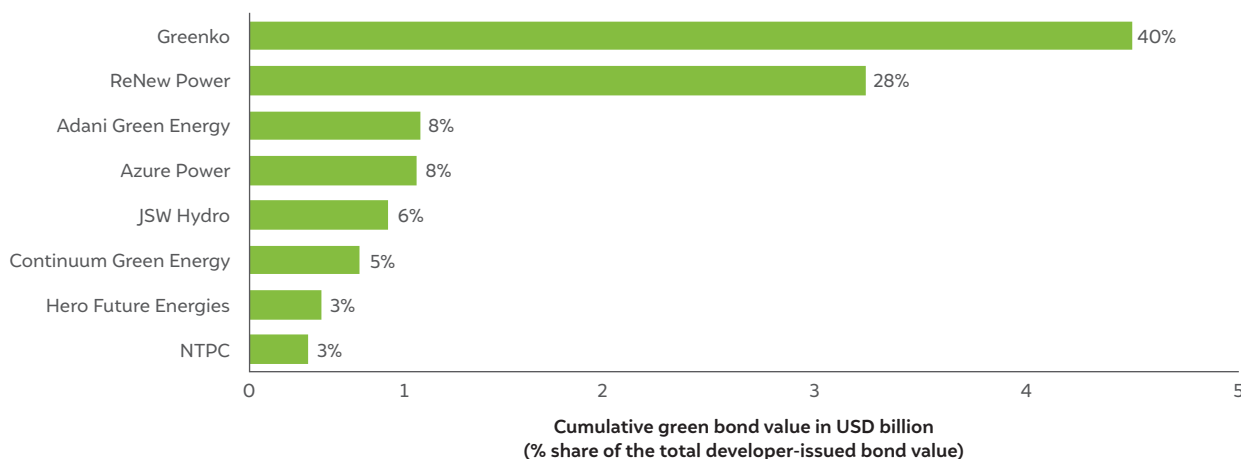


3.2 Which developers have issued green bonds?

A total of eight Indian developers have issued green bonds worth USD 11.2 billion since 2014. While annual value of issuances has grown significantly, Indian offerings are dominated by two of the largest RE developers, Greenko and ReNew Power, as depicted in Figure 6. The two developers have issued almost 70 per cent of all developer green bonds by value.

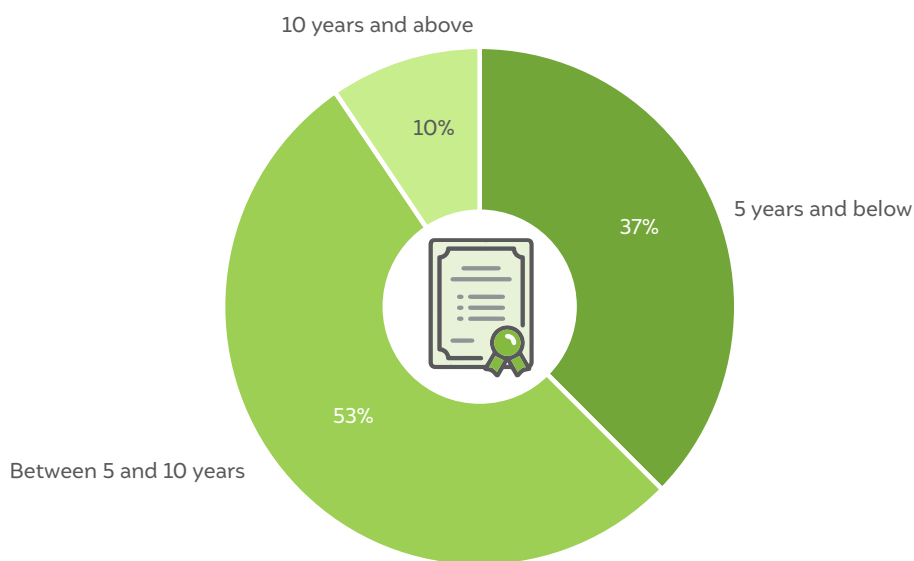
Between 2014 and 2020, green bonds were issued by leading project developers like Adani Green Energy, Azure Power, Greenko, NTPC, and ReNew Power. However, more recently, in 2021, we see new entrants making their debut in international bond markets (Continuum Green Energy, Hero Future Energies, and JSW Hydro). Figure 8 lists the size and maturity period for all bonds issued by developers.

Figure 6 Greenko and ReNew Power dominate Indian developer-issued green bonds



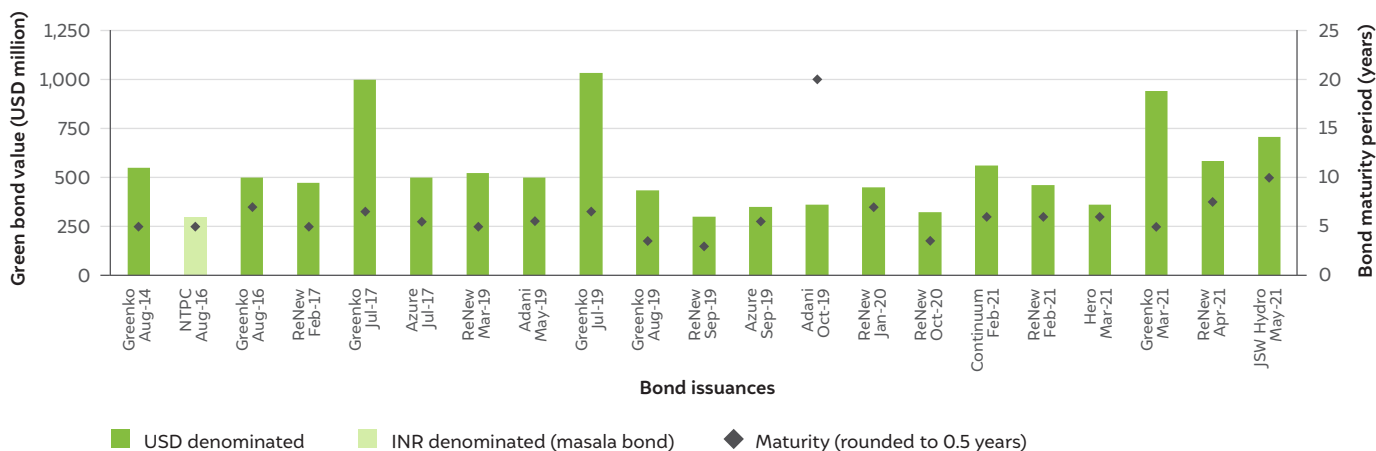
Source: CEEW-CEF compilation

Figure 7 Most bonds have a maturity period between 5 and 10 years



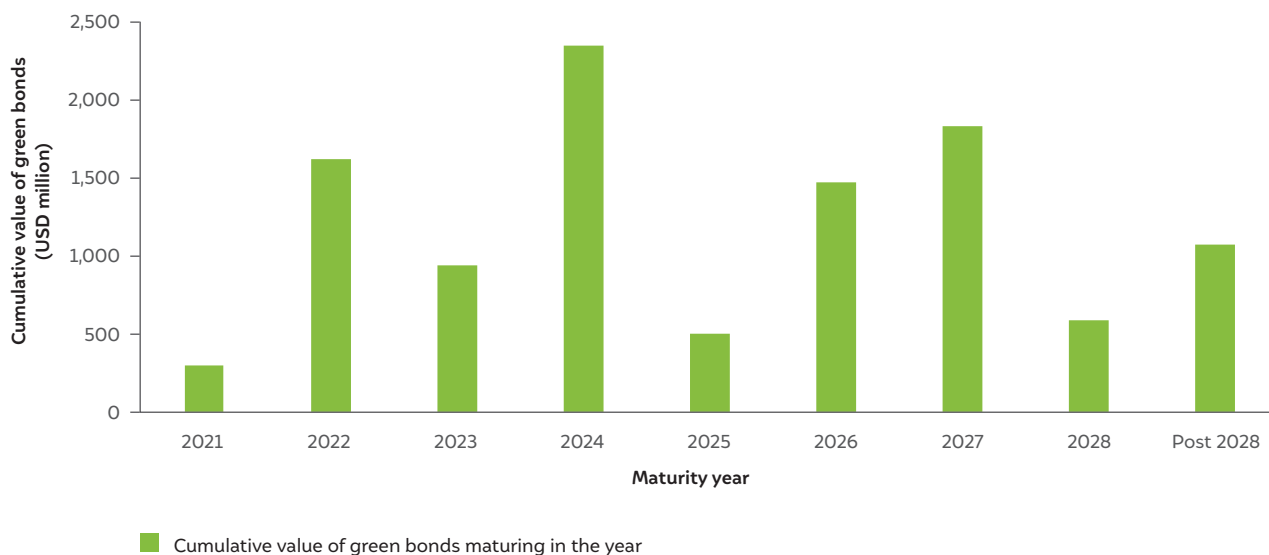
Source: CEEW-CEF compilation

Figure 8 Two green bonds, both by Greenko, have crossed the USD 1 billion mark; the average green bond size is just over USD 500 million



Source: CEEW-CEF compilation

Figure 9 Green bonds worth over USD 5 billion will mature by 2024



Source: CEEW-CEF compilation

Figure 9 shows that USD 5 billion worth of developer-issued green bonds will mature by 2024. Given the longer terms of institutional loans that were initially used to finance construction and project power purchase agreements (PPAs), developers are likely to refinance these bonds as they mature or even earlier, likely through new green bond issuances.

Developers mostly chose to list their bonds on the Singapore Exchange. The one exception was ReNew Power’s 2021 USD 585 million issuance, which

was exclusively listed on the recently set up India International Exchange (Gupta 2021). Additionally, Adani Green Energy’s USD 500 million bond, issued in 2019, was listed on the India International Exchange as well as the Singapore Exchange.

3.3 How has green bond pricing evolved?

Figure 10 reveals that while coupon rates for initial green bond issuances were as high as 8 per cent, they have recently been fluctuating between 4 to 6 per

cent. Figure 10 represents the coupon rate as the sum of the US treasury benchmark for a similar maturity period and the spread over this benchmark. These coupon rates are fixed interest rates determined after a book-building exercise in the market. Therefore, they represent the actual cost of borrowing for the developer. Interest payments are typically made to investors twice a year, while the principal amount is typically repaid through a bullet repayment at the end of the maturity period. Some bonds provide a partial amortising schedule for the principal repayment, while only Adani Green Energy's USD 363 million bond, issued in 2019, provides a primarily amortising schedule.

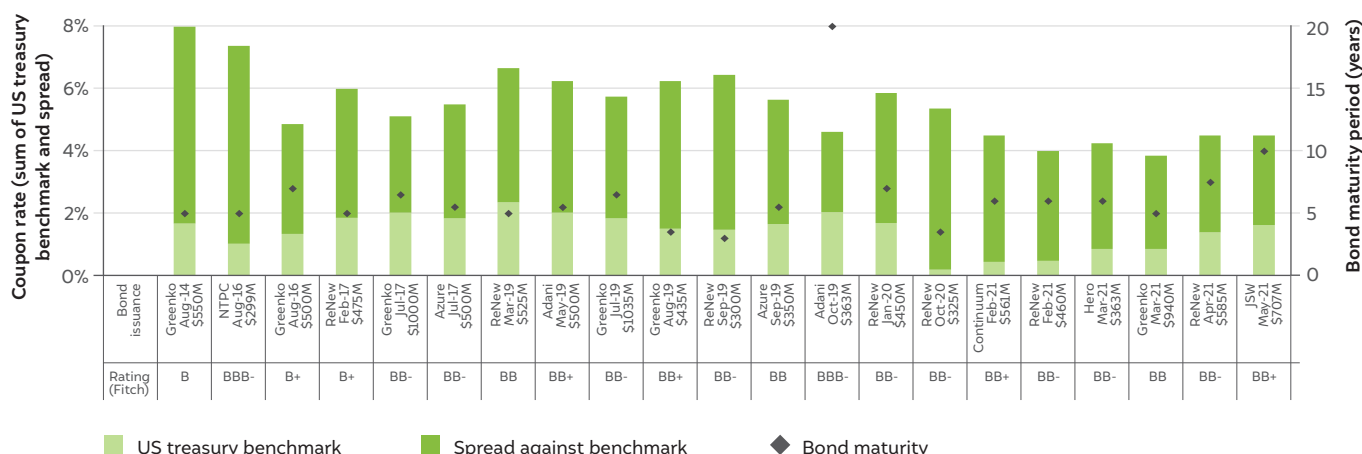
Coupon rates for Indian developer-issued green bonds have been slightly higher than those for corporate non-green bonds, that average around 4 per cent (RBI 2021). While ReNew Power and Greenko have successfully raised funds at 4 per cent and below

through one issuance each in 2021, the broader trend still indicates that developers are paying a premium for green bonds. Our analysis reveals that credit ratings for 19 of the 21 green bonds issued are below investment grade, resulting in the high interest rates for Indian RE green bonds.

The average spread over benchmark for 2021 is 60 basis points lower than the overall average.

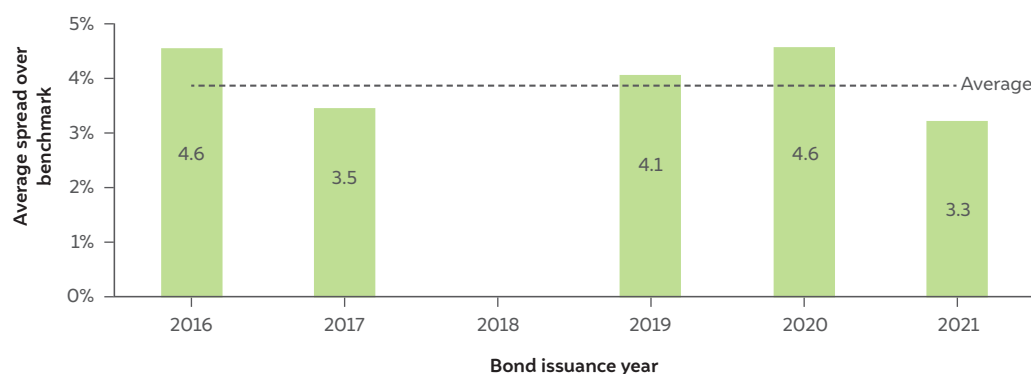
The spread of coupon rates against the US treasury benchmark averages near 4 per cent, as depicted in Figure 11. Interestingly, the average spread for 2021 is over 60 basis points lower than the average spread across all issuances, suggesting that developers have been able to refinance their portfolios at lower costs in 2021. However, this trend has fluctuated over the past years and remains indicative.

Figure 10 Bond coupon rates have typically ranged between 4-6%



Source: CEEW-CEF analysis

Figure 11 The spread against the US treasury benchmark has sharply decreased in 2021



Source: CEEW-CEF analysis

BOX 3 Adani Green Energy's 20-year green bond

In 2019, Adani Green Energy issued India's first-ever amortising green bond in international markets, at USD 363 million with a 4.625 per cent coupon rate and repayments scheduled over a 20-year maturity period (ET Energyworld 2019). The bond carried an investment-grade rating of BBB- and offers the lowest spread against the US treasury benchmark of all RE developer green bonds. The only other developer-issued green bond to carry an investment-grade rating was NTPC's 2016 masala bond. Interestingly, this bond was issued to primarily refinance foreign currency loans, unlike most other bond offerings that primarily refinance INR loans.



Source: CEEW-CEF research

3.4 Who buys green bonds at issuance?

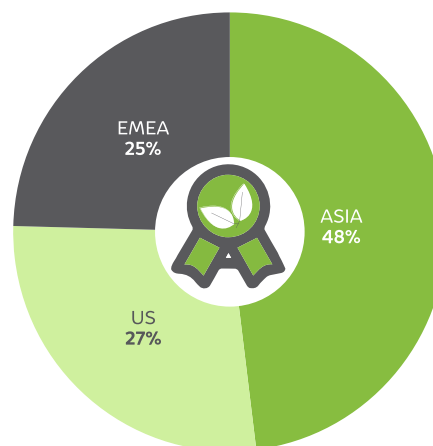
Our analysis suggests that Asian investors are the leading source of the influx of international debt capital for Indian RE developers. Figure 12 shows that 48 per cent of the bond value was picked up by Asian accounts, followed by investors in the US at 27 per cent and those in Europe, Middle East, and Africa (EMEA) at 25 per cent.

It is important to note that the geographical placement represents the location of buyer accounts that bid for the bond offering and not the location of the global headquarters of the buyer. Therefore, bids from Asia may include buyers from the US or EMEA who bid through their Asian subsidiaries and vice versa. Further, regional placement data are only available at the time of bond issuing and do not represent the current geographical breakup of bond allocation.

Overall, the split between Asia, the US, and EMEA at the time of issuance has remained consistent across developer bond issuances, cementing the view that Asian markets are a reliable source of capital for developers.

International markets have shown a strong appetite for Indian green bonds, with bonds typically oversubscribed from 1.5 to over 8 times. On average, bonds have been oversubscribed by 3.6 times.⁹

Figure 12 Asian investors have purchased almost half of all proceeds from developer-issued green bonds



Source: CEEW-CEF compilation⁸

Debut issuances have also received significant interest, with Continuum Wind Energy and Hero Future Energies' 2021 bonds oversubscribed by 6 and 8.3 times, respectively. Undersubscription is rare, with the only significant instance being that of a planned 2020 bond by SB Energy, which was pulled due to low market interest despite a high coupon rate of 6.75 per cent (Barman 2020).

8. Based on a CEEW-CEF compilation of publicly available data and developer responses to data requests for 67 per cent of developer-issued green bonds by value in USD billion.

9. Based on a CEEW-CEF compilation of available subscription data of 79 per cent of developer-issued green bonds by value in USD billion.

4. Portfolios financed by green bonds

This section discusses characteristics of the RE portfolio refinanced through green bonds and assesses their impact on bond pricing, i.e., the spread over the benchmark. We specifically delve into the renewable technology (solar, wind, or hydro), offtaker identity, operational history, and tariff profile.

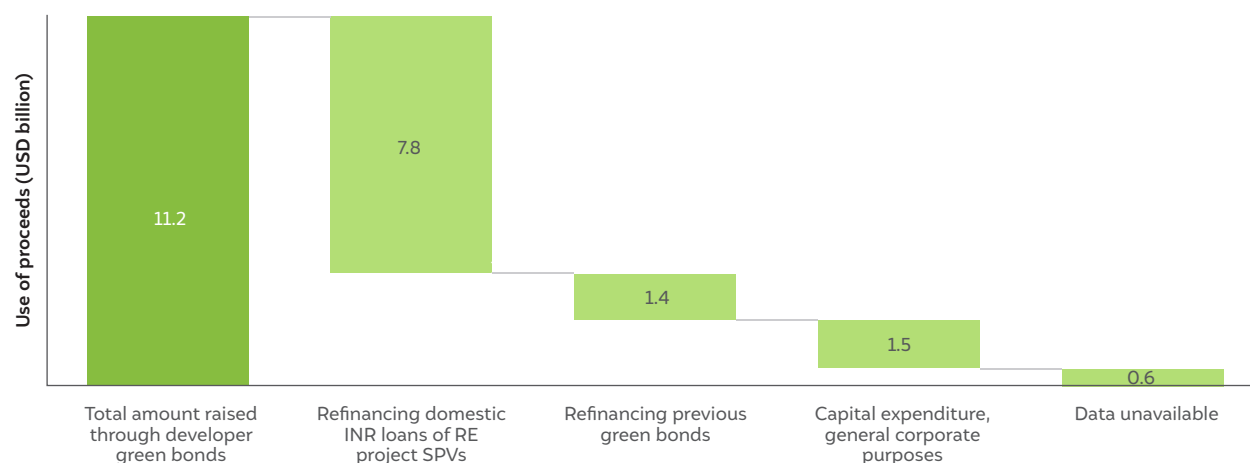
Figure 13 shows that of the USD 11.2 billion worth of green bonds issued by Indian developers, green bonds worth USD 9.2 billion refinanced RE project loans.¹⁰ Of the balance, proceeds worth USD 1.5 billion were allocated towards capital expenditure, general corporate purposes, and fees related to bond issuance and account management.¹¹

RE projects with loans refinanced by a bond are referred to as the bond's 'restricted group'. These projects are housed in various SPVs that typically act as issuers for the bond offering. The existing indebtedness of the restricted group, which overwhelmingly comprises domestic INR loans, is refinanced through the bond proceeds. Restricted

group assets are typically secured as collateral with conditionalities. Thus, the restricted group is a critical evaluation parameter for bond investors. It also represents the exact projects financed through international bond markets in the country.

Figure 14 depicts the difference between the interest rates of existing loans and green bond coupon rates. On average, developers have obtained a differential of 5.7 per cent on their domestic INR loans.¹² This advantage does not include the market-dependent cost of hedging or prepayment penalties,¹³ which significantly lower the differential. Developers typically do not hedge bond proceeds for the whole of the maturity period at once and prefer to recycle short duration hedging agreements. The 12-month Mumbai Interbank Forward Offer Rate (MIFOR) index, an indicator of hedging costs, averaged 4.8 per cent over the financial year 2020–21. The actual hedging cost is likely to include a spread over this benchmark. As the cost is market-dependent, developers might not always obtain an advantage over domestic INR loans. In such situations, they enter the market primarily to obtain access to a wider pool of capital due to low liquidity with domestic lenders.

Figure 13 Over 80% of bond proceeds were allocated for refinancing



Source: CEEW-CEF analysis

10. Based on CEEW-CEF analysis of bond use of proceeds available in bond listing documents.

11. Use of proceeds data is unavailable for Greenko's 2014 USD 550 million bond and has not been included.

12. Based on CEEW-CEF analysis of restricted group loans available in bond listing documents.

13. Typically levied as a one-time payment of 1–2 per cent on the outstanding amounts being repaid before maturity, although developers may include covenants stating that the penalty will not apply if prepayment is through bonds or Infrastructure Investment Trusts (InvIT).