Transition risk analysis and pathway to Net Zero

Prepared for ISSUER A by Kamma – example report

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About this report

Background

ISSUER A have commissioned Kamma to deliver an overview of the carbon footprint on a pool of mortgage assets, its sources, and a data-driven pathway to Net Zero.

Kamma's technology is designed to resolve some of the biggest challenges linked to the availability and accuracy of environmental property data, creating the most accurate profile of UK properties.

Recommendations and insights built on top of this data are supplied to prompt, challenge, inspire and support ISSUER A's wider Net Zero strategy.

Report objectives

This report focuses on Scope 3 emissions from ISSUER A's pool of mortgage assets. It draws on the best available data sources, with the limitations of each source outlined clearly in the Appendix.

The objectives of this report are to:

1. Benchmark emissions linked to ISSUER A's pool of mortgage assets and ascertain the sources and core drivers
2. Segment the sources and identify opportunities to improve
3. Articulate a data-driven path to Net Zero for the pool of mortgage assets, with clear actions, impacts and estimated costs

How it works
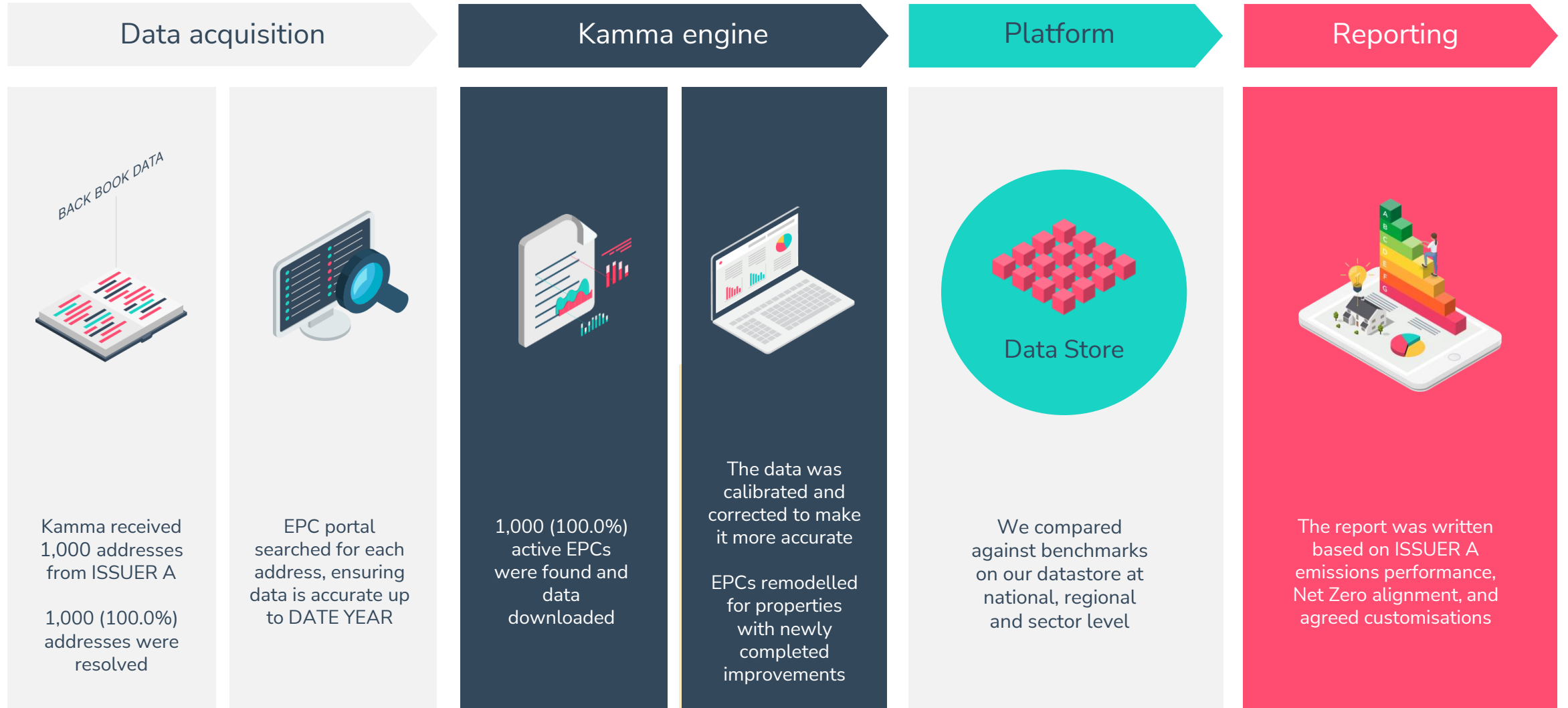
Data acquisition	Kamma engine	Platform	Reporting

Kamma received 1,000 addresses from ISSUER A

1,000 (100.0%) addresses were resolved

EPC portal searched for each address, ensuring data is accurate up to DATE YEAR

1,000 (100.0%) active EPCs were found and data downloaded

The data was calibrated and corrected to make it more accurate

EPCs remodelled for properties with newly completed improvements

Data Store

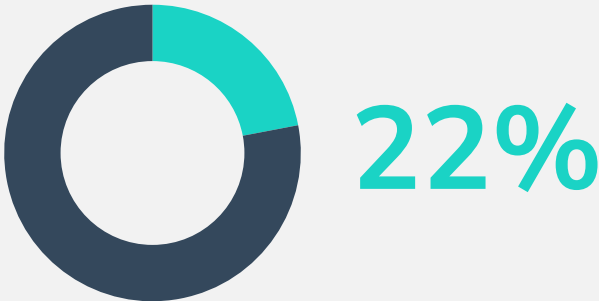We compared against benchmarks on our datastore at national, regional and sector level

The report was written based on ISSUER A emissions performance, Net Zero alignment, and agreed customisations

The national target of Net Zero by 2050 is under threat

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And the emissions of UK housing stock are a big part of the problem...

22%

of greenhouse gas emissions are from UK homes

56%
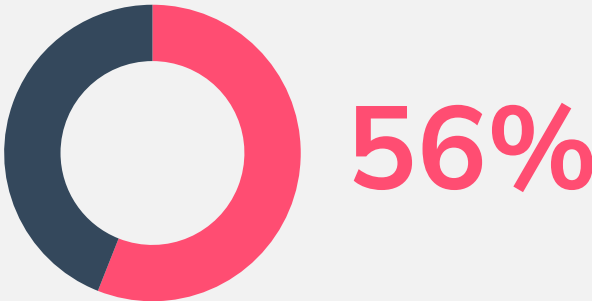
of UK homes are rated EPC D or below (considered inefficient)

The average EPC (SAP) score in England & Wales has increased by ISSUER A 3.0 SAP points in 12 years

92+	A
81-91	B
69-80	C
55-68	D
39-54	E
21-38	F
1-20	G
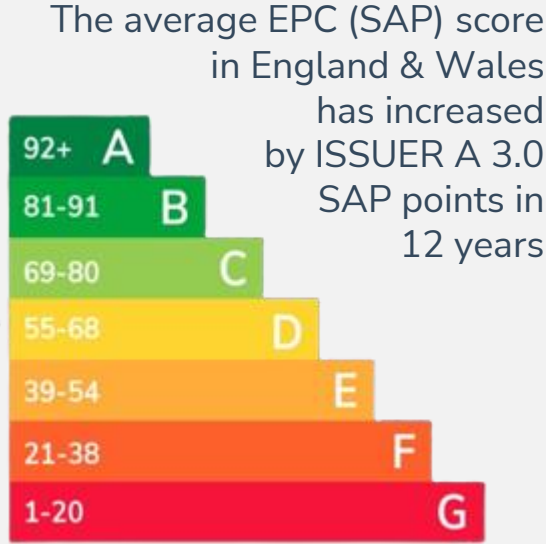
Property is the slowest to decarbonise of all major emitters

Percentage reduction in CO$_2$ emissions since 1990 by major sector

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Paris Agreement

Climate Change Act

Energy supply

Industry

Transport

Residential

80%
70%
60%
50%
40%
30%
20%
10%
0%
-10%
-20%
-30%

1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020
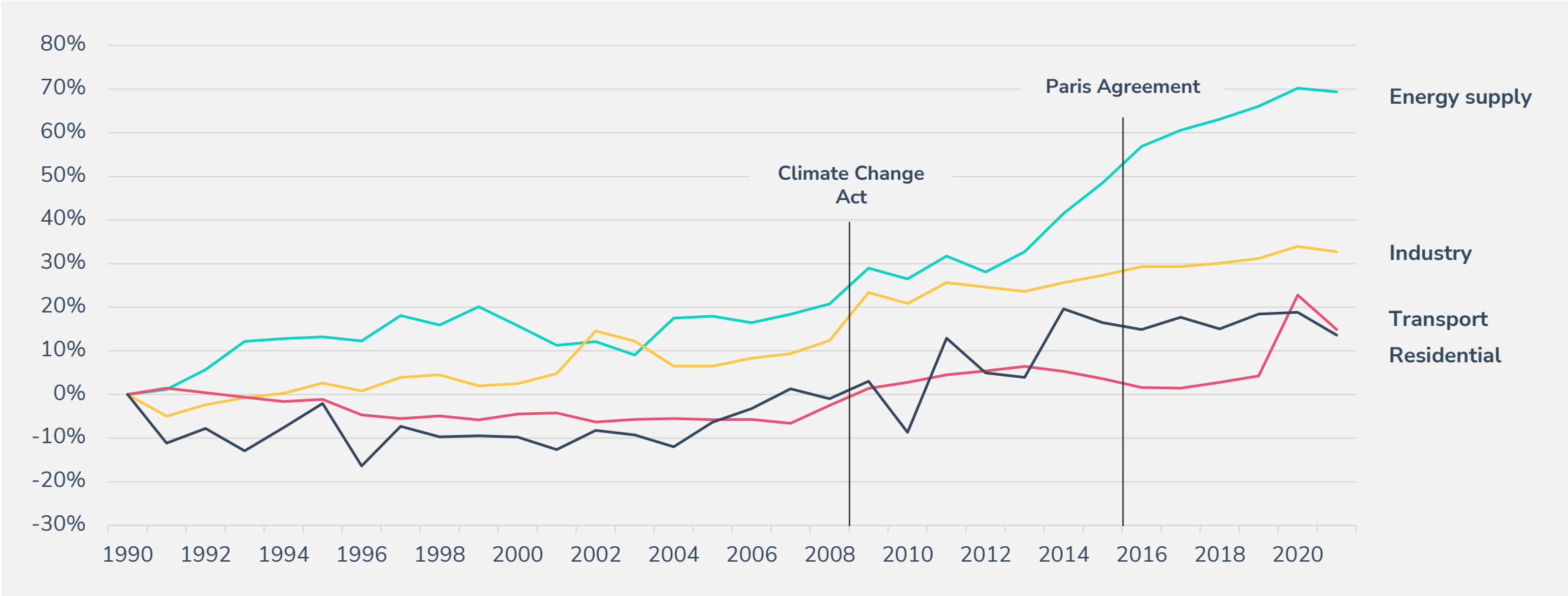
Source: DESNZ 1990-2021 sector CO$_2$ emissions.

And this comes at a cost

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Cost of estimated energy bill (£ / year)

■ Average energy bill Dec 2020   ■ Average energy bill Dec 2022

	EPC A	EPC B	EPC C	EPC D	EPC E	EPC F	EPC G
Total	£733	£916	£1,465	£2,015	£2,931	£3,846	£6,044
Dec 2022	£429	£536	£857	£1,179	£1,715	£2,250	£3,536
Dec 2020	£304	£380	£608	£836	£1,216	£1,596	£2,508

Average annual emissions (tonnes / year)

EPC A	EPC B	EPC C	EPC D	EPC E	EPC F	EPC G
0.4	1.3	2.2	2.2 / 1.5	2.2 / 3.4	2.2 / 6.3	2.2 / 8.3
0.4	1.3	2.2	3.7	5.6	8.5	10.5

■ Average EPC C emissions   ■ Additional emissions compared to EPC C

Estimated annual fuel bill 2022/23 | Average EPC C emissions per property
Source: Ofgem and Cornwall Insight | Kamma

Proposed legislation will dramatically increase the role of the private sector in improving household energy efficiency

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The Minimum Energy Performance of Buildings Bill, CBES and TCFD-aligned disclosure requirements

Improving home energy performance through lenders

Department for Business, Energy & Industrial Strategy

Consultation on setting requirements for lenders to help householders improve the energy performance of their homes

Closing date: 12 February 2021

November 2020
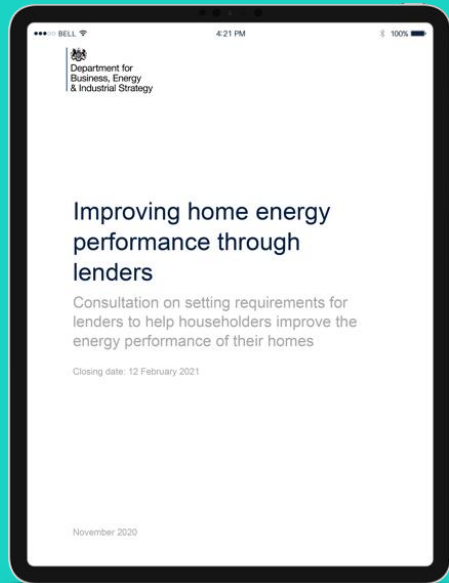
- All homes to be EER C by 2035 where "practical, cost effective and affordable"

- Lenders to commit to back book average of EER C by 2030

- All social landlords to ensure a significant proportion of their residential properties are EER C by 2035

- All commercial rented buildings to be at least EER C by 2027 and B by 2030*

- 2022 Climate Biennial Exploratory Scenario (CBES) required a sample of financial organisations to provide evidence of physical and transition risks associated with climate change, supporting future policy mandates targeting the financial sector

- Disclosure is mandatory from 2022 for premium listed companies across four categories of disclosure (governance, strategy, risk management, metrics and targets)

- Disclosure requirements need to align with emerging standards from the International Sustainability Standards Board (ISSB) and the UK Transition Plan Taskforce (TPT)

*EER targets for commercial buildings are already confirmed under the Government's Energy White Paper, 17th March 2021

Executive summary

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1,000
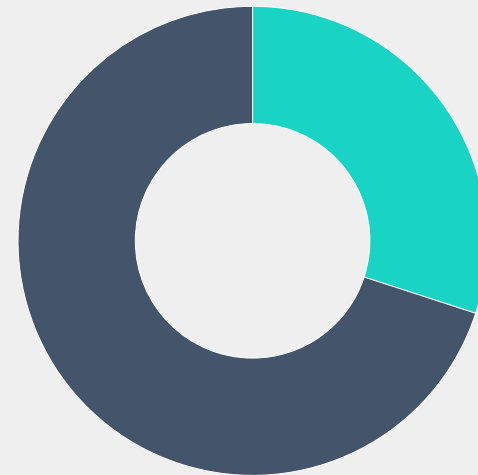Number of properties assessed in the pool

50.0%
Already at EER 'C' rating

2,000
Tonnes of carbon emissions can be saved through home improvements

70.0
Average SAP score for the pool of loans

£1.0m
Cost to comply with proposed regulations

30%
of properties are rated as **'green'** according to Kamma's methodology

Executive summary: Implications

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Insight	Implication
1	
2	
3	
4	
5	

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The pool of loans is on track to...

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Legend: ■ Required rate ■ Current rate

Y-axis (rating scale): C (72, 70, 68), D (68, 66, 64, 62, 60)

X-axis categories: ISSUER A, UK 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030
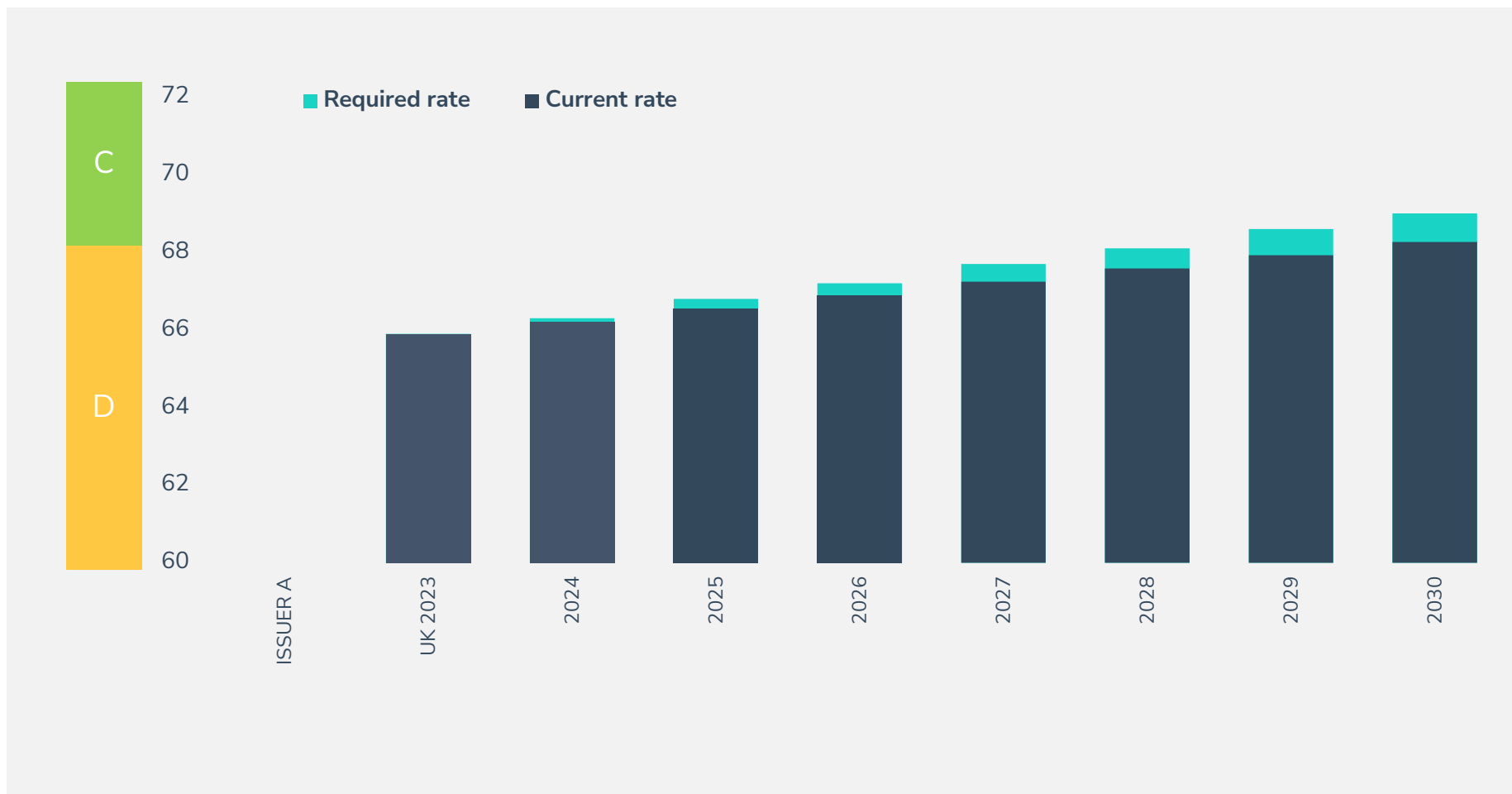
Government target

Country to average EER C by 2030

Based on the current rate of change

The UK will average EER C by **2033**

The **ISSUER A** pool of loans is projected to achieve EER C by 2025

Source: Kamma datastore sweep, MONTH YEAR

Benchmarking EER performance

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EER band distribution (%) – ISSUER A vs. PRS average

	G F	E	D			C	B A	% with an active EPC
UK		10.0	10.0	10.0	10.0	10.0		52%
UK PRS		10.0	10.0	10.0	10.0	10.0		60%
BANK A		10.0	10.0	10.0	10.0	10.0		91%

X properties below current regulatory requirements | X properties found on the PRS exemptions register | X properties below future regulatory requirements

EIR performance

Performance

	ISSUER A	National avg.	+/- National avg.
Pool average EIR* – register data	60	60	1
Pool average EIR* - recalculated	75	75	2
CO2 output (tonnes) – register data	3	3	-1
CO2 output (tonnes) - recalculated	3	3	-1

ISSUER A EIR rating breakdown (%)

	A	B	C	D	E	F	G
	5.6	18.4	40.1	26.7	11.4	0.7	0.5

Current and potential back book emissions
Current emissions 5,000 tonnes

■ Potential emissions
■ Potential emissions savings

2,500	2,500
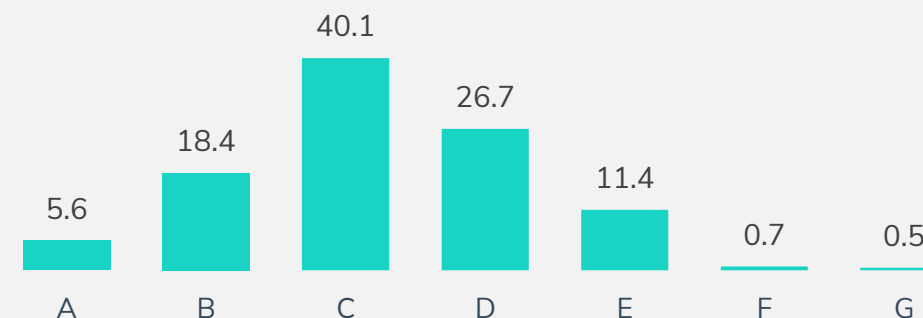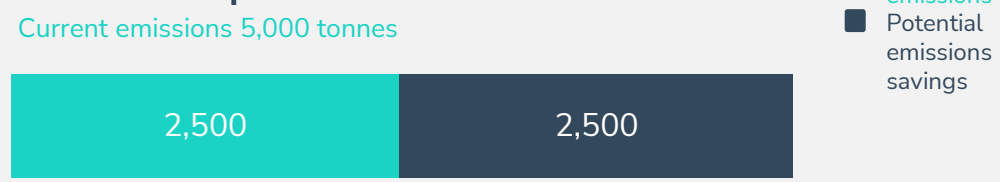
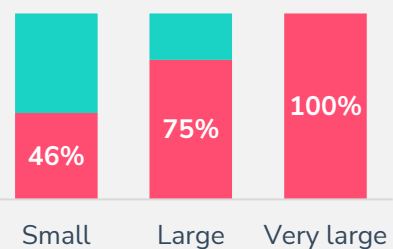*** Environmental Impact Rating (EIR):** The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO2) emissions. The higher the rating the less impact it has on the environment. This rating is based on the performance of the building and its fixed services (such as heating and lighting).

Assessing property types most likely to be inefficient

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Date property was built
% below EPC C

Before 1930	1930-1950	1950-1975	1975-2000	2000-2015	After 2015
65%	56%	32%	27%	0%	0%
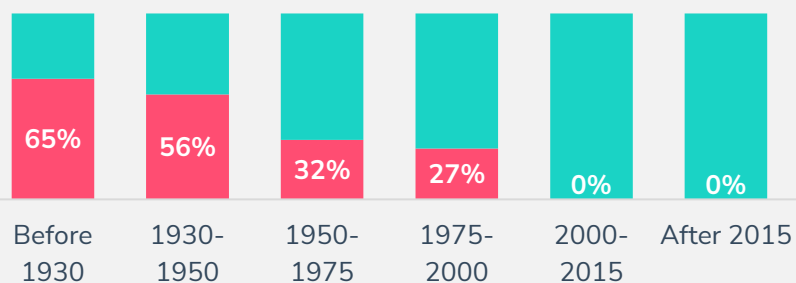
Size of property
% below EPC C

Small	Large	Very large
46%	75%	100%

■ Below C   ■ C and above

Deprivation of neighbourhood
% below C by deciles

1	2	3	4	5	6	7	8	9	10
43%	50%	53%	56%	43%	44%	53%	50%	56%	49%

Most deprived

Least deprived

Average EPC

■ D
■ E
■ F
■ G
■ No properties in region
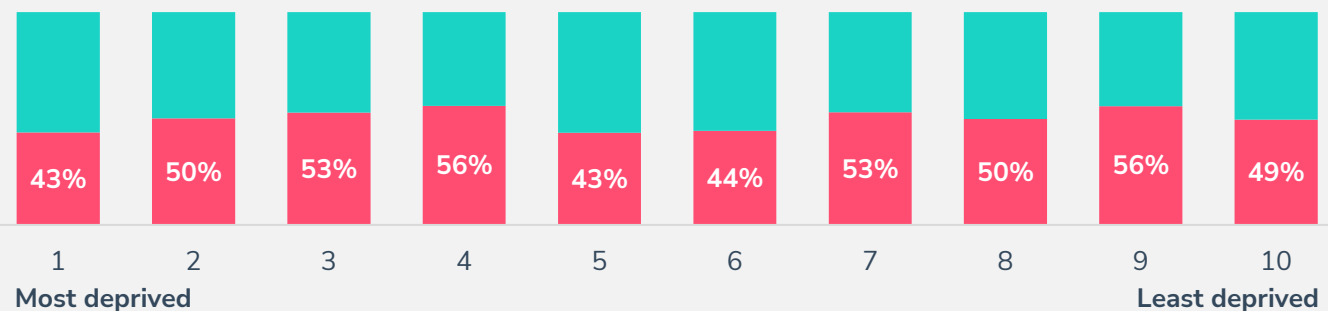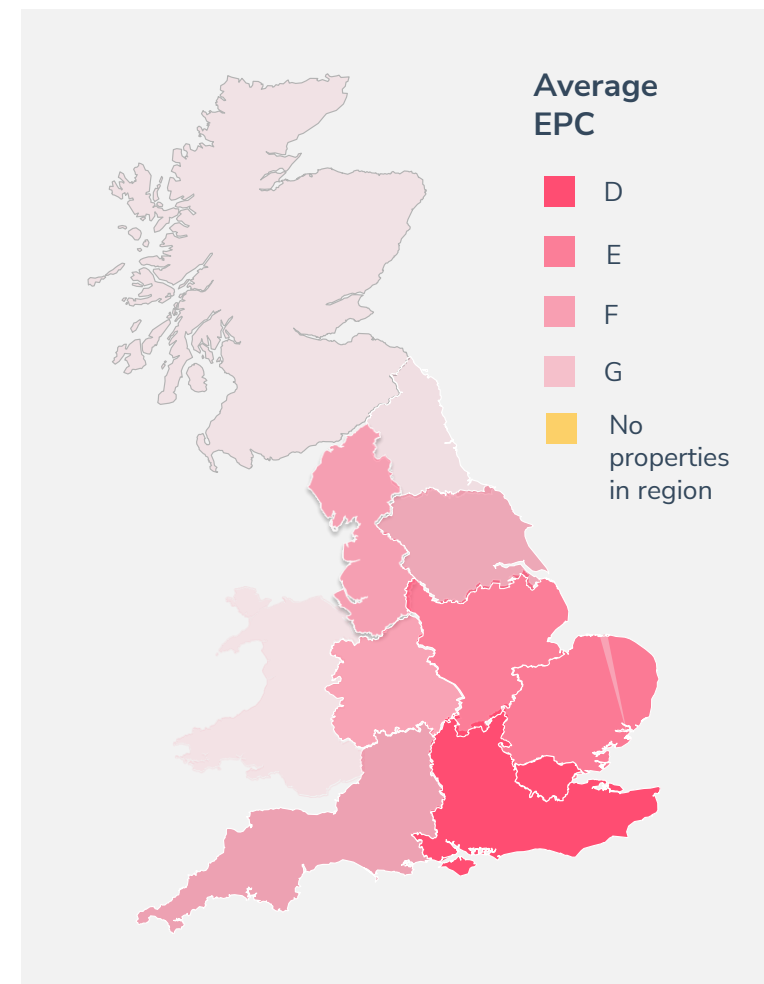
What is the cost of compliance?

The cost of complying with new regulatory targets is significant, but represents a green lending opportunity

£X.xm is the cost of compliance for the entire book to **average EPC C**

This represents the cost of meeting the legislative requirement for lenders to average EPC C across their books by 2030

£X.Xm is the cost of compliance for the entire book to achieve **minimum EPC C**

The additional investment required to bring the entire book to a minimum EPC C, **presenting a significant green finance opportunity**
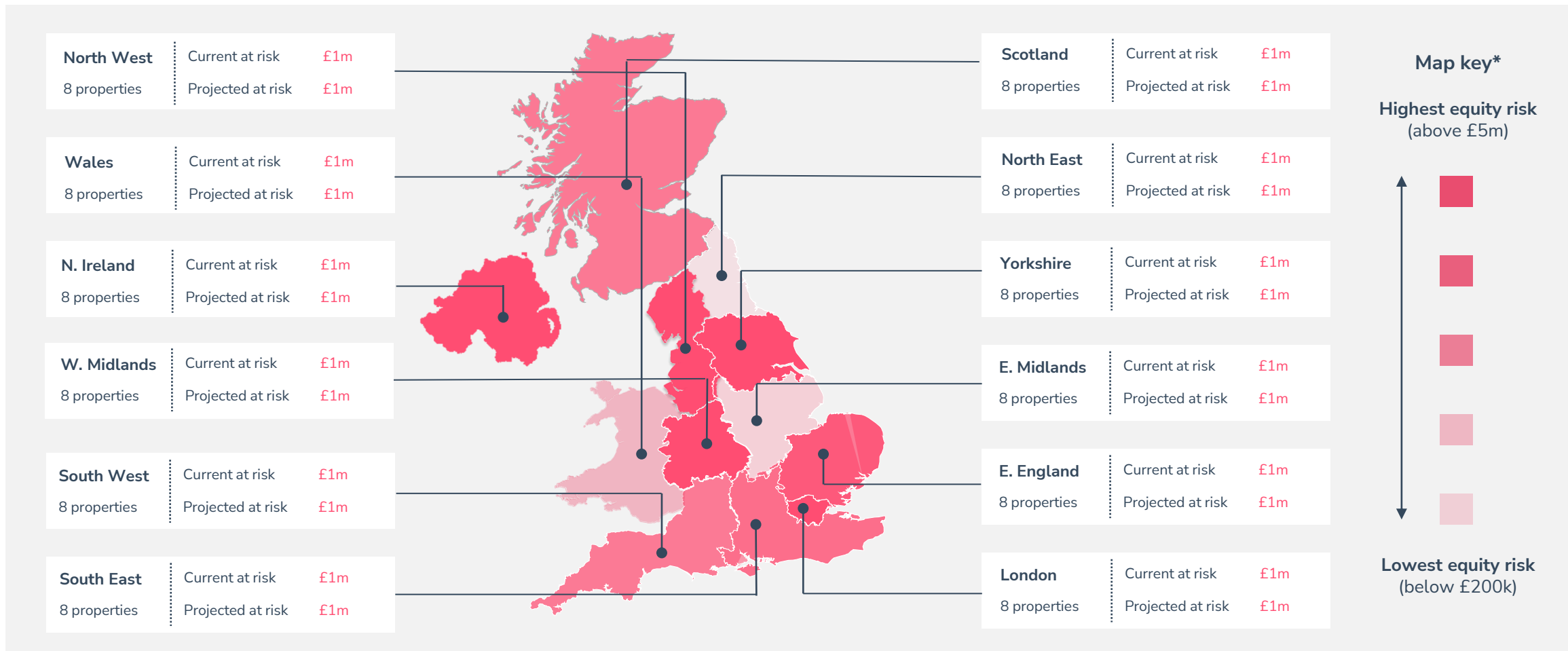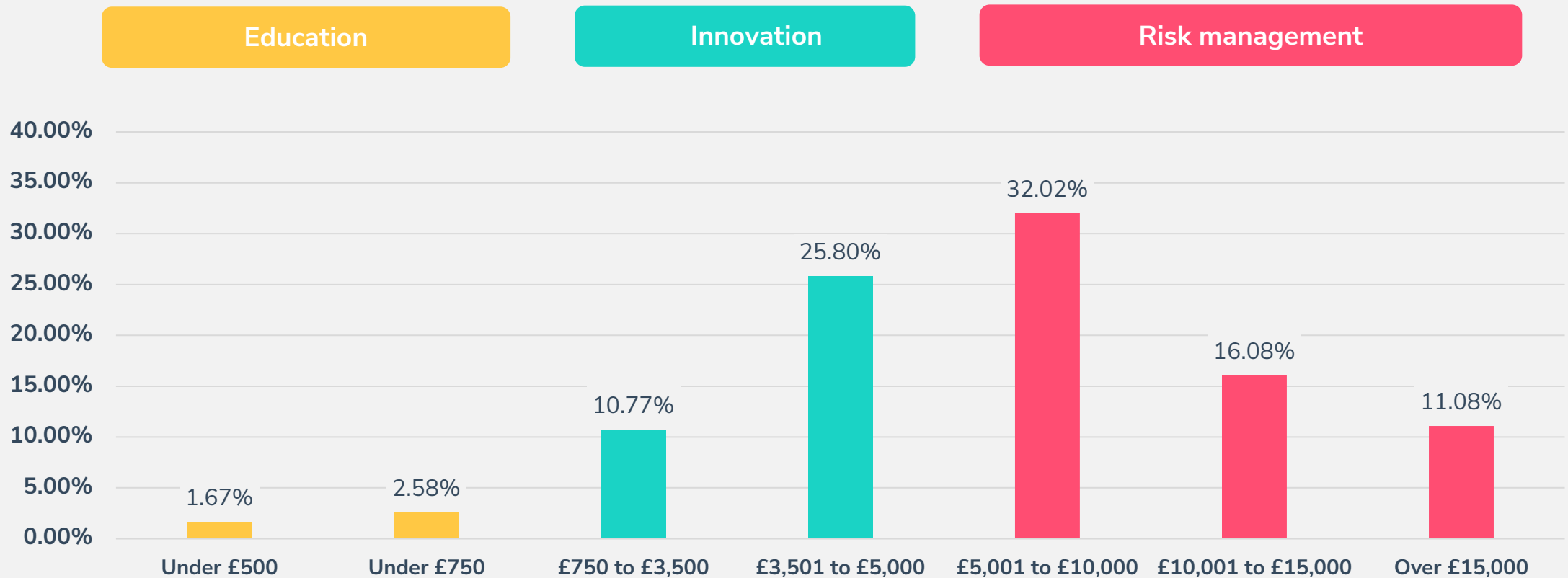
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Source: Kamma datastore sweep, MONTH YEAR

Assessing materiality: Impact on current and projected final LTV thresholds

Properties crossing an LTV threshold if the cost of compliance is loaded onto the mortgage

North West		
	Current at risk	£1m
8 properties	Projected at risk	£1m

Wales		
	Current at risk	£1m
8 properties	Projected at risk	£1m

N. Ireland		
	Current at risk	£1m
8 properties	Projected at risk	£1m

W. Midlands		
	Current at risk	£1m
8 properties	Projected at risk	£1m

South West		
	Current at risk	£1m
8 properties	Projected at risk	£1m

South East		
	Current at risk	£1m
8 properties	Projected at risk	£1m

Scotland		
	Current at risk	£1m
8 properties	Projected at risk	£1m

North East		
	Current at risk	£1m
8 properties	Projected at risk	£1m

Yorkshire		
	Current at risk	£1m
8 properties	Projected at risk	£1m

E. Midlands		
	Current at risk	£1m
8 properties	Projected at risk	£1m

E. England		
	Current at risk	£1m
8 properties	Projected at risk	£1m

London		
	Current at risk	£1m
8 properties	Projected at risk	£1m

Map key*

Highest equity risk
(above £5m)
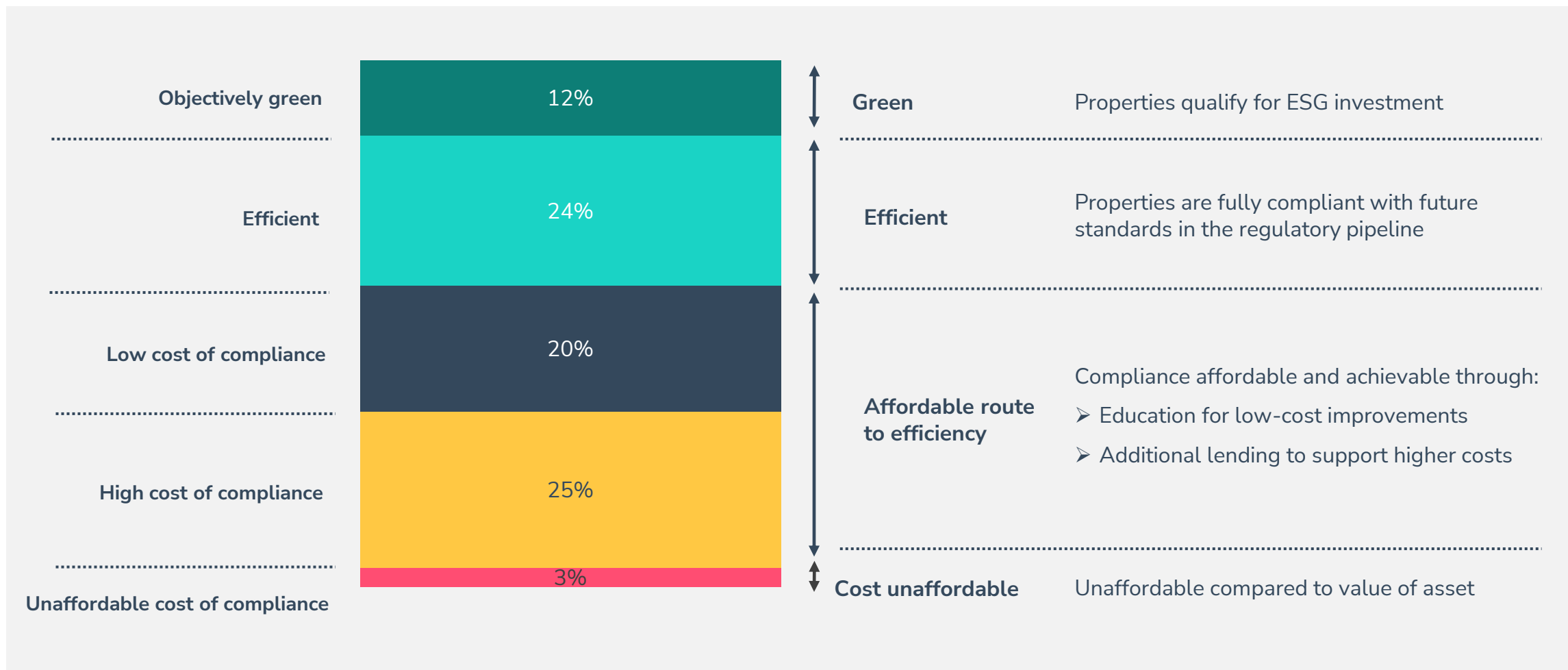
Lowest equity risk
(below £200k)

The cost to compliance differs dramatically by customer. These different needs require different approaches

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Proximity to C - % by cost bands
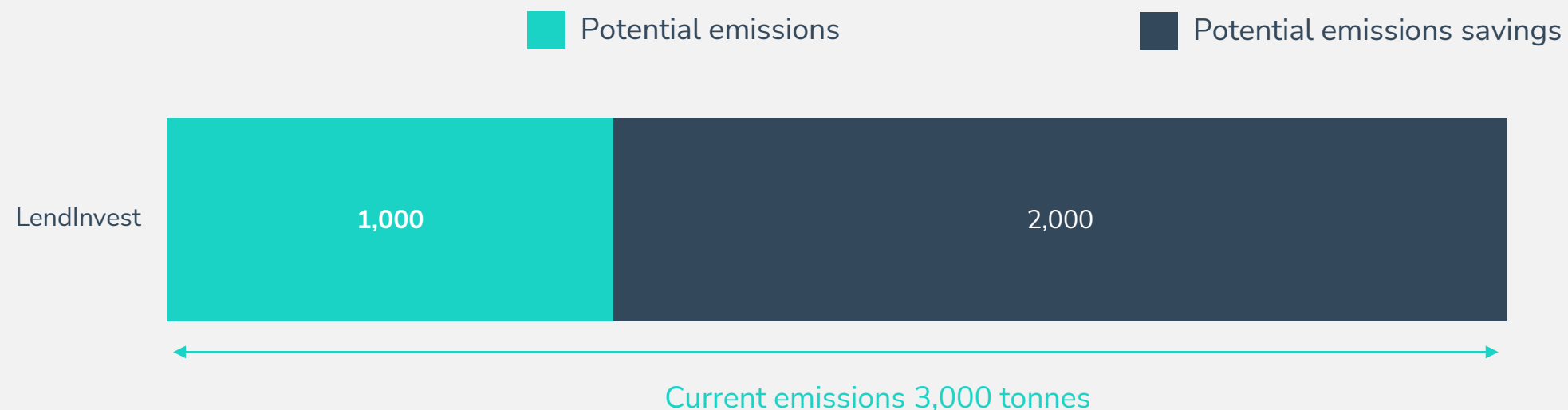

| Education | Innovation | Risk management |

- Under £500: 1.67%
- Under £750: 2.58%
- £750 to £3,500: 10.77%
- £3,501 to £5,000: 25.80%
- £5,001 to £10,000: 32.02%
- £10,001 to £15,000: 16.08%
- Over £15,000: 11.08%

Linking actions and opportunities to levels of climate

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Segmenting the climate risk of ISSUER A's back book

Objectively green	12%	Green	Properties qualify for ESG investment
Efficient	24%	Efficient	Properties are fully compliant with future standards in the regulatory pipeline
Low cost of compliance	20%	Affordable route to efficiency	Compliance affordable and achievable through: ➢ Education for low-cost improvements ➢ Additional lending to support higher costs
High cost of compliance	25%		
Unaffordable cost of compliance	3%	Cost unaffordable	Unaffordable compared to value of asset

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ISSUER A customers have the potential to collectively reduce their emissions by an estimated 1,000 tonnes per annum

Current and potential back book emissions*

■ Potential emissions   ■ Potential emissions savings

LendInvest

1,000   2,000

← Current emissions 3,000 tonnes →

Supporting customers to improve drives up compliance whilst driving down emissions

These fabric-first improvements could reduce emissions by

500

tonnes per annum

These non-fabric improvements could reduce emissions by

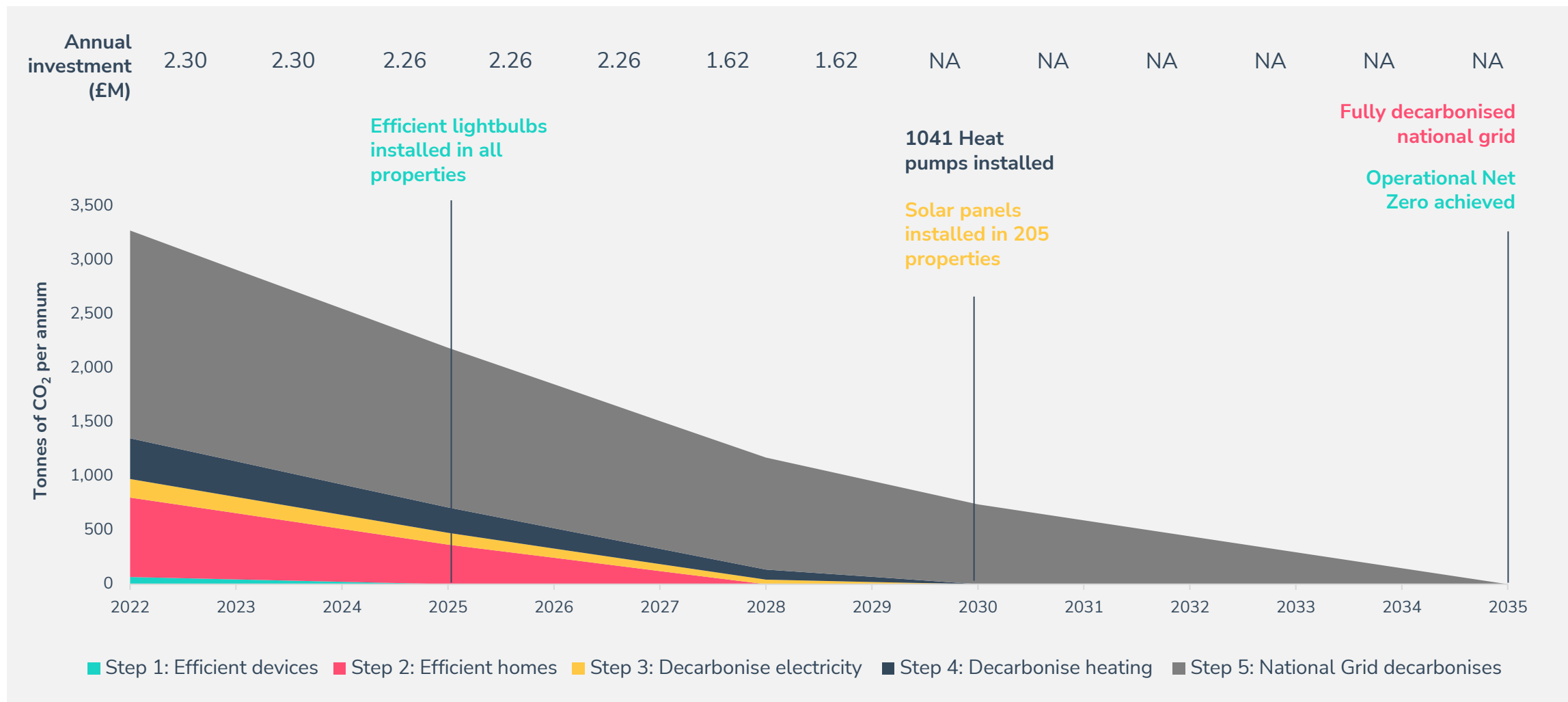## 1,000

tonnes per annum

Top 10 most impactful improvements
By number of qualifying properties, excluding 'quick wins'

	Qualifying properties	Average SAP increase	Total CO2 reduction (t)	Cost per tonne (£)
Solar photovoltaic panels, 2.5 kWp	1,000	7.00	500	£1,000
Solar water heating	1,000	7.00	500	£1,000
Low energy lighting for all fixed outlets	500	7.00	500	£1,000
50 mm internal or external wall insulation	500	7.00	500	£1,000
Solid floor insulation	300	7.00	500	£1,000
Suspended floor insulation	300	7.00	500	£1,000
Cavity wall insulation	200	7.00	500	£1,000
Replace boiler with new condensing boiler	200	7.00	500	£1,000
Upgrade heating controls	200	7.00	500	£1,000
Increase loft insulation to 270 mm	100	7.00	500	£1,000

■ 'Fabric-first' improvement

Source: Kamma datastore sweep. MONTH YEAR.

Example of achieving operational Net Zero by 2035

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Annual investment (£M)	2.30	2.30	2.26	2.26	2.26	1.62	1.62	NA	NA	NA	NA	NA	NA

Efficient lightbulbs installed in all properties

1041 Heat pumps installed

Fully decarbonised national grid

Solar panels installed in 205 properties

Operational Net Zero achieved

- Step 1: Efficient devices
- Step 2: Efficient homes
- Step 3: Decarbonise electricity
- Step 4: Decarbonise heating
- Step 5: National Grid decarbonises

Source: Kamma datastore sweep, MONTH YEAR

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Green Asset Scoring combines multiple datapoints to provide a robust, representative and comparable single number score

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Kamma has a proprietary scoring system that takes into account the following values and metrics:

1. Recalculated EIR incorporating real-time CO_2 conversion factors

2. Presence of renewables at a property

3. Presence of fossil fuels at a property

4. Property ahead or behind trajectory to net zero across term of investment

5. Properties with negative CO_2 emissions

6. Where use of proceeds is relevant, Kamma adopts the ICMA framework to score

Kamma's more accurate approach qualifies more, rather than fewer, loans for green securitisation, opening-up access to growing ESG investment funds

Green Asset Scoring – what it means

Scoring

Score below 5
Assets are not green

Score above 5
Assets are green

0   1   2   3   4   5   6   7   8   9   10

Example scenarios

Score above 7
Assets qualify for green securitisation

Score above 10
Portfolio is made up almost entirely of EIR A properties

# Green Asset Scoring for the ISSUER A's portfolio

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Green Asset Scorecard

|	ISSUER A	UK	PRS	Social	Diff to PRS +/-	Diff to UK +/-
Green Asset Score (mean)	3.0	3.0	5.0	3.0	+0.5	-0.5
Green share of portfolio	50%	50%	50%	50%	+5.0	+5.0%
Number of green properties (based on active EPC certificates)	500	5,000,000	500,000	500,000	1,000	1,000

X% of the ISSUER A's portfolio could qualify for green securitisation

Typical Green Rating Approach (EER A and B)

Typical Green Rating

50%	50%
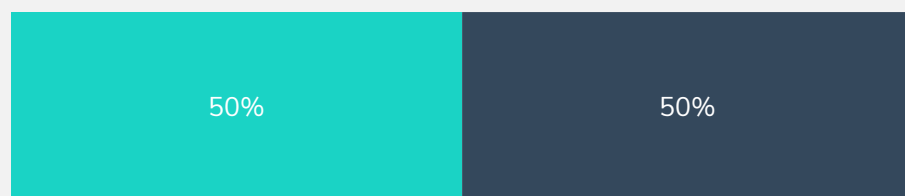
Kamma Methodology

50%	50%
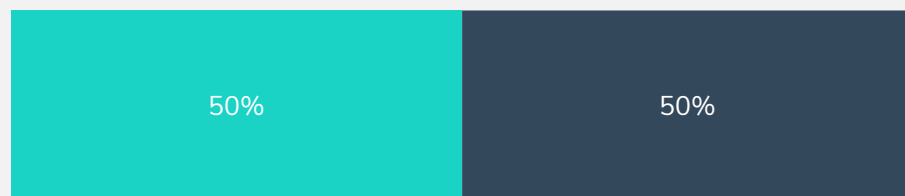
■ Green   ■ Not green

Assets qualified

ISSUER A overall score: **X** UK PRS score: **X**

Kamma scores are largely based on recalculated CO_2 emissions. The average emissions for the ISSUER A sample is lower than the national average. Our methodology maximises the size of the investment pool while minimising greenwashing.

Highlights

- Around **£X million** in existing loans qualifies for green securitisation, an increase of almost **£X million** compared to typical methods

- Based on loan balance, the investment pool is **X** times the size of using typical approaches

- Eliminate greenwashing: **X** properties that are rated EER A or B emit high amounts of CO_2 and are therefore NOT considered green by Kamma

- Increase pool size: **X** properties are rated lower than an EER band A or B, but have relatively low emissions, and are therefore considered green by Kamma

Source: Kamma datastore sweep, MONTH YEAR

More accurate data reduces financed emissions and improves financial disclosures

As of 2022, disclosures in line with the **Task Force for Climate Related Disclosures** recommendations became mandatory for ISSUERs, buildings societies, insurers and premium listed companies, but many ISSUERs are already making disclosures. Financed emissions metrics are a key disclosure.

Kamma calculates financed emissions metrics in line with the **2020 PCAF Global Green House Gas Reporting** and accounting standard with greater coverage and accuracy than elsewhere. Disclosing data quality forms a key part of climate-related disclosures. Using Kamma's data and analysis ensures you can achieve the best possible data quality score.

PCAF Scoring

1. Actual building energy consumption and emission factors specific to the respective energy source. Actual building energy consumption and supplier-specific emission factors are used.

2. Actual building energy consumption and average emission factors specific to the respective energy source. actual building energy consumption and average emission factors are used.

3. Estimated building energy consumption per floor area based on official building energy labels AND the floor area are available.

4. Estimated building energy consumption per floor area based on building type and location-specific statistical data AND the floor area.

5. Estimated building energy consumption per building based on building type and location specific statistical data AND the number of buildings.

ISSUER A

Financed emissions (tCO2e/y)	1,000,000
Physical emissions intensity (kgCO2e/m2)	25.00
Economic emissions intensity (tCO2e/£M)	10.0
PCAF data quality score	3.00

PCAF Score: When data is taken from the EPC register, it is considered as modelled data and given a PCAF quality score of 3. Because Kamma uses grid emission factors by region, the proportion of properties where electricity was used as a heat source can be given a PCAF score of 2. The average score is then calculated across all properties in the sample.

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MONTH YEAR

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Lenders need new data sources to support them

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Most accurate available EPC

EPC register

Covering all UK EPC registers, including, Scotland and NI

EPC recency

Data direct from the EPC search tool, up to 900k more certificates

Closing blind spots

Address resolution

~95% match rates compared to a market standard of ~80%

No EPC, no problem

Modelled EPC, based on property characteristics, to fill gaps

Corrected and calibrated

Retrofit pricing, fuel savings & ROI

Up-to-date pricing based on BCIS database & energy markets

Updated carbon emissions

Real-time carbon footprint taken directly from national grid

Intelligent analytics

Transition risk segmentation and trajectory to Net Zero

Advanced data and modelling enables full transparency on local transition risk, related costs & the path to Net Zero

Physical risk analysis at property level

Size, frequency and materiality of physical risk, at property, not post code, level

The difference between Kamma and the traditional method

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The traditional method

The EPC register calculates emissions based on a decade-old methodology

This is most pertinent when it comes to homes fully or partially heated by electricity. Carbon emissions for the UK electricity grid do not take account of significant decarbonisation and can represent double the correct emissions values.

EPC emissions are based on modelled averages

Emissions are based on properties of a similar size and age, regardless of occupants and actual heating habits. Actual CO2 emissions depend on the energy consumption habits of the dwelling's occupants, plus the percentage utilisation of renewable sources by the grid at any point in time.

Some renewable heat sources are under-represented

Heat pumps for example are assumed to leave a carbon footprint equal to that of electricity generated from the grid.

The Kamma method

Kamma recalculates EPC emissions based on the latest carbon intensity factor data

The net effect of doing this is lower overall emissions disclosure due to electrically heated properties' emissions being overstated.

Kamma can recalculate emissions based on real-time regional carbon intensity data, straight from the National Grid
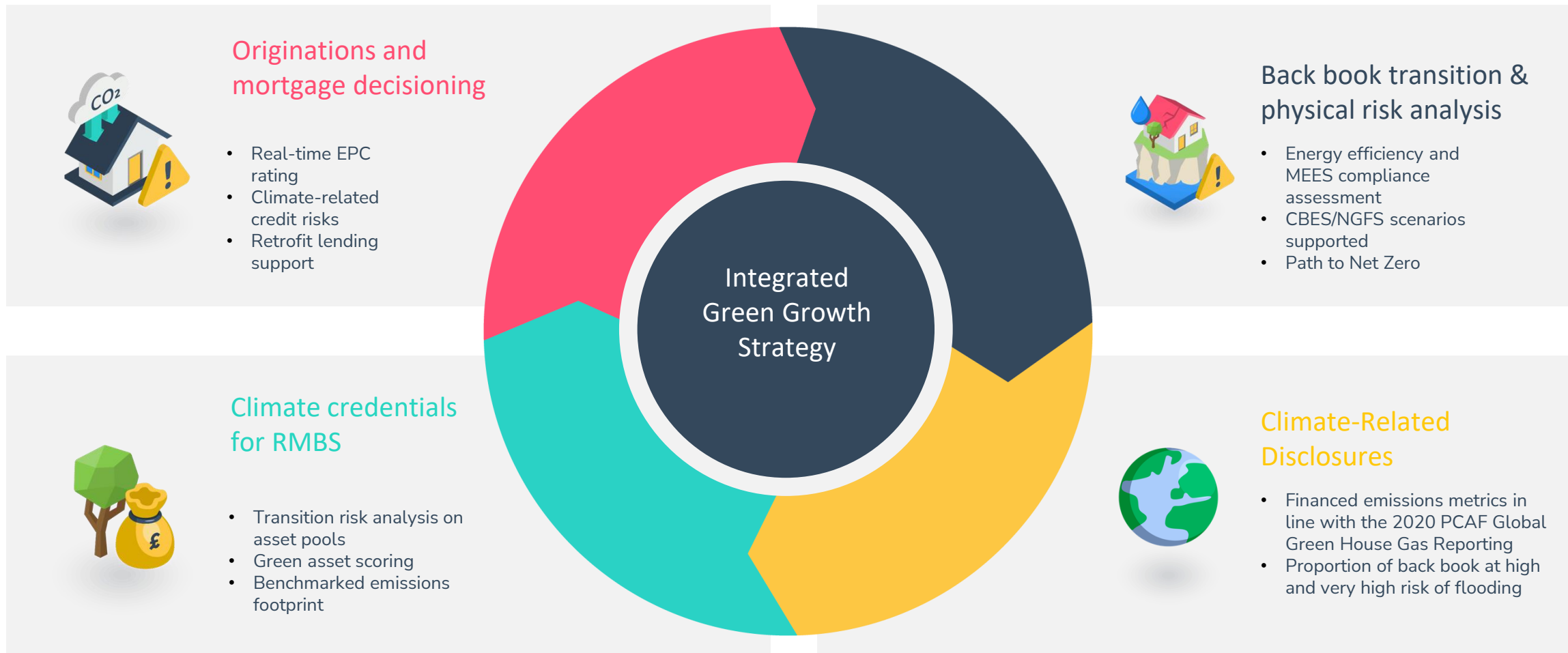
Kamma's recalculated emissions values represent the huge regional disparity in emissions intensity by geographic region and take into account up to the minute carbon intensity factors.

Kamma gives heat pumps the credit they deserve

By working with the HPF (Heat Pump Federation) we are able to accurately estimate the carbon intensity of homes heated by either ground source or air source heat pumps, a segment that will increase significantly in size over the coming years.

Focusing on four priorities for specialist lenders

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Our climate solutions are designed to support the development and execution of an integrated green growth strategy

Originations and mortgage decisioning

- Real-time EPC rating
- Climate-related credit risks
- Retrofit lending support

Back book transition & physical risk analysis

- Energy efficiency and MEES compliance assessment
- CBES/NGFS scenarios supported
- Path to Net Zero

Integrated Green Growth Strategy

Climate credentials for RMBS

- Transition risk analysis on asset pools
- Green asset scoring
- Benchmarked emissions footprint

Climate-Related Disclosures

- Financed emissions metrics in line with the 2020 PCAF Global Green House Gas Reporting
- Proportion of back book at high and very high risk of flooding

Other climate analysis available from Kamma

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Kamma works with world-leading providers of natural perils data to model the physical risks of climate change across any property portfolio.

With Kamma's unrivalled match rates for address resolution, and our partners' well established perils data we can provide a service that is more accurate down to an individual property level than anything else on the market.

Flood Risk: Includes fluvial, pluvial and coastal flood risk. Current risk (defended and undefended) plus models for 2030, 50 and 80 (can be customised). Damage repair costs modelled to property level.

Subsidence Risk: Includes acute risks such as sinkholes and landslides, and also chronic risks such as clay shrink-swell. All risks are combined and modelled into a current risk score as well as modelled future risk scores based on climate scenarios

Coastal Erosion: A risk type that is particularly important to measure within the UK. Provided as a current risk score and modelled future risk scores based on climate scenarios

Where possible future risk is based on NGFS scenarios, and in any case is available based on RCP scenarios. Flood risk can be based on either RCP, NGFS scenarios or both, whereas subsidence and coastal erosion in currently only available as RCP scenarios, although NGFS support is on our roadmap.