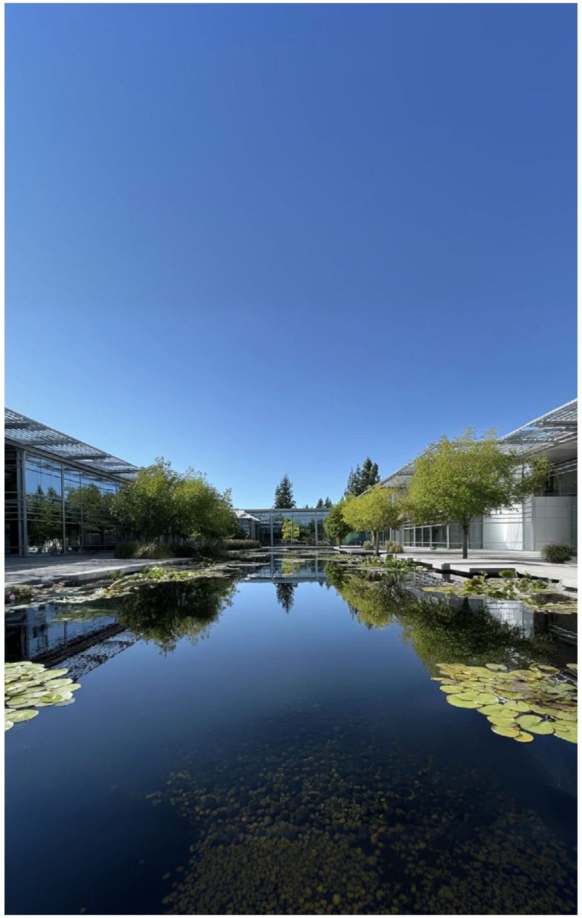
This paper investigated how environmental factors can influence value, returns, and payback when assessed in a structured and consistent manner. Performing asset-specific analysis focused on sustainability-related investments can provide insightful perspectives around the likely impact on overall asset strategies.

Across the limited number of case studies analysed, significant data gaps were highlighted. Environmental data was uneven and incomplete, which restricts the ability to compare outcomes and evaluate the financial merit of environmental interventions consistently.

The findings illustrate the tension between long-term environmental ambitions and short-term investment goals. Value movements observed in the case studies could not be attributed to environmental interventions alone, as outcomes are also influenced by asset-specific characteristics, market dynamics, and broader economic conditions.

In particular, these cases were observed during a period of yield decompression, which would have had a material impact on some asset values; this highlights the need for caution when interpreting valuation shifts without full market context. At the same time, there may be potential wider benefits, such as area uplift or regeneration, which are not fully captured by traditional valuation approaches.

Among the environmental factors examined, energy consumption showed the clearest



observable payback effects, alongside the timing of retrofit interventions. Reductions in GHG emissions were explicitly targeted in one case but did not show a consistent or measurable influence on payback or valuation outcomes, based on the available information. In the absence of robust, comparable evidence linking environmental upgrades to rental growth or material Opex savings, value assessments continue to rely heavily on assumptions and judgement.

A further structural challenge relates to the definition of environmental Capex. Many interventions serve multiple purposes, including regulatory compliance, maintenance, tenant comfort, and operational efficiency, making it difficult to clearly distinguish environmental spending from standard expenditure.

As data availability improves, performing this type of analysis at a wider scale, by sector and geography, could help build stronger datasets and more evidence-based inputs. Until consistent datasets emerge, underwriting inputs will continue to depend on assumptions.

Overall, integrating environmental considerations into underwriting is constrained less by analytical approaches and more by the quality, consistency, and availability of data inputs. Identifying trends and correlation will depend on better data collection (and sharing), clearer definitions and greater transparency around assumptions. More collaboration between valuers, investment managers and investors is necessary for a consistent assessment of environmental performance in terms of value at risk or upside opportunity.

INREV will continue to work with the broader industry to improve environmental data sharing and promote consistent definitions, supporting its members in embedding sustainability within non-listed real estate investment strategies and operations.

Appendix

Appendix A. Definitions and abbreviations

Environment, Social and Governance (ESG): ESG refers to a set of factors related to environmental, social and governance issues. They may present both risks and opportunities for a particular investment, and can be used to define investment strategies, performance and risk metrics, and criteria for investment.

Environmental criteria may include climate change and carbon emissions, air and water pollution, biodiversity, deforestation, energy efficiency, waste management and water scarcity.

Market value is the estimated amount for which an asset or liability should exchange on the valuation date between a willing buyer and a willing seller in an arm's length transaction, after proper marketing and where the parties had each acted knowledgeably, prudently and without compulsion.

Investment value is the value of an asset to a particular owner or prospective owner for individual investment or operational objectives.[8]

Valuation vs underwriting

Real estate valuations rely strictly on relevant, observable market information, and transaction-based, comparable evidence. Market values serve as the starting point for investment underwriting and are determined through physical inspections, resulting in a single number as of a specific date.

Underwriting, on the other hand, extends beyond regulated valuations by incorporating risk assessment and return expectations to estimate future value. It involves investment analysis and forward-looking assumptions to evaluate potential returns, cash flows, and the risks associated with the asset's business plan.[8]

For more definitions, refer to the INREV Global Definitions Database.

7 INREV. (2023). RICS Valuation – Global Standards (Red Book).
IVSC. (2022). International Valuation Standards.

8 INREV. (2025). Integrating environmental considerations in real estate underwriting.

Abbreviation	Full form
BMS	Building Management System
BREEAM	The Building Research Establishment Environmental Assessment Method
Capex	Capital Expenditure
CRREM	Carbon Risk Real Estate Monitor
DCF	Discounted Cash Flow
DGNB	German Sustainable Building Council (Deutsche Gesellschaft für Nachhaltiges Bauen)
EPC	Energy Performance Certificate
ERV	Estimated recovery value
ESG SDDS	Environmental Social Governance Standard Data Delivery Sheet
GHG	Greenhouse gases
HQE	Haute Qualité Environnementale
HVAC	Heating, Ventilation, and Air Conditioning
IVSC	International Valuation Standard Council
KPI	Key Performance Indicator
LEED	Leadership in Energy and Environmental Design
NOI	Net Operating Income
NPV	Net Present Value
Opex	Operating expense
PRI	Principles for Responsible Investment
RICS	Royal Institution of Chartered Surveyors
R4R	Risk for Real Estate
SHORE	Sustainable Housing & Real Estate certification
WELL	WELL Building Standard

Appendix B. DCF model example that considers environmental impacts in valuation and underwriting

i. Inputs

Total Lettable Floor Area (SQM)	16 875,00	Match	DCF (Years)	10	Valuation date	31/12/2025
Parking Places (Indoor)	370	Match	Growth	1,30%	Landlord	XXXX
Parking Places (Outdoor)	0		Discount Rate*	8,10%	Address	Square XY
Vacancy	12,00%		Exit Yield	6,80%	Postal Code	12345
Vacancy change Y1	0,00%		Transaction costs	7,50%	City	Paris
Vacancy change Y2	0,00%		Starting Year	2025		
Vacancy change Y3	0,00%		**Discount rate = Cap Rate + Growth*			
Vacancy change Y4	0,00%					
Vacancy change Y5	0,00%					

Use	*Tenant*	*Area*	*Unit*	*t per SQM per m*	*Rent per SQM per annum*	*Total Rent*	*Term to expiry*
Office	Tenant 1	2 100	SQM	31,67	380	798 000	6,87
Office	Tenant 2	2 500	SQM	30,00	360	900 000	7,29
Office	Tenant 3	2 125	SQM	32,50	390	828 750	1,92
Retail	Retail Tenant	350	SQM	30,00	360	126 000	4,52
Office	Tenant 4	1 100	SQM	33,33	400	440 000	6,33
Office	Tenant 5	6 675	SQM	34,17	410	2 736 750	6,33
Office	Vacant	2 025	SQM	31,25	375	759 375	
Parking	included for Tenants	270	Space		-	-	
Parking	Parking Tenant	100	Space		125	150 000	
			SQM		-	-	
	Total Lettable Area	**16 875**		32,71		**6 738 875**	**5,89**
	Total Parking	**370**					

Energy Performance	
kWhEP/m2/year	140
Rating	C

GHG	
kq eqCO2/m2/year	4
Rating	B

Fuel Source	Renewable Energy

Green Certification	Available

Green Certification
Available
Not Available

Physical / Climate Risk	Moderate

Insurance Risk Premiums (EUR)	
High	25 000
Moderate	12 500
Low	7 500

Budgets for operational costs (estimated)

Consumptions			
Energy Consumption	*77 963 €*	*0,22 € per kWh*	15% on Landord
Water Consumption	*12 500 €*		
Waste Management	*7 500 €*		
GHG tax	*4 000 €*	*1 000 € per kg*	
Insurance	*12 500 €*		
Cleaning			
Cleaning	*35 000 €*		
Total operational costs	***149 463 €***	on 100% occupancy	
Total operational costs/m2	8,86		

Other 'E' Onsiderations	
2024 target and Progress	**2025 Objective / Targets**
Leak detection implemented	Energy Reduction competition with other assets

Inflation assumptions	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Oxford Economics	1,6%	1,6%	1,6%	1,6%	1,6%	1,6%	1,6%	1,6%	1,6%	1,6%

Note: The figures are shown for illustrative purposes only.

ii. Link with ESG SDDS

Reconciliation tables: E Inputs & SDDS

Energy Consumption	
Required	
ESG3.1	Actual energy consumption - landlord's control (kWh/yr)
ESG3.1.1	Actual energy consumption - tenant's control (kWh/yr)
ESG3.1.2	Actual energy data coverage (% of area)
ESG3.1.3	Estimated energy consumption - landlord's control (kWh/yr)
ESG3.1.3.1	Estimated energy consumption - tenant's control (kWh/yr)
ESG3.1.4	Total energy consumption (kWh/yr)
ESG3.1.5	Total energy consumption data coverage (% of area)
ESG3.1.6	Energy intensity (kWh/area/yr)
ESG3.2	Renewable energy generated and consumed on-site by landlord (kWh/yr)
ESG3.2.1	Renewable energy generated on-site and exported by landlord (kWh/yr)
ESG3.2.2	Renewable energy generated and consumed on-site by third party or tenant (kWh/yr)
ESG3.2.3	Renewable energy generated off-site and purchased by landlord (kWh/yr)
ESG3.2.4	Renewable energy generated off-site and purchased by tenant (kWh/yr)
ESG3.2.5	Renewable energy data coverage (% of area)
ESG3.8	Percentage of assets with an energy rating (% of area)
ESG3.8.1	Exposure to energy-inefficient real estate assets (% of AUM)
ESG3.8.2	Exposure to energy-inefficient real estate assets data coverage (% of area)
Based on the asset type	
ESG3.1.7	Energy intensity, for office asset/property type (kWh/area/yr)
ESG3.1.7.1	Energy intensity, for retail asset/property type (kWh/area/yr)
ESG3.1.7.2	Energy intensity, for residential asset/property type (kWh/area/yr)
ESG3.1.7.3	Energy intensity, for industrial/logistic asset/property type (kWh/area/yr)
ESG3.1.7.4	Energy intensity, for parking asset/property type (kWh/area/yr)
ESG3.1.7.5	Energy intensity, for student housing asset/property type (kWh/area/yr)
ESG3.1.7.6	Energy intensity, for hotel asset/property type (kWh/area/yr)
ESG3.1.7.7	Energy intensity, for leisure asset/property type (kWh/area/yr)
ESG3.1.7.8	Energy intensity, for health care asset/property type (kWh/area/yr)
ESG3.1.7.9	Energy intensity, for aged care asset/property type (kWh/area/yr)
ESG3.1.7.10	Energy intensity, for education asset/property type (kWh/area/yr)
ESG3.1.7.11	Energy intensity, for agricultural asset/property type (kWh/area/yr)
ESG3.1.7.12	Energy intensity, for other asset/property type (kWh/area/yr)
Recommended	
ESG4.1	Actual fuel consumption - landlord controlled (kWh/yr)
ESG4.1.1	Actual renewable fuels - landlord controlled (kWh/yr)
ESG4.1.1.1	Proportion of fuels from renewable resources - landlord controlled (%)
ESG4.1.2	Actual fuel consumption - tenant controlled (kWh/yr)
ESG4.1.3	Actual fuel data coverage (% of area)
ESG4.1.4	Actual district heating and cooling - landlord controlled (kWh/yr)
ESG4.1.5	Actual district heating cooling from renewable resources - landlord controlled (kWh/yr)
ESG4.1.5.1	Proportion of district heating and cooling from renewable resources - landlord controlled (%)
ESG4.1.6	Actual district heating and cooling - tenant controlled (kWh/yr)
ESG4.1.7	Actual district heating cooling data coverage (% of area)
ESG4.1.8	Actual electricity consumption - landlord controlled (kWh/yr)
ESG4.1.9	Actual electricity from on-site renewable resources - landlord controlled (kWh/yr)
ESG4.1.9.1	Proportion of electricity consumption from on-site renewable resources - landlord controlled (%)
ESG4.1.10	Actual electricity from off-site renewable resources - landlord controlled (kWh/yr)
ESG4.1.10.1	Proportion of electricity consumption from off-site renewable resources - landlord controlled (%)
ESG4.1.11	Actual electricity consumption - tenant controlled (kWh/yr)
ESG4.1.12	Actual electricity data coverage percentage (% of area)

Water Consumption	
Required	
ESG3.5	Actual water consumption - landlord controlled (m3/yr)
Recommended	
ESG4.5	Actual water consumption - tenant controlled (m3/yr)
ESG4.5.1	Estimated water consumption (m3/yr)
ESG4.5.2	Total water consumption (m3/yr)
ESG4.5.3	Water intensity (m3/area/yr)
Based on the asset type	
ESG4.5.4	Water intensity, for office asset/property type (m3/area/yr)
ESG4.5.4.1	Water intensity, for retail asset/property type (m3/area/yr)
ESG4.5.4.2	Water intensity, for residential asset/property type (m3/area/yr)
ESG4.5.4.3	Water intensity, for industrial/logistic asset/property type (m3/area/yr)
ESG4.5.4.4	Water intensity, for parking asset/property type (m3/area/yr)
ESG4.5.4.5	Water intensity, for student housing asset/property type (m3/area/yr)
ESG4.5.4.6	Water intensity, for hotel asset/property type (m3/area/yr)
ESG4.5.4.7	Water intensity, for leisure asset/property type (m3/area/yr)
ESG4.5.4.8	Water intensity, for health care asset/property type (m3/area/yr)
ESG4.5.4.9	Water intensity, for aged care asset/property type (m3/area/yr)
ESG4.5.4.10	Water intensity, for education asset/property type (m3/area/yr)
ESG4.5.4.11	Water intensity, for agricultural asset/property type (m3/area/yr)
ESG4.5.4.12	Water intensity, for other asset/property type (m3/area/yr)
ESG4.5.4	Water consumption data coverage (% of area)

Waste Management	
Required	
ESG3.6	Actual waste generated - landlord controlled (tonne/yr)
Recommended	
ESG4.6	Actual waste generated - tenant controlled (tonne/yr)
ESG4.6.1	Estimated waste generated (tonne/yr)
ESG4.6.2	Total waste generated (tonne/yr)
ESG4.6.3	Hazardous waste generated (tonne/yr)
ESG4.6.3.1	Non-hazardous waste generated (tonne/yr)
ESG4.6.6	Waste data coverage (% of area)
ESG4.6.7	Share of real estate assets not equipped with facilities for waste sorting and not covered by a waste recovery or recycling contract (% of number of assets)
ESG4.6.8	Real estate assets not equipped with facilities for waste sorting and not covered by a waste recovery or recycling contract, data coverage (% of area)
Based on the asset type	
ESG4.6.4	Waste generated, for office asset/property type (tonne/yr)
ESG4.6.4.1	Waste generated, for retail asset/property type (tonne/yr)
ESG4.6.4.2	Waste generated, for residential asset/property type (tonne/yr)
ESG4.6.4.3	Waste generated, for industrial/logistic asset/property type (tonne/yr)
ESG4.6.4.4	Waste generated, for parking asset/property type (tonne/yr)
ESG4.6.4.5	Waste generated, for student housing asset/property type (tonne/yr)
ESG4.6.4.6	Waste generated, for hotel asset/property type (tonne/yr)
ESG4.6.4.7	Waste generated, for leisure asset/property type (tonne/yr)
ESG4.6.4.8	Waste generated, for health care asset/property type (tonne/yr)
ESG4.6.4.9	Waste generated, for aged care asset/property type (tonne/yr)
ESG4.6.4.10	Waste generated, for education asset/property type (tonne/yr)
ESG4.6.4.11	Waste generated, for agricultural asset/property type (tonne/yr)
ESG4.6.4.12	Waste generated, for other asset type (tonne/yr)

GHG Emissions	
Required	
ESG3.3	Actual scope 1 emissions (tonne CO2e/yr)
ESG3.3.1	Actual scope 1 emissions data coverage (% of area)
ESG3.3.2	Actual scope 2 emissions - location based (tonne CO2e/yr)
ESG3.3.2.1	Actual scope 2 emissions - market based (tonne CO2e/yr)
ESG3.3.3	Actual scope 2 emissions data coverage (% of area)
ESG3.3.4	Actual scope 3 emissions (tonne CO2e/yr)
ESG3.3.5	Actual scope 3 emissions data coverage (% of area)
ESG3.3.6	Estimated scope 1 emissions (tonne CO2e/yr)
ESG3.3.7	Estimated scope 2 emissions - location based (tonne CO2e/yr)
ESG3.3.7.1	Estimated scope 2 emissions - market based (tonne CO2e/yr)
ESG3.3.8	Estimated scope 3 emissions (tonne CO2e/yr)
ESG3.3.9	Total operational carbon - location based (tonne CO2e/yr)
ESG3.3.10	Total operational carbon - market based (tonne CO2e/yr)
ESG3.3.11	Operational carbon data coverage (% of area)
ESG3.3.12	Operational carbon intensity - location based (tonne CO2e/area/yr)
ESG3.3.12.1	Operational carbon intensity - market based (tonne CO2e/area/yr)
Based on the asset type	
ESG3.3.13	Operational carbon intensity - location based , for office asset/property type (tonne CO2e/area/yr)
ESG3.3.13.1	Operational carbon intensity - location based , for retail asset/property type (tonne CO2e/area/yr)
ESG3.3.13.2	Operational carbon intensity - location based , for residential asset/property type (tonne CO2e/area/yr)
ESG3.3.13.3	Operational carbon intensity - location based , for industrial/logistic asset/property type (tonne CO2e/area/yr)
ESG3.3.13.4	Operational carbon intensity - location based , for parking asset/property type (tonne CO2e/area/yr)
ESG3.3.13.5	Operational carbon intensity - location based , for student housing asset/property type (tonne CO2e/area/yr)
ESG3.3.13.6	Operational carbon intensity - location based , for hotel asset/property type (tonne CO2e/area/yr)
ESG3.3.13.7	Operational carbon intensity - location based , for leisure asset/property type (tonne CO2e/area/yr)
ESG3.3.13.8	Operational carbon intensity - location based , for health care asset/property type (tonne CO2e/area/yr)
ESG3.3.13.9	Operational carbon intensity - location based , for aged care asset/property type (tonne CO2e/area/yr)
ESG3.3.13.10	Operational carbon intensity - location based , for education asset/property type (tonne CO2e/area/yr)
ESG3.3.13.11	Operational carbon intensity - location based , for agricultural asset/property type (tonne CO2e/area/yr)
ESG3.3.13.12	Operational carbon intensity - location based , for other asset/property type (tonne CO2e/area/yr)
Recommended	
ESG4.3	Embodied carbon (tonne CO2e/yr)
ESG4.3.1	Total carbon emissions - location based (tonne CO2e/yr)
ESG4.3.1.1	Total carbon emissions - market based (tonne CO2e/yr)
ESG4.3.2	Total carbon intensity - location based (tonne CO2e/area/yr)
ESG4.3.2.1	Total carbon intensity - market based (tonne CO2e/area/yr)
ESG4.3.3	Carbon-offsets acquired (tonne CO2e/yr)
ESG4.3.4	Total carbon emissions, data coverage (% of area)

Physical Risks	
Required	
ESG3.4.2	Proportion of assets that are at low risk, in any category, from climate-related physical hazards (% of AUM)
ESG3.4.2.1	Proportion of assets that are at medium risk, in any category, from climate-related physical hazards (% of AUM)
ESG3.4.2.2	Proportion of assets that are at high risk, in any category, from climate-related physical hazards (% of AUM)

iii. Environmental impacts

Scenario	*B. Improvement Scenario*

Planned actions to implement environmental factors, related costs and results of the actions in terms of operational and financial impacts remain in the liberity of the users to decide according to the respective market conditions and state of the quality of the asset.
The impact can depend on sector and geography. Care should be taken to avoid double counting and clarify how environmental factors are incorporated in the market value provided by the valuers.

B. "Improvement" Scenario

CapEX schedules*	Actions	Year (1 to 10)	CapEx Plan	Operational and Financial Effect (Pc	Impact[1]	Impact Year (1 to 10)	Value Impact
1. Energy consumption / energy use intensity	*i.e. PV installations, metering system*	N/A		Tenant Attraction_Rent Increase	0,00%	N/A	
1. Energy consumption / energy use intensity	*i.e. LED lightning, insulations*	N/A		Tenant Attraction_Vacancy Decreas	0,00%	N/A	
1. Energy consumption / energy use intensity		N/A		Opex Reduction _ Energy Consumpti	0,00%	N/A	
1. Energy consumption / energy use intensity		N/A		Opex Reduction _ Water Consumptic	0,00%	N/A	
1. Energy consumption / energy use intensity		N/A		Opex Reduction _ Waste Managemer	0,00%	N/A	
1. Energy consumption / energy use intensity		N/A		Opex Reduction _ Carbon Tax Decre:	0,00%	N/A	
1. Energy consumption / energy use intensity		N/A		Investor Perception_Yield Compress	0,00%	N/A	
2. Energy ratings	*i.e. upgrade to higher EPC labels*	N/A		Tenant Attraction_Rent Increase	0,00%	N/A	
2. Energy ratings		N/A		Tenant Attraction_Vacancy Decreas	0,00%	N/A	
2. Energy ratings		N/A		Opex Reduction _ Energy Consumpti	0,00%	N/A	
2. Energy ratings		N/A		Opex Reduction _ Carbon Tax Decre:	0,00%	N/A	
2. Energy ratings		N/A		Investor Perception_Yield Compress	0,00%	N/A	
3. GHG Emissions	*i.e. PV installations, retrofitting*	N/A		Tenant Attraction_Rent Increase	0,00%	N/A	
3. GHG Emissions		N/A		Tenant Attraction_Vacancy Decreas	0,00%	N/A	
3. GHG Emissions		N/A		Opex Reduction _ Energy Consumpti	0,00%	N/A	
3. GHG Emissions		N/A		Opex Reduction _ Carbon Tax Decre:	0,00%	N/A	
3. GHG Emissions		N/A		Investor Perception_Yield Compress	0,00%	N/A	
4. CRREM Misalignment Year	*i.e. increase in renewable, eco-desigr*	N/A		Tenant Attraction_Rent Increase	0,00%	N/A	
4. CRREM Misalignment Year		N/A		Tenant Attraction_Vacancy Decreas	0,00%	N/A	
4. CRREM Misalignment Year		N/A		Opex Reduction _ Energy Consumpti	0,00%	N/A	
4. CRREM Misalignment Year		N/A		Opex Reduction _ Water Consumptic	0,00%	N/A	
4. CRREM Misalignment Year		N/A		Opex Reduction _ Waste Managemer	0,00%	N/A	
4. CRREM Misalignment Year		N/A		Opex Reduction _ Carbon Tax Decre:	0,00%	N/A	
4. CRREM Misalignment Year		N/A		Investor Perception_Yield Compress	0,00%	N/A	
5. Risk score / level	*i.e. protection measures for flooding,*	N/A		Tenant Attraction_Rent Increase	0,00%	N/A	
5. Risk score / level		N/A		Tenant Attraction_Vacancy Decreas	0,00%	N/A	
5. Risk score / level		N/A		Investor Perception_Yield Compress	0,00%	N/A	
5. Risk score / level		N/A		Insurance Cost level decrease	Moderate	N/A	No Change
6. Building certificates	*i.e. voluntary certifications as BREEA*	N/A		Tenant Attraction_Rent Increase	0,00%	N/A	
6. Building certificates		N/A		Tenant Attraction_Vacancy Decreas	0,00%	N/A	
6. Building certificates		N/A		Opex Reduction _ Energy Consumpti	0,00%	N/A	
6. Building certificates		N/A		Opex Reduction _ Water Consumptic	0,00%	N/A	
6. Building certificates		N/A		Opex Reduction _ Waste Managemer	0,00%	N/A	
6. Building certificates		N/A		Opex Reduction _ Carbon Tax Decre:	0,00%	N/A	
6. Building certificates		N/A		Investor Perception_Yield Compress	0,00%	N/A	

[1] Impact %s are not prescriptive. Users may insert their own.

B. Improvement Scenario	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Total Impact	Value Impact
Combined Impacts	1	2	3	4	5	6	7	8	9	10		
Unit rent p.m. (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Vacant area (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Energy Consumption Cost (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Water Consumption Cost (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Waste Management Cost (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Carbon Tax (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Insurance Cost	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	No Change
Exit Yield Change (%)	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	
CapEX Plan (EUR)	0	0	0	0	0	0	0	0	0	0	0	

	ESG Impact Scenario Value	Market Value	
Exit Year Net Cash Flow	6 832 953	6 832 953	Total Cash Flow ex Exit Value
Exit Value	102 092 355	102 092 355	Exit Value
Discounted CF	42 112 651	42 112 651	Discounted CF
Discounted Exit Value	46 852 879	46 852 879	Discounted Exit Value
ESG CapEx Schedule	-	-	0
Market Value Gross	88 965 530	88 965 530	Market Value Gross
Transaction Cost 7,5%	6 672 415	6 672 415	Transaction Cost 7,5%
Market Value after ESG Net (rounded)	82 293 000	82 293 000	Market Value after ESG Net (rounded)
Market Value after ESG per sqm	4 877	4 877	Market Value after ESG per sqm
Gross Initial Yield ESG Impact	7,38%	7,38%	Gross Initial Yield ESG Impact
Net Initial Yield ESG Impact	6,66%	6,66%	Net Initial Yield ESG Impact
IRR	8,10%		

Note: The figures are shown for illustrative purposes only.

Appendix C. DCF model stress testing based on the real market case

Note: This example draws on a real case and is provided for illustrative purposes only. It combines actual data with assumption-based inputs and is intended to show how various scenarios are tested to frame environmental ambition levels. It should not be interpreted as an accurate representation of the performance of any specific asset or transaction.

This asset was subject to a phased environmental investment programme, with Capex of €5.5M allocated in each of the first two years and €2.7M in the third year.

During the renovation period, vacancy rate increased to 53% in year one and remained at this level until completion of the works. Upon completion, rental income increased by 20% in year four and by a further 14% in year five, while occupancy improved by 35% and 15% in years four and five, respectively. The upgrades resulted in a reduction of annual insurance costs by €5,000 from year six onwards, and investor sentiment led to a compression of the exit yield by 100 basis points after year five, based on the information provided by the investment manager.

Table 2: Office – Milan, Italy

	Investment value	Capex (Year 1 & 2)	Capex (Year 3)	Rental increase (Year 4 & 5)	Vacancy decrease (Year 1, 4 & 5)	Energy consumption decrease	Exit yield compressions	Insurance cost level decrease	Investment value after intervention
Baseline	**€40.9M**	**-**	**-**	**€3.3M**	**15%**	**€0.1M**	**7.10%**		**-**
Impacts (Energy consumption/ energy use intensity)*	-	€11.0M	€2.7M	↑20%	↑38%	↓36%	↓100BPS		**↑€15.8M ****
	-	-	-	↑14%	↓35%	-	-		
	-	-	-	-	↓15%	-	-		
	-	-	-	-	-	-	-	Low	

* Replacement of technical installations (HVAC, Electricity, BMS) to guarantee better comfort and energy control. Replacement of the facades, improvement of wellbeing and design of green external areas**

** Investment value changes may not be only attributed to environmental Capex interventions.

Even though both energy consumption and insurance costs declined, their portion in the value change remained insignificant. Overall contribution to value change from various KPI’s is presented as follows:

	Discounted Differences (€)	Contribution to Value Change
Rental Income Difference	2,682,558	6.56%
Energy Consumption Difference	-136,987	0.33%
Water Consumption Difference	0	0.00%
Waste Management Difference	0	0.00%
GHG Tax Difference	0	0.00%
Insurance Cost Difference	-17,898	0.04%
Cleaning Cost Difference	0	0.00%
Operational Cost Difference	-154,885	0.38%
Operational Cash Flow Difference	2,837,443	6.94%
Capex Difference	-11,760,007	-28.75%
Cash Flow Difference with Capex	-8,922,564	-21.81%
Exit Value Difference	19,654,653	48.05%
TOTAL NET VALUE DIFFERENCE	**15,802,000**	**38.63%**

It is interesting to observe that the value would have increased by only 10%, if the total rental increase were limited to only 10% to become effective as of year 4. Indeed, due to the high vacancy rate during the renovation period, overall contribution of rent to the value increase would have been negative €0.5M, meaning that the main contributor to the value increase would be the yield decrease.

	Discounted Differences (€)	Contribution to Value Change
Rental Income Difference	-581,927	-1.42%
Energy Consumption Difference	-136,987	0.33%
Water Consumption Difference	0	0.00%
Waste Management Difference	0	0.00%
GHG Tax Difference	0	0.00%
Insurance Cost Difference	-17,898	0.04%
Cleaning Cost Difference	0	0.00%
Operational Cost Difference	-154,885	0.38%
Operational Cash Flow Difference	-427,042	-1.04%
Capex Difference	-11,760,007	-28.75%
Cash Flow Difference with Capex	-12,187,049	-29.80%
Exit Value Difference	11,418,769	27.92%
TOTAL NET VALUE DIFFERENCE	**3,286,000**	**8.03%**

Consequently, an absence of positive perception from investors in the uplift works would mean that the yield remains at the same level, and a 34% increase in the rental level would help to raise the value only by 10%, instead of 38%, as the impacts were combined.

	Discounted Differences (€)	Contribution to Value Change
Rental Income Difference	2,682,558	6.56%
Energy Consumption Difference	-136,987	0.33%
Water Consumption Difference	0	0.00%
Waste Management Difference	0	0.00%
GHG Tax Difference	0	0.00%
Insurance Cost Difference	-17,898	0.04%
Cleaning Cost Difference	0	0.00%
Operational Cost Difference	-154,885	0.38%
Operational Cash Flow Difference	2,837,443	6.94%
Capex Difference	-11,760,007	-28.75%
Cash Flow Difference with Capex	-8,922,564	-21.81%
Exit Value Difference	12,989,116	31.76%
TOTAL NET VALUE DIFFERENCE	**4,066,000**	**9.94%**

With no increase in rent and no change in yield, the value would have been decreased by 25%. Improved occupancy and Opex cost would have fallen short of compensating the Capex required for the uplift.

	Discounted Differences (€)	Contribution to Value Change
Rental Income Difference	-1,927,886	-4.71%
Energy Consumption Difference	-136,987	0.33%
Water Consumption Difference	0	0.00%
Waste Management Difference	0	0.00%
GHG Tax Difference	0	0.00%
Insurance Cost Difference	-17,898	0.04%
Cleaning Cost Difference	0	0.00%
Operational Cost Difference	-154,885	0.38%
Operational Cash Flow Difference	-1,773,000	-4.33%
Capex Difference	-11,760,007	-28.75%
Cash Flow Difference with Capex	-13,533,007	-33.09%
Exit Value Difference	3,489,577	8.53%
TOTAL NET VALUE DIFFERENCE	**-10,044,000**	**-24.56%**

Appendix D. Other quantitative insights from the industry

De Nederlandse Coöperatieve Vereniging van Makelaars en Taxateurs in onroerende goederen (NVM), the association of real estate agents and appraisers in the Netherlands, analysed a number of anonymised Dutch office and residential assets, valuing each under three scenarios: brown (low sustainability), light green (moderate upgrade), and dark green (deep retrofit), to show how sustainability investments affect rent, yield, vacancy, and market value.[9] Using DCF and income methods, the analysis highlighted that moderate upgrades often deliver greater value uplift than deep retrofits, due to cost-benefit and market willingness to pay.

The Dutch Green Building Council (DGBC) has established the Duurzaamheidsparagraaf (DuPa) framework, providing a standardised structure for capturing sustainability and climate-related data for local real estate valuations. DuPa version 2.0 is currently in force and DuPa 3.0 is under development to align with the EU Taxonomy.[10]

The Urban Land Institute (ULI) is developing a tool called Preserve to facilitate the industry-wide adoption of their transition risk assessment guidelines, created as part of ULI's C Change programme.[11]

9 NVM. (2022). Praktijkhandreiking taxeren duurzaam vastgoed.
10 DGBC. (2025). Duurzaamheidsparagraaf (DuPa).
11 ULI. (2024). C Change Survey: Decarbonisation and Transition Risk in Real Estate Investment.

Appendix E. Overview of environmental data to be captured for the analysis of impacts in valuation and underwriting[12]

Environmental factors	Data to be captured and analysed	Unit of measurement
Energy consumption / energy use intensity including renewable energy sources	Primary and final energy consumption Energy intensity Method of energy generation Quantity and specification of renewable energy systems (eg solar panels, heat pumps, biomass, wind turbines) Heating source Usage	$kWh/m^2/year$ kWh/m^2 $kWh/m^2/year$ % of primary/final energy demand met by renewable energy produced onsite % used on-site versus % delivered back to the grid
Energy ratings indicating energy efficiency and performance	Energy Performance Certificate (EPC) Other energy ratings in the market Any improvements to the building have been made since the energy rating occurred?	Energy label (A–G) kWh/m^2 Expiry date of EPC Yes/no; if yes, please specify
GHG emissions, including scope and methodology	CO_2e emissions, excluding and including refrigerant gases, based on real energy consumption	$kgCO_2e/m^2/year$

12 RICS. (2024). ESG data list for real estate valuations.

Environmental factors	Data to be captured and analysed	Unit of measurement
Stranded year based on energy/ carbon intensity according to the chosen decarbonisation pathway (eg CRREM- misalignment year)	CRREM pathway analysis Other pathway analysis (examples include ParisProof in The Netherlands under DuPa 2.0, DGNB SYSTEM for Buildings in Use or DGNB AWARD 'Climate Positive' in Germany and beyond, BREEAM In use and UK Net Zero Carbon Buildings Standard Benchmark curve) Stranding date Transition risk	Whether current property performance is on the pathway and in line with future targets Decarbonisation Capex and updated stranded date
Risk score / level based on industry recognised climate risk methodology	Climate risk (eg flood, heat, drought, sea level, precipitation) analysis issued by a recognised source (eg MSCI, Moody's, R4R) Mitigation measures already in place?	Has the client done a study indicating whether the property is subject to climate risk by 2050 (yes/ no)? Yes/no. If no, or not entirely, are the mitigation measures taken into account in the Capex budget?
Building certificates indicating overall asset quality	Green building certification schemes National-level certificates BREEAM, LEED, WELL, Fitwel, BOMA360, SHORE, DGNB, HQE This is not an exhaustive list.	Label/certificate – yes or no; if yes, specify the level Date of issue and expiry