

# The different shades of LGD

Infrastructure LGD needs to factor in sector-specific nuances

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## Executive summary

In 2023, CRISIL Ratings conducted a study of 80 stressed infrastructure assets to understand the trends in loss-given default (LGD) in the sector. The results were published in our report, '**A structural lift for infra LGD: time to factor in improvements in the ecosystem**'.

We have now increased the sample to 150+ assets that have happened over the last decade, to make it more representative. Additionally, we have studied some of the sub-sectors, such as roads and power, in greater detail.

The widened sample reaffirm the LGD for infrastructure assets in the 20-60% range, well below the typical LGD (60-80%) factored in by lenders. Sectors such as renewables (solar, wind) and transmission indicated a low LGD trend of 20-30%. LGD in the power sector, encompassing thermal, hydro and gas-based projects, was found at the higher end of the spectrum, at 60-70%, whereas the road sector LGD remained typically in the 25-35% range for annuity projects and 35-50% for toll projects.

The updated study interestingly highlights the dynamic nature of infrastructure LGD, which varies based on multiple factors, including project type, authority, operational status, counterparty profile, timing of the default, priority of claims and overall macro and regulatory environment.

For instance, typical LGDs for annuity road projects<sup>1</sup> were at 25-35%, significantly lower than toll road projects. Similarly, LGDs for road projects with central counterparty was lower at 30-40% compared to state road projects, which was at 50-55%. Furthermore, LGDs for operational road projects were significantly lower at 25-35% compared with those for under-construction road projects at 45-55%.

Infrastructure LGDs have also come down over time, after the implementation of the Insolvency and Bankruptcy Code (IBC) 2016. For instance, road sector LGDs, after fiscal 2016, were low at 20-25% against 35-40% pre-2016.

In the case of the power sector, gas-based projects indicated a higher LGD compared with other power assets. This underscores the point that LGD is not a constant number and should be looked at more fundamentally.

Similar to the 2023 study, the updated study involves infrastructure assets for which data was available courtesy the involvement of CRISIL Ratings as a rating agency in providing recovery risk ratings/independent credit evaluations in the stressed assets space. For other assets, data was collected from publicly available sources, including the Insolvency and Bankruptcy Board of India (IBBI) website and other recognised portals.

The infrastructure sector in India has witnessed a slew of measures that have addressed legacy issues. This is reflected in a raft of policy facilitations that have helped to shore up by several notches the attractiveness of Indian infrastructure as an investment destination.

With these measures, a gradual perceptible shift is seen in the infrastructure sector's credit profile. Infrastructure assets today are better poised to withstand potential stress. Furthermore, in a post-default scenario, the inherent nature of infrastructure assets and many of the favourable policy measures typically result in lower losses.

Rightfully, this improvement in risk profile should be reflected in both probability of default (PD) and LGD – the twin pillars of credit risk.

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<sup>1</sup> Annuity also includes hybrid annuity model (HAM) assets

While improvement in PD is readily visible and is also factored into the pricing, data on loss (and recovery) rates are scarce and difficult to find. As a result, LGD estimates used by the market participants tend to remain relatively static (compared with PD) or are strongly anchored around the historical data.

It is within this context that CRISIL Ratings conducted and published a report on infrastructure LGD last year. The study has now been expanded to a larger sample size after discussing the 2023 study results with various lenders, investors and other market participants in the infrastructure space.

This article aims to capture the shift in credit profile in the infrastructure space and analyse the key changes in the sector that will continue to drive credit risk. It also indicates that expected loss (EL) ratings — capturing PD and LGD — can provide additional insights and help in risk-based pricing.

## Study limitations

The study is based on a sample of stressed infrastructure assets spanning the past decade, where data was readily available and considered reliable by CRISIL Ratings. It must be highlighted that even though the study sample has been expanded with over 150 infrastructure assets reaffirming the earlier results, limitations remain.

There are some sub-segments where the sample size continues to be very small. It may be difficult to arrive at definitive conclusions on LGD for such subsegments.

There could be many other stressed assets in the infrastructure space where data is not available and hence, these do not form part of this study. If the data is made available, the findings could be different from what has been presented in this study.

In general, the LGD estimates would have been far more representative if there was a further increase in the sample size across subsegments and where actual figures are available after successful resolution.

The historical distribution of actual recoveries has also varied widely, both across subsegments and within a subsegment. The variability could have been due to general macroeconomic and credit market conditions or credit factors specific to the defaulted asset under study, such as the nature of the project or the operational status of the project at the time of default.

Other reasons causing the variability include the relative seniority of claims, and the differences in negotiating strength among a company's creditors who may own debt at different group entities.

Hence, users of this report must note the limitations and avoid generalising the LGD estimates from this study to the broader infrastructure sector without conducting further analysis or supplementing it with additional data.

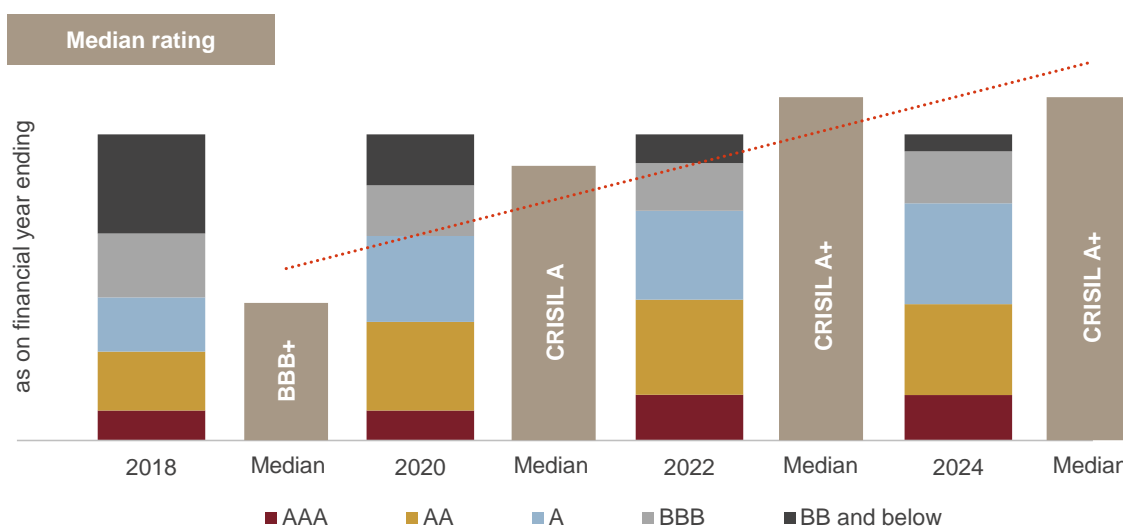
## Median PD rating of infra assets has improved steadily

The infrastructure sector has undergone several improvements to address the concerns of developers and investors. These improvements have helped to reduce bottlenecks, resulting in fewer projects getting stuck and higher proportion of operational assets with minimal time or cost overruns. This has had a positive impact on the financial risk profile of these assets.

This is reflected in the median rating of the CRISIL Ratings portfolio of infrastructure assets, as shown in Chart 1. Please refer to the CRISIL Ratings article, *'Building bonds'*<sup>2</sup> for details.

The median rating has improved from **'CRISIL BBB+'** in 2018 to **'CRISIL A+'** in 2024 – during the same period the number of infrastructure assets rated by CRISIL Ratings increased from ~300 to ~500 companies.

**Chart 1: Rating distribution and median credit rating for CRISIL Ratings infra portfolio**



Source: CRISIL Ratings

<sup>2</sup> <https://www.crisilratings.com/content/dam/crisil/our-analysis/reports/Ratings/documents/2022/09/building-bonds.pdf>



## Larger study reaffirms healthy trend in infra LGD

The results are based on the expanded study by CRISIL Ratings of 150+ infrastructure defaults for which data was available, against the earlier study where the sample size was 80 assets. The larger study reaffirms our earlier loss estimates and are represented in the table below.

Sector	Number of assets studied	Estimated LGD range
Roads – toll	55	35-50%
Roads – annuity	13	25-35%
Power assets (thermal, gas, hydro)	57	60-70%
Wind assets	13	20-30%
Solar assets	5	20-30%
Transmission	5	20-30%
Others <sup>3</sup>	5	60-70%

In many of these cases, CRISIL Ratings was directly involved as a rating agency executing a mandate. These include credit ratings of companies that acquired stressed assets, independent credit evaluation of resolution plans required by banks as part of the Reserve Bank of India (RBI) regulations, and the recovery risk ratings of security receipts issued by asset reconstruction companies (also required as per RBI regulations). The data was supplemented with information from publicly available sources, including from IBBI and other recognised portals.

It is important to highlight that while arriving at the LGD estimates, the CRISIL Ratings study factors in the time value of money lost for the lenders during the resolution period of defaulted assets. The final estimated LGD ranges in the table are backed by experience-based intuitive judgement, as required.

The LGD estimates are based on stressed infrastructure assets for which data was available, and the data does suffer from sampling bias. For sectors such as renewables (particularly, solar) and transmission, the case history of defaults is limited, leading to a low number of data points.

Furthermore, as the study spans the past decade, it comprises a diverse range of projects, including projects that defaulted a long time back (legacy defaults, prior to 2016) and those that defaulted recently. Legacy defaults, forming nearly 40% of the overall sample, involve assets burdened by substantial debt due to cost overruns and other unresolved issues. These saw a steep decline in the asset value, leading to elevated LGDs for the lenders. In contrast, after the emergence of resolution through the IBC in the latter half of the last decade, the recent defaults that were studied have benefited from timely identification and resolution, yielding lower LGD.

Therefore, the final results underscore transitional LGDs covering a mixed bag of legacy defaults and relatively recent defaults. This also leaves scope for further improvement in infrastructure LGD in the time to come.

The findings must be interpreted in the context of these limitations.

<sup>3</sup> Other sector includes shipyards, ports, airports



## Rationale for the sectoral LGD range for infrastructure assets:



**Renewables (solar, wind):** The estimated LGD for renewables was found at 20-30%. As a sector, renewables has a limited case history of defaults. These projects face limited risk during construction because they are modular and have low complexity. The operational assets have shown a stable operating performance track record due to the presence of long-term power purchase agreements (PPAs) and central counterparties. While the older assets have higher equipment costs and tariff structure, the equipment cost and tariff rates have come down over the past few years, more so in the case of solar power projects.

Majority of the renewables sector defaults in the study was on account of weak liquidity or delayed payments from some of the state electricity distribution companies, which have had a poor track record of payments.



**Transmission:** The estimated LGD for transmission assets was found at 20-30%. These assets, like renewables, have a limited case history of defaults. Construction challenges remained the driver for majority of the transmission defaults studied by CRISIL Ratings. Delays in getting right of way (RoW) approvals and forest clearances have impacted project execution in the past, resulting in cost overruns. However, once operational, transmission projects have minimal complexity as there are no moving parts, and revenue is based on line availability (which has not witnessed any major disruption) and low counterparty credit risk (due to point of connection mechanism for interstate transmission assets).

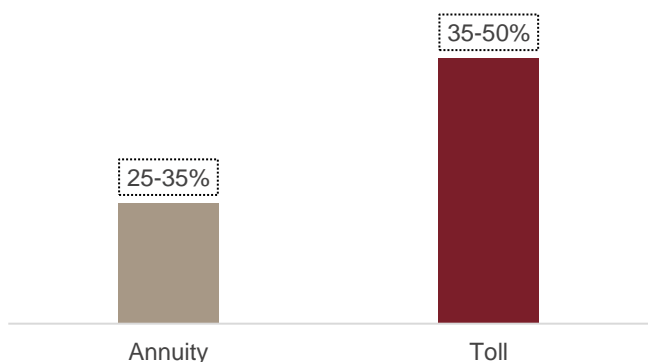


**Roads:** The estimated LGD for road assets was typically found at 25-35% for annuity projects and 35-50% for toll projects. In the past, road projects faced challenges such as significant cost overruns, delays in land acquisition, protracted project execution, and poor sponsor health, leading to unviable levels of debt. In the case of toll assets particularly, overly optimistic bidding prices that were not commensurate with actual traffic volume and toll revenue led to stress buildup during the operational stage.

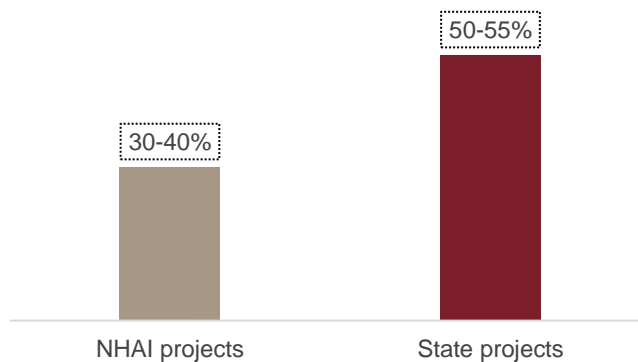
On the other hand, annuity assets faced limited challenges at the operational stage, which were mostly on account of maintenance issues, delayed annuities (state projects) or issues at the sponsor end. With the development of HAM, under-construction risk was also mitigated for annuity road assets.

It needs to be noted that most of the roads that defaulted in the past were toll roads. This is also reflected in the CRISIL Ratings study, with toll road projects forming majority of the road sector defaults studied. The study also highlights the variability in road sector LGD depending on project authority, with LGD for the National Highways Authority of India (NHAI) projects lower at 30-40% vis-à-vis 50-55% for state road projects.

**LGD (%) for annuity and toll road projects**



**LGD (%) for NHAI projects and state projects**



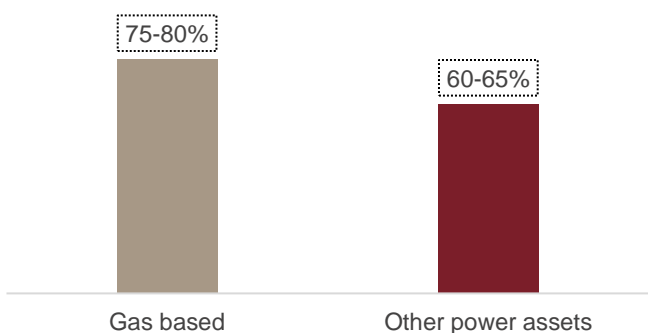
The highlight of the study for the road sector was a bimodal LGD pattern with majority of the defaults having either a very low LGD or very high LGD. Assets on the lower end of the LGD spectrum primarily had liquidity-based defaults, mostly in the operational phase, while the ones on the higher end had defaults on account of RoW or other regulatory/legal issues, mostly in the under construction or stabilisation phase.



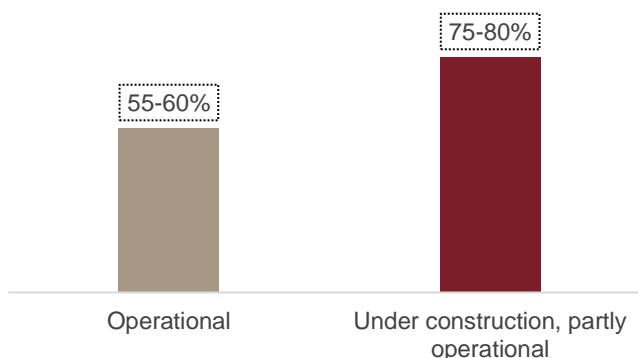
**Power sector (thermal/hydro/gas):** The estimated LGD for power assets was found to be 60-70%. Power plants, especially those dependent on coal, faced challenges related to fuel supply. Delays or disruptions in coal supply, inadequate quantity of coal, changes in coal pricing policies or cancellation of coal mines impacted the operational efficiency and financial viability of several power plants. Construction delays, land acquisition issues, regulatory clearances and other execution challenges increased project costs and debt burden, and hampered revenue generation. Lack of power purchase agreements (PPAs) also affected cash flows. Thus, power plants faced financial stress due to large debt, inadequate capital structure and mismatched cash flows.

The study highlights the dynamic nature of power sector LGD, based on asset type (gas-based/others) and operational status. Many gas power plants were left stranded in the past by lack of gas availability, leading to huge losses. Operational power projects which defaulted majorly on account of significant cost overrun, on the other hand, saw a slightly better LGD due to cash flow visibility compared with under-construction projects.

**LGD (%) for gas based and other power assets**

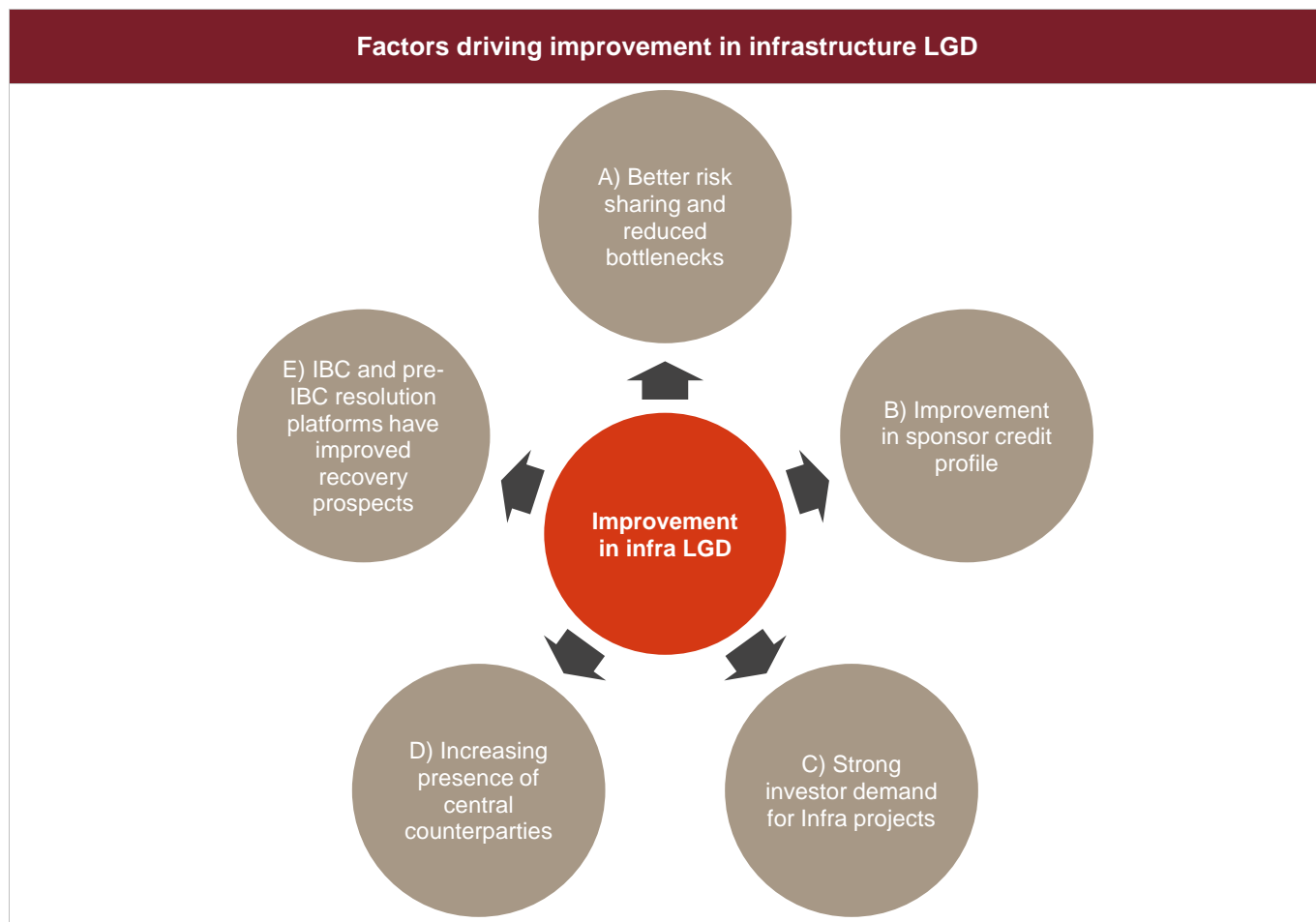


**LGD (%) as per operational status**



## Sector developments that will continue to drive lower LGDs

Infrastructure has been a key pillar of the India story and is expected to remain so in the decade to come. The infra theme has been supplemented by a slew of policy measures over the past decade, which have helped shore up the sector's attractiveness as an investment destination by several notches. These structural reforms in the infrastructure space have had a positive impact on both PD as well as LGD.



### A) Better risk sharing and reduced bottlenecks

Today, we see better risk sharing between the authorities and private entities, with modification of the concession agreements. For example, introduction of HAM brought in a fair distribution of risk, with NHAI bearing 40% of the project cost and 80% RoW being a prerequisite for appointed date. This resulted in transfer of a significant portion of project risk to the authority, which was earlier borne almost entirely by the private developers. The recent amendments in the build-operate-transfer (BOT) model concessions are also aimed at improving the risk sharing through measures such as equity support and construction grants.

In the past, many infrastructure projects went into default due to severe bottlenecks during the construction or stabilisation stage. This was due to lack of fuel supplies, cancellation of coal blocks, or lack of PPA for thermal/gas plants, or delay in awarding land for road projects. For some of these projects, viability itself became questionable or the time and cost estimates overshoot significantly, leading to significantly high debt levels.

The large amount of unsustainable debt in these stressed infrastructure projects necessitated a substantial haircut to make them viable. Better risk sharing and reduced bottlenecks, especially in the roads and renewables sectors, have now resulted in improved credit metrics and should continue to drive improvement in infra LGD.

## **B) Improvement in the sponsor credit profile**

Better risk sharing and reduced bottlenecks have reduced the strain on sponsor health. For instance, for HAM road projects, the sponsor is required to invest only 15% of the project cost — almost half the investment required in annuity or toll road projects. In terms of capital commitment, the under-construction HAM road projects now closely resemble EPC construction projects for the sponsor. This has resulted in improvement in the credit profile of infra SPVs as well as sponsors.

In the past, lopsided risk sharing and bottlenecks, leading to cost and time overruns, resulted in leveraged balance sheets of the sponsors. Lack of a ready market for infrastructure assets limited the ability of sponsors to monetise long-term, chunky assets when in distress. Today, investor demand exists for operational infrastructure assets. Infrastructure investment trusts (InvITs) have also helped infrastructure sponsors recycle the capital locked in long-term infrastructure projects. Recycling of equity capital ensures that sponsors can maintain optimal leverage, thereby enabling their continued participation in infrastructure buildout.

Moreover, improvement in the credit profiles of the sponsors ensures that even if there is a default at the SPV level, the business viability continues and losses are minimised due to the better ability of the sponsors to support and infuse funds, albeit with a small delay. An improved sponsor credit profile also means that the defaulted assets may be sold to other interested sponsors, resulting in lower loss to the lenders.

## **C) Strong demand for Infra projects from foreign investors and InvITs**

The introduction of platforms, such as InvITs, and increased participation of global investors has improved the demand for infrastructure assets. Many stressed assets have found their way into InvITs, or platforms promoted by marquee global investors. The CRISIL Ratings study also saw some stressed road assets getting acquired by such platforms, with LGDs at the lower end.

Reforms in the infrastructure space have led to large global investor funds vying for equity and debt investment opportunities in the segment. Domestic infrastructure segments<sup>4</sup> were able to attract foreign direct investment (FDI) of over USD 70 billion<sup>5</sup> during fiscals 2020-2024 from marquee global investors such as Blackstone, Brookfield, KKR, Macquarie, CDPQ and Canadian Pension Plan Investment Board.

Given the long-term potential of the Indian infrastructure space, investor interest is expected to increase. Stressed assets, therefore, may see quick turnaround through sponsor replacement.

## **D) Increasing participation of central counterparties in the infra space**

The presence of central counterparties — such as NHAI (in the roads sector), Solar Energy Corporation of India Ltd (SECI) and NTPC Vidyut Vyapar Nigam Ltd (NTPC) (renewables), and Power Grid Corporation of India Ltd (transmission) — has increased substantially over the past few years.

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<sup>4</sup> Communication services, transport, construction, and energy

<sup>5</sup> RBI annual report 2024

In the roads sector, NHAI has awarded ~45% of the projects under HAM in the past five fiscals. The nodal body's track record in making annuity payments for these projects has been impeccable. Delays, if any, are limited to 10-20 days from the annuity date (as per a study on operational HAM projects).

Similarly, the role of SECI and NTPC as counterparties in the renewables space has increased consistently. As of fiscal 2024, more than half of the large renewable groups rated by CRISIL Ratings having total capacity of ~32 GW had central counterparties, compared with ~20% in fiscal 2019. The increased participation of central counterparties with strong credit profile, policy initiatives such as the Electricity (Late Payment Surcharge and Related Matters) Rules, 2022, and liquidity infusion targeted towards settlement of outstanding dues of generation companies (gencos) in the renewables and thermal space have helped improve investor and lender confidence.

Increased participation of central counterparties ensures timely payments and lower counterparty and liquidity risk. as reflected in improved PD ratings of infrastructure assets. Furthermore, in a post default scenario, presence of central counterparties ensures quicker resolution, leading to lower haircuts.

***As per the CRISIL Ratings study (roads sector), the typical LGD for projects with NHAI as a counterparty was in the 30-40% range, whereas for the state-backed road projects, it was 50-55%.***

## **E) IBC and push for pre-IBC resolution have improved recovery prospects**

The introduction of IBC and the RBI's push towards pre-IBC resolution 30 days from the date of default have resulted in early detection and fast tracking of the resolution process for assets in default.

While multiple resolution platforms did exist before IBC, effective and timely resolution remained elusive. Consequently, assets in default remained stressed without any viable resolution in sight. Many assets are still undergoing the resolution process. Timely identification will help in preservation of economic value, leading to higher recovery for lenders.

## LGD is not static

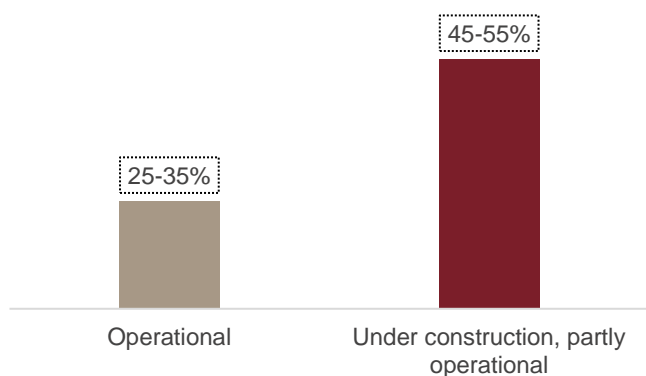
LGD, similar to PD, is not static and varies by sector and even for projects within a sector, and also over time.

Our study highlights the dynamic nature of LGD for road assets. LGD varies depending on operational status and timing of default. Operational stressed projects with better visibility of project scope, capital structure and cash flows tend to have lower LGDs compared with projects still under construction or partly operational.

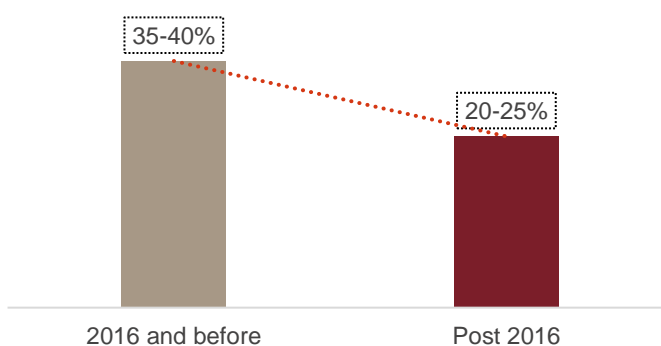
On the other hand, post the introduction of IBC in 2016, which aimed at timely resolution of stressed assets, the prospects of recovery have improved. So far, debt of around Rs 10.6 lakh<sup>6</sup> crore has been resolved under this regime. The RBI push for early detection and resolution of stressed assets has also been instrumental in improving financial prudence.

Visibly, LGDs post 2016 are lower at 20-25% for road sector assets compared with 35-40%, pre-2016.

**LGD (%) as per operational status – Road assets**



**LGD (%) pre and post 2016 – Road assets**



Please note the dynamic nature of LGD is not limited to the road sector but is applicable to all sectors.

<sup>6</sup> IBB quarterly newsletter April-June 2024 – Till June 2024, total 1,005 corporate insolvency resolution processes (CIRPs) have yielded resolution plans with total realisation of Rs. 3.4 lakh crores against total claims of Rs. 10.6 lakh crores.

## **LGD should be futuristic and fundamental in nature**

LGD for the infrastructure sector is expected to improve with better risk sharing in concession agreements, reduced bottlenecks during the construction stage, improvement in sponsor credit profile, strong investor demand for infra projects and healthy recovery prospects driven by IBC and pre-IBC resolution platforms.

Increased demand for infrastructure assets with the emergence of InvITs and quicker legal timelines due to resolution platforms have led to improved valuation for stressed infrastructure assets, resulting in better recovery.

It is critical for investors to factor in developments in the infrastructure sector. With a visible improvement in both the credit metrics — PD and LGD — a re-evaluation of the perceived risk in the infrastructure sector is imperative.

While the re-evaluation of credit ratings for infrastructure assets based on PD has already taken place, LGD needs to be considered in equal measure as well. Currently, many market participants use an LGD which is constant or anchored to the past — this does not factor in the recent developments in the infrastructure sector and insolvency regime.

However, as highlighted in previous sections, LGD, like PD, is not static and varies based on various factors even within the same sector. LGD can also vary at the instrument level for the same issuer — two different instruments of the same issuer can have different LGDs because of multiple layers of debt (senior debt, subordinated debt, etc.) with distinct priority of claims. In such cases, the issuer-level LGD will not translate into an instrument-level LGD.

An LGD which is constant and anchored to the past may not reflect the positive developments in the infrastructure sector and depict its dynamic nature. Also, with further developments in the sector and the government thrust on enhancing and streamlining recovery processes, the improvement in LGD is expected to continue.

LGD, therefore, should be a forward-looking, point-in-time estimate of loss specific to the instrument, incorporating all the quantitative and qualitative factors, including sector-specific nuances.



## The EL rating scale

To incorporate the improvements in PD and LGD for credit risk assessment of the infrastructure sector, lenders and investors may consider using EL Rating — a rating scale conceptualised and crafted for the sector at the behest of the Ministry of Finance in 2016. The EL Rating scale is recognised by regulators such as SEBI, IRDAI and PFRDA.

The EL Rating, which is assigned on an expected loss based ordinal rating scale, combines the two pillars of credit risk — PD and LGD — providing a holistic risk representation.

By incorporating LGD, the EL Rating emphasises the presence of structural safeguards for infrastructure assets and can help accurately reflect the underlying risk. It complements the conventional PD rating and can act as an additional input to lenders and investors to price the risk for infrastructure assets more efficiently. It can also help issuers raise capital at a competitive cost.

Efficient risk-based pricing for infrastructure assets is the need of the hour. It will go a long way to mobilise the required funds for the huge, planned infrastructure buildout.

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