Financing costs and the competitiveness of renewable power

Executive Summary

Authors: Christian Wilson, Gireesh Shrimali, Ben Caldecott

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Executive summary

The cost-competitiveness of renewable power critically depends on cost of capital. Decarbonising power generation is critical, as the sector accounts for 40% of global greenhouse gas emissions[1]. To limit global warming to 2°C, renewables need to exceed 80% of power generation by 2050, of which 82% is in solar and wind[1,2]. This requires low-carbon investment to double[3,4], making the weighted average cost of capital (WACC) of renewables an important catalyst for the decarbonisation of power[5,6]. As renewable power assets have a higher capital intensity than fossil fuels, with significant upfront capital costs and limited operational costs, the levelised cost of energy (LCOE) of renewables is more sensitive to changes in WACC[7–9]. As a result, alongside supportive policies, technological advancements, and high learning rates[10], falls in interest rates over the past two decades have acted as a headwind for renewables, lowering the WACC, and therefore, improving competitiveness relative to fossil fuels[11].

Recent increases in interest rates may slow down the net zero transition. However, in recent years, interest rates have increased sharply to combat inflation stoked by an economic recovery post-COVID-19 and an energy crisis prompted by Russia's invasion of Ukraine, with the median advanced economy central bank rate rising from close to zero in 2021 to 5% in 2024[12]. A 2019 study outlined such an increase as an "extreme scenario" with negative implications for the levelised cost of energy (LCOE) of renewables[13]. This extreme scenario has come to pass, raising the question of what impact it has had and what will happen if rates now fall. Indeed, in 2024, U.S. and EU central banks cut interest rates, with continued reductions expected[12]. Whether future changes in financing costs materially impact the cost competitiveness of renewables relative to fossil fuels will depend on regional dynamics. An assessment of these dynamics can help policymakers and multilateral development banks identify where reductions in WACC are most needed.

To address these issues, we carry out the following analyses. First, we utilise asset-level project finance transactions to track and compare the cost of debt of renewables and fossil fuel power between 2000 and 2024. Second, we examine the impact of recent increases in interest rates on the LCOE of renewables and fossil fuel power assets in North America. Third, we model the effect of changes in financing costs on the cost competitiveness of renewables relative to fossil fuels across regions, including Europe, the U.S., China, and India. Our key findings are as follows.

Risk of renewables versus fossil fuel power

Renewable assets have been perceived to be less risky. Following the aftermath of the 2008 financial crisis, we find that lending spreads for renewable and fossil fuel power assets have compressed following unconventional monetary policy[14], but between renewables and fossil fuels, there has been a gap in spreads of around negative 100bps, indicating that renewables are perceived as lower risk (Figure 1a). This difference holds when we control for both loan and country characteristics. While low-carbon firms have been shown to have a lower cost of capital before[15–19], within the power sector, comparisons are challenging as many firms operate low- and high-carbon assets[20]. Indeed, studies comparing low- and high-carbon energy firms have excluded power[21]. Consequently, our findings provide new evidence that renewables are viewed as lower risk by utilising asset-level data.

These findings are relevant to researchers modelling the impact of financing costs on the energy transition. As renewables tend to use project finance and fossil fuels tend to use corporate finance[22], previous studies have estimated renewable WACC at the asset level and fossil fuel WACC at the firm level, resulting in a higher WACC for renewables versus gas[23,24]. As diversified firms are lower risk than a single asset, this approach could underestimate fossil fuel WACC if firms adjust discount rates when assessing project-specific risk[25].

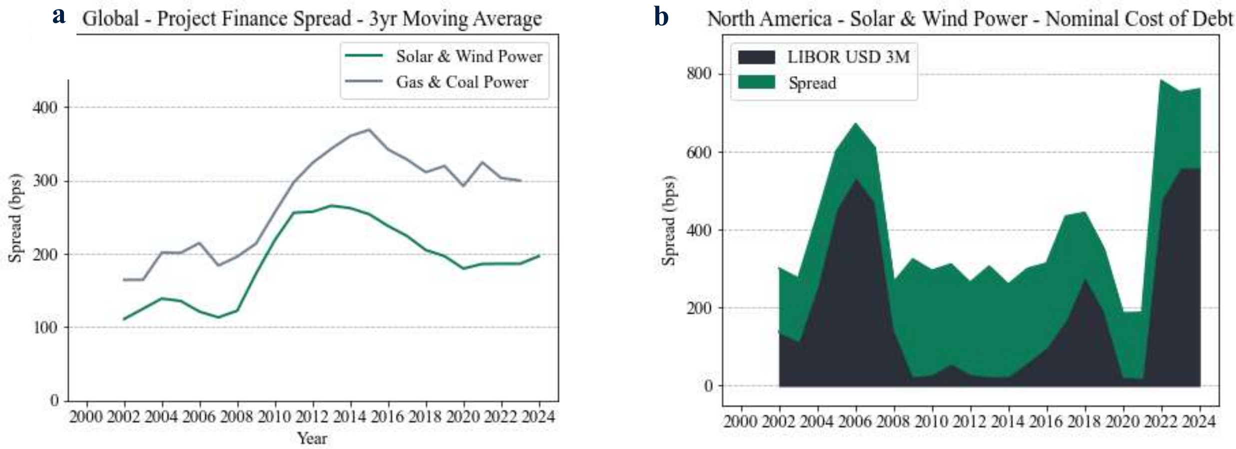


Figure 1. Renewable and fossil fuel spread over time. a, Three-year moving average of project finance loan spreads for global & wind and gas & coal power assets. **b**, Nominal cost of debt for solar & wind project finance transactions in North America, broken down in average annual spread and the 3-month US Dollar London Interbank Offered Rate (LIBOR). 2024 data ends in July.

Impact of higher interest rates and the role of fiscal policy

Higher interest rates have a disproportionately high impact on the cost-competitiveness of renewables, but fiscal policy can help. While spreads have fallen over time, recent interest rate rises have sharply increased overall financing costs. In North America, the nominal cost of debt for solar & wind transactions increased from less than 2% in 2022 to almost 8% in 2024 (Figure 1b). Changes in interest rates have impacted renewables more than fossil fuels. In the U.S., higher financing costs added 18% to the LCOE of solar PV without tax credits, while adding only 9% to the LCOE of combined cycle gas turbines (CCGT) (Figure 2). With tax credits, financing costs added 12% to solar PV LCOE, highlighting how the Inflation Reduction Act (IRA) not only reduce LCOE, but by reducing capital costs, also reduces sensitivity to WACC. Fiscal support mechanisms, such as tax credits, should, therefore, be considered alongside monetary instruments as a mechanism to shield renewables from interest rate rises[26].

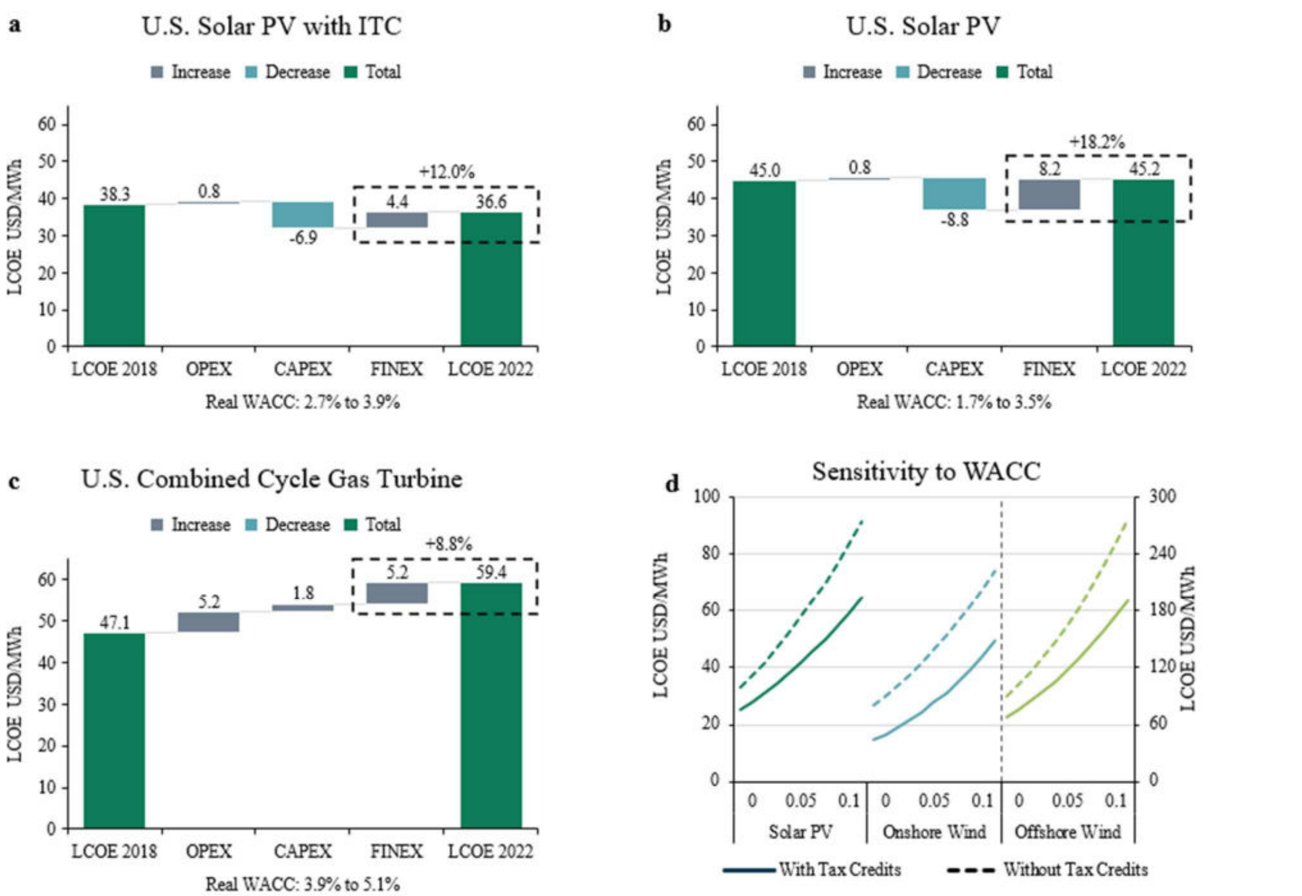
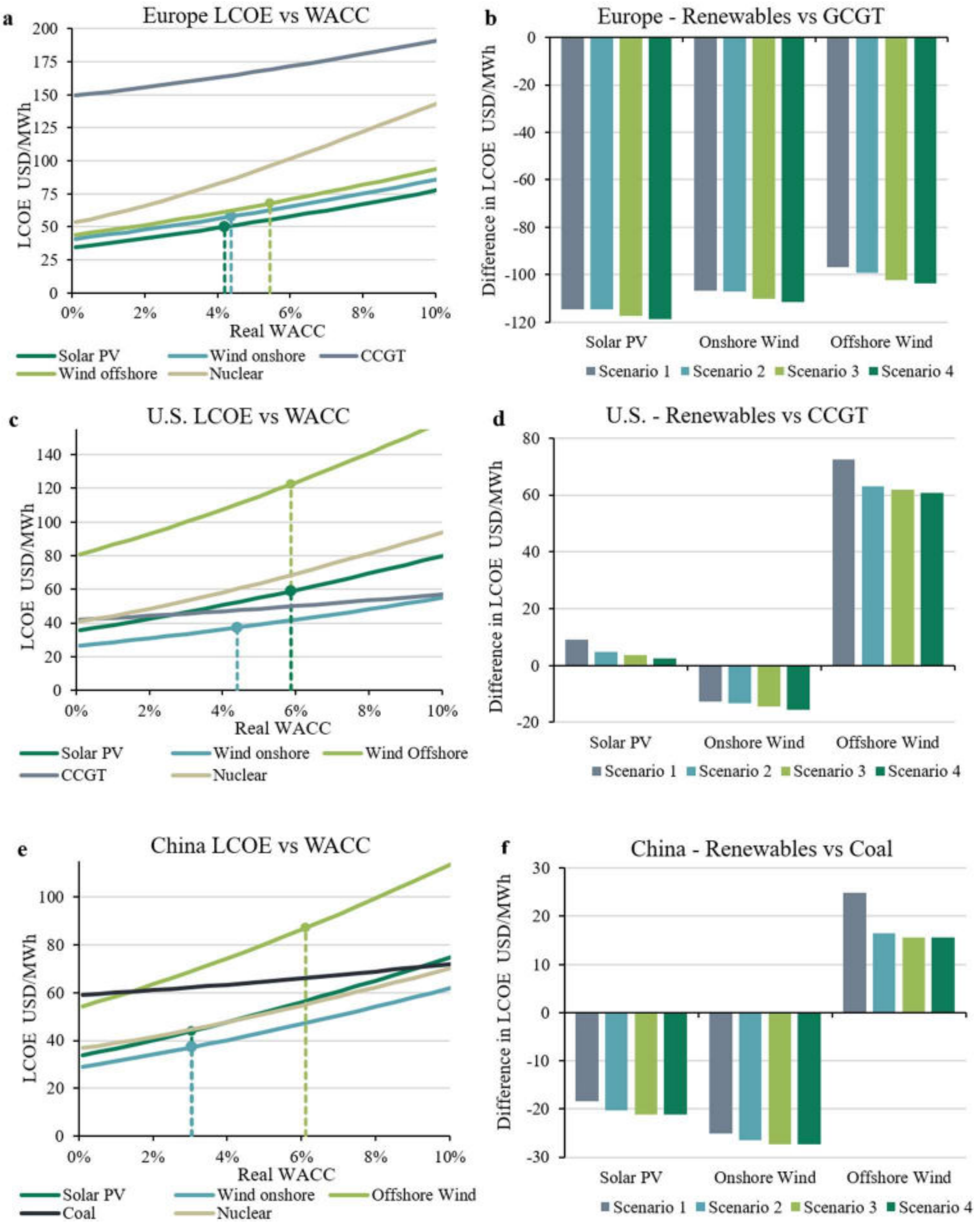


Figure 2. Historical change in LCOE. a,**b**,**c**, Change in LCOE between the NREL 2020 ATB model (base year 2018) and the NREL 2024 ATB model (base year 2022) is broken down into the change in OPEX, CAPEX, and FINEX for solar PV with investment tax credits (ITC) (**a**), solar PV without investment tax credits (**b**), and combined cycle gas turbine (**c**). **d**, The sensitivity of LCOE to WACC with and without tax credits. Solar PV and onshore wind are shown with the left-hand y-axis. Offshore wind with the right-hand y-axis. Investment tax credits are applied to solar PV and offshore wind. Production tax credits are applied to offshore wind.

Regional financing costs and cost competitiveness

Regional variations in financing costs have varying impacts cost competitiveness of renewables. Going forward, the impact of changes in WACC differs by region. In Europe, reductions in WACC do not make a material difference in cost competitiveness, as renewables are already significantly cheaper than fossil fuels (Figure 3a,b). However, in the U.S., a 25% fall in solar PV WACC reduces the gap in LCOE with CCGT from +9.1 USD/MWh to 2.4 USD/MWh (Figure 3c,d). Finally, a 25% reduction in India effectively results in cost parity between onshore wind and coal, while in China, the difference in LCOE between offshore wind and coal is reduced by 37% (Figure 3e,f,g,h).

In summary, changing financing costs have the potential to trigger points in the cost competitiveness of renewables. Interventions by policymakers and development banks can target investor concerns regarding regulatory, currency, and off-taker risk[27]. For researchers, these findings reinforce the need to account for regional variations in financing costs when modelling the energy transition. Historically, models have assumed a uniform WACC[28,29], but when regional variations are accounted for, this leads to major differences in the future deployment of renewables[23,24,30].



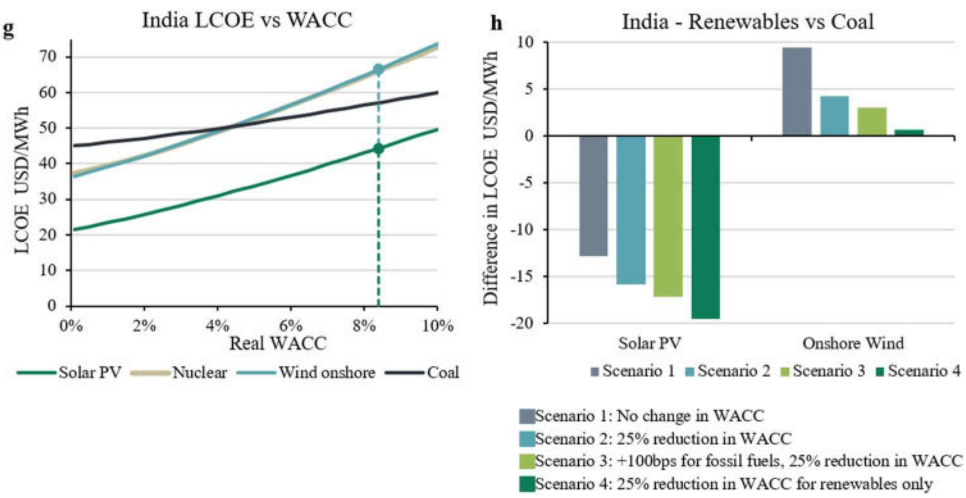


Figure 3. Cost of renewables versus fossil fuels by region. Left-hand charts show LCOE as real WACC changes. The dotted lines refer to IRENA's 2023 WACC estimates. Right-hand charts show the difference in LCOE between renewables and fossil fuels as WACC changes. This is shown for Europe (**a**,**b**), the U.S. (**c**,**d**), China (**e**,**f**), and India (**g**,**h**).

Conclusion

Lower financing costs for renewables are crucial for improving the economic[31] and political viability of the energy transition[32]. This study shows how changes in financing costs can increase the costs of renewables, or help facility cost parity. However, while falls in the cost of renewables are important, this alone is not enough to decarbonise the power sector. In China, the U.S., and India, fossil fuel power remains cheap, with new capacity additions continuing at pace[33–35]. In contrast, in the EU, where fossil fuel power costs are higher due to fuel and carbon prices, new capacity additions have been more limited[35,36]. Therefore, even if stranded asset risks are priced in the cost of capital[37–40], the low sensitivity to financing costs will mute any impact on fossil fuel LCOE. As a result, policies that increase the cost of fossil fuels, such as carbon prices, have an essential role in conjunction with policies that reduce the risk and costs of renewables[41].

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