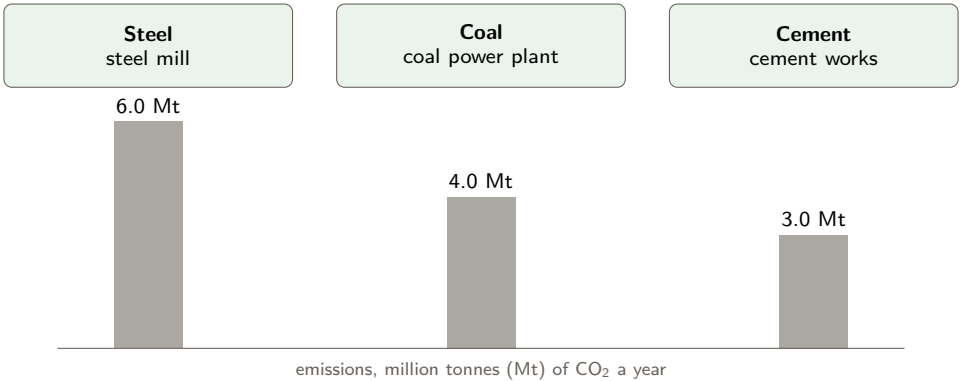
Climate value-at-risk of firms and portfolios

Mathematics of green finance risk management

Joerg Osterrieder

University of Twente

Steel, Coal and Cement and the tonnes they emit



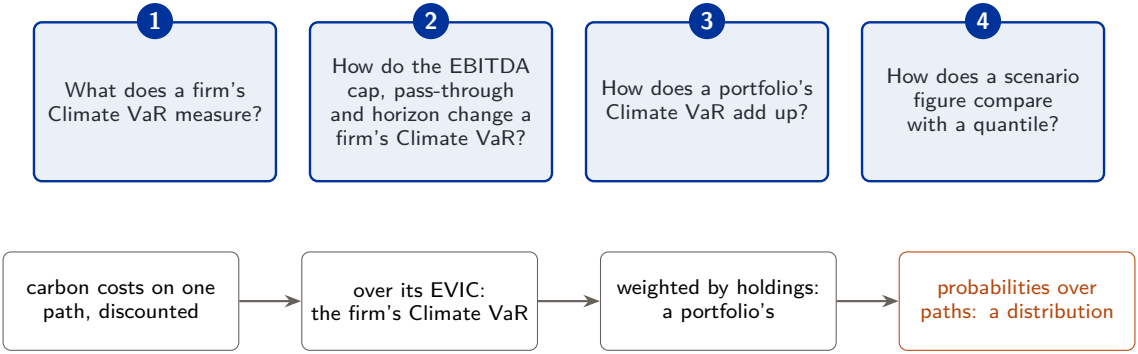
Rank the three by the share of their value that the Orderly carbon price path removes over 2026 to 2040.

The six-firm book: six stylised firms, Coal, Cement and Steel facing carbon prices and Port, Rice and Solar facing warming, each with its emissions, pass-through, abatement cost, EBITDA and EVIC. Stylised values.

Climate VaR turns a carbon price path into a share of a firm's value

1. State a firm's Climate VaR: minus the present value of its net carbon costs on one carbon price path, each year at most its EBITDA, over its EVIC
2. Compute a firm's net carbon cost and share of value for one year, and the physical part from the extra average annual loss
3. Compute how Climate VaR changes with pass-through, and find the years in which the EBITDA cap binds
4. Explain how pass-through, EVIC, abatement and the horizon set the order of firms by Climate VaR
5. Compute a portfolio's Climate VaR as the holding-weighted sum of its firms' figures
6. Compute an expected loss and a quantile over paths with probabilities, and say which one a risk limit needs

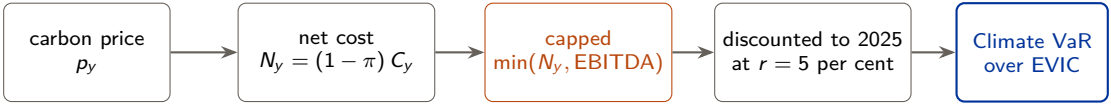
Four questions on Climate VaR



A firm's carbon costs on one path, discounted and divided by its EVIC, give its Climate VaR; holdings weight the firms' figures into a portfolio's; probabilities over paths turn one figure per path into a distribution.

Climate VaR divides a path's discounted net carbon costs by EVIC

1 2 3 4 **What does a firm's Climate VaR measure?**



$$\text{Climate VaR} = -\frac{1}{V}\sum_{y=2026}^{2040}\frac{\min(N_y, \text{EBITDA})}{(1+r)^t}, \quad t = y - 2025, \qquad C_y = \begin{cases} p_y E - p_y^2/(2k) & p_y < \bar{p} \\ \bar{p}E/2 & p_y \geq \bar{p} \end{cases}$$

C_y is L1's compliance cost; Climate VaR is minus the loss. A year loses at most its EBITDA, as a firm stops before paying more than it earns. V is EVIC: shares at market value, debt and minorities' interests at book value.

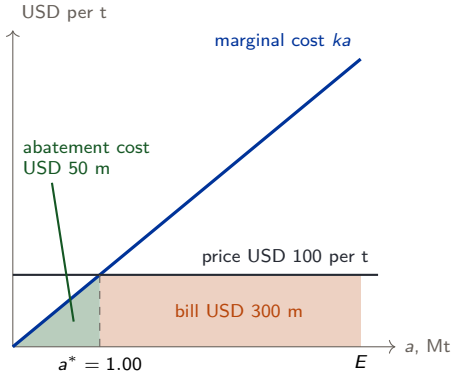
EVIC: PCAF (2025), Global GHG Accounting and Reporting Standard Part A, 3rd ed., section 5.2, p. 57, read 30 September 2026.

A firm passes its whole carbon cost on to customers, so $\pi = 1$. What is its Climate VaR on any path?

Net carbon cost of Coal in 2026

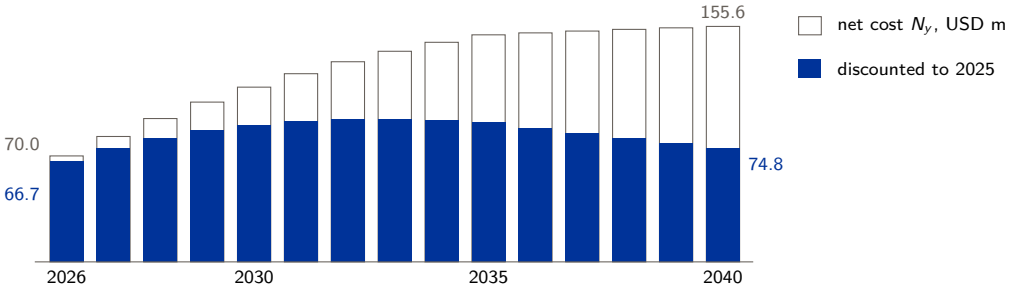
$a^* = p/k = 100/100 = 1.00$ Mt	$ka^* = p$
$C = p(E - a^*) + ka^{*2}/2$	bill plus abatement, USD m
$= 300 + 50 = 350$	$100 \times (4.0 - 1.00)$
$N = (1 - \pi)\, C = 0.2 \times 350 = 70$	$\leq$ EBITDA of 320
$PV = 70/1.05^t = 66.67$	$t = 2026 - 2025 = 1$
share $= 66.67/2{,}600 = 2.56$	per cent of EVIC

Coal abates where its marginal cost ka meets the price, pays the price on the rest and keeps 0.2 of the cost: a net carbon cost of USD 70 m. The year removes 2.56 per cent of its EVIC of USD 2,600 m. Stylised values.



At the same 2026 price Cement has $k = 400$, $\pi = 0.90$ and EVIC USD 1,000 m. What are its abatement, net cost and share of EVIC lost?

Climate VaR of Coal over 2026 to 2040

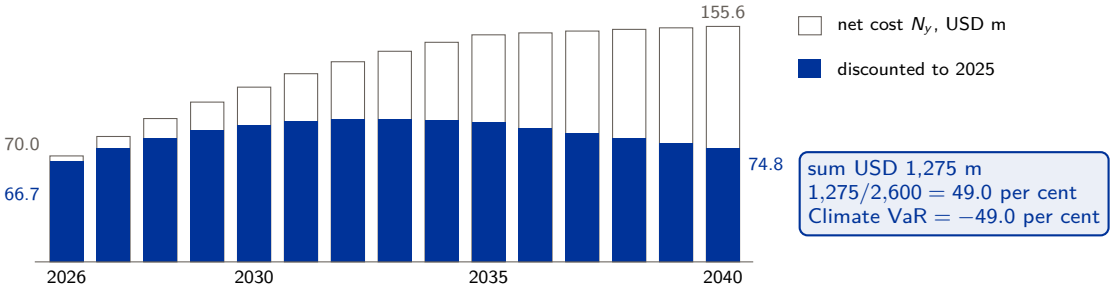


What share of Coal's EVIC of USD 2,600 m do the fifteen filled bars add up to?

The price, in US dollars of 2025, rises to USD 300 per t by 2035 and to USD 333.33 by 2040. Abatement grows with the price, so the net cost rises more slowly than the price, and after 2033 discounting shrinks each year's bar faster than the cost grows. Stylised values.

Without discounting, what share of Coal's EVIC would the fifteen net costs, the outlined bars, remove?

Climate VaR of Coal over 2026 to 2040



What share of Coal's EVIC of USD 2,600 m do the fifteen filled bars add up to?

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Warming adds the present value of the extra average annual loss

$$E[S] = \lambda\, E[X] \qquad \text{AAL of L2}$$

$$E[S_m] = m\lambda\, E[X] \qquad \text{rate times } m$$

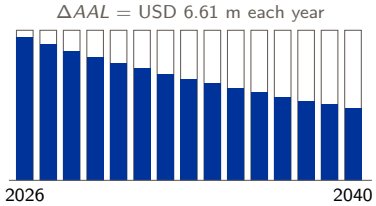
$$\Delta AAL = (m-1)\,\lambda\, E[X] \qquad \text{the extra loss}$$

$$PV = \Delta AAL \sum_{t=1}^{T} (1+r)^{-t} \qquad t = y - 2025$$

$$= \Delta AAL\, \frac{1-(1+r)^{-T}}{r} \qquad \text{geometric sum}$$

$$\text{physical Climate VaR} = -PV/V \qquad \text{over EVIC}$$

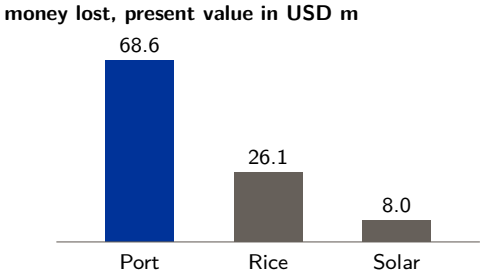
With $T = 15$ years, 2026 to 2040, and $r = 0.05$ the present value factor is 10.38. Warming triples the rate of Port's storm surges, $m = 3.0$, so its extra average annual loss is $(m-1) \times AAL = 2.0 \times 3.305$, USD 6.61 m a year. Stylised values.

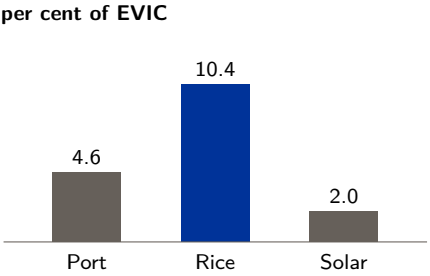


filled: discounted to 2025,
sum 6.61×10.38 = USD 68.6 m

With the five-year factor 4.33, what is Port's physical Climate VaR over 2026 to 2030, on its EVIC of USD 1,500 m?

Port loses the most money to warming and Rice the largest share of value





	m	AAL, L2	ΔAAL	EVIC, USD m	physical Climate VaR, %
Port, storm surge	3.0	3.305	6.61	1,500	−4.6
Rice, river flood	1.5	5.028	2.51	250	−10.4
Solar, hail and typhoon	1.2	3.833	0.77	400	−2.0

Each present value is $\Delta AAL \times 10.38$, and Rice's EVIC is a sixth of Port's. Stylised values.

Rice's EVIC doubles to USD 500 m with its losses unchanged. Does Rice still lose the largest share of value to warming?

Climate VaR is linear in pass-through until the EBITDA cap binds

1 2 3 4 **How do the EBITDA cap, pass-through and horizon change a firm's Climate VaR?**

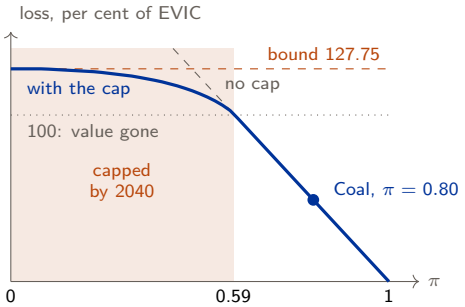
$$\text{Climate VaR}(\pi) = -\frac{1}{V}\sum_y \frac{\min\{(1-\pi)\,C_y,\ \text{EBITDA}\}}{(1+r)^t}$$

$$= -(1-\pi)\,\frac{1}{V}\sum_y \frac{C_y}{(1+r)^t} \quad \text{no year capped}$$

$$\frac{\partial\,\text{Climate VaR}}{\partial\pi} = \frac{1}{V}\sum_y \frac{C_y}{(1+r)^t} = \frac{-\text{Climate VaR}}{1-\pi}$$

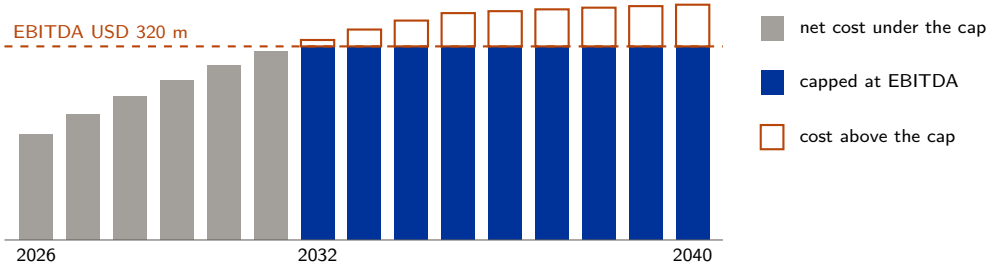
$$\text{cap binds in } y \iff N_y = (1-\pi)\,C_y > \text{EBITDA}$$
$$\iff \pi < 1 - \text{EBITDA}/C_y$$

The exponent is $t = y - 2025$. For Coal, $49.04/0.2 = 245.2$, so its loss falls by 24.52 points per 0.1 of pass-through. A capped year adds nothing to the slope. Stylised values.



Coal raises its pass-through from 0.80 to 0.85. By how many points does its loss fall, and what is its Climate VaR then?

Capped years of Coal at a pass-through of 0.5



Compliance cost C_y, USD m: 621.6 in 2031, 661.1 in 2032, 695.7 in 2033, 725.3 in 2034.
2031: $N = 0.5 \times 621.6 = 310.80 \leq 320$
2032: $N = 0.5 \times 661.1 = 330.55 > 320$
so the cap binds from 2032, where
$\pi = 0.5 < 1 - 320/661.1 = 0.516$.

Climate VaR $= -112.7$ per cent with the cap, -122.6 without. Past -100 per cent the firm's value is gone: the path's costs exceed Coal's EVIC, and a holding loses at most what it holds. MSCI's range runs from -100% to $+100\%$.

Stylised values.

MSCI Climate Paris Aligned Filtered Indexes Methodology (May 2025), section 4.1.4, p. 11, read 30 September 2026.

At a pass-through of 0.55, in which year does Coal's net cost first exceed its EBITDA?

Climate VaR of Steel, Coal and Cement over 2026 to 2040

	E, Mt	$1-\pi$	EVIC, USD m	$(1-\pi)E/V$, t per USD m	k	loss, no abatement, %	abatement, points	loss, %
Steel	6.0	0.1	3,600	166.7	133.3			
Coal	4.0	0.2	2,600	307.7	100			
Cement	3.0	0.1	1,000	300.0	400			

Rank the three again, with pass-through, EVIC and the abatement slope k in view.

With no abatement the loss is $(1-\pi)(E/V)$ times the discounted price sum, USD 2,324 per t. For Coal, 307.7 t per USD m $\times$ USD 2,324 per t $=$ USD 0.715 m per USD m, 71.5 per cent. A small k abates more at each price. Stylised values.

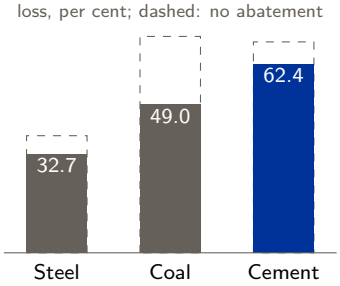
Below which pass-through would Steel's loss exceed Coal's, with no year capped?

Climate VaR of Steel, Coal and Cement over 2026 to 2040

	E, Mt	$1-\pi$	EVIC, USD m	$(1-\pi)E/V$, t per USD m	k	loss, no abatement, %	abatement, points	loss, %
Steel	6.0	0.1	3,600	166.7	133.3	38.7	−6.0	32.7
Coal	4.0	0.2	2,600	307.7	100	71.5	−22.5	49.0
Cement	3.0	0.1	1,000	300.0	400	69.7	−7.3	62.4

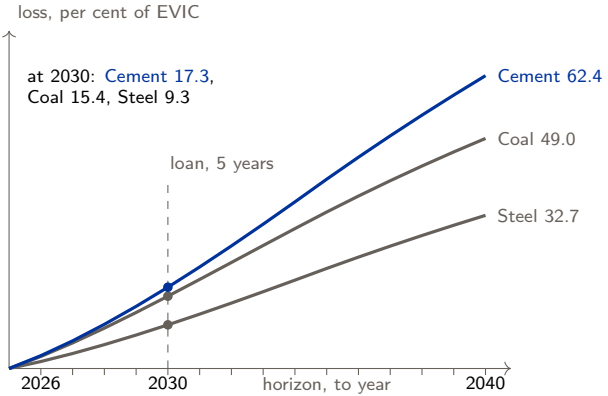
Rank the three again, with pass-through, EVIC and the abatement slope k in view.

With no abatement the loss is $(1-\pi)(E/V)$ times the discounted price sum, USD 2,324 per t. For Coal, 307.7 t per USD m × USD 2,324 per t = USD 0.715 m per USD m, 71.5 per cent. A small k abates more at each price. Stylised values. Pass-through and EVIC put Steel last; abatement takes 22.5 points off Coal and 7.3 off Cement: Cement first, at a Climate VaR of −62.4 per cent.



Below which pass-through would Steel's loss exceed Coal's, with no year capped?

Five years hold under a third of each firm's fifteen-year Climate VaR

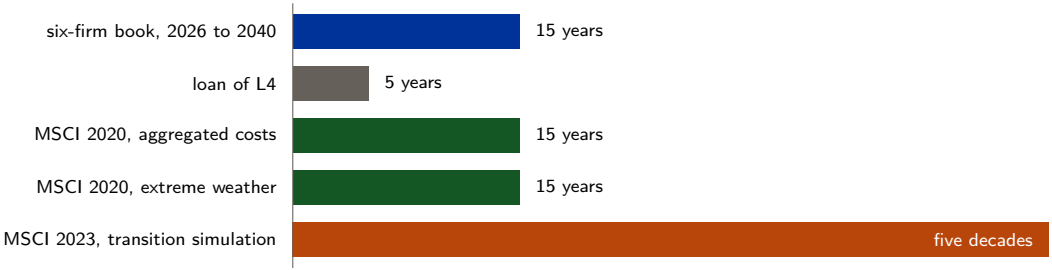


Each firm's curve adds one discounted year to its Climate VaR at a time. The order holds at every horizon. Cement's compliance cost grows 3.00 times from 2026 to 2040, Coal's 2.22 times, so Cement's later years weigh most.

L4 takes the five-year figure, the horizon of a loan, as the fall in asset value: Coal's EVIC of USD 2,600 m falls by 15.4 per cent. Stylised values.

Coal's five-year figure is a larger share of its fifteen-year figure than Cement's. Which input of Coal makes its later years add less?

MSCI's Climate VaR of 2020 aggregates 15 years of costs, the six-firm book's horizon



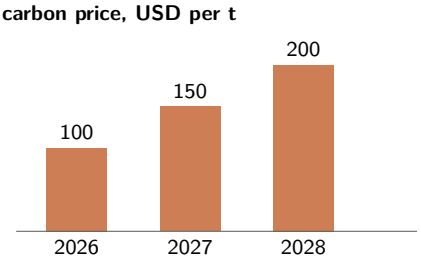
In 2020 MSCI aggregated costs over the next 15 years and projected extreme weather over the coming 15; in 2023 it simulated decarbonisation costs over five decades. Stylised values.

MSCI ESG Research (2020), MSCI ESG Climate Data & Metrics, February 2020, Climate Value-at-Risk, p. 3, read 1 October 2026.
MSCI ESG Research (2020), Managing Climate Risk in Investment Portfolios, Research Insights, June 2020, p. 22, read 1 October 2026.
Nagy, Barnett and Giese (2023), Understanding the Drivers of Transition-Risk Climate VaR, MSCI blog post, 18 August 2023, read 1 October 2026.

A lender limits a 7-year loan to Coal by Climate VaR. Estimate Coal's figure over 2026 to 2032 from its horizon curve.

Climate VaR of Glass over 2026 to 2028

Glass, a glass works
emissions $E = 2.0$ Mt a year
abates all its tonnes at $\bar{p} =$ USD 400 per t,
so $k = \bar{p}/E = 200$
pass-through $\pi = 0.6$
EBITDA USD 100 m a year, EVIC USD 1,200 m
real rate $r = 5$ per cent, $t = y - 2025$

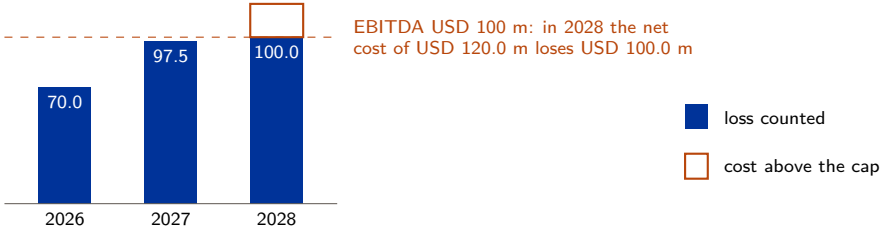


In pairs, eight minutes:

1. each year's abatement $a = p/k$ and compliance cost $C = pE - p^2/(2k)$;
2. the net cost $N = (1 - \pi)\, C$, and the loss, at most EBITDA;
3. each loss discounted to 2025, their sum, and the sum over EVIC;
4. then at $\pi = 0.7$: the capped years and the new Climate VaR.

Stylised values.

Glass loses 20.1 per cent of its EVIC, and its 2028 cost exceeds the cap



year	p	a	C	N, $\pi = 0.6$	loss	discount	present value	at $\pi = 0.7$
2026	100	0.50	175.00	70.0	70.0	0.9524	66.7	50.0
2027	150	0.75	243.75	97.5	97.5	0.9070	88.4	66.3
2028	200	1.00	300.00	120.0	100.0	0.8638	86.4	77.7
sum							241.5	194.0
Climate VaR, sum over EVIC 1,200							−20.1%	−16.2%

Money in USD m. At $\pi = 0.7$ no year of Glass reaches the cap, and its loss falls by 3.9 points. Stylised values.

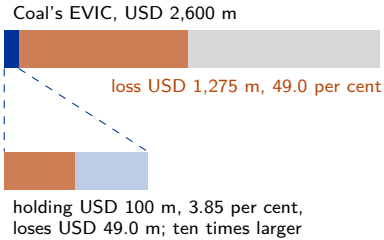
A holding loses its share of the firm's discounted costs, so holdings add

1 2 **3** 4 **How does a portfolio's Climate VaR add up?**

$$\ell_i = -\text{Climate VaR}_i \qquad \text{discounted costs over EVIC}$$
$$s_i = h_i / V_i \qquad \text{share held}$$
$$\text{loss on } h_i = s_i\,\ell_i\,V_i = h_i\,\ell_i \qquad V_i \text{ cancels; at most } h_i$$
$$\text{loss on all} = \sum_i h_i\,\ell_i \qquad \text{one path for all}$$
$$\text{Climate VaR}_P = -\sum_i (h_i/H)\,\ell_i \qquad H = \sum_i h_i$$

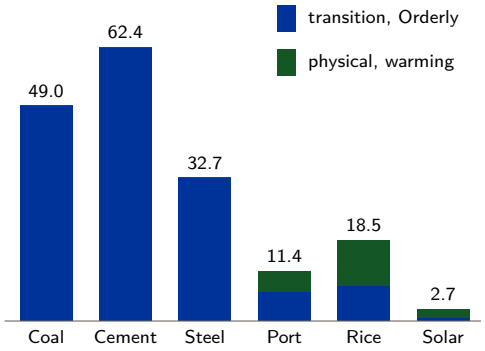
Every claim, shares and debt, is taken to lose the firm's share of value; L4 splits the loss. On one path each ℓ_i is one number and the losses add, as PCAF adds emissions by the holding over EVIC. Stylised values.

PCAF (2025), Global GHG Accounting and Reporting Standard Part A, 3rd ed., section 5.2, p. 58, read 30 September 2026.



A fund holds USD 50 m of Coal and USD 150 m of Steel. What is the fund's Climate VaR?

Climate VaR of the six-firm portfolio



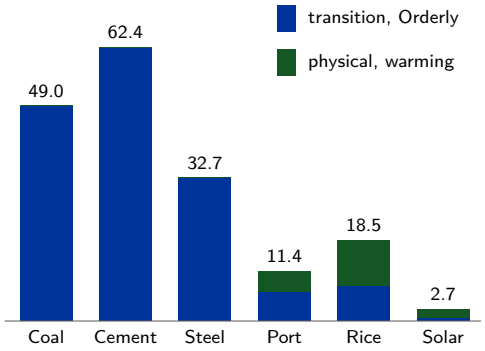
USD m lost on a holding of USD 100 m in each firm of the six-firm book.

Guess first, then add the six bars: what share of the USD 600 m does the portfolio lose?

Stylised values.

With USD 100 m in Coal, Cement and Steel only, what is the three-firm portfolio's Climate VaR?

Climate VaR of the six-firm portfolio



USD m lost on a holding of USD 100 m in each firm of the six-firm book.

Guess first, then add the six bars: what share of the USD 600 m does the portfolio lose?

The six losses add to USD 176.7 m of USD 600 m:

$$\text{Climate VaR}_P = -\frac{176.7}{600} = -29.45 \text{ per cent}$$

Orderly transition costs give 26.62 points and the six-firm book's warming scenario 2.83.

Stylised values.

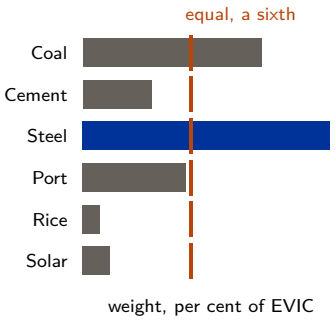
With USD 100 m in Coal, Cement and Steel only, what is the three-firm portfolio's Climate VaR?

Climate VaR of the six firms held at EVIC weights

	EVIC, USD m	weight, %	discounted costs, USD m
Coal	2,600	27.8	1,275.1
Cement	1,000	10.7	624.3
Steel	3,600	38.5	1,175.5
Port	1,500	16.0	170.0
Rice	250	2.7	46.4
Solar	400	4.3	10.7
all	9,350		3,302.0

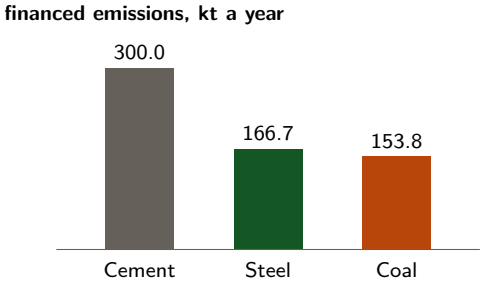
Climate $\text{VaR}_P = -3{,}302.0/9{,}350 = -35.3$ per cent

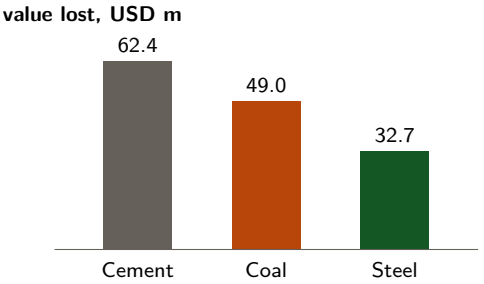
At EVIC weights the portfolio owns the same share of every firm, so its figure is the six firms' discounted costs over their total EVIC. Steel and Coal weigh more than a sixth, the other four less. Stylised values.



Held at EVIC weights, what is the Climate VaR of Coal, Cement and Steel alone?

Financed emissions put Steel above Coal, and Climate VaR puts Coal above Steel

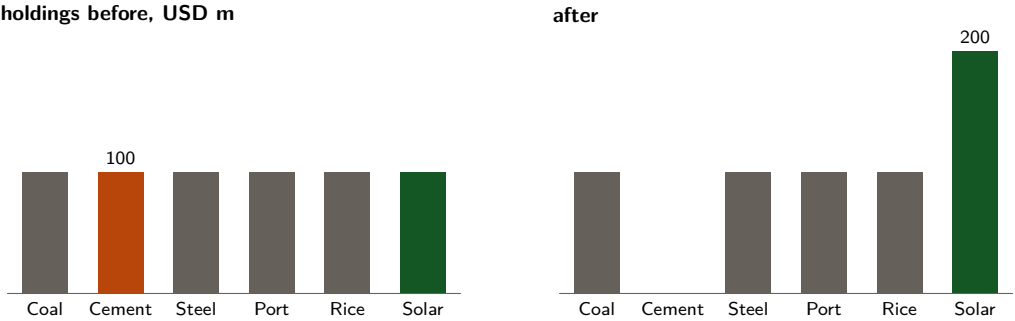




Both measures apply the same share to a holding of USD 100 m: the holding over EVIC. Financed emissions multiply it by the firm's tonnes; Climate VaR multiplies it by what the tonnes cost the firm after pass-through and abatement, discounted over 2026 to 2040. Steel passes on 0.90 of its cost, Coal 0.80. Stylised values.

Steel's pass-through falls to Coal's 0.80. Do the two measures then rank Steel and Coal the same way?

Moving USD 100 m from Cement to Solar cuts the loss by 9.95 points



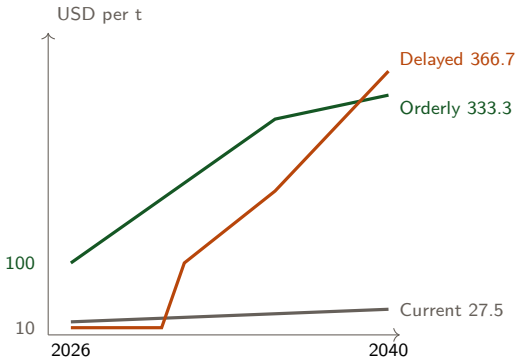
$$\Delta\ell_P = (\ell_i - \ell_j)\,\frac{\Delta h}{H} = (62.4 - 2.7) \times \frac{100}{600} = 9.95, \qquad i \text{ Cement}, j \text{ Solar}$$

The losses fall from USD 176.7 m to USD 117.0 m of USD 600 m, so the portfolio's loss falls from 29.45 to 19.50 per cent: each USD m moved takes 0.10 points off, the difference of the two loss shares over H. Stylised values.

Move USD 100 m from Coal to Port instead. By how many points does the portfolio's loss fall, and to what?

The portfolio loses 26.6 per cent on Orderly and 2.7 on the Current path

1 2 3 **4** **How does a scenario figure compare with a quantile?**



transition loss, %	Current	Delayed	Orderly
Cement	5.4	36.0	62.4
Coal	5.5	28.8	49.0
Steel	3.0	18.9	32.7
portfolio	2.7	15.5	26.6

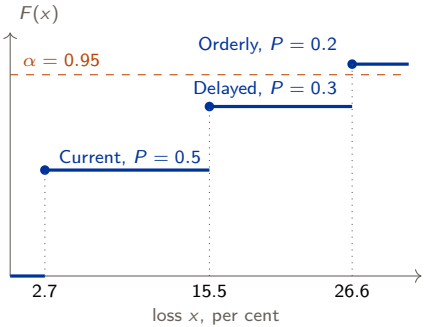
Each figure assumes that its path happens. On the Current path Coal's loss passes Cement's, 5.5 against 5.4: the order depends on the path as well. The physical part, 2.83 points, stays at the six-firm book's one warming scenario. Stylised values.

On the Delayed path the price stays at USD 10 per t until 2030. What is Coal's Climate VaR over 2026 to 2030 on it?

Probabilities over paths turn scenario figures into an expected loss and a quantile

$L_s = -$Climate VaR on path s	one number per path
$P_s = \Pr(\text{path } s)$, $\sum_s P_s = 1$	a probability each
$E[L] = \sum_s P_s L_s$	expected loss
$F(x) = \sum_{s:\, L_s \le x} P_s$	loss at most x
$L_\alpha = \min\{x : F(x) \ge \alpha\}$	α quantile

The six-firm book gives its paths no probabilities. With the P_s of the picture, F is a step function, and its quantiles are scenario figures, one path each. Stylised values.



The portfolio's transition loss on the three paths.

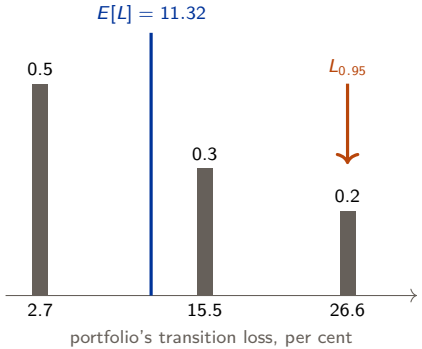
In the picture, for which levels α is the α quantile the Delayed figure?

Expected loss and 95th percentile of the portfolio over three paths

path	P_s	L_s, %	$P_s L_s$	$F(L_s)$
Current	0.5	2.7	1.35	0.5
Delayed	0.3	15.5	4.65	0.8
Orderly	0.2	26.6	5.32	1.0
		$E[L]$	11.32	

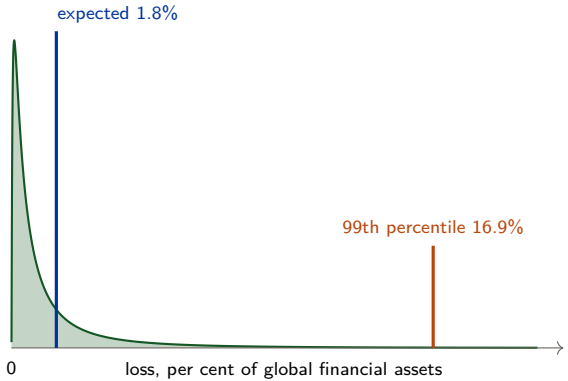
$L_{0.95} = 26.6$: F first reaches 0.95 at the Orderly figure.
$L_{0.75} = 15.5$, the Delayed figure.

$E[L] = 11.32$ lies between the Current and Delayed figures. Orderly's probability, 0.2, exceeds $1 - 0.95$, so the 95th percentile of the portfolio's loss is the Orderly figure. Stylised values.



Set Orderly's probability at 0.04 and the Current path's at 0.66. What is the 95th percentile now?

Dietz et al. find a 99th percentile climate VaR 9.4 times the expected one

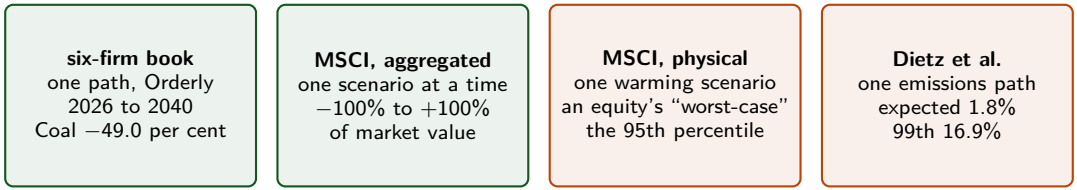


Dietz et al. give a distribution of the climate damage to global financial assets along one business-as-usual emissions path: an expected climate VaR of 1.8% and a 99th percentile of 16.9%, 9.4 times larger. The spread covers damages inside that one scenario. A quantile answers how bad a loss is with a stated probability; the six-firm book's figure answers how bad it is on one path.

Stylised positions.
Dietz et al. (2016), Nature Climate Change 6, 676 to 679, abstract, read 30 September 2026.

What would the six-firm book need before it could state a 99th percentile of Coal's Climate VaR?

MSCI reports Climate VaR by scenario, and a 95th percentile for physical risk



MSCI reports its aggregated Climate VaR in per cent of market value, one scenario at a time. For physical risk it adds an equity's "worst-case" downside or upside, the 95th percentile, inside one warming scenario. Stylised values. MSCI Climate Paris Aligned Filtered Indexes Methodology (May 2025), section 4.1.4, p. 11, read 30 September 2026; MSCI Climate Paris Aligned Filtered Indexes Methodology (May 2025), MSCI Climate Value-at-Risk, p. 18, read 30 September 2026.

A risk committee limits Coal's loss exceeded with five per cent probability. Which of the four figures answers it?

Climate VaR adds capped, discounted costs over EVIC, by firm and by holding

1	What does a firm's Climate VaR measure?	Minus the share of EVIC lost on one path: net carbon costs, each year at most EBITDA, discounted, plus the extra average annual loss. Coal: −49.0 per cent.
2	How do the EBITDA cap, pass-through and horizon change a firm's Climate VaR?	Coal's loss falls 24.52 points per 0.1 of pass-through until the cap binds, below 0.59. Past a loss of 100 per cent the value is gone, and a holding loses at most what it holds.
3	How does a portfolio's Climate VaR add up?	As the holding-weighted sum of the firms' losses, exact for the transition part, where every firm is on one path: a holding of USD 100 m in each firm loses 29.45 per cent, Orderly transition plus warming.
4	How does a scenario figure compare with a quantile?	A quantile needs probabilities over paths. Dietz et al. find 1.8% expected and 16.9% at the 99th percentile on one emissions path; MSCI's methodology of May 2025 names a 95th percentile for physical risk.

Stylised values.

Sources on climate value at risk

- S. Dietz, A. Bowen, C. Dixon and P. Gradwell (2016). 'Climate value at risk' of global financial assets. *Nature Climate Change* 6, 676 to 679: abstract.
- MSCI ESG Research (2020). MSCI ESG Climate Data and Metrics, February 2020: Climate Value-at-Risk, p. 3.
- MSCI ESG Research (2020). Managing Climate Risk in Investment Portfolios. Research Insights, June 2020: p. 22.
- MSCI (2025). MSCI Climate Paris Aligned Filtered Indexes Methodology, May 2025: section 4.1.4, p. 11, and p. 18.
- Z. Nagy, R. Barnett and G. Giese (2023). Understanding the Drivers of Transition-Risk Climate VaR. MSCI blog post, 18 August 2023.
- NGFS (2024). NGFS long-term scenarios for central banks and supervisors, Phase V, November 2024.
- PCAF (2025). The Global GHG Accounting and Reporting Standard, Part A: Financed Emissions, third edition: section 5.2, pp. 57 and 58.

Sources read on 1 October 2026 for MSCI's 2020 documents and blog post, on 30 September 2026 for the others.

Declarations

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Checkpoint: Climate VaR of firms and portfolios

1. A firm has EVIC USD 800 m and EBITDA USD 50 m; its net carbon costs in 2026 to 2028 are USD 30, 45 and 60 m. Its Climate VaR at $r = 5$ per cent?
2. A kiln: 5 Mt, $\bar{p} =$ USD 500 per t, $\pi = 0.7$, EVIC USD 3,000 m. Its share of EVIC lost at USD 150 per t in 2026? A warehouse, EVIC USD 200 m, AAL USD 3 m, $m = 1.5$: its physical part over 2026 to 2040?
3. A firm's Climate VaR is -30 per cent at $\pi = 0.75$, no year capped. What is it at 0.85? At 0.75, with compliance costs USD 200, 260 and 320 m in 2026 to 2028 and EBITDA USD 70 m, which years are capped?
4. Firm A: 2 Mt, $\pi = 0.5$, EVIC USD 2,000 m; firm B: 8 Mt, $\pi = 0.9$, EVIC USD 4,000 m; neither abates nor reaches its cap. Which loses more on one path, by what factor, and over five years?
5. A portfolio holds USD 200, 300 and 500 m in firms at -40, -10 and -4 per cent. Its Climate VaR?
6. Paths with probabilities 0.6, 0.3, 0.1 give -2, -15, -40 per cent. The expected loss, the 95th percentile, and which one a limit exceeded with five per cent probability needs?

Stylised values.



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Climate value-at-risk of firms and portfolios - Mathematics of Green Finance Risk Management, Lecture 3

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This copy was published at https://digital-ai-finance.github.io/Green-Finance/teaching/module4-mathematics/M4_Mathematics_L3_Climate_VaR.pdf

The project site is https://digital-ai-finance.github.io/Green-Finance. A question about this file goes to joerg.osterrieder@utwente.nl.

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