Weekly Summary

Economics of Climate Change

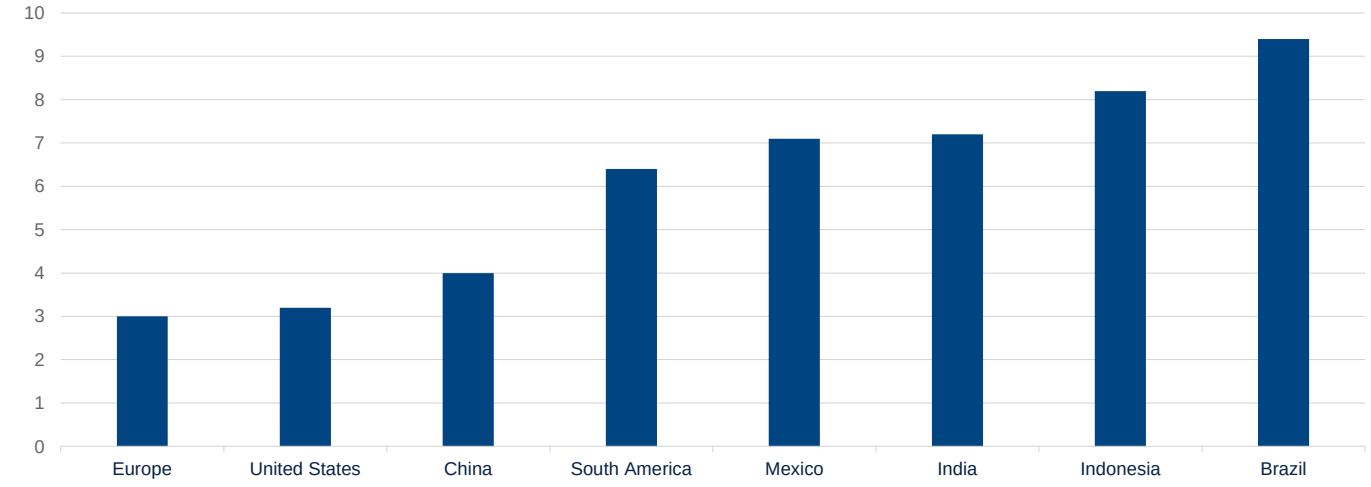
June 14, 2024

Cost of Capital, Renewables and Cleantech

The cost of capital is critical for renewable energy or cleantech projects as they involve capital-intensive investments, policy uncertainty, and risks associated with trial phase projects lacking commercial development. De-risking strategies can help to reduce the cost of capital, especially in developing economies. However, as long as technology risks are relevant, i.e. in emerging cleantech, de-risking strategies should be carefully tailored to foster innovation without dampening competition.

Cost of capital and renewable energy projects. The cost of capital (Box 1. What is the cost of capital and how to estimate it) is critical for clean energy projects due to their high capital intensity. Clean energy projects, such as solar PV and wind projects, require significant upfront investment but have low operating costs.Therefore, the cost of capital can greatly influence their financial viability. For example, the cost of capital for utility-scale solar PV projects in emerging markets and developing economies (EMDEs) is often more than twice as high as in advanced economies (**Figure 1**), which can make these projects less attractive to investors and result in higher energy production costs, ultimately diminishing the competitiveness of the whole economy.

Figure 1. **REAL COST OF CAPITAL OF UTILITY-SCALE SOLAR PV IN SELECTED COUNTRIES. 2021** (%)



Source: BBVA Research from IEA-Tools and analysis – Cost of Capital Observatory.

Box 1. What is the cost of capital and how to estimate it

The cost of capital is the expected financial return required to make an investment worthwhile. It serves as a benchmark for investors to assess the risk and return of various investment opportunities. The cost of capital is interchangeable with financing cost, and it can significantly influence a company's financial decisions and overall strategy. The formula for weighted average cost of capital (WACC) is:

$$WACC=(\text{cost of debt}\times\text{share of debt})+(\text{cost of equity}\times\text{share of equity})$$

- **Cost of Debt:** This is the after-tax interest rate that a company pays on its debt. It consists of a benchmark borrowing cost, such as a 10-year government bond rate, and a premium that reflects the specific risks associated with the project's cash flows.
- **Cost of Equity**: This represents the return expected by shareholders as compensation for their investment risk.It is typically higher and often more challenging to estimate than the cost of debt, as it includes expected dividends and capital gains.

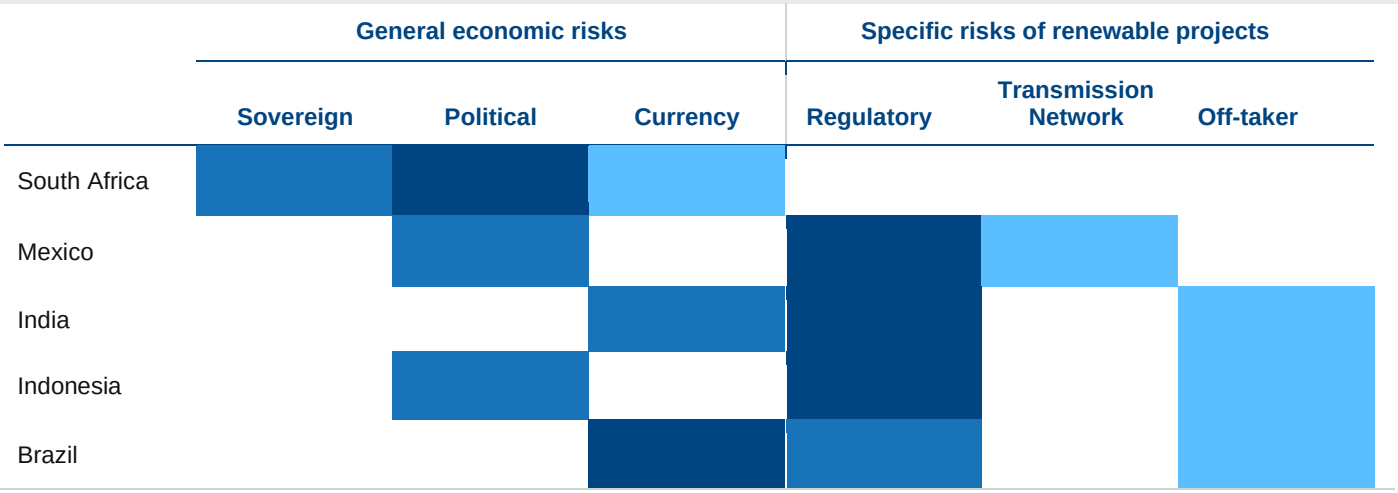
Estimating the cost of capital involves determining both the cost of debt and the cost of equity. The cost of debt is relatively straightforward as it is the interest rate paid on borrowed funds. However, estimating the cost of equity can be complex, especially in EMDEs where capital markets are less developed and transparency around risks is lower.

All in all, the factors influencing the cost of capital are related to the **country's macroeconomic risks** (political stability, inflation, and the business environment), and **project specific risks** (regulatory certainty, reliability of revenue streams or infrastructure availability).

Risks to be addressed, both general and specific. IEA's annual survey[1] to different stakeholders identifies top risks to be addressed first to achieve reductions in the cost of capital in different countries (**Figure 2**). The figure categorizes the primary risks for reducing the cost of capital into two groups: general economic risks (sovereign, political, currency) and specific risks of renewable projects (regulatory, transmission network, off-taker[2]). General economic risks are more relevant in South Africa, and they are also present in the rest of the countries, specially political and currency risks; on the other hand, among the specific risks of renewable projects, they are predominant in Mexico, India, Indonesia, and Brazil, with regulatory risks being the major concern.

1: IEA-Cost of Capital Observatory-Dashboard.
2: Off-taker risk refers to the revenue-related risks that come from relying on state utilities with poor financial health. In many developing countries, the energy market structure involves a regulated single buyer—a state utility that buys power from generators at a regulated cost and then sells power to the consumer.

Figure 2. **RISKS TO BE ADDRESSED FIRST TO REDUCE THE COST OF CAPITAL**
SELECTED ECONOMIES, 2023. FROM DARKEST TO LIGHTEST, TOP RISK #1, #2, AND #3



Source: BBVA Research from IEA-Tools and analysis – Cost of Capital Observatory.

How to bring down the cost of capital in developing economies.[3] Several factors can increase the potential profitability of renewable energy projects and their positive impact in the economy:

- **Clear Vision and Planning:** A well-defined vision and plan for energy transitions aligned with long-term goals such as those of the Paris Agreement. This should include setting **near-term milestones** and **integrating planning** for investments, financing sources, employment, skills, supply chains, and social implications. Against this background, enhanced **institutional capacity** for early-stage project feasibility and preparation is essential.[4]
- **Strengthening Policy and Regulatory Frameworks:** Transparent, predictable, and open dialogue with stakeholders, including both well-designed and standardized contracts, key to ensuring project bankability.
- **Targeted Financial and Technical Support:** Least developed countries and nascent markets need targeted support to kick-start clean energy investments. Grant funding is crucial, especially where projects involve technologies that are not yet cost-competitive or are in frontier markets with higher risks.
- **Expanding Payment Guarantees:** Payment risk, particularly from state-owned utilities, is a significant concern. Expanding guarantees that cover payment delays can reduce the cost of capital and attract investment.
- **Enhanced Concessional Funding:** Concessional funding[5] plays a critical role in enabling clean energy projects that might not otherwise attract private funding addressing macroeconomic risks such as foreign exchange risk and mobilizing much larger volumes of private capital.
- **Tailored Support for New Technologies:** Emerging technologies require specific support to mitigate risks such as lack of infrastructure or technological uncertainties. This can include targeted tax credits, first-loss guarantees, and consumer access to low-cost loans.

3: Based on Reducing the Cost of Capital, World Energy Investment Special Report. IEA
4: Accurate and timely availability of data on the energy sector and the broader economy is crucial to reduce investor uncertainty.
5: Concessional funding refers to financial resources provided on terms more generous than market's. This typically involves lower interest rates, longer repayment periods, or a combination of both.

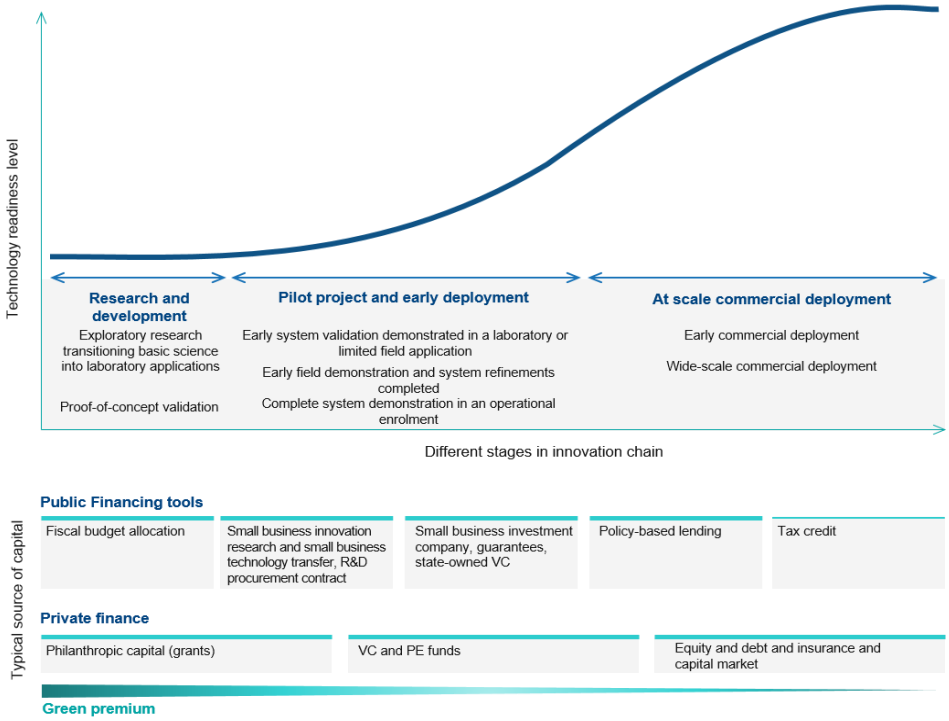
Cost of Capital and Cleantech: from prêt-à-porter to tailor-made strategies.[6] Different stages of the green technology innovation pipeline require and benefit from different sources of capital and approaches to funding, depending on the level of the green premium. The technology readiness level (TRL) curve (**Figure 3**) illustrates the different stages of innovation in renewable and clean technology projects, emphasizing the specific combinations of public finance tools and private funding required at each stage.

In the research and development phase, which includes exploratory research, proof-of-concept validation, and transitioning basic science into laboratory applications, funding predominantly should come from public sources for an effective de-risking. Tools such as fiscal budget allocation, small business innovation research, small business technology transfer, and R&D procurement contracts might be tools for this stage of innovation.

Moving into the pilot project and early deployment phase, where early system validation occurs, initial field demonstrations are conducted, and systems are refined and demonstrated in operational environments, a mix of public and private funding becomes essential. Public finance tools like policy-based lending, small business investment company guarantees, state-owned venture capital, and tax credits are utilized alongside private finance from philanthropic capital grants, venture capital (VC), and private equity (PE) funds.

Finally, the at-scale commercial deployment phase involves early and wide-scale commercial deployment, the reliance shifts more towards private finance. Public finance tools continue to play a role through policy-based lending and tax credits. However, the primary funding sources are equity, debt, insurance, and capital markets. This stage marks the full transition of technologies into the market, driven significantly by private investment.

Figure 3. **TECHNOLOGY READINESS LEVEL AND STAGES IN INNOVATION CHAIN** (GREEN PREMIUM)



Source: Funding the green technology innovation pipeline: Lessons from China.

6: Based on Funding the green technology innovation pipeline: Lessons from China.

Highlights of the Week

- **Global |** Slowing demand growth and surging supply put global oil markets on course for major surplus this decade - News - IEA. New IEA medium-term outlook sees comfortably supplied oil markets to 2030, though unwavering focus on energy security will remain crucial as powerful forces transform the sector.
- **Global |** CAT guide to a good 2035 NDC. If governments don't strengthen their 2030 targets and fail to substantially increase climate action before 2030, limiting peak global warming to 1.5°C will very likely not be possible and would lead to a multi-decadal, high overshoot of this limit.
- **Global** | The IMF's Climate Change Debate. The institution has a role to play in addressing this threat, but there are limits on how far it should go
- **Europe |** Central banks in a changing world: the role of the ECB in the face of climate and environmental risks.
- **Europe |** Experts: What do the European elections mean for EU climate action? - Carbon Brief. This week's European parliamentary election results saw parties on the populist right making **big gains** in France and Germany, while the historic "**green wave**" of 2019 **receded.**

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