

CRISIL Ratings criteria for expected loss rating of infrastructure projects

July 2023

Criteria contacts

Somasekhar Vemuri

Senior Director, Regulatory Affairs & Operations
and Chief Criteria Officer
somasekhar.vemuri@crisil.com

Chaitali Nehulkar

Director
Rating Criteria and Product Development
chaitali.nehulkar@crisil.com

Ramesh Karunakaran

Director
Rating Criteria and Product Development
ramesh.karunakaran@crisil.com

Vishal Raj

Analyst
Rating Criteria and Product Development
vishal.raj@crisil.com

In case of any feedback or queries, you may write to us at criteria.feedback@crisil.com

Background

Expected loss (EL) rating of debt issued by infrastructure projects is based on the EL¹ methodology.

The ratings will be assigned on a scale from CRISIL EL 1 to CRISIL EL 7, with EL 1 representing the lowest expected loss, and EL 7 the highest.²

The EL over the life of a debt instrument is, in turn, based on the two pillars of credit risk — probability of default (PD) and loss given default (LGD).

The EL rating provides crucial information to investors. The information is all the more relevant in the context of infrastructure projects, which are typically funded by much shorter debt tenures than their economic lives and involve periods of unpredictable ramp-up, and cash flow mismatches due to delayed payment from counterparties.

Infrastructure projects are also exposed to significant risks such as cost and time overruns during the construction phase on account of regulatory hurdles. However, once the construction is complete and the project stabilises, credit risk profile usually improves.

Empirical evidence shows the risk of default and loss reduces materially after operations stabilise. Nevertheless, cash flow mismatches due to delayed payments from counterparties, and cash flow variability could constrain the timely debt-servicing ability of operational projects. Hence, even operational infrastructure projects that are fundamentally viable but face short-term liquidity crunch would have constrained credit ratings on the conventional rating scale.

The cash-flow mismatches, however, may not eventually translate into sizeable losses to the investors.

In addition, public private partnership projects have embedded safeguards such as termination payments and contractual protection that limit ultimate losses to debt investors.

Conventional credit rating methodology does not adequately consider these features of infrastructure projects. However, the CRISIL Ratings EL scale factors in these aspects. It undertakes PD assessment as well as a dynamic, forward-looking loss given default (LGD) appraisal, incorporating the underlying asset characteristics as well as recent sectoral and macroeconomic developments.

When used along with PD ratings, EL ratings can help market participants make informed decisions. Also, instruments with the same PD can have different LGDs and, therefore, different EL.

Scope

While EL as a concept is applicable to all sectors, EL ratings are currently offered only for the infrastructure sector³. It can be applied to assess infrastructure projects throughout their life cycle and for debt issued to both special-purpose vehicles and infrastructure corporates.

This document covers the CRISIL Ratings methodology to assess EL ratings for infrastructure project debt.

¹ Previous criteria may be found at: https://www.crisilratings.com/content/dam/crisil/criteria_methodology/expected-loss-ratings/archive/ccrisils-criteria-for-expected-loss-ratings-for-infrastructure-projects-feb2023.pdf

² Pursuant to the Securities and Exchange Board of India (SEBI) guidelines in July 2021, CRISIL Ratings has aligned the EL scale with that introduced by SEBI. The earlier scale and definition CRISIL Ratings used have been provided in the annexure for ready reference.

³ Please refer to annexure for the master list of infrastructure sub-sectors by the Department of Economic Affairs (Ministry of Finance)

EL rating scale for infrastructure projects

The EL rating reflects an opinion on the expected loss to be incurred over the life of the instrument. The table below gives the rating symbols, definitions, and the range of EL that each symbol conveys.

Rating	Definition	Indicative EL range
CRISIL EL 1	Instruments rated 'EL 1' are considered to have the lowest expected loss over the life of the instrument	$\leq 1.25\%$
CRISIL EL 2	Instruments rated 'EL 2' are considered to have very low expected loss over the life of the instrument	$1.25 < X \leq 3.5\%$
CRISIL EL 3	Instruments rated 'EL 3' are considered to have low expected loss over the life of the instrument	$3.5 < X \leq 7.5\%$
CRISIL EL 4	Instruments rated 'EL 4' are considered to have moderate expected loss over the life of the instrument	$7.5 < X \leq 15\%$
CRISIL EL 5	Instruments rated 'EL 5' are considered to have high expected loss over the life of the instrument	$15 < X \leq 25\%$
CRISIL EL 6	Instruments rated 'EL 6' are considered to have very high expected loss over the life of the instrument	$25 < X \leq 35\%$
CRISIL EL 7	Instruments rated 'EL 7' are considered to have highest expected loss over the life of the instrument	$> 35\%$

CRISIL Ratings considers the 'life of the instrument' to be equivalent to the original maturity of the instrument. Some additional cushion over and above the original maturity may be considered to account for potential recoveries after the maturity of the instrument (especially in case of shorter duration instrument). However, in no event can the instrument life exceed the project life.

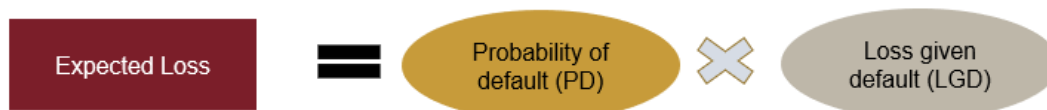
Typical project life for some infrastructure project types

Sector	Typical project life
Annuity roads	As per concession agreement
Toll roads	As per concession agreement
Sea ports	As per concession agreement
Solar power plants	15-18 years
Wind power plants	18-20 years
Thermal power plants	~25 years
Transmission	~35 years

Methodology for computing EL

The two main components of EL for any debt instrument are:

1. Probability of default (PD)
2. Loss given default (LGD)



Once the PD and LGD have been estimated, the EL may be computed by simply multiplying these two elements over the life of the instrument. For instance, the following table calculates EL for a 10-year zero-coupon bond rated 'A' on the CRISIL Ratings conventional PD rating scale with an estimated LGD of 30%.

Arriving at expected loss		
PD (A)	5%	As per CRISIL Ratings default statistics
LGD (B)	30%	Only for illustration
Expected loss (A) * (B)	1.5%	Over the life of the instrument; 10 years

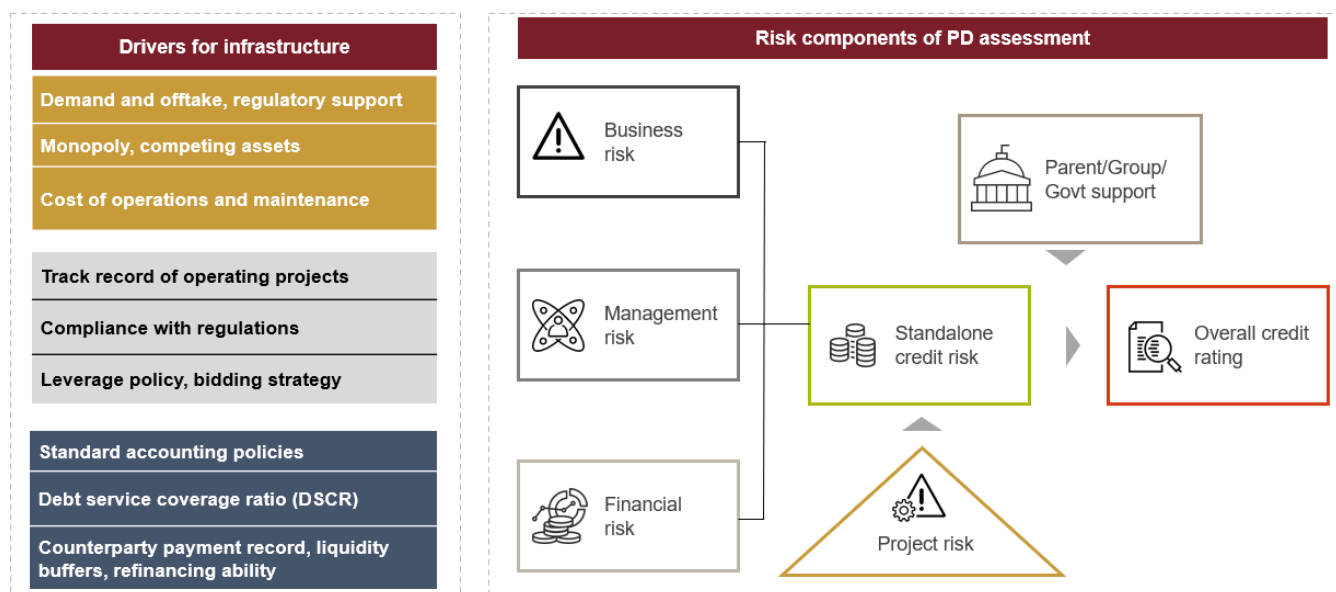
The expected loss here will be 1.5% over the life of the bond being rated and will translate into an **EL2** rating on the CRISIL Ratings EL scale. The annualised expected loss is 0.15% in this case (10-year duration).

PD rating scale (the conventional credit rating scale)

The rating on the PD scale ('AAA' to 'D') is the first key input for arriving at the EL rating. CRISIL Ratings has around 35 years of experience in evaluating PD ratings, with a portfolio of ~18,600 issuers as of March 2023. It has well-defined criteria for assigning these ratings, with different criteria developed for different sectors and instruments to specifically capture their nuances. These rating criteria have been published on the CRISIL Ratings website (www.crisilratings.com).

In case of infrastructure projects, the rating methodology focuses more on project risk, adequacy of cash flows to service debt (debt service coverage ratio), and liquidity.⁴

PD methodology for infrastructure projects



⁴ Refer CRISIL Ratings criteria on infrastructure - https://www.crisilratings.com/content/dam/crisil/criteria_methodology/infrastructure/CRISIL-Ratings-criteria-infra-unique-rat-drivers_2007.pdf
Refer CRISIL criteria on toll roads, wind energy, solar energy and transmission for sub-sector specific criteria at- https://www.crisilratings.com/content/dam/crisil/criteria_methodology/power/crisil-ratings-criteria-for-the-power-sector.pdf

LGD evaluation (or post-default recovery)

Simply put, LGD is a measure of how much a lender will lose (conversely, how much recovery will happen) out of the total principal lent and the interest accrued if the borrower defaults on its debt obligation.

It is not static and varies across time. For instance, LGD during the construction stage of an infrastructure asset can turn out to be different from that seen once the project is operationalised.

LGD also depends on the credit and market conditions, regulatory frameworks and sectoral trends that are subject to change over time.

To calculate LGD, CRISIL Ratings evaluates hypothetical material events that can lead to a default. Instrument-specific factors such as liability structure, seniority and underlying security against the instrument are centrally factored into the assessment. This enables the assessment of instrument-specific expected recovery.

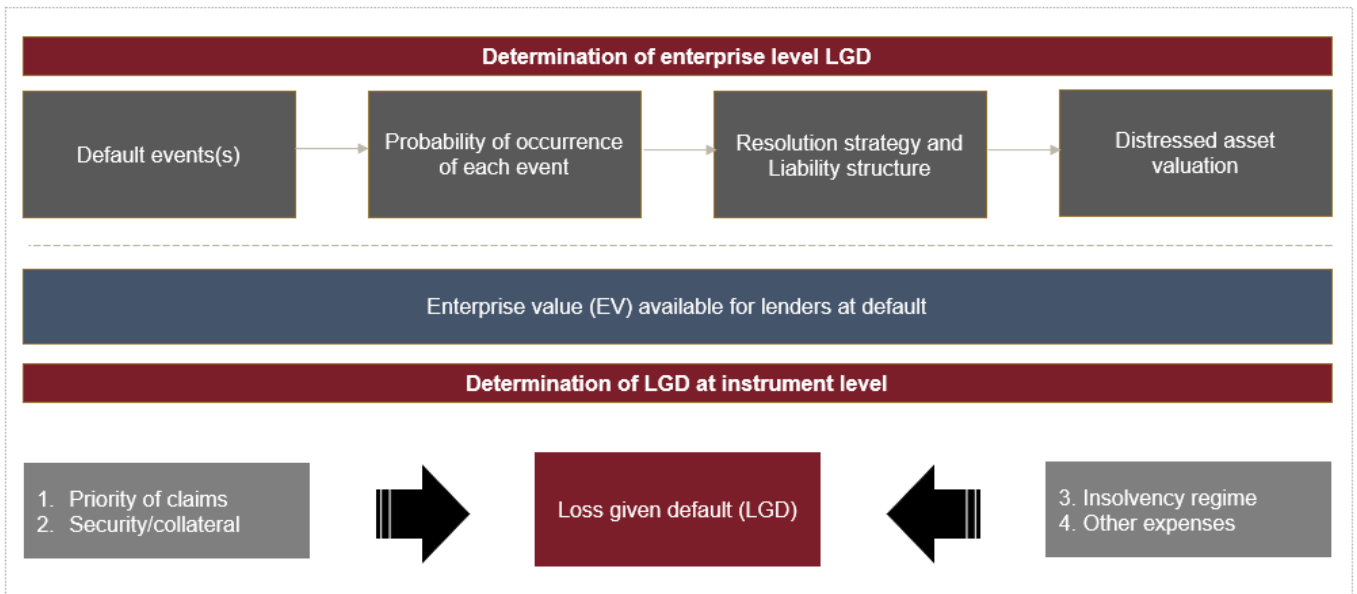
The PD assessment typically assumes a normal business course and base case conditions to arrive at the conventional PD rating. LGD assessment, on the other hand, incorporates tail scenarios to identify possible material events that may lead the asset into a default.

Sample illustration for a thermal power asset:

Base case assumptions	Tail scenarios
<ul style="list-style-type: none"> ▪ Legal agreements (power purchase, fuel supply, among others) will be honoured ▪ Any payment delay or counterparty risk will not stretch for a prolonged period 	<ul style="list-style-type: none"> ▪ The agreements are not honoured/partially honoured, leading to default ▪ Payment delays are stretched for a prolonged period, resulting in default

These tail events may or may not pan out in the real world. But LGD, by definition, is an estimation of loss to the lenders in a post-default condition. Hence, identifying these events, estimating their probability of occurrence and the corresponding financial impact become key inputs to the LGD assessment. These events are used to simulate hypothetical defaults for the asset.

LGD methodology for infrastructure projects



LGD assessment is a two-step process from enterprise-level LGD to instrument-level LGD.

Arriving at enterprise-level LGD

- **Default events:** CRISIL Ratings identifies all the probable material events that may lead the asset being rated into a default. These can be a mix of sector-specific events based on sectoral trends, and asset-specific events nuanced to asset characteristics.

For assets that are closer to default or already in default, the tail events can be estimated with high level of certainty. However, for assets where default is not visible in the imminent future, CRISIL Ratings estimates relative probability of occurrence for each of the tail events based on its expertise on the infrastructure sector and the prevailing market, regulatory, and economic conditions.

CRISIL Ratings assumes a mutually exclusive probability for each of the tail events while arriving at the corresponding loss estimates (LGD) for the lenders.

- **Resolution strategy and liability structure:** For each of the probable events, CRISIL Ratings identifies appropriate resolution strategies. The range of resolution strategies can include, but is not limited to, restructuring of the debt, restructuring of the business, sale of assets and liquidation. These resolution strategies are based on the economic viability of the asset being rated. For instance, if the economic viability of the asset is low, the resolution strategy could be to liquidate the asset. However, if the economic viability is high, the resolution strategy could be debt restructuring with liquidity support through working capital or equity infusion.

CRISIL Ratings factors in the likely resolution strategy based on its own experience and fundamental analysis of the business and its economic viability. Additionally, CRISIL Ratings assumes that the current financial liability structure of the asset shall remain in place till the time of resolution of default.

- **Arriving at distressed asset valuation:** After all the probable events, their respective probabilities and optimal resolution strategies are identified, CRISIL Ratings evaluates distressed asset value corresponding to each event. The distressed asset value will depend on the severity of the event and its expected impact on the asset's

cash flows, asset-specific factors such as the residual value of the asset, operating parameters such as production capacity, utilisation rates and cost structure, the industry in which the issuer operates, and the prevailing macroeconomic environment.

For each probable event, enterprise-level LGD is arrived at by comparing the distressed asset value vis-à-vis the total outstanding debt obligation (including principal and any accrued interest obligations) at the time of default.

Here, CRISIL Ratings assumes the company has a single asset class of debt and a consolidated entity structure. The final enterprise-level LGD is the probability weighted average of all the individual loss estimates corresponding to each probable event.

Arriving at instrument-level LGD

While arriving at the enterprise-level LGD, it is assumed that there is a single asset class of debt and a consolidated entity structure. However, there can be multiple layers of debt with distinct priority of claims. In such cases, the enterprise-level LGD will not translate into an instrument-level LGD.

EL rating, by definition, is the opinion of CRISIL Ratings on the expected loss over the life of the instrument.

Typically, any LGD is first absorbed by the equity holders, then the subordinate lenders and lastly by the senior lenders. Hence, the instrument-level LGD will be an outcome of the rank of the instrument being rated within the overall pool of claims. CRISIL Ratings will also factor in the value of the collateral for instruments that are secured in nature (if any), insolvency regime, and any other expenses (such as operational or legal expenses) required for the sustenance of the asset to arrive at the final instrument-level LGD.

Conclusion

EL ratings combine both pillars of credit risk (PD and LGD), which is inherently dynamic. It keeps evolving depending on industry conditions, competitive environment, company's decisions that could impact its balance sheet and cash flow, and regulatory changes. EL rating will change if either PD or LGD or both vary with time.

Infrastructure projects have unique features, such as predictability of cash flows over the life of the project, which are optimally captured through an EL assessment over the life of a debt instrument.

Annexure

Rating scale and definition used prior to changes carried out pursuant to SEBI guidelines in July 2021

Rating	Definition	Indicative EL Ranges
CRISIL INFRA EL 1 (Lowest expected loss)	Instruments rated 'EL 1' are considered to have the lowest expected loss over the life of the instrument	$\leq 1.25\%$
CRISIL INFRA EL 2 (Very low expected loss)	Instruments rated 'EL 2' are considered to have very low expected loss over the life of the instrument	$1.25 < X \leq 3.5\%$
CRISIL INFRA EL 3 (Low expected loss)	Instruments rated 'EL 3' are considered to have low expected loss over the life of the instrument	$3.5 < X \leq 7.5\%$
CRISIL INFRA EL 4 (Moderate expected loss)	Instruments rated 'EL 4' are considered to have moderate expected loss over the life of the instrument.	$7.5 < X \leq 15\%$
CRISIL INFRA EL 5 (High expected loss)	Instruments rated 'EL 5' are considered to have high expected loss over the life of the instrument	$15 < X \leq 25\%$
CRISIL INFRA EL 6 (Very high expected loss)	Instruments rated 'EL 6' are considered to have very high expected loss over the life of the instrument	$25 < X \leq 35\%$
CRISIL INFRA EL 7 (Highest expected loss)	Instruments rated 'EL 7' are considered to have highest expected loss over the life of the instrument	$> 35\%$

Harmonised master list of infrastructure sub-sectors by the Department of Economic Affairs (MoF)

Sr.No.	Category	Infra sub-sectors
1.	Transport & logistics	<ul style="list-style-type: none"> ○ Roads and bridges ○ Ports ○ Shipyards ○ Inland waterways ○ Airport ○ Railway track, including electrical & signaling system, tunnels, viaducts, bridges ○ Railway rolling stock along with workshop and associated maintenance facilities ○ Railway terminal infrastructure including stations and adjoining commercial infrastructure
2.	Energy	<ul style="list-style-type: none"> ○ Electricity generation ○ Electricity transmission ○ Electricity distribution ○ Oil/gas/liquefied natural gas storage facility ○ Energy storage systems
3.	Water and sanitation	<ul style="list-style-type: none"> ○ Solid waste management ○ Water treatment plants ○ Sewage collection, treatment, and disposal system ○ Irrigation (dams, channels, embankments, among others) ○ Storm water drainage system
4.	Communication.	<ul style="list-style-type: none"> ○ Telecommunication (fixed network) ○ Telecommunication towers ○ Telecommunication & telecom services ○ Data centres
5.	Social & commercial infrastructure	<ul style="list-style-type: none"> ○ Education institutions (capital stock) ○ Sports infrastructure

		<ul style="list-style-type: none">○ Hospitals (capital stock)○ Tourism infrastructure○ Common infrastructure for industrial parks and other parks with industrial activity, such as food parks, textile parks, SEZs, tourism facilities and agriculture markets○ Post-harvest storage infrastructure for agriculture and horticultural produce, including cold storage○ Terminal markets○ Soil-testing laboratories○ Cold chain○ Affordable housing○ Affordable rental housing complex○ Exhibition-cum-convention centre
--	--	---

Full notification dated October 11, 2022, can be accessed at: <https://egazette.nic.in/WriteReadData/2022/239561.pdf>

About CRISIL Ratings Limited (A subsidiary of CRISIL Limited, an S&P Global Company)

CRISIL Ratings pioneered the concept of credit rating in India in 1987. With a tradition of independence, analytical rigour and innovation, we set the standards in the credit rating business. We rate the entire range of debt instruments, such as, bank loans, certificates of deposit, commercial paper, non-convertible / convertible / partially convertible bonds and debentures, perpetual bonds, bank hybrid capital instruments, asset-backed and mortgage-backed securities, partial guarantees and other structured debt instruments. We have rated over 35,000 large and mid-scale corporates and financial institutions. We have also instituted several innovations in India in the rating business, including rating municipal bonds, partially guaranteed instruments and infrastructure investment trusts (InvITs). CRISIL Ratings Limited ("CRISIL Ratings") is a wholly-owned subsidiary of CRISIL Limited ("CRISIL"). CRISIL

Ratings Limited is registered in India as a credit rating agency with the Securities and Exchange Board of India ("SEBI").

For more information, visit www.crisilratings.com.

About CRISIL Limited

CRISIL is a leading, agile and innovative global analytics company driven by its mission of making markets function better.

It is India's foremost provider of ratings, data, research, analytics and solutions with a strong track record of growth, culture of innovation, and global footprint.

It has delivered independent opinions, actionable insights, and efficient solutions to over 100,000 customers through businesses that operate from India, the US, the UK, Argentina, Poland, China, Hong Kong and Singapore.

It is majority owned by S&P Global Inc, a leading provider of transparent and independent ratings, benchmarks, analytics and data to the capital and commodity markets worldwide.

CRISIL Privacy

CRISIL respects your privacy. We may use your personal information, such as your name, location, contact number and email id to fulfil your request, service your account and to provide you with additional information from CRISIL. For further information on CRISIL's privacy policy please visit www.crisil.com/privacy.