

Stressing the loan the bank agreed to

A credit committee wants to know what happens to the loan when things go wrong. The answer has to be about the loan it is being asked to approve. Re-sizing the debt for each stress answers a different question, so the engine freezes the financial-close debt and re-runs everything else. This post runs Riverbend's stress pack.

01 THE METHOD

Every scenario re-runs the model on the financial-close debt: principal and sculpted repayments are frozen at the base case; interest, DSRA, tax and the waterfall recompute. Capex overruns are funded by sponsor equity. Rate shocks move the floating base rate only: margins, swap rates and fixed-rate loans do not reprice.

COD delay: construction runs longer (IDC, fees) and the first months of operation are lost while repayments start on the date fixed at financial close; the shortfall falls to the DSRA, the EPC contractor's delay damages or delay-in-start-up (DSU) insurance.

Annual output varies with the weather. The energy yield report treats each year's output as normally distributed around the P50 (a bell curve): the P90 is the output beaten in nine years out of ten, the P99 in 99 years out of 100. From the report's one-year P90 the workbook works out the spread, σ , and the P99 in two live formulas:

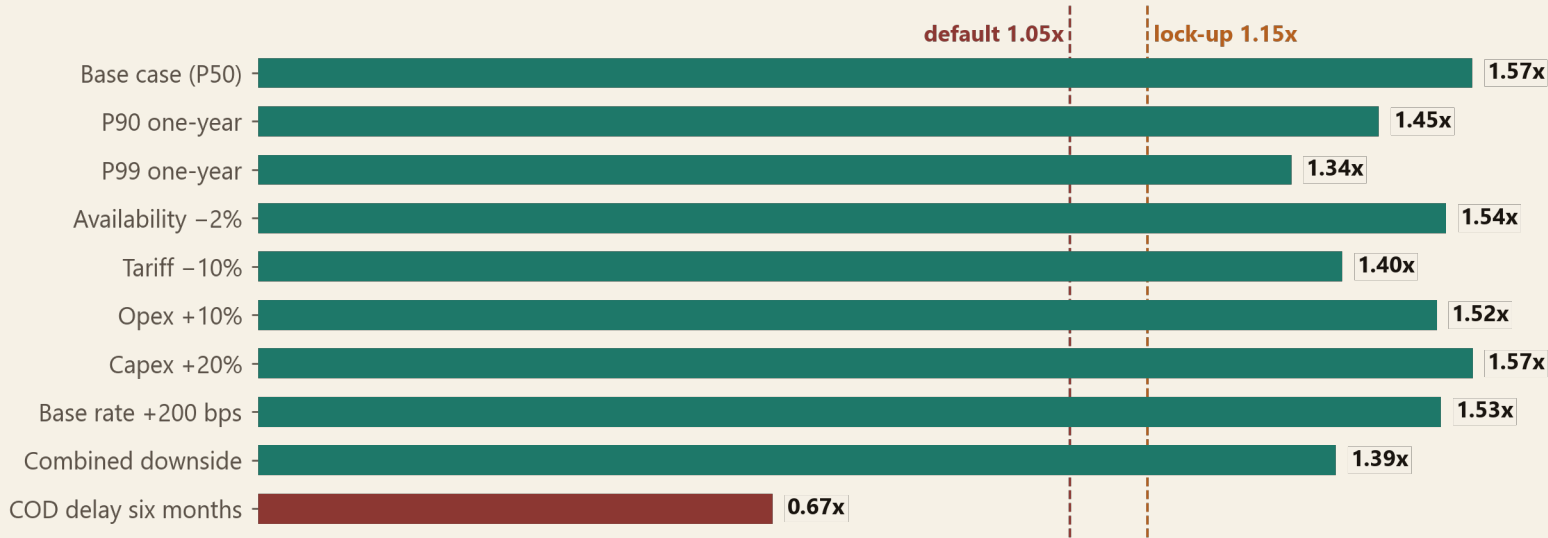
TABLE 8.1 Yield uncertainty, Lender Stress tab

WORKBOOK ROW	VALUE
P90 one-year	92.5%
Yield uncertainty, $\sigma = (1 - P90) / 1.2816$	5.9%
P99 one-year = $1 - 2.3263 \times \sigma$	86.4%

Formulas: $= (1 - B9) / 1.2816$ and $= 1 - 2.3263 \times B10$. 1.2816 is how far below the average, in standard deviations, the 10th percentile of a normal distribution sits; 2.3263 the 1st percentile. So $\sigma = (1 - 0.925) \div 1.2816 = 5.85\%$ of P50, and $P99 = 1 - 2.3263 \times 5.85\% = 86.4\%$ of P50 (NREL, 2012; Solargis).

02 THE RESULT

EXHIBIT 8.2 Minimum DSCR by stress, debt frozen at R554.9m



Every case but the COD delay holds above the 1.05x event of default, and the combined downside (P90 output, capex and opex 10% higher and rates 100 bps up, all at once) holds above the 1.15x lock-up at 1.39x. Capex overruns barely move the cover because they are funded by sponsor equity: they hurt the IRR, not the lender.

TABLE 8.3 The stress matrix, Lender Stress tab

SCENARIO	MIN DSCR	AVG DSCR	LLCR	EQUITY IRR	LOCK-UP YRS	EOD YRS
Base case (P50)	1.570x	1.582x	1.566x	21.58%	0	0
P90 one-year yield: 92.5% of P50	1.449x	1.469x	1.446x	17.98%	0	0
P99 one-year yield: 86.4% of P50	1.336x	1.377x	1.347x	15.04%	0	0
Availability 2% lower (energy lost)	1.536x	1.551x	1.534x	20.63%	0	0
Tariff 10% lower	1.402x	1.430x	1.405x	16.75%	0	0
Opex +10%	1.524x	1.554x	1.539x	20.78%	0	0
Capex +10% (equity funded)	1.570x	1.597x	1.576x	16.96%	0	0
Capex +20% (equity funded)	1.570x	1.612x	1.586x	13.95%	0	0
Base rate +100 bps	1.553x	1.567x	1.547x	21.10%	0	0
Base rate +200 bps	1.529x	1.553x	1.529x	20.62%	0	0
COD delay 6 months	0.665x	1.525x	1.456x	15.20%	1	1
Combined: P90, capex +10%, opex +10%, base rate +100 bps	1.394x	1.444x	1.410x	13.17%	0	0

Shaded cells are engine-computed values written into the workbook; the rest are live Excel formulas.

03 THE ONE THAT DOESN'T HOLD

COD DELAYED SIX MONTHS

The repayment profile and the final maturity are fixed at financial close, and the first repayment falls six months after COD but no later than a fixed backstop date. Delay COD by six months and the instalments start on time with half a year of revenue missing: 0.67x in year 1, with the lock-up and the default test both failed. That gap is what the DSRA, the EPC contractor's delay damages, delay-in-start-up (DSU) insurance (which pays lost revenue when insured damage during construction causes the delay) and the sponsor's completion support are for, and the reason this row stays in the credit paper.

04 HOW FAR BEFORE 1.00X

TABLE 8.4 Breakevens: minimum DSCR of 1.00x on the frozen debt

LEVER, EVERY YEAR	HEADROOM	YEAR-1 EQUIVALENT
Generation (every year)	31.8%	99 218 MWh
Energy tariff (every year)	31.6%	R0.65/kWh realised

A 31.8% loss of output in every year sits beyond one-year P99.9.

05 IN THE TERM SHEET

TABLE 8.5 Indicative term sheet, section 6

CASE (DEBT FROZEN AT FINANCIAL CLOSE)	MIN DSCR	LLCR	EQUITY IRR
Base case (P50)	1.57x	1.57x	21.6%
P90 one-year yield: 92.5% of P50	1.45x	1.45x	18.0%
P99 one-year yield: 86.4% of P50	1.34x	1.35x	15.0%
Combined: P90, capex +10%, opex +10%, base rate +100 bps	1.39x	1.41x	13.2%

The same rows as the workbook, because both are written from one run.

06 CONCLUSION

Twelve cases and two breakevens on the loan as agreed, in 0.9 seconds. The base case and every operating stress, the combined downside included, clear the lock-up; only a construction delay breaks the cover, and the structure already has the tools for that. Next: how the model itself is checked.

Checking the model, two ways

The workbook's own checks, NREL SAM, and a published SA case.

Riverbend Solar is an illustrative case study: a fictional deal with no real counterparty. Every figure comes from one run of the engine; every exhibit is generated, none is typed.