Climate risk in a loan book, from hazard to capital

Formulas, the coverage grid and the exercise

The three loans, USD 100 m each

	borrower	EBITDA	interest	Scope 1, Mt CO_2	LGD today	collateral	EVIC
K	coal power plant, Vietnam	84	12	3.0	45%	none	600
S	solar farm, Chao Phraya flood plain	30	6	0	40%	60	150
G	garment maker, coal-fired boilers	35	10	0.04	45%	none	200

Money in USD m. The stress test: a carbon price of 100 US dollars of 2010 per tonne in 2030, and a 1-in-100-year flood that removes 15 of the solar farm's EBITDA and 25 per cent of its collateral. Stylised values.

The coverage grid

interest coverage	6 or more	4 to 6	3 to 4	2 to 3	1.5 to 2	1 to 1.5	below 1
PD, per cent	1.0	1.5	2.0	2.5	5	10	25

Each row holds from its lower bound up to the next: coverage of exactly 4 gives 1.5 per cent. Stylised values.

Formulas

carbon cost	Scope 1 emissions × carbon price; Mt times USD per tonne is USD m. No pass-through and no free allocation.
interest coverage	EBITDA / interest, with EBITDA after the carbon cost and the flood
LGD	1 − collateral/exposure, never below zero
expected loss	EL = PD × LGD × exposure
IRB capital	$K(\text{PD}, \text{LGD}, M)$ per unit of exposure, CRE31.5, at $M = 2.5$ years; RWA = 12.5 × K × exposure; capital = 10.5% of RWA
financed emissions	exposure / EVIC × Scope 1 emissions, the PCAF attribution
NGFS families	orderly: the carbon price alone; hot house world: the flood alone; disorderly: both

Exercise, in pairs, eight minutes

A cement plant borrows USD 100 m.

	EBITDA, USD m	interest, USD m	Scope 1, Mt CO_2	carbon price, USD per t	LGD
cement plant	52	10	0.4	100	45%

1. its interest coverage and PD today, from the grid;
2. its carbon cost, EBITDA and coverage at the carbon price;
3. its PD and expected loss under the stress test.

Check values. The carbon cost is USD 40 m, and coverage today is 5.2. Stylised values.

Glossary

EBITDA	earnings before interest, taxes, depreciation and amortisation	PD	probability of default within one year
LGD	loss given default, the share of exposure lost	EL	expected loss, PD × LGD × exposure
IRB	internal ratings-based approach of the Basel framework	RWA	risk-weighted assets
EVIC	enterprise value including cash, the PCAF denominator for listed firms	PCAF	Partnership for Carbon Accounting Financials
NGFS	Network for Greening the Financial System; its scenarios set carbon prices and warming	Scope 1	a firm's direct emissions

Sources: BCBS, Basel Framework, CRE31 (version in force from 1 January 2023, published 27 March 2020), paragraph 31.5; BCBS (2011), Basel III: A global regulatory framework for more resilient banks and banking systems, revised version June 2011, Annex 1, Calibration of the capital framework, p. 64; PCAF (2025), Global GHG Accounting and Reporting Standard Part A, 3rd ed., section 5.2, p. 58.

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