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Financing the Energy Transition through Cross- Border Investment:

A New Model for Article 6 of the Paris Agreement

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Financing the Energy Transition through Cross- Border Investment:

A New Model for Article 6 of
the Paris Agreement

A Case Study of the Middle East & North Africa

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Executive Summary

Developing countries urgently need capital to finance the energy transition, in particular clean energy infrastructure to replace fossil fuels and support sustainable development. The situation is set to deteriorate as access to capital becomes more constrained amid rising interest rates and faltering global markets. At the same time, despite progress at COP26, developed countries' emissions reduction targets are not far-reaching enough to prevent more than 2°C degrees of global warming. Moreover, concern over energy security and affordability means that meeting even these targets will be challenging. In this context, this paper presents a new framework for how developed countries can meet ambitious emissions reductions goals at the same time as helping developing countries access climate finance. We show how developed states can invest in clean infrastructure in the developing world, receiving credit towards their own emissions targets and de-risking private sector investment. Our approach is based on a new understanding of how governments can use Article 6 of the Paris Agreement.

Article 6 of the Paris Agreement was finalized at COP26 and created the mechanism for sovereign carbon markets. Through Article 6, carbon emissions reductions in one country can count for the emission reductions targets of another. Developed countries act as 'financing states' for emission reductions outside their borders, receiving credit for projects they finance. Developing nations host projects and, in exchange for low-cost funding, perform a 'corresponding adjustment' to ensure that any emissions reduction credit transferred away is not double counted.

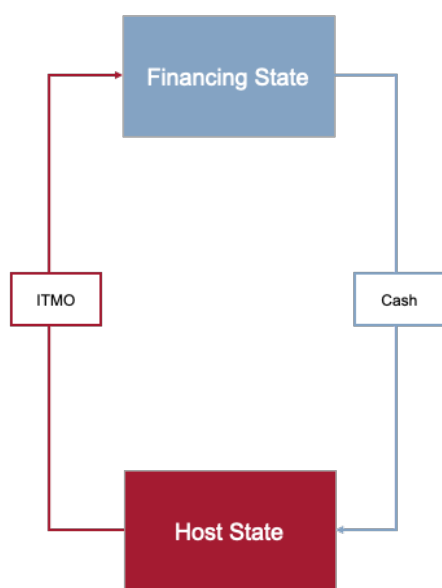
Through interviews with over 70 high-level policymakers, our research shows a risk that under the prevailing interpretation of Article 6, countries will simply not use the mechanism. This means that developing nations will continue to lack international financial support, and the Paris emissions reductions targets will be at risk. The problem is that Article 6 is currently understood as a 'Direct Purchase' of carbon credits, where financing states purchase carbon credits from developing countries.¹

¹ In other words, this is state-to-state transactions of emission units similar to Article 17 of the Kyoto Protocol

Because financing states are neither politically nor economically ready to buy credits outright, and host states do not have the infrastructure to sell them, this Direct Purchase approach means Article 6 is unlikely to be used in practice. Although there has been significant research to develop the technical side of the Article 6 process, this largely remains within the same Direct Purchase paradigm. The Direct Purchase approach and results of our policymaker interviews are explored in Section II.

To make Article 6 operational therefore, the first contribution of this paper is to propose two alternative approaches instead of direct purchases. The first is the ‘Project Investment’ approach, where financing states invest in projects and receive a proportion of the associated emissions reductions relative to the investment’s impact on project additionality, alongside a financial return. This can derisk projects in developing countries, facilitating private investment. By moving from purchasing to investing, Article 6 transactions can become more politically and economically feasible for financing states, lowering the barriers to governments using Article 6 to meet their NDCs. The second approach is the ‘Private Sector approach,’ where states establish policy infrastructure to outsource the acquisition of Article 6 credits to the private sector, for instance through instituting carbon border taxes paid in carbon credits. Both of these approaches are explained in detail in Section III.

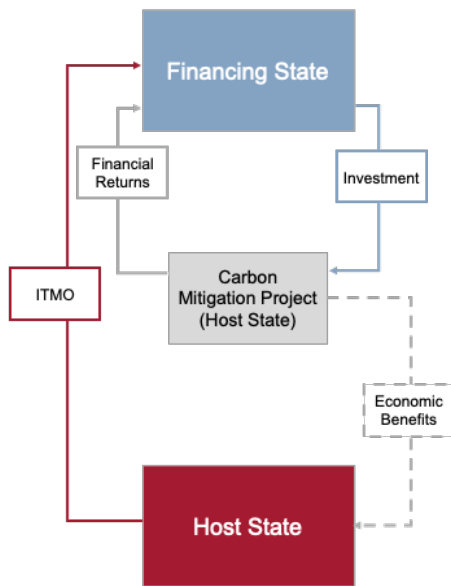
Figure 1. Overview of Proposed Article 6 Financing Strategies



Direct Purchase Approach

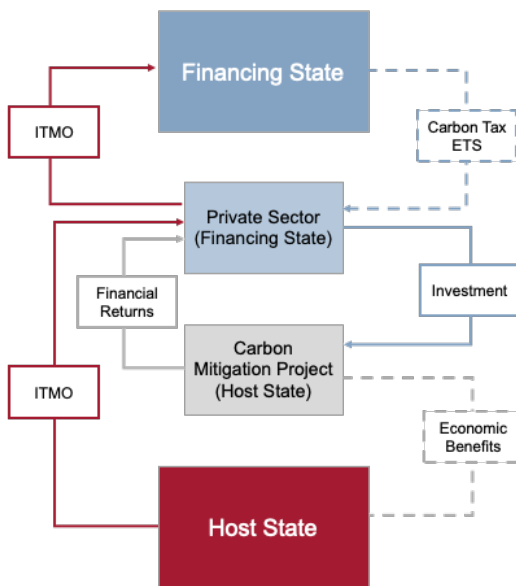
Financing states purchase credits from host countries directly or from project developers. Parties agree the price per tonne of CO₂, and verify that the project is additional. This is similar to the CDM, or to voluntary markets, except with a corresponding adjustment.

Project Investment Approach



Financing states fund carbon mitigation projects in host countries using financial instruments such as grants, government guarantees, equity investments, or concessional loans. Financing states then receive credit for a proportion of the emission reductions these projects generate. The Project Investment approach offers financing states a ‘double bottom line’ with both a financial and carbon credit return.

Private Sector Approach



Financing states outsource the acquisition of carbon credits to the private sector, for example by instituting a carbon border tax paid in carbon credits, rather than in cash. The financing state can then use these credits to count for its own NDC. Under the Private Sector approach, firms can acquire credits either through project investment or direct purchase.

Key to these approaches is understanding additionality, i.e. whether the emissions reductions would have occurred without Article 6 financing. In this paper, we propose that additionality can be quantified relative to Article 6 investment’s impact on cost of capital. If a project can sustain a cost of capital, i.e. the return paid to investors, that is high enough without Article 6 for the private sector or host government to invest, then the project is not additional as it could be financed anyway. Many developing country projects, however, are not profitable enough to pay returns commensurate with the risk they entail. Article 6 should bridge

this gap, with financing countries investing at concessional levels in exchange for carbon credits, lowering the cost of finance to where the private sector will invest, in effect derisking the project.

We present a new adaptable financial model for understanding how Article 6 financing affects the cost of capital and creates additionality. This model is supplied along with this paper and creates a framework for understanding how different investments should translate into different divisions of carbon credits, i.e. for a given project sponsored by Article 6, our model shows the proportion of emissions reductions retained by the host state versus the proportion transferred to the financing state. If a financing state provides concessional loans to a high-risk project, for example, this should entitle the financing government to different credit allocation than would equity investment, grants or other financial instruments such as sovereign guarantees in different risk jurisdictions. This is because additionality, we believe, is not binary: different types of investment are more or less additional. These differences are quantified in our Emissions Reduction Allocation Calculator (ERAC). Using the ERAC, policymakers can input financial and environmental data to calculate what proportion of the project carbon mitigation is additional, and hence the proportion to which a financing state is entitled. The financial mechanics of the ERAC are explained in detail in Section IV.

The Project Investment approach has the potential to radically alter the incentive structure for both financing and host states and to ‘crowd-in’ private investment through de-risking. To see the advantages of this new approach, we compare Project Investment to predecessor mechanisms under the Kyoto Protocols. Under Kyoto, developed states with emissions targets could use the Clean Development Mechanism (CDM) to acquire credits from developing countries, which at the time did not have binding emissions goals. Kyoto also created ‘Joint Implementation,’ where one developed state received emissions reductions credit for a project it financed in another developed state. However, while the CDM and Joint Implementation facilitated the transfer of project emissions reductions from one country to another, both these Kyoto mechanisms aimed at purchases: a financing state paid for infrastructure and received credit, with the variable being the price of carbon. The problem with this approach, we believe, is that additionality is understood as binary: if a project is additional, the financing state

receives all the credit, ignoring the fact that the private sector would likely have supplied some of the capital, it just required de-risking.

While Kyoto required an assessment that a project was additional, therefore, the direct purchase framework incentivized a race-to-the-bottom: the more credits generated at the lowest possible price, the better the deal for the financing state. This incentivized low-quality credits and the financing of ‘low hanging fruit.’ Under the Project Investment approach, we move from purchasing credits to receiving a proportion of emissions reductions in exchange for investment. Here, the financing state receives credit only for emissions reductions financed above the market rate, i.e. for emissions reductions that are additional, with the host state retaining credit for the remainder. This means financing states are incentivized to invest in the most additional projects, i.e. those least likely to happen anyway, as this will maximize their carbon credit return on investment. At the same time, such investments also create the largest private sector de-risking effect, bringing down the cost of capital on riskier projects and ‘crowding in’ private investment whose proportion of the project emissions reductions the host state retains for its own targets.

To demonstrate how the Project Investment approach could work in practice, Section V presents case studies where different financial instruments such as equity, debt, grants and sovereign guarantees create different levels of additionality in heterogeneous projects. We analyze examples of Saudi investment in Jordan, an Israeli sovereign guarantee for Morocco, a Qatari grant to Palestine, and an Emirati loan to Morocco. Each of these cases is analyzed using the ERAC to generate different allocations of carbon credits to host and financing state governments based on the differing impact on cost of capital of each investment. Our case studies come from the Middle East and North Africa (MENA) region, which combines some of the host countries most in need of financial assistance with hydrocarbon-rich financing states that have recently embarked on efforts to transform their economies and build regional climate networks. Through these MENA case studies, we explore how a major co-benefit of the Project Investment approach could be diplomatic progress through collaboration on cross-border investment.

The stakes for successfully implementing Article 6 are high. Since the 2015 Paris Accords, the prognosis for climate change has become more stark. At the same

time, after a decade of favorable global financial conditions, the COVID pandemic and crises in food and energy markets have stretched many governments. Rich and poor countries alike are weathering an economic downturn, with debt and inflation rising. Remedying these challenges while lowering global emissions will not be a simple task, and Article 6 will not be the sole solution. Emerging markets produce a fraction of global emissions, and developed countries must decarbonize at home at the same time as financing the energy transition abroad. Nonetheless, as climate change accelerates, international cooperation, especially on cross-border investment, is more urgent than ever.

I. INTRODUCTION

In this section we present the background to Article 6 and discuss its potential to accelerate carbon abatement by offering low-cost financing to developing countries. We then discuss how Article 6 transactions are envisioned from a technical perspective, as enunciated by the guidance finalized at COP26 in Glasgow in 2021. This section is intended as a general background to Article 6.

At COP26 in November 2021, countries finalized the long-awaited guidance for rules on international carbon trading, governed by Article 6 of the Paris Agreement. Using Article 6, if one country finances carbon mitigation projects in another, for instance renewable energy generation or energy efficiency projects, the financing government can count the associated emissions reductions towards its own emissions reductions targets (known as ‘nationally determined contributions,’ or NDCs). Disagreement over Article 6 has been a key point of contention since the drafting of the Paris rulebook in 2015, and until COP26, negotiators were unable to reach consensus.²

Through Article 6, it is hoped developed states will reach ambitious emissions reductions targets in the short term. Article 6 allows developed countries to offset a small proportion of their emissions as they work on long-term abatement of CO₂ in harder-to-decarbonize sectors such as transport, steel production, and agriculture. For developing countries, on the other hand, Article 6 can facilitate much-needed finance for decarbonization and development that would otherwise be unreachable. Other economic co-benefits could be substantial too, including, for example, increased access to energy and improvements in air-quality. In this way Article 6 can offer a ‘win-win’ to developing and developed countries by creating a mechanism that incentivizes developed states to finance carbon mitigation outside their borders.

² Edmonds, J., Yu, S., McJeon, H., Forrister, D., Aldy, J., Hultman, N., Cui, R., et al. (2021). How Much Could Article 6 Enhance Nationally Determined Contribution Ambition toward Paris Agreement Goals through Economic Efficiency? *Climate Change Economics*, 12 (1): 3

Background to Article 6

Article 6 of the 2015 Paris Agreement is the successor to the market-based approaches of the Kyoto Protocols. Under Kyoto, developed states with emissions targets could use the ‘Clean Development Mechanism’ (CDM) to acquire credits from developing countries, which at the time did not have quantified emissions reductions goals. Kyoto also provided for ‘Joint Implementation,’ where one developed state could receive credit for emissions reductions from a project it financed in another developed state. These approaches were not entirely unsuccessful, and the CDM supported more than \$90 Bn of renewable energy investments in developing countries, equivalent to 13% of their total renewable energy investments.³ Despite this, however, market-based approaches have come under sustained criticism along several axes since their original introduction at Kyoto. First, there are fears that trading carbon could lead to double counting, with the same project counted in two different countries’ emissions reductions. Second, there are concerns over ‘additionality,’ where countries might claim credit for reductions that would have occurred even without a carbon trading mechanism: such projects would not be ‘additional.’⁴ Third, there are worries about ‘carbon leakage,’ where emissions avoided in one jurisdiction simply move to another country, negating any decrease.⁵

Article 6 was designed to overcome many of these problems. Under Article 6, the countries hosting mitigation infrastructure and receiving investment must perform a ‘corresponding adjustment,’ which excludes any sold-off emission reductions to the carbon accounts that the host country submits to the UN. This avoids double counting as no project can be adjusted for twice, so credits cannot be double sold. At the same time, under Paris, almost every country has an NDC, as opposed to only developed states under Kyoto, and most, but not all, NDCs have voluntary emission targets. Assuming that only countries with emissions reductions targets would be eligible to host Article 6 projects, and that countries actually reach these NDCs, this setup would address carbon leakage, as carbon emissions displaced from one country cannot go to another without counting

3 Kossoy, A., Peszko, G., Oppermann, K., Prytz, N., Klein, N., Blok, K., Lam, L., Wong, L., and Borkent, B. (2015). State and trends of carbon pricing 2015. Technical report, World Bank.

4 Calel R, Colmer J, Dechezleprêtre A, Glachant M (2021) Do carbon offsets offset carbon? Center for Climate Change Economics and Policy Working Paper 398/Grantham Research Institute on Climate Change and the Environment Working Paper 371. London: London School of Economics and Political Science

5 Kortum S. & Weisbach D. (2017), “The design of border adjustments for carbon prices”, National Tax Journal

against that country's NDC. These are, of course, large assumptions, and are discussed in Section VI.

Concerns over additionality are still present for Article 6, and one of the contributions of this paper will be to suggest that additionality must be quantified in financial terms for any Article 6 project (see Section IV). This radically changes the current methodology for determining additionality, where today parties generally rely on consultants to make an assessment of whether a project is additional or not.⁶ Instead, in Section IV, we will propose that additionality is a scale, where the more Article 6 financing impacts the cost of financing of a project and crowds-in private investment, the more additional it is.

The Potential of Article 6

At COP26, member states reiterated a \$100 billion climate finance commitment for developing countries. This goal, however, is just a fraction of the estimated \$5 trillion required for carbon mitigation in the next decade to stay on track for Paris's 1.5 degree aspirational goal.⁷ This gap must, to a large extent, be filled by domestic decarbonization amongst the developed economies who account for a large part of global emissions. But it will also be critical to mobilize the private sector to invest, especially in the developing world where governments are more fiscally constrained. A key challenge is therefore how to incentivize the private sector where the need for financing is most acute but the risk is higher and returns lower. As the latest IPCC report notes, this is where Article 6 comes in: 'NDCs require international cooperation, for example bilateral agreements under Article 6.'⁸

6 Edmonds, James, Sha Yu, Haewon Mcjeon, Dirk Forrister, Joseph Aldy, Nathan Hultman, Ryna Cui et al. (2021):2

7 Boehm, S., K. Lebling, K. Levin, H. Fekete, J. Jaeger, R. Waite, A. Nilsson, J. Thwaites, R. Wilson, A. Geiges, C. Schumer, M. Dennis, K. Ross, S. Castellanos, R. Shrestha, N. Singh, M. Weisse, L. Lazer, L. Jeffery, L. Freehafer, E. Gray, L. Zhou, M. Gidden, and M. Gavin. 2021. State of Climate Action 2021: Systems Transformations Required to Limit Global Warming to 1.5°C. World Resources Institute: <https://doi.org/10.46830/wrirpt.21.00048>

8 IPCC : 605 (at the time of writing, subject to copy editing)

Host Countries

For developing countries, the 2022 global economic downturn and tightening financing conditions makes one thing paramount: access to financing. This was not always the case, and after the 2008 financial crisis, access to financing reached unparalleled levels. This was driven by unconventional monetary policy, including historically low interest rates and quantitative easing. These policies were designed to drive up aggregate demand, support the global recovery, and buttress the global financial system. Loose monetary policy also pushed private investors on a ‘hunt for yield’, with global asset managers seeking out opportunities for investing in emerging markets. This private capital furthered the already strong flow of capital to emerging markets from public sources such as the US, China, and multilateral institutions such as the World Bank.

Since 2016, there has been a dramatic drop in funding from public sources for emerging markets, Chinese loans, for example, have plummeted since 2016, with lending from China’s main policy banks falling 94% from a 2016 peak of \$75 Bn.⁹ The effects of this global financial retrenchment are already being seen, with debt crises from Sri Lanka and Pakistan to Zambia and Argentina. The developing world’s debt burden began expanding during the Great Recession, and was furthered by borrowing through the recovery. Since 2020, these debt burdens have been exacerbated by the pandemic, alongside high prices for food and oil that necessitated increased spending. While a debt standstill allowed breathing room during the pandemic, this policy has ended, and developing countries do not have the fiscal resources to service existing debt, let alone raise new capital. This backdrop makes it hard for emerging markets to avoid humanitarian crises, much less progress on the green transition. The NDC partnership network notes that ‘inadequate access to financing remains a chief constraint to achieving Paris Climate Agreement goals,’ and this was corroborated by our own interviews.¹⁰

Article 6 was designed to provide capital at affordable terms not linked to fiscally contractionary policy. An Oxfam analysis of lending between the IMF and developing world found that in 2020, 84% of IMF loans negotiated required public-expenditure cuts that could ‘undermine health-care and pension schemes, freeze wages for public-sector workers, and reduce unemployment insurance,

9 Rhodium Group, Mingy & Kratz, “China’s Belt and Road: Down but not Out” (2021)

10 NDC Partnership, “Climate Finance: Enabling Climate Action” (2020)

sick pay, and other social benefits.¹¹ Article 6, on the other hand, offers finance without these conditions and in many ways can be seen as the ultimate response to many developing nations' long-standing skepticism of the global environmental movement. Prior to the 1972 Stockholm Conference, arguably the genesis of modern international environmental law, the Group of 77 developing countries passed a resolution to ensure 'global concerns over environmental protection should not interfere with their development agenda¹²'. Article 6 was designed not only not to impede development, but rather to bring in new capital.

Financing Countries

Even for developed financing states, reaching ambitious emissions goals will be hard. The electric sector is particularly illustrative of deep-decarbonization challenges. As the proportion of low-carbon electricity generated from variable renewables such as wind and solar PV increases, it can become increasingly difficult for grid operators to ensure reliability and avoid blackouts. Grid management challenges that arise from large amounts of variable renewable generation can be addressed, but it will take time to develop nascent utility-scale storage technologies and build new transmission.

More broadly, developed states are struggling with energy security and affordability in the context of a global cost of living crisis, made worse by energy supply disruptions following Russia's war against Ukraine. Article 6 can help developed countries here in two ways. First, Article 6 gives financing states an avenue to lower net emissions by financing reductions abroad while working on structural changes to decarbonize the domestic economy. This can create time to safeguard energy supply while meeting international commitments. Second, Article 6 can reduce financing states' total spend on reaching their NDCs, critical given constrained government budgets. This is another key aspect to Article 6: it allows developed countries to invest in the most efficient projects - home or abroad - to mitigate emissions. As Edmonds et al. note: 'for some countries it is more cost effective to cooperate with other countries that have lower marginal abatement costs than to reduce

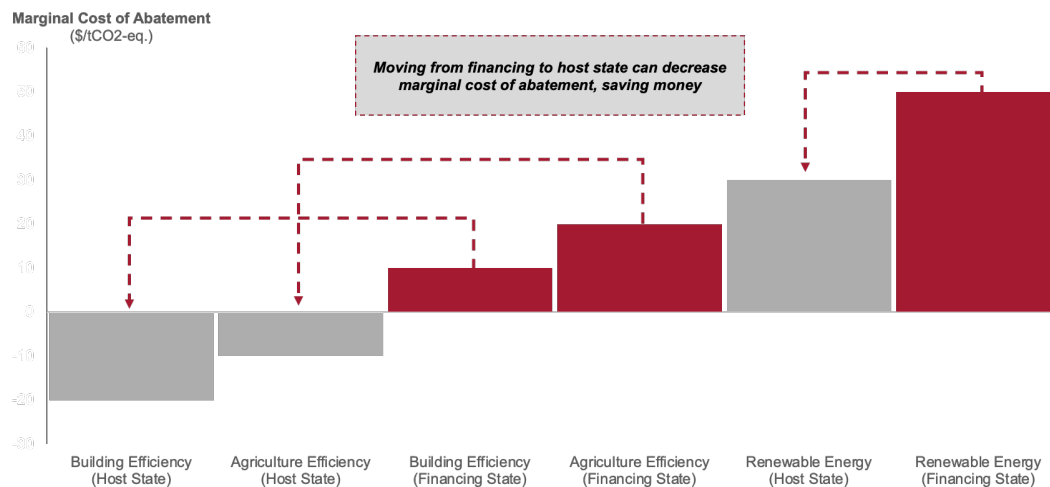
11 Spence, Stiglitz, Ghosh, "Avoiding a K-Shaped Global Recovery" <https://www-project-syndicate-org.ezp-prod1.hul.harvard.edu/commentary/global-economy-avoiding-k-shaped-recovery-by-michael-spence-et-al-2021-03> (2021)

12 Salzman, Hunter & Zaelke, *International Environmental Law and Policy* (2021, 6th ed.)

emissions domestically.¹³ The World Bank estimates Article 6 could halve the cost of implementing countries' NDCs, saving \$250 Bn by 2030.¹⁴

The way in which Article 6 can save financing governments money can be seen through the 'marginal abatement curve'. This shows abatement cost (capital spent per tonne of CO₂ reduced) for different technologies in different jurisdictions. In Figure 2, we see an indicative marginal abatement curve. Projects in developing country host states - in gray - may have higher 'abatement returns' than those in developed countries in red. This means developed country governments could generate greater emissions reductions for less capital abroad. It is important to note this understanding is not without criticism, as Hahn & Stavins noted in 1999, while marginal abatement curve could theoretically look like Figure 2, 'theory and experience with credit programs suggest that they are less likely to facilitate major cost savings, partly because of the large transactions costs that are involved.'¹⁵

Figure 2. Indicative examples of Marginal Costs of Abatement in Host and Financing Countries



13 Edmonds, James, Sha Yu, Haewon Mcjeon, Dirk Forrister, Joseph Aldy, Nathan Hultman, Ryna Cui et al. "How Much Could Article 6 Enhance Nationally Determined Contribution Ambition Toward Paris Agreement Goals Through Economic Efficiency?." *Climate Change Economics* 12, no. 02 (2021): 2150007. <https://www.worldscientific.com/doi/epdf/10.1142/S201000782150007X>: 5

14 World Bank, "What You Need to Know About Article 6 of the Paris Agreement (2022) =

15 Hahn, R.W. and Stavins, R.N., 1999. What has Kyoto wrought? the real architecture of international tradeable permit markets. *The Real Architecture Of International Tradeable Permit Markets* (February 1999): 5

How Article 6 Works

Through Article 6, as finalized at COP26 in November 2021, there are two ways transactions can occur. The first option is a central exchange to connect financing and host countries. Such an exchange was theoretically established when the Paris Agreement was signed in 2015; Article 6.4 creates a new UN body to be known as the ‘Sustainable Development Mechanism’ (SDM). The advantages of central trading are clear. From a market perspective, centralization could create liquidity by matching supply for ITMOs with demand. Centralizing trading could also support climate change adaptation by creating a ‘share of proceeds fund’ where a percentage of each transaction is taken as a tax and redistributed to developing countries (agreed at COP26 in 2021). In addition a ‘haircut’ on the carbon credit transferred could be applied, i.e. a proportion of emissions excluded both from the financing and host country NDC. This would ensure a boost in overall net reduction in emissions from Article 6.

While the Article 6.4 centralized mechanism will eventually be a key player in Article 6 transactions, there is for now no agreement on its structure. From our conversations with national governments, negotiators at COP, and the UNFCCC, we do not expect full operational capacity before 2025 at the earliest. With this in mind, it is likely that Article 6 transactions will instead occur as bilateral contracts negotiated between host and financing countries. These would occur under Article 6.2, the guidance for which was finalized at COP26. There is, however, complete ambiguity about how these contracts will be structured, including what financial instruments will be used and at what price.

Article 6.2 is an accounting mechanism, outlining the process by which a host state can sign a letter of authorization, thus creating an ITMO. The host state then performs a corresponding adjustment to its carbon accounts at the UNFCCC for the same emissions amount transferred away. What Article 6.2 does not do, however, is give states any idea about what kind of financial transaction would entitle a financing country to that ITMO; this is left to the negotiating parties. This ambiguity is in part because Article 6.2 was not initially intended as the mechanism through which Article 6 trades would occur. Instead, as described, credits were expected to be primarily exchanged

through a centralized mechanism, which never materialized. Article 6.2 was intended to be limited to countries ‘selling’ their excess emissions reductions to another country, for example by linking national emissions trading schemes (ETS). Academic literature has in the past argued that it is the ‘net flow of allowances between linked ETSs that should be accounted as ITMOs under Article 6.2.’¹⁶

It is critical to understand this expansion of the remit of Article 6.2 to cover bilateral transfers because it helps to understand some of the drawbacks and institutional barriers we will examine in this paper. As Simon Fellermeier, who is responsible for international climate policy at the Swiss Federal Office for the Environment, told us: ‘we are using Article 6.2 because it was totally uncertain when 6.4 would come about and it’s still uncertain when 6.4 will actually be usable.’

In this paper, one of our central goals is to create a new way of understanding how bilateral transactions under Article 6.2 should occur. In Section II we discuss how the prevailing norms around these transactions are in effect barring any progress, and in Section III propose a format governments can follow to maximize benefit to both host and financing country.

The Middle East & North Africa as a Case Study

In this paper we use the Middle East and North Africa (MENA) as a case study to demonstrate how governments may use Article 6. MENA contains some of the countries most in need of financial assistance, for instance Lebanon or Palestine, but at the same time, developed countries that have committed large amounts of resources to the energy transition. For states like Saudi Arabia or the United Arab Emirates, financing Article 6 projects abroad can fit into larger goals such as Saudi Vision 2030, or the Abu Dhabi Economic Vision 2030. MENA therefore provides a paradigmatic case study for how even carbon-heavy economies can decarbonize. This is particularly true for the Gulf Cooperation Council (GCC), a regional union comprising Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. But gas has also shaped Israel and Egypt, where East Mediterranean fields have transformed the countries into exporters of gas. As an opportunity, research from local scholars has shown how MENA hydrocarbon-exporting states

¹⁶ Mehling, M. A., Metcalf, G. E., & Stavins, R. N. (2018). Linking climate policies to advance global mitigation. *Science*, 359(6379), 997–998. <https://doi.org/10.1126/science.aar5988>

have ‘recently adopted ambitious visions and post-carbon strategies that have sought to diversify economies and decrease local consumptions. These are ‘formally linked to global consensus or referred to in progress reports on the SDGs or the Paris Agreement.’¹⁷

Egypt’s COP presidency began November 2022, to be followed by the UAE presidency from November 2023. Egypt’s vision is to ‘move from negotiations and planning to implementation,’ with a focus on finance as ‘the cornerstone for implementing climate actions.’¹⁸ This situates our research in a unique moment for the Middle East, hosting two consecutive COPs and buoyed by developments such as Saudi Arabia’s Middle East Green Initiative and Israel’s new relationships with its neighbors. These give pertinence to our case studies of Article 6 investment, including Saudi investment in Jordan; Qatari grants to Palestine; Israeli guarantees in Morocco and Emirati loans to Egypt.

17 Mohammad Al-Saidi, Esmat Zaidan & Suzanne Hammad (2019) Participation modes and diplomacy of Gulf Cooperation Council (GCC) countries towards the global sustainability agenda, *Development in Practice*, 29:5,

18 <https://cop27.eg/en/egpresidency>

II. CURRENT UNDERSTANDINGS OF ARTICLE 6

In order to explore how Article 6 is understood by actual policymakers, we conducted over 70 stakeholder interviews with government officials, investors, environmental specialists and other experts in the fields of international law, carbon markets, and finance. An overview of our interview subjects and their affiliations is included in the acknowledgements for this paper. Our focus was the MENA region, though we also gathered views from European, American and other international subjects. In general, government officials we interviewed were ministers and senior civil servants from Ministries of Finance, Environment, Energy and Foreign Affairs. Our conversations centered on three questions: what is your understanding of how Article 6 could work in your country; how does your government intend to use Article 6; and what do you consider the key advantages and drawbacks of Article 6.

In this section, we discuss the results of our interviews, identifying potentially existential challenges for Article 6, both from a practical and theoretical perspective. We argue that the way that Article 6 is currently understood, something we call the ‘Direct Purchase’ approach, is unlikely to succeed at a large scale due to the concerns our interviewees identified.

The Direct Purchase Approach

Through our research, it became clear most policymakers understand Article 6 as a ‘direct purchase’ of carbon credit. In other words, similar to private carbon markets, Article 6 ITMOs are seen as a commodity to be bought or sold. Under this approach, to acquire an ITMO, a financing state directly pays a host state government or firm. This understanding is also evident from most NDCs, where governments refer to ‘buying’ and ‘selling’ ITMOs to meet their targets.

Under the direct purchase approach, as described by the stakeholders we interviewed, a financing state government buys ITMOs from a host state government. The price of ITMOs would likely mirror the price of carbon in other markets, for example emissions trading schemes in the EU or UK, especially if these ETS are fungible (i.e. if the ETS accepts ITMOs for at least a portion of a firm’s obligations). This approach has the benefit of being simple to implement:

fiscal resources are allocated at a set price per tonne of CO₂ and purchases executed accordingly. While there are some uncertainties about the logistics of a direct purchase, for example the monitoring, reporting and verification of emissions reductions, these issues are currently being discussed at the international level and there is indication that agreement will be reached.

Direct purchases are capital intensive, as capital must be delivered upfront to buy ITMOs. For countries with the political drive to make NDCs a priority, and sufficient economic capital, the direct purchase approach can be an attractive option for rapidly meeting NDC targets. This, for example, is in part the approach envisioned by the government of Norway, which is setting out to directly purchase ITMOs.

It is important to note that under the direct purchase approach, credits can either be general, i.e. a host state authorizing the sale of tonnes of carbon credit for a generic corresponding adjustment, or project-based, i.e. the host state authorizing the sales of carbon mitigation coming from a specific project. In either case, however, the financial transaction occurring is a sale.

Key Challenges for the Direct Purchase Approach

Most financing state governments we interviewed, while committed to their NDCs, are not currently contemplating using Article 6. The main reason for this was almost always that a direct purchase of Article 6 credits is seen as too expensive and directly allocating a budget as too challenging. Indeed, there is a wider question: why spend money abroad to meet an international climate commitment? The Gulf states we interviewed, while not lacking financial resources, are undertaking extensive modernizations of their economies. While these states have a history of philanthropy, our interviews showed a resistance to Article 6 amongst senior political actors when it was construed as, for example, Saudi Arabia or the UAE simply ‘paying’ for other countries’ development. In Israel, members of the government were clear that the Ministry of Finance spending directly to purchase credits is financially and politically impossible.

For host countries as well, our interviews showed impediments to the direct sale of Article 6 credits. While in principle, host countries were interested in the idea of selling Article 6 credits, they do not have the capital to spend on projects that would generate emissions reductions, and hence the ITMOs they could sell. Nor is the private sector

willing to provide such capital at financially viable levels at present. In addition, selling ITMOs places risk on the host country: if a host country finances a project that fails, having expected revenue from ITMO sales, the host government may end up liable for losses.

More widely than the financial challenges of the Direct Purchase approach, host governments were also concerned about the impact for their own NDCs of selling ITMOs. The Direct Purchase approach is zero-sum: any ITMO transferred from a host state makes it proportionately harder for that country to meet its NDC due to the corresponding adjustment. This is especially concerning when we reconsider the Marginal Abatement Curve in Figure 2. If ITMOs represent emissions reductions on the left hand of the marginal abatement curve, then developing countries may be selling the 'low hanging fruit' of emissions reductions, i.e. those that require the least expenditure, making it even harder to reach NDCs long term.

To a large extent, these problems are the effect of how additionality is understood under the direct purchase approach. While any credit sold must be deemed to be additional, i.e. it must be assessed that the project generating the credits would not have occurred without Article 6 financing, the problem as we see it is that additionality is treated as a binary. In other words, projects are either additional or not, and all the emissions from an additional project are additional. This means host states are actually signing over credits for emissions reductions that the private sector would in part have financed in the right conditions. It is easy to demonstrate this with a simple example: imagine a large project that is just a fraction too risky for private sector financing. With a small grant, the project costs are reduced and the project becomes viable. Under the direct purchase approach, for example Joint Implementation under the Kyoto Agreement, the entire set of emissions reductions would be considered additional, despite the fact that the vast majority of the capital could have been financed by the private sector, had Article 6 been used as a de-risking instrument.

Research from academia and private firms offers some potential solutions for the problems faced by direct purchases. Aldy & Halem have suggested in the context of voluntary markets that future streams of credits be securitized, offsetting risk and allowing host countries to sell credits before they are generated. This would provide capital for projects on the expectation of future ITMO revenue and approach would transfer risk from host to financing country.¹⁹ Financial engineering, however, could

¹⁹ Aldy & Halem (2022). The Evolving Role of Greenhouse Gas Emission Offsets in Combating Climate Change.

add complexity to sovereign carbon markets, which are poorly understood and mistrusted, and such transactions are in any case not envisioned medium term. In sum therefore, despite being the prevailing understanding of how Article 6 works amongst policymakers, the Direct Purchase model faces key challenges that mean it is unlikely to be used in practice.

III. NEW APPROACHES FOR ARTICLE 6 FINANCING

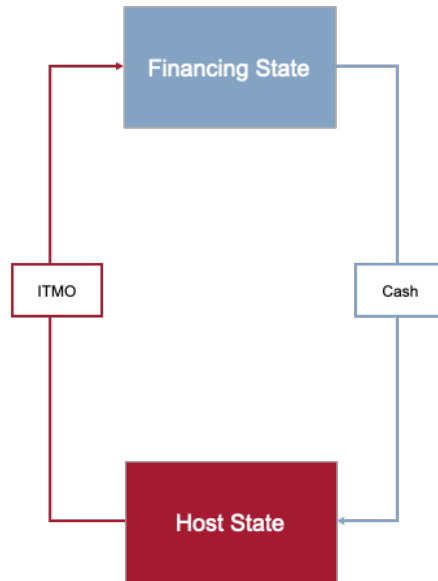
Given the concerns with the direct purchases described in Section II, we propose two new approaches to Article 6 financing that circumvents some of these challenges. We call these the ‘Project Investment’ and ‘Private Sector’ approaches. Under the Project Investment approach, financing states use public resources to fund specific carbon mitigation projects, investing in infrastructure that reduces emissions, rather than directly purchasing ITMOs. This investment de-risks the project for the private sector, and entitles financing states to credit for a proportion of emissions reductions generated, as well as potential financial return and other benefits. The share of emissions reductions that the financing state receives is limited to only the additional component of the Article 6 investment, i.e. that financed at a concessional level to the market rate. This can be calculated using the financial model we present in the next section. Under the Private Sector approach, financing states ‘outsource’ the acquisition of ITMOs to the private sector, for example by instituting a carbon tax that must be paid in carbon credits, rather than in cash. This reduces the burden on the state by having the private sector fund projects, though tax revenue is forgone.

One of our interviews with a senior UK civil servant, who was one of the organizers of COP26, is illustrative of current views amongst policymakers. He told us, like many other interviewees we spoke to, that his government understands Article 6 as a direct purchase, making it a last resort given the expected price of ITMOs. Even for advanced economies such as the UK, a direct purchase of carbon credits is therefore seen as financially impossible and politically toxic. When, however, we described the Project Investment approach, the civil servant was much more positive, saying candidly he ‘suspects the UK approach has not yet been properly thought through.’

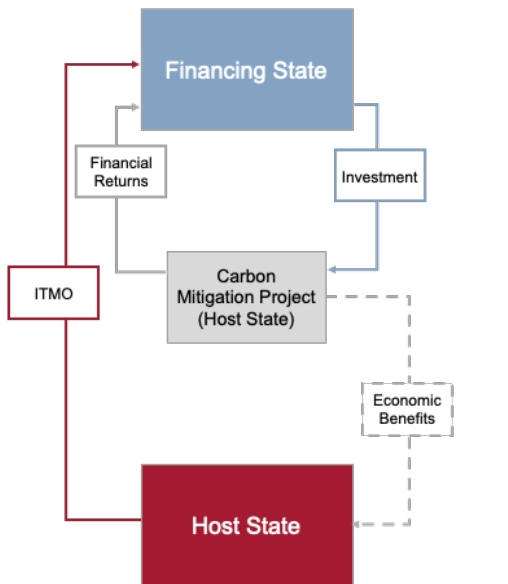
In this section, we lay out the Project Investment and Private Sector approaches in detail, describing how these approaches to Article 6 might work both in theory and in practice. When analyzing the Project Investment approach, we do so through the lens of infrastructure project investment, since we view this as the most likely and highest potential avenue for mobilizing Article 6 financing. However, in theory any project could be the subject of Article 6 financing.

Figure 3. Overview of Proposed Article 6 Financing Strategies

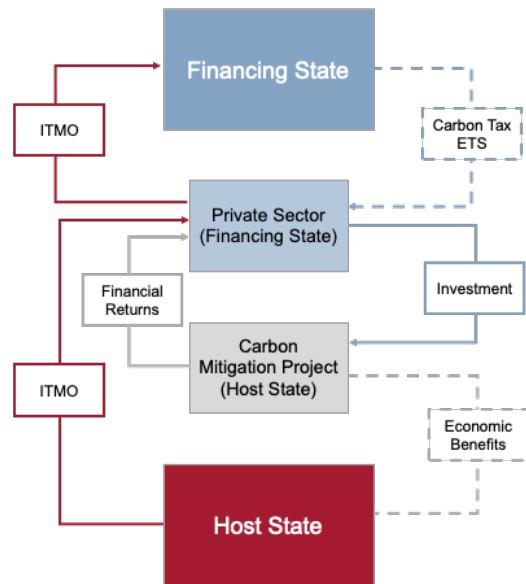
Direct Purchase Approach



Project Investment Approach



Private Sector Approach



Moreover, the Union should support less developed countries with the necessary technical assistance in order to facilitate their adaptation to the new obligations established by this regulation” (European Commission, 2021).

The Project Investment Approach

Under the Project Investment approach, financing states contribute a portion of project capital costs at a concessional rate, i.e. a lower rate of return than necessitated by prevailing market conditions, in return for a proportion of the project's emissions reductions. Under this approach, concessional Article 6 investment 'blends' with private capital to lower the project's overall cost of financing and attract additional investment. Therefore, the key feature of the Project Investment approach is additionality: Article 6 financing lowers the cost for a project to levels that are financially viable for additional private investors.

In general, infrastructure projects are financed with a mixture of debt and equity. Equity typically represents 10% - 30% of total investment, with debt representing 90% - 70%. There are exceptions to this rule of thumb; in certain countries, particularly developing markets, projects may be entirely financed by equity, especially when cash flows are not stable enough to sustain interest payments. Equity investors are project owners, entitled to profits after other costs are paid, including interest on debt. Being project owners gives equity investors control, and management are themselves often equity holders. In fact, management having 'skin in the game,' i.e. investing in project equity, is often a requirement for funding from other investors, to ensure management incentives are aligned with the project.

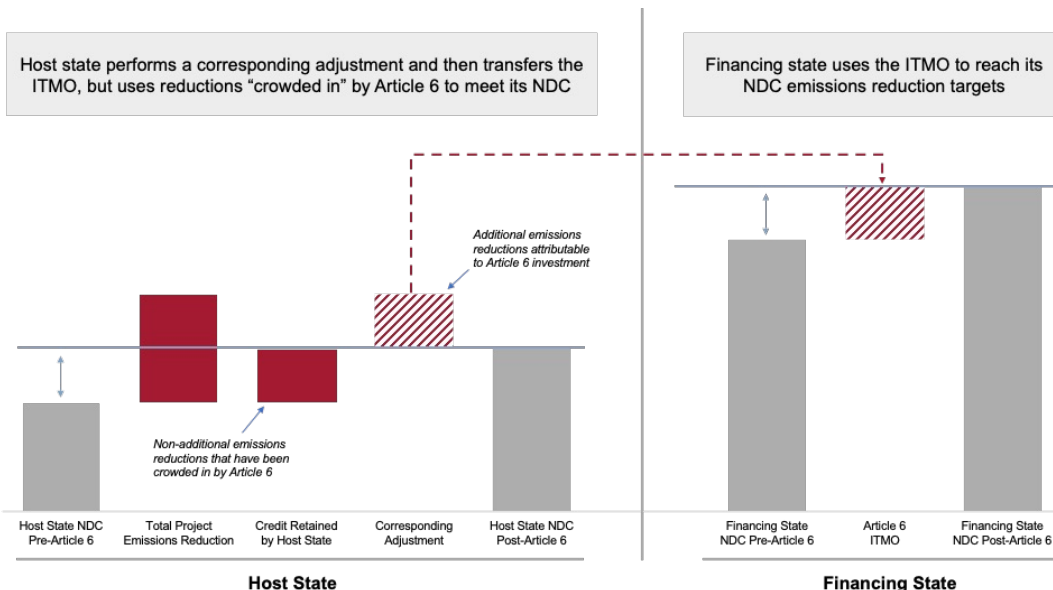
Debt investors lend to the project in exchange for a fixed stream of interest payments. The most common form of debt financing for infrastructure projects is loans or bilateral lending agreements, typically from banks. Loans can be secured against the project's assets as collateral or in some cases unsecured. Other debt instruments also exist: in credit facilities, investors set aside a certain amount of capital that projects can 'draw down' at any time, or bonds, which are publicly issued (and tradable) debt instruments bought by institutional investors. The cost of debt, i.e. interest paid, is one of the key variables in financial viability, since it has a material impact on a project's expenses and, by extension, a project's returns. This presents a problem for developing countries: investors only lend to emerging markets at high interest rates to compensate for risk, often making projects financially unviable.

Article 6 project investment can also occur through other financial instruments outside debt and equity. One example is a grant, where financing states simply

support projects without the expectation of a financial return. Another example would be sovereign guarantees. Sovereign guarantees offer an attractive way for financing states to bring down a project's cost of financing without committing capital upfront. Using a sovereign guarantee, a financing state guarantees debt issued in a host state, promising to pay back the investors if something goes wrong. This reduces investment risk, lowering the interest rate. All these different financing instruments are explored in detail in Section V.

In Figure 4, we see how the Project Investment approach can help both financing and host states meet their NDCs. In the example, both financing and host country would miss their targets without Article 6. When an Article 6 investment is made, however, the financing state sponsors a project in a host country that creates emissions reductions. Because this investment is made at a concessional level, the cost of financing is reduced, meaning the project has more leeway to increase returns, and private capital is 'crowded-in' which would not otherwise have been invested. The emissions reductions attributable directly to the additional Article 6 investment are transferred as an ITMO, allowing the financing state to meet its NDC while the host state performs a corresponding adjustment. The emissions reductions financed by crowded-in capital, however, are retained by the host state for its own NDC. This creates a new way of understanding additionality, i.e. those emissions reductions financed by countries through the Article 6 mechanism explicitly that necessarily could not have been financed at market rates or through other development financing.

Figure 4. Impact of Article 6 Financing on Host & Financing Country NDCs.



It is important to note that our Project Investment approach shares some similarities to the Joint Implementation mechanism under the Kyoto Protocols. As we shall see, however, the key difference comes in how to deal with additionality. Where Joint Implementation envisioned a financing state receiving emissions reduction credit for any project financed in a host country that is deemed to be additional, the core of the Project Investment approach is that the host country receives credit for emissions reductions up to the point of financial viability. This is discussed in Section V in detail.

The Private Sector Approach

Under the Private Sector approach, financing states outsource the acquisition of carbon credits to the private sector. Governments remain key to the process: host governments authorize ITMO issuance with a letter of authorization and perform a corresponding adjustment; financing governments receive the ITMO from the private sector and register it with the UNFCCC for inclusion in their NDC. However, by moving the burden for acquiring ITMOs to private firms, actual government expenditure is reduced.

The private sector approach can be pursued in several ways. First, a financing state could set up a specific tax that must be paid in ITMOs, rather than in cash. This may be, for example, a carbon border tax, similar to the carbon border adjustment mechanism (CBAM) envisaged in the EU.²⁰ This would tax imports in certain sectors, and require that firms exporting into the financing country ‘hand in’ ITMOs equal to a proportion of carbon emissions associated with that good or service. Alternatively, taxes on goods such as fuels can be envisioned, which would also be paid in ITMOs rather than cash. This could create a pathway, for example, for the transportation sector to become net zero, as emissions generated by the use of fuel could be offset in the national carbon accounts by ITMOs handed in by the fuel companies.

Outside direct taxation, emissions trading schemes or cap-and-trade systems also offer an avenue for the private sector approach. Firms subject to a cap-and-trade or ETS could offset excess emissions outside their quota by acquiring ITMOs overseas. This again would give a financing state a path to net zero by setting low caps, with excess emissions offset through ITMOs. This is similar to the EU ETS and CDM,

²⁰ Indeed, the CBAM has an explicit aim to encourage greener production in emerging markets: the EU stands ready to work with low and middle-income countries towards the decarbonization of their manufacturing industries.

with the addition that now there would be debits made against the accounts of the host countries.

It is worth noting that in the Private Sector approach, the private sector itself will rely on either the Direct Purchase or Project Investment approach for their own acquisition of ITMOs, but the buyer or investor will be a private firm, rather than the state. If, for example, an Emirati telecoms company were to be subject to a carbon tax paid in ITMOs, the management would have to decide between the direct purchase of ITMOs or investing in carbon mitigation projects to receive ITMOs.

On a practical level, as well as creating the obligation for private sector firms to acquire ITMOs to meet national obligations, governments will have some role in facilitating domestic firms' interactions with foreign carbon mitigation projects. This could be bilateral agreements between host and financing country governments, under which a financing state promises that ITMOs generated in certain types of projects, for example renewable energy, will automatically be eligible for its tax or ETS. Several states have already begun to put in such frameworks, including Switzerland, which is discussed in detail later in this Section, and Sweden, where the government has signed agreements with several developing countries. Crucially, however, these currently envision Article 6 transactions as direct purchases, rather than as project investments.

Article 6 & Private Carbon Markets

Our expectation is that, as Article 6 becomes utilized, more and more governments will to some extent use the Private Sector approach. This will create private demand for ITMOs, as firms need credits to meet ETS or carbon tax requirements, and could have two far-reaching effects on private carbon markets.

First, the Private Sector approach could support environmental integrity in voluntary carbon markets. Carbon markets today are divided into 'voluntary' and 'compliance' markets. Compliance markets comprise credit for Emissions Trading Schemes or Cap-&-Trade systems. Examples include EU Allowances (EUAs) in the EU ETS, or RGGI credits for the Eastern US cap-&-trade system. Voluntary credits, often called 'offsets,' are unregulated and bought by firms for voluntary commitments (e.g. net zero targets). While there are limited provisions for offsets to

be used in certain compliance markets, these are normally limited to less than 5% of a firm's total carbon budget.

Voluntary credits have been subject to criticism for the same issues that Article 6 was designed to address: double counting and additionality. The expansion of the Private Sector approach, however, could support environmental integrity by pushing firms to replace unregulated offsets with Article 6 ITMOs. As more businesses operate in countries employing the Private Sector approach, firms will increasingly be incentivized to acquire ITMOs instead of voluntary credits, as otherwise they would 'double offset'. This is because, based on our conversations with policymakers voluntary offsets will almost definitely be ineligible for carbon border taxes. An example is the EU's carbon border adjustment mechanism (CBAM), where firms that have not paid a carbon tax in their local jurisdiction will be subject to a levy, so as not to disadvantage EU firms paying carbon fees. Our expectation is that the CBAM is unlikely to accept voluntary offsets as proof that firms have paid a tax, though ITMOs would qualify. If a shift from voluntary offsets to ITMOs were to occur, it would blur the distinction between compliance and voluntary markets, expanding corresponding adjustments and avoiding double counting.

The second major impact of the Private Sector approach may be to attract carbon trading, and the associated ecosystem of finance, consultancy, legal services etc., to countries employing the approach. Firms will need a marketplace to acquire ITMOs, and as financing states will determine what kind of credits they would like to acquire, including the rules around format, their own financial center could be a natural trading venue. Both the Saudi and the Emirati governments are working to attract carbon credit trading, as are global centers such as London and Singapore. Different jurisdictions are taking different approaches: in the UAE, the state sovereign wealth fund Mubadala is partnering with local exchanges. In London, the London Stock Exchange is using existing market infrastructure to create new investment vehicles 'in a way that will enable their investors to receive investment returns in specie, in the form of carbon credits, instead of, or in addition to, cash dividends and other distributions'²¹. These dynamics are explored in Section V, with a case study of the UAE acquiring ITMOs in Morocco.

²¹ <https://www.londonstockexchange.com/discover/news-and-insights/voluntary-carbon-markets>

Swiss Use of Article 6.2 (Klik Foundation)

The Swiss Government provides a possible example of how the Private Sector approach could work in practice. The Swiss Article 6 framework is given by the Swiss CO₂ Act, revised to comply with the Paris Agreement.²² The exact structure of the Swiss system is not finalized, but in effect, Switzerland will compel motor oil companies to offset part of the carbon emissions generated by the auto sector by purchasing Article 6 ITMOs, and handing them over to the government for use in the Swiss NDC.

Switzerland has begun to negotiate bilateral agreements with foreign countries, under which the motor fuel companies would find projects to sponsor, and receive ITMOs to be handed in to the government. In order to facilitate this process, the private motor oil companies set up the Klik Foundation to purchase credits on their behalf. As Simon Fellermeier, responsible for International Climate Policy and Market-Based Mechanisms at the Swiss Federal Office for the Environment told us, these are ‘bilateral agreements that we continue to sign and continue to negotiate in order to implement our NDC.’

Figure 5. High-level overview of ITMO flow from Host Countries to Swiss Government.



Despite the elegance of the Klik solution, our interviews with its administrators showed the limits of the Private Sector approach here. Private sector contributions are unlikely to meet Switzerland’s deficit to its NDC target, and so the government has retained optionality to directly acquire credits if it appears the NDC will not be reached. Nonetheless, the Klik Foundation provides key lessons for other countries. Switzerland found a way to pass the burden for meeting part of its NDC to private companies, the essence of the Private Sector approach. In some ways, this remains a government to government transfer: host countries must sign a letter of authorisation for a corresponding adjustment to validate the ITMO, and the motor fuel companies must hand in the credit to the Swiss government for registration with the UNFCCC. However, the capital comes from the private sector, as does

²² <https://www.klik.ch/foundation/legal-foundations>

the responsibility for finding specific projects, though these are negotiated within the framework of broad national agreements. The Klik Foundation already has many such agreements, including Morocco. The institutional mechanism for such an arrangement is in effect a carbon border tax, imposed on a specific industry (motor fuels), that must be paid in ITMOs instead of in cash. Like Sweden and other bilateral contracts signed so far, these envision Article 6 transactions as direct purchases, rather than as project investments.

IV. MEASURING THE IMPACT OF ARTICLE 6

One of the major advances of the Project Investment approach is to consider additionality as a sliding scale, rather than understanding projects as simply additional or not. Under our framework, Article 6 investments are additional to the extent they are made at concessional levels the market would not finance: only investments made below market rate are additional, and the further below that rate, the more additional they are. This is variable: risks are not equal across jurisdictions and investments and if, for example, Saudi Arabia invests equity at a concessional level in Morocco, i.e. with a lower expected IRR than market rates, the investment may be more or less additional than, for example, a concessional debt investment in Lebanon. This means the government should receive a different proportion of project emissions reductions to reflect the different level of additionality. This solves the problem identified in Section III, where the binary nature of the direct purchase paradigm meant much of the capital contributed to ‘additional’ projects could have been financed at market rates.

We believe that our understanding of additionality can help address many of the problems that plagued the old CDM and that are still concerns for Article 6. We build on the work of Calel et al. (2021), who found that in India, more than 50% of approved carbon offsets under the CDM were allocated to projects that would very likely have been built anyway, i.e. that were not additional. Their methodology was to identify projects which qualified as additional, and generated emissions credits, but where there existed other similar projects that were strictly less profitable, yet were built without the same subsidies.²³

The Emissions Reduction Allocation Calculator

In order to quantify additionality, and hence calculate the proportions of a project’s emissions reductions to which a financing state is entitled, we have supplied with this paper our new Emissions Reduction Allocation Calculator (ERAC). The ERAC compares the theoretical cost of capital for a project before the Article 6 investment, i.e. the market rate, with the cost of capital after the Article 6 investment, i.e. where

²³ Calel R, Colmer J, Dechezleprêtre A, Glachant M (2021) Do carbon offsets offset carbon? Center for Climate Change Economics and Policy Working Paper 398/Grantham Research Institute on Climate Change and the Environment Working Paper 371. London: London School of Economics and Political Science: 2

concessional Article 6 finance has lowered the cost of capital to a level the project can afford to pay. Project financing instruments - grants, equity, debt or sovereign guarantees - are heterogeneous, so host and financing states need this common framework to understand how these different instruments will impact the proportion of emissions reductions to which a financing state is entitled.

To understand how the ERAC works, it is necessary to understand the weighted average cost of capital (WACC), a common concept in financial analysis. WACC is the overall, blended cost of financing for a project, and we will be using it as our measurement for cost of capital. To calculate the WACC, we proportionally sum the cost of equity, which is the return to equity investors, with the cost of debt, which is the interest paid.

$$\text{WACC} = \underbrace{K_d}_{\text{Cost of Debt}} * \underbrace{(1-t)}_{\text{Tax Shield from Debt Financing}} * \underbrace{\frac{d}{(d+e)}}_{\text{Proportion of Debt Financing}} + \underbrace{K_e}_{\text{Cost of Equity}} * \underbrace{\frac{e}{(d+e)}}_{\text{Proportion of Equity Financing}}$$

To illustrate how a WACC is calculated, imagine a project 50% debt financed at a 10% interest rate, 50% equity financed at a 20% return, with a 20% tax rate. To calculate the post-tax cost of debt, we apply a 20% tax shield, reducing the cost of the 10% interest to 8%, as interest is a tax-deductible expense. This ‘blends’ to give a WACC of 14%, i.e. the weighted average of 50% debt at 8% and 50% equity at 20%.

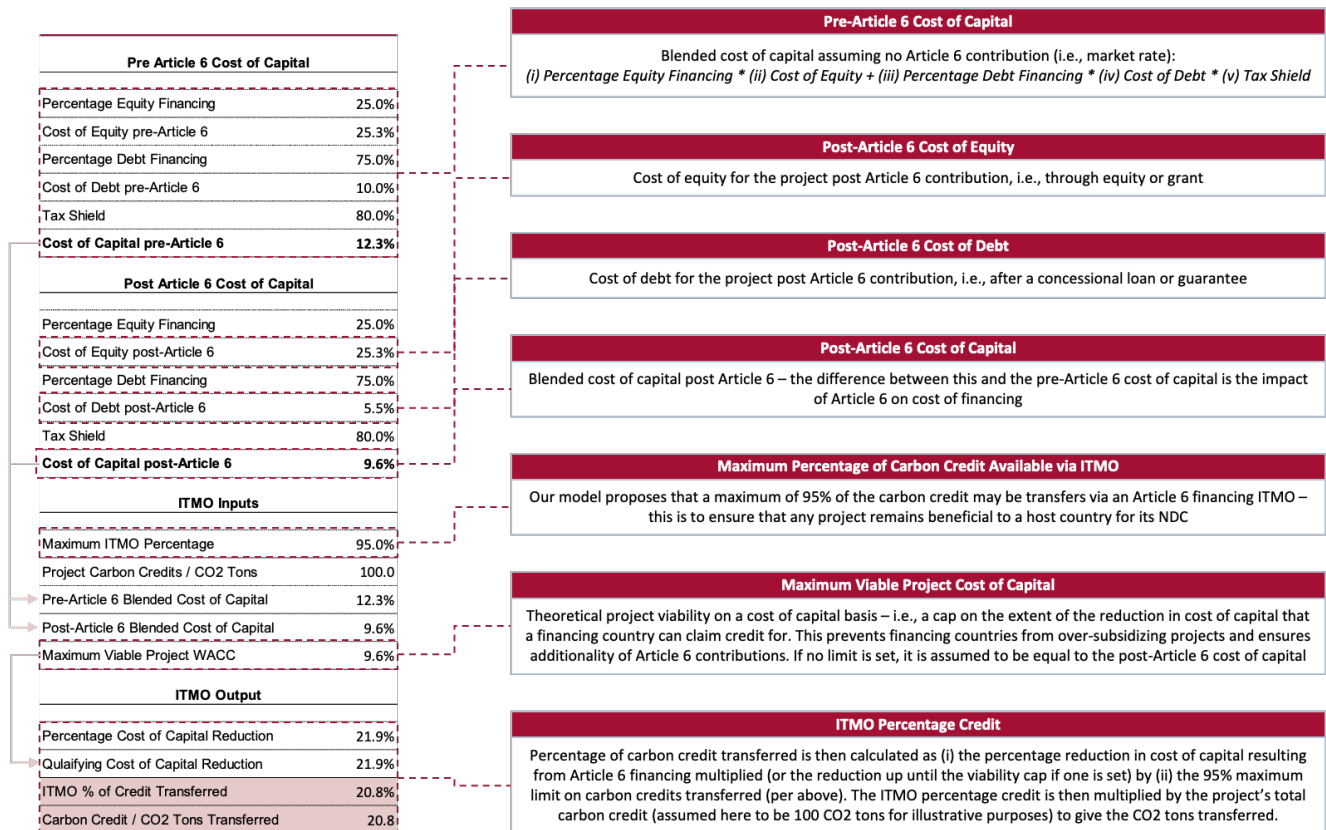
Using our ERAC, we calculate the proportion of emissions reductions transferred as an ITMO. We base this calculation on the impact Article 6 financing has on the WACC. As we know, Article 6 must be additional, making projects occur that could not otherwise be financed. Therefore, if Article 6 financing does not reduce the WACC - i.e. creates 0% impact - the financing state is entitled to 0% of reductions. For a project that must be 100% financed by grants, i.e. where the private sector would not finance any of the project in any circumstances, the financing state would receive 95% of credit generated. We use a 95% cap to ensure host states always receive some (i.e. a minimum of 5%) credit towards their own NDC. Our ERAC uses a linear scale from 0% WACC impact (no Article 6 financing, 0% credit) to 100% impact (100%

financed by Article 6 grants, reducing the weighted cost of capital to zero, 95% of credit generated).

$$\begin{aligned}
 & \text{Percentage of Carbon Credits Transferred} \\
 & = \frac{\text{Difference Between Cost of Capital Pre/Post Article 6 Financing}}{\text{Cost of Capital Pre Article 6 Financing}} * \text{Upper Limit for Credit Transfer} \\
 & = \frac{(WACC_{pre} - WACC_{post})}{WACC_{pre}} * 95.0\%
 \end{aligned}$$

In Figure 6 below, we see an annotated example of our ERAC, demonstrating how a state can use the model to evaluate an Article 6 investment. Each input can be calculated using our financial model.

Figure 6. Illustrative ITMO allocation calculation using the ERAC



While the ERAC has taken some time to explain, the mechanics are actually extremely straightforward and require only two inputs. First, financing states and host states need to agree on the theoretical pre-Article 6 WACC, i.e. the cost of financing the market would demand (WACCpre). Second, they must agree on the WACC that the project can afford, i.e. the point at which private investors enter (WACCpost). At a technical level, both of these can be computed using relatively straightforward financial models. We have developed one such financial model for a solar field, which is discussed in Appendix III. This model takes financial inputs and models the effect that different forms of financing will have on the WACC. This model, which is supplied attached to this paper, can be adapted by policymakers, investors and project developers to find WACCpre and WACCpost. More generally, however, the ERAC should be thought of as a tool for host states and financing states to use in an Article 6 negotiation. The detailed financial model presented in Appendix III will inform this discussion, but the theoretical market cost of capital (WACCpre) must be decided on the basis of agreement, including by comparing variables such as past projects, precedent transactions, and market conditions.

There are several major advantages to our ERAC. First, as we have seen, the Project Investment approach and ERAC can de-risk projects and crowd-in maximal volumes of private sector capital. This will make Article 6 more effective at bringing capital to the developing world. Second, moving from direct purchases to investment makes it more likely, at a political level, that financing states will actually use the mechanism. At a more granular level, however, a core advantage of the ERAC is also its simplicity. Previous market mechanisms under Kyoto, including Joint Implementation and the CDM required assessments that projects were additional, and this is also the market standard in voluntary carbon credits. Such assessments are extremely costly, and bottlenecks are currently impeding the pipeline of carbon credit projects. Under the project investment approach, additionality is a function of an investment's impact on cost of capital, which must be agreed between financing and host state. Not only will this mitigate additionality risks such as those identified by Calel et al. (2021), but it is also simpler to do.

V. PROJECT INVESTMENT CASE STUDIES

In this section we demonstrate how the Project Investment approach could be used to develop a solar photovoltaic (PV) project using grant financing, concessional equity investment, concessional debt, and sovereign guarantees in four hypothetical MENA region partnerships. We present the instrument mechanics, as well as its advantages and disadvantages. We then apply our financial model and Emissions Reduction Allocation Calculator in each case.

These case studies are derived from our conversations with policymakers and market practitioners but are illustrative in nature. While these hypothetical projects could serve as blueprints for real-world pilot projects, the intention of these case studies is to demonstrate how Project Investment could work in the real world. It is also important to note that in our examples, we understand governments to use the Project Investment approach to acquire ITMOs. The insights here, however, also apply to the Private Sector approach, where firms will need these financial instruments if using the Project Investment approach.

For each case study, we use an example photovoltaic solar PV project. Our hypothetical project has an assumed investment need of \$25m and an installed capacity of 27 megawatts (MW). While solar PV projects will vary in their performance across projects, for consistency across projects we assume a capacity factor of 20% and 50 gigawatt-hours (GWh) of annual generation.

We assume that all electricity generated in each project will be sold at \$0.10 USD per kWh via a 20-year power purchasing agreement (PPA). Standard assumptions for operation and maintenance costs, depreciation, and taxes are held constant across projects. Debt is assumed to be a 10-year, fully amortizing loan with a one year grace period. Equity IRR is calculated on a 20-year basis. All these factors are fully adjustable in the financial model that we supply with this paper.

To illustrate the impact on project feasibility we use sensitivity tables that show the project IRR to non-Article 6 equity investors via color-coded outputs, which we use as a proxy for project viability. In other words, if IRR is at a level which would attract equity investors to the project, taking into account the risk profile, we assume that

the project is viable (coded green in the table). If the IRR is too low, the project is not likely to attract financing (coded red).

Our sensitivity tables show two different ways that additional Article 6 capital can be used. First, Article 6 financing can reduce the cost of a project, which makes additional projects become financially viable as the private sector will now invest. Second, Article 6 can ‘free up’ capital to fund less commercial investments that are still critical for decarbonization (e.g. grid upgrades). From this perspective, a project that is financially viable but that requires, for example, substantial grid upgrades to be brought onto a country’s power system, would ‘come online’ from that non-commercial infrastructure being subsidized by Article 6.

For each case study, the sensitivity table shows the impact of the Article 6 investment - either grants, equity, debt, or guarantees - relative to supplementary capital expenditure that could be put into investments such as grid upgrades.

Financial Instrument 1: Grant Financing

Grants are the most direct instrument that financing countries can use: a country gives capital to subsidize project financing costs or to free up funds for non-commercial investment. Grants are also the project financing instrument most similar to the direct purchasing approach: by receiving ITMOs generated from a grant-financed project, the financing country in effect simply pays a host country for ITMOs. However, under this Project Investment approach, the financing state is only entitled to a proportion of credit generated, rather than a fixed volume of credits, as per the Direct Purchase approach.

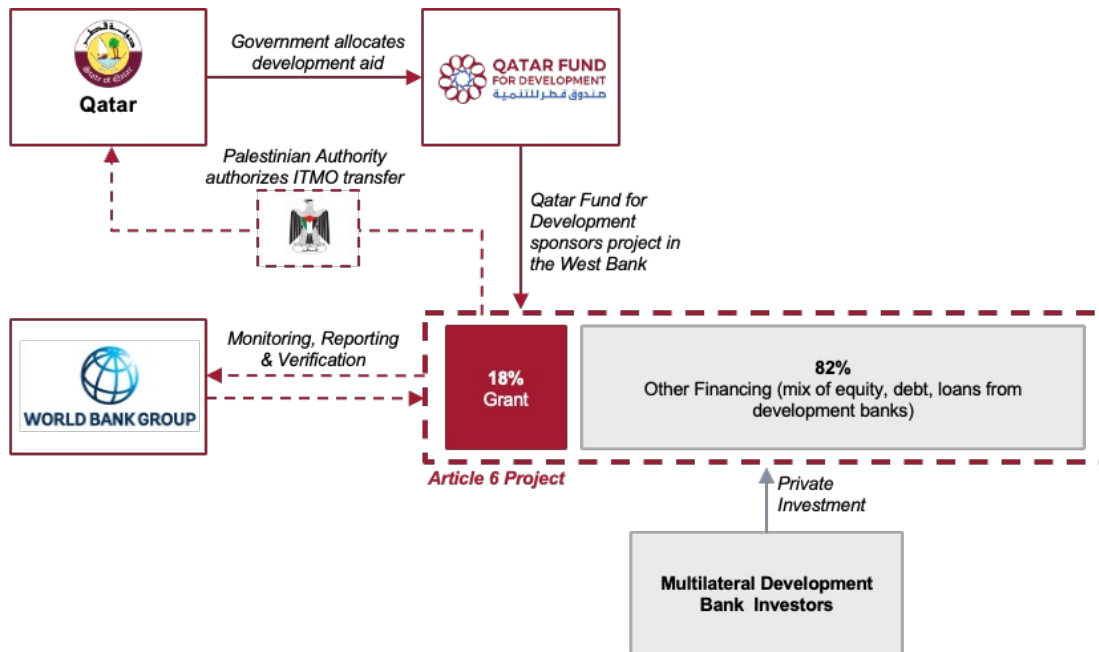
For host states, grants offer the largest effect per dollar on WACC. Because grants do not come with ownership rights, they also leave a host country in full control of its infrastructure, although in practice at a political level, grants often come with strings attached, whether diplomatic, such as limiting the actions of a government, or economic, such as using suppliers domiciled in the grant-giver’s country.

For financing states, grants, along with direct purchases, likely offer the highest return per dollar in terms of ITMO credit, and may potentially come with a lower long-term commitment to project management as the grant-giver is not a project owner (though will likely want to monitor the project). This, however, does mean that grants are extremely capital intensive and may be politically harder to procure.

Example Project: Qatari Grant to Palestine

To illustrate how grants could work, the first project is a Qatari-funded solar PV facility in the Tulkarem region of the West Bank. The \$25m investment could be made through the Qatar Fund for Development, and potentially supported by the World Bank for monitoring, reporting and verification.

Figure 7. Qatari Grant to Palestine through the Qatar Fund for Development



Qatar already has a large program to sponsor humanitarian aid in Palestine, focused on Gaza, where Qatar is one of the few states operating. While humanitarian aid is critical, Article 6 Project Investment could help create long-term impact. Like many Gulf states, Qatar’s philanthropy in Palestine has been hampered by mistrust on a governmental level. Our conversations with policymakers showed that Gulf governments are unwilling to fund projects associated with the Palestinian Authority, the government of Palestine that is a signatory to the Paris Accords. This is both due to fear of corruption, and because of US embargos on funding the Palestinian Authority following the Taylor Force Act²⁴. Without US support for Palestinian projects, Qatar has limited its aid to short-term relief. The development of Palestinian infrastructure is also hampered by Israeli policies that constrict building. This is particularly salient for solar in Area C.²⁵

²⁴ The 2018 Taylor Force Act, named after an American student killed in a terrorist attack, ceases American economic aid to the Palestinian Authority until the PA stops paying the Palestinian Authority Martyr’s Fund

²⁵ Area C is the largest part of Palestine, with the most potential for solar development, that remains in Israeli control following the Oslo Accords

Article 6 offers deep potential political co-benefits here. For Qatar, an international framework could enforce greater scrutiny for its grants. A project in Palestine would likely not only attract investment from an Article 6 financing state, but also international institutions such as the World Bank who could bring security to the distribution of funds. At the same time, the shepherding role of a multilateral institution such as the World Bank to assist in the Article 6 transaction could open more conducive Israeli policy.

Qatar's 2030 NDC goal is a reduction of 25% emissions versus business as usual (BAU), with net zero by 2050. As part of its greenhouse gas mitigation strategy, Qatar plans to generate 20% of electricity from solar PV by 2030. This increase in renewable energy, while ambitious, would not get Qatar to its 2030 emissions reduction target. While Palestine's emissions are small compared to Qatar's, Article 6 is one tool Qatar could use to reduce CO₂ emissions, while also bringing in foreign investment to Palestine.

Financial Considerations

Our analysis assumes a grant would be used to offset the equity portion of private investment, though this assumption can be adjusted in our financial model. We make this assumption because equity is the hardest investment to attract, particularly in locations such as Palestine where risk is high. In addition, the project may benefit from concessional debt from international organizations such as the World Bank, meaning an Article 6 grant will be at its most additional in securing equity. The below summary of terms assumes Qatar provides a \$5.0M grant to the project, with debt at a 15% rate, representing a 5% spread above the cost of debt for a project in Jordan. We show a scenario where \$1.0M supplementary capital expenditure is unlocked.

Table 1. Project Summary of Terms: Grant Contribution

Project Summary	
Project / Use of Funds	Off-grid distributed rooftop solar project
Project Lifespan	20 years
Total Investment Amount	\$27,500,000
Total Grant Financing	\$5,000,000
<i>Of Which Qatar</i>	<i>\$5,000,000 (100%)</i>
Total Equity Financing	\$1,875,000
<i>Equity Financing IRR</i>	<i>28%</i>
Total Debt Financing	\$20,625,000
<i>Average Cost of Debt</i>	<i>15%</i>
WACC Pre Article 6 Financing	15.9%
WACC Post Article 6 Financing	10.6%
Percentage of ITMO Transferred	31.7%
Total Additional Investment Mobilized	\$1,000,000

As can be seen in the sensitivity analysis below, if Qatar made a \$5.0M grant, including \$1,000,000 of supplementary capital expenditure, for instance in distribution lines to take the electricity generated by the solar field to homes, equity investors could expect 27.5% IRR. This is likely high enough to attract private capital, based on our conversations with investors, hence it is coded green. Given the higher cost of debt financing for projects in Palestine, the amount of supplementary capital expenditure that could be unlocked by a concessional Article 6 contribution is lower than in other example cases, as the outputs of the table shows, even with Qatar contributing a grant. As a result of Qatar's grant, the WACC is reduced from 13.5% to 10.3%, meaning Qatar would receive an ITMO worth 23.1% of project emissions reductions, using our ERAC.

Table 2. IRR Sensitivity Table: Grant Contribution (USD) vs Additional Capital Investment (USD)

		Grant Contribution				
		3,500,000	4,000,000	4,500,000	5,000,000	5,500,000
Additional Capital Investment	500,000	21.2%	24.2%	28.6%	36.3%	56.4%
	1,000,000	18.4%	20.5%	23.3%	27.5%	35.0%
	1,500,000	16.2%	17.8%	19.9%	22.6%	26.7%
	2,000,000	14.8%	16.1%	17.8%	20.0%	23.0%
	2,500,000	14.0%	15.3%	16.9%	18.9%	21.6%

Financial Instrument 2: Concessional Equity Investment

Equity investment is essential to financing infrastructure projects. Equity ‘unlocks’ debt by absorbing the first losses: if something goes wrong, whether a loss of revenue or the write-down of an asset, equity investors are the first to lose out. This buffer is typically a requirement for investors to lend debt to a project. In addition, equity investment is normally used to pay for project development costs such as land studies and pilots, all of which must be completed before debt investment. Because equity investment is associated with higher risk, the return investors expect is higher than on debt. A typical equity investor in a private project might expect an IRR of between 12-15% for a very secure project, or up to 30%+ for riskier projects.

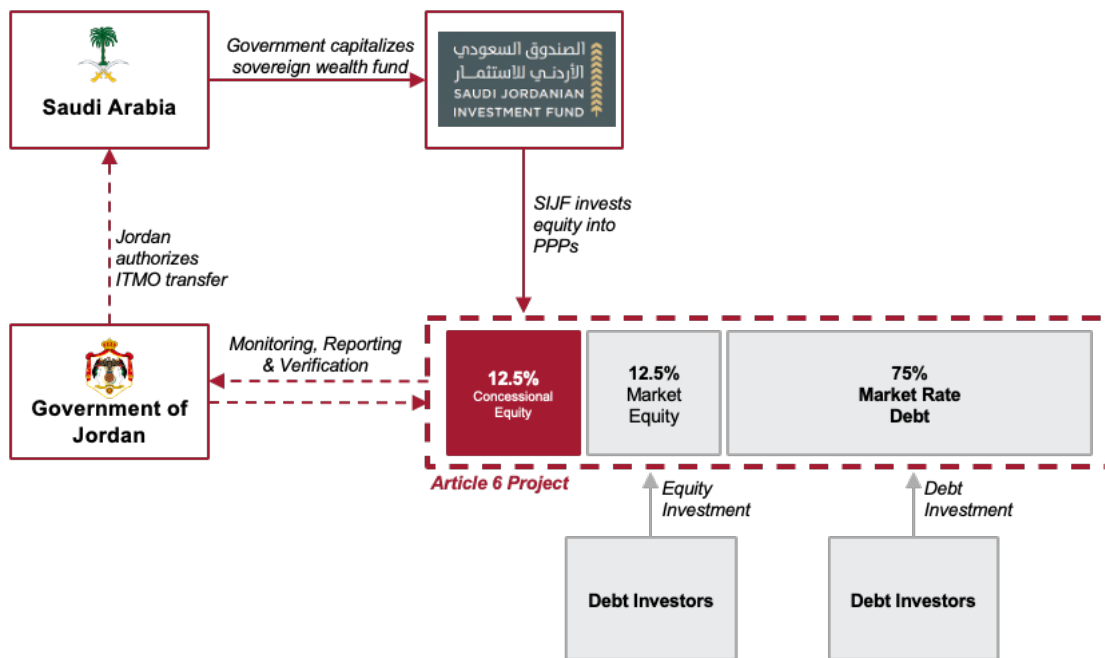
Under Article 6, a financing state could provide concessional equity at a lower IRR than demanded by the market, catalyzing projects that would otherwise not be financially viable. For host countries, concessional equity investment is particularly helpful given that equity is typically one of the most challenging investments to attract in high-risk jurisdictions. In addition, because equity is an ownership stake, such investment typically brings technical and management expertise that can benefit the host country. The pros of management, however, must be weighed against political or security concerns from foreign ownership of infrastructure. This concern is particularly relevant in the political context of the region. It is likely politically unsustainable, for instance, for the Israeli government to own power infrastructure in Egypt, while this constraint may be less acute for instruments such as debt or guarantees.

For financing countries, equity investment offers the opportunity to directly own projects. Countries in the Middle East such as Saudi Arabia or the United Arab Emirates are transitioning from hydrocarbon exports to focusing on renewable energy. Equity investment offers the opportunity to further other national goals wider than decarbonization. Project ownership abroad can, for example, support domestic companies or technical experts who may be involved in project execution. In addition, compared to other Article 6 instruments, equity offers the highest potential returns, creating a greater financial incentive.

Example Project: Saudi Arabian Equity Investment in Jordan

An example of concessional equity investment could be Saudi Arabia financing of projects in Jordan. The Saudi sovereign wealth fund, the Public Investment Fund, operates in Jordan through the Saudi Jordanian Investment Fund (SJIF). SJIF has \$3bn in capital commitments, almost entirely from Saudi Arabia with minor contributions from Jordan.²⁶ The SJIF has a mandate to invest in renewables, but investments must currently be at market terms, excluding many carbon mitigation projects as the IRR is too low.

Figure 8. Saudi Equity Investment in Jordan through the Saudi Jordanian Investment Fund



Jordan has significant potential for solar, particularly in the south, with one of the world’s highest levels of irradiation. However, from our conversations with the Jordanian government, it is clear a major limiting factor for expansion of renewables is a lack of transmission capacity and energy storage. Lack of transmission lines has also stalled solar projects in recent years.²⁷ Given this, Article 6 investment may be used to ‘free up’ supplementary Jordanian capital expenditure for storage or transmission lines to parts of Jordan reliant on off-grid diesel generators. Caution must be taken with this approach, however, to ensure that new transmission and increased access to electricity does not in fact increase fossil generation.

²⁶ <https://sjifund.com/>

²⁷ Grid’s ‘technical challenges’ prompt freeze in green energy projects | Jordan Times <https://www.jordantimes.com/news/local/grids-%E2%80%98technical-challenges%E2%80%99-prompt-freeze-green-energy-projects>

Our interviews with Jordanian policymakers showed interest in projects to generate ITMOs. Yet despite interest from foreign governments, particularly the GCC, a lack of clarity on Article 6 has precluded progress. The head of World Bank coverage in Jordan, Harikumar Gaddde, told us of a working group between the Ministry of Environment and NEPCO, the national power company, to explore how carbon offsets can generate investment. However, as a Policy Director at the Ministry of Environment told us: ‘financial instruments are crucial because a Minister of Finance must see the implications of investment.’

For Saudi Arabia, Article 6 could support the ambitious NDC which aims to reduce and avoid 278 million tonnes of CO₂ annually by 2030, implying a 2030 reduction of ~48%, with net zero by 2060. More broadly, Article 6 investment may support Saudi ambition for regional leadership on climate change. The Saudi Middle East Green Initiative, for example, could be a forum for bilateral Article 6 deals.

Financial Considerations

Below are project terms were Saudi Arabia to contribute a \$3.5m concessional equity investment at 12% IRR, equivalent to 50% of total equity. Through the derisking effect, this would make the project investable and unlock additional investment to finance grid upgrades or connections that would otherwise inhibit project feasibility (assumed to be \$1.5m). Debt is assumed at a 10% rate based on current yields for Jordanian 10-year government bonds. Saudi Arabia has reduced the cost of capital from 12.5% to 10.7%, and would receive ITMOs worth 13.5% of project carbon impact according to our ERAC.

Table 3. Project Summary of Terms: Concessional Equity Contribution

Project Summary	
Project / Use of Funds	Utility scale solar PV plant (with additional grid connection / upgrade investment)
Project Lifespan	20 years
Total Investment Amount	\$27,500,000
Total Equity Financing	\$6,875,000
<i>Of Which KSA</i>	<i>\$3,437,500 (50%)</i>
<i>KSA Target IRR</i>	<i>12%</i>
<i>Of Which Third-party Investors</i>	<i>\$3,437,500 (50%)</i>
<i>Third-party Investors Target IRR</i>	<i>26%</i>
<i>Implied Blended IRR</i>	<i>19%</i>
Total Debt Financing	\$20,625,000
<i>Average Cost of Debt</i>	<i>10%</i>
WACC Pre Article 6 Financing	12.5%
WACC Pre Article 6 Financing	10.7%
Percentage of ITMO Transferred	13.5%
Total Additional Investment Mobilized	\$1,500,000

The below sensitivity table shows the impact of different sized Saudi Article 6 equity contributions on the implied IRR for third-party equity investors at different levels of additional capital investment. If Saudi Arabia were to contribute a concessional Article 6 equity investment of 50% or more, the project begins to become attractive for additional investors even while adding \$2.5m of capital investment.

Table 4. IRR Sensitivity Table: Equity Contribution (USD and %) vs Additional Capital Investment (USD)

		Equity Contribution				
		-	1,031,250	2,062,500	3,093,750	4,125,000
		0.0%	15.0%	30.0%	45.0%	60.0%
Additional Capital Investment	500,000	12.5%	15.1%	18.9%	25.1%	37.9%
	1,000,000	11.7%	14.2%	17.7%	23.3%	34.6%
	1,500,000	10.9%	13.2%	16.4%	21.5%	31.4%
	2,000,000	10.1%	12.3%	15.3%	19.8%	28.5%
	2,500,000	9.4%	11.4%	14.2%	18.3%	25.7%

Financial Instrument 3: Concessional Debt

Concessional debt works through a principle known as ‘blended finance’; debt is provided at a lower interest rate than normally paid to the market, blending with private capital to bring down the cost of financing and enabling projects to be financially viable.

For host states, gaining access to concessional debt can be a game changer because debt typically provides the majority of financing needed for an infrastructure project. This means even marginal decreases in cost of debt can have large effects on overall cost. Furthermore, because interest on debt is a legal obligation, unlike dividends to equity holders which are voluntary, access to affordable debt is essential for ensuring project operational capital.

For financing states, debt investments offer the opportunity to generate stable project returns from debt interest, while also giving a flow of ITMOs. Debt investments may also be easier to procure politically, as much development financing is currently executed through debt.

Example Project: United Arab Emirates Debt Investment in Morocco

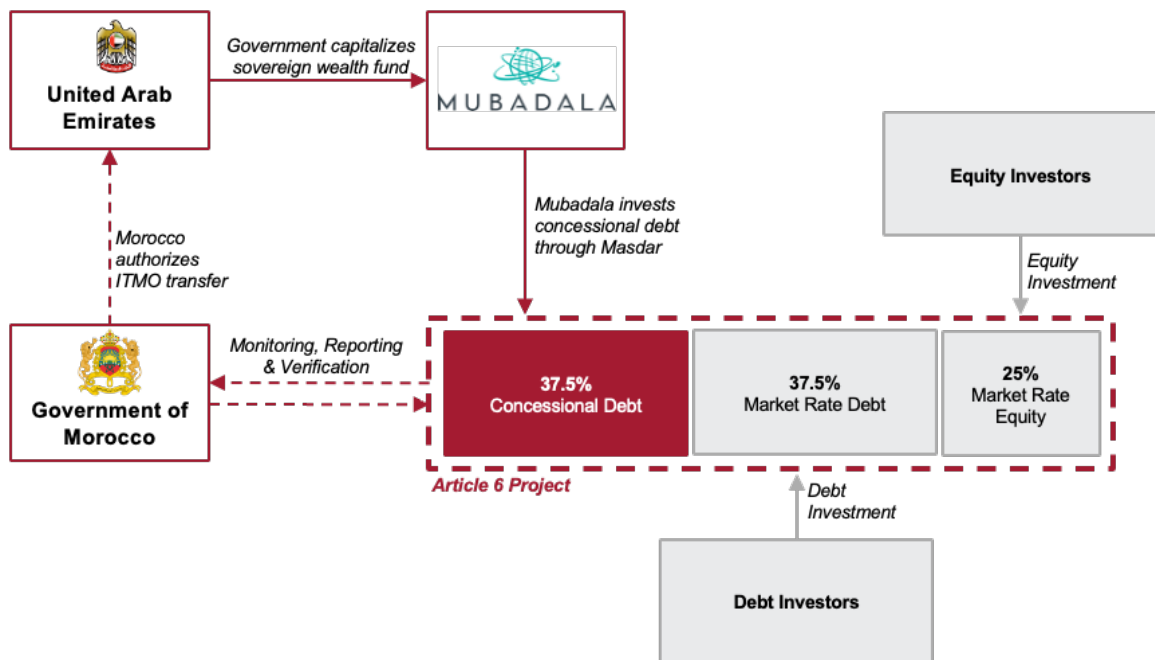
In this scenario, we show how the UAE Sovereign Wealth Fund, Mubadala, could use concessional debt via Masdar, the government renewable energy company, to finance an off-grid solar plant in Morocco.

Morocco is not completely excluded from financial markets, and private investment has reached several major projects in recent years. In a 2021 report, EY ranked Morocco the most attractive destination for renewable energy investment in Africa or the MENA region.²⁸ Despite this, however, investment reaches only secure projects such as solar plants connected to the most developed parts of the grid. Abdelmajid Bennis, Country Lead for the Global Green Growth Institute (GGGI) in Morocco, told us: ‘The success of the energy transition in Morocco is facing new challenges. The main challenge is to develop the monitoring and flexibility of the electrical system by multiplying efforts to strengthen the power grid to evacuate and transport the electrical energy produced, while developing its capacity to accommodate renewable energy.’

28 https://assets.ey.com/content/dam/ey-sites/ey-com/en_gl/topics/power-and-utilities/ey-recal-58th-edition-top-40-ranking-october-2021.pdf

At a technical level, Morocco is one of the host countries in the Middle East with the most progressed system for Article 6 use. The government has been working closely with the GGGI to address the largest barriers to meeting Morocco’s NDC, for example promoting a new renewable energy law. The government is also working on a new monitoring, reporting and verification system linked to NDC tracking, through which corresponding adjustments could be registered in order to generate ITMOs. At the same time, the UAE is a natural MENA financing state to lead Article 6 piloting. The UAE was the first Arab country to launch a ‘Vision’ program, with UAE Vision 2021 in 2010. Since then the UAE has expanded its Vision 2030, part of which is not only decarbonizing the Emirati economy, but also expanding to regional leadership in renewables. This leadership is rooted in the Emirates upcoming presidency of COP28, and in September 2022 the UAE raised its NDC reduction target to 31% by 2030, from 23.5% previously. Our understanding is that the UAE is also interested in the Private Sector approach, both as a way to incentivize carbon trading within the Abu Dhabi financial hub, and to reach the NDC.

Figure 9. UAE Concessional Loan to Morocco through Mubadala



Financial Considerations

In the summary of terms below, the UAE contributes a ~\$10.3m concessional loan at 5% interest rate, equivalent to 50% of the total debt financing, with remaining debt provided at 7.5% based on current government debt yields for Morocco. Under such

a debt financing package, the project would be able to attract equity investors at a 24% IRR, while enabling \$2.5m of supplementary capital expenditure. This Article 6 investment would make the project investable for the private sector, as well as allocating supplementary capital expenditure for the project's technical feasibility. Since the UAE has reduced the blended overall cost of capital for the project from 10.4% to 9.7%, they would receive an ITMO worth 6.8% of the project's carbon impact according to our ERAC - this is less than in other examples given that the cost of financing in Morocco, and therefore Article 6 additionality, is lower.

Table 5. Project Summary of Terms: Concessional Loan Contribution

Project Summary	
Project / Use of Funds	Off-grid distributed solar project (possibly via mini-grids)
Project Lifespan	20 years
Total Investment Amount	\$27,500,000
Total Equity Financing	\$6,875,000
<i>Equity Financing IRR</i>	24%
Total Debt Financing	\$20,625,000
<i>Of Which UAE</i>	<i>\$10,312,500 (50%)</i>
<i>UAE Concessional Loan Interest Rate</i>	5%
<i>Of Which Third Party Lenders</i>	<i>\$10,312,500 (50%)</i>
<i>Third Party Lender Interest Rate</i>	7.5%
<i>Implied Blended Cost of Debt</i>	6.3%
WACC Pre Article 6 Financing	10.4%
WACC Post Article 6 Financing	9.7%
Percentage of ITMO Transferred	6.8%
Total Additional Investment Mobilized	\$2,500,000

The sensitivity table output below shows the impact of the size of a UAE concessional debt contribution relative to increasing amounts of additional capital investment for the project's IRR.

Table 6. IRR Sensitivity Table: Concessional Loan (USD / % Total Debt) vs Additional Capital Investment (USD)

		Concessional Debt Contribution				
		-	5,156,250	10,312,500	15,468,750	20,625,000
		0.0%	25.0%	50.0%	75.0%	100.0%
Additional Capital Investment	500,000	27.2%	28.7%	30.2%	31.7%	33.3%
	1,000,000	25.6%	27.0%	28.4%	29.9%	31.4%
	1,500,000	24.0%	25.3%	26.7%	28.1%	29.6%
	2,000,000	22.5%	23.8%	25.1%	26.5%	27.9%
	2,500,000	21.1%	22.4%	23.7%	25.0%	26.4%

Financial Instrument 4: Sovereign Guarantees

A sovereign guarantee is a fundamentally different type of financial instrument from equity, debt or grants. Instead of providing capital upfront, a financing state promises to repay investors if the project is disrupted. In other words, it is private investors, or the host state government itself, that lend money to the project, but if anything goes wrong, it is the financing state that steps in to pay any liability. This means that investors take credit risk on the financing state, rather than the project. Sovereign guarantees therefore lower the rate of interest that must be paid on debt because the risk is lower: the cost of guaranteed debt corresponds to the guarantor, rather than the host state.

It is worth noting that in general, there are two types of sovereign guarantees. First, guarantees can apply to a project's income. This would mean if local beneficiaries are unable to pay a tariff, for example a power bill for solar electricity, the guarantor makes up the deficit in revenue. This lowers the project risk as project income is more secure. In this paper, however, we focus on a second type of guarantee, i.e. guarantees on debt. Here the guarantor promises to make up the interest rate or loan principle in the event that the project cannot pay. This could be because of a fall in revenue, as with guarantees on income, or it could be to make up for losses from political events, such as the destruction of the infrastructure itself.

Taking one example, the interest rate on Egyptian government debt in November 2022 was over 18% (10-year yield), while Israeli debt was only 5% (10-year yield). While the interest rate on the debt of specific projects is not the same as that of

government bonds, most interest rates ultimately derive from credit ratings, and these are normally capped at the credit rating of the local government. This makes the yield on the sovereign's debt a good proxy for what infrastructure projects will pay. At the same time, the rate a guarantor pays on its own debt is often up to 1% lower than the rate paid on debt it guarantees, in part due to liquidity concerns. These stark disparities in interest rates demonstrate how large the implications could be if projects in countries such as Jordan, Morocco or Tunisia could borrow at the rates of guarantors such as Saudi Arabia, the UAE or Israel.

The major advantage of using guarantees for Article 6 is they do not require a financing state to put up funds up front, and thus may open up large pools of capital. From our interviews with financing states, it is clear guarantees may be favored by several potential MENA financing states. From the perspective of a Ministry of Finance, it is financially and politically more feasible to issue guarantees than to allocate capital for purchases, as guarantees often do not feature in the state budget. Furthermore, under most accounting practices, for example the IMF, guarantees do not add to the debt burden, unlike equity, debt or grants which must be funded either through borrowing or taxation. However, the natural corollary of these advantages is that governments are taking on a contingent liability, and it is unclear what may be the potential fiscal implication, especially in the uncertain jurisdictions where Article 6 finance is needed.

An additional factor to consider when evaluating guarantee is that capital must be raised outside the Article 6 financing mechanism (i.e. the investment to actually be guaranteed). Given that the risk is low because of the guarantee structure, this may actually be an interesting opportunity for certain types of green finance, or funds with a specific mandate to lend to sustainable projects.

Example Project: Israeli Sovereign Guarantee for Investment in Morocco

In this example, Israel could offer a sovereign guarantee on debt invested in a project in Morocco. As we have seen, the differential in the borrowing cost of Israel and Morocco, means that a guarantee would reduce the cost of financing for such a project, making it financially viable. As discussed, Morocco is able to access capital for certain projects,. However, for riskier areas, including off-grid solar, where revenue is not yet certain and costs remain high, capital is scarce. Guarantees could

help these projects access the market while not adding to the Moroccan debt burden or ceding ownership to any foreign entities.

For Israel, guarantees present an attractive instrument for Article 6. Israel announced a new NDC ahead of COP26, including a 27% emissions reduction by 2030 and a 2050 net zero goal. Israel's NDC is being codified by a new Climate Law, committing the government to meeting the target.²⁹ This goal, however, faces logistical difficulties, and a lack of land limits the potential for renewables.³⁰ In addition, large renewable capacity would require extensive grid development at additional cost and land. In part due to these challenges, Israel's NDC notes that 'Israel is planning to achieve its NDC mitigation objectives through domestic means but is following Article 6 negotiations so that this option remains open should it be relevant in the future.' However, from our conversations with the Israeli government, it is clear that the Direct Purchase approach is not an option, and that there are no funds available for debt, equity or grant investments. Israel has neither a sovereign wealth fund, nor a national development bank. While Israel's Agency for International Development Cooperation (Mashav) does engage in foreign projects, this is largely training and technology sharing, rather than financing. In this context, there may be optionality to leverage government guarantees provided by the Ministry of Finance for debt on solar projects in Israel, which could possibly be extended to projects overseas as an Article 6 instrument. Regarding the private sector mechanism, we understand that government ministries are currently preparing an implementation plan for a carbon tax, with a focus on fuel, which the Environment Ministry believes could open pathways to private sector Article 6 purchases, following the approach of the Swiss Klik Foundation.³¹

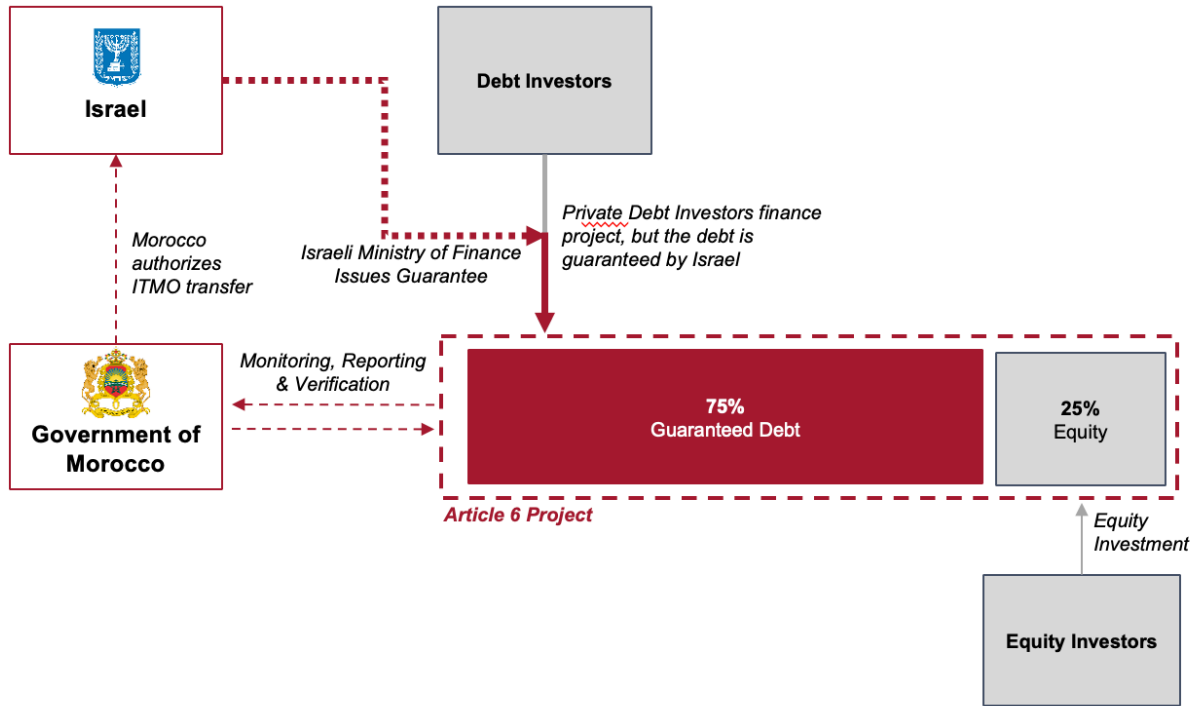
The example case of Israel guaranteeing debt in Morocco also demonstrates the potential political co-benefits of Article 6 cooperation on sovereign guarantees. Given the politically sensitive nature of Israel's relationship with other countries in the region, it is unlikely that Israeli ownership of power-producing infrastructure would be possible. However, guarantees offer a potential avenue for cooperation in the newly formed set of Abraham Accords countries.

29 https://www.gov.il/en/departments/news/gov_approved_climate_law

30 As an example, a 30% renewable share would require ~15,000 MW capacity, i.e. ~150,000 dunams of land

31 Government of Israel, "Government steps up efforts to tackle climate crisis: Israel to introduce carbon pricing for the first time" (2021) https://www.gov.il/en/departments/news/press_02082021_b

Figure 10. Israeli Sovereign Guarantee to Moroccan Project



Financial Considerations

The table below shows terms if Israel were to provide a guarantee covering 100% of the project’s debt financing. We assume that the guarantee would reduce the cost of financing on the portion guaranteed by 200 basis points (2%) based on the spread between the current cost of Israel’s government debt (~5%) and our assumed cost of debt financing for Morocco (~7.5%), allowing for a liquidity premium where guaranteed debt costs 50 bps higher than the guarantor. With the benefit of the guarantee, the project would be able to attract equity investors at a 21% IRR, while shouldering \$2.5m of supplementary capital expenditure. Similar to previous examples, this has positive implications from the perspective of both financing and technical feasibility. Since Israel will have reduced the blended overall cost of capital for the project from 10.8% to 9.6%, they would receive an ITMO worth 10.5% of the project’s carbon impact according to the ERAC.

Table 7. Project Summary of Terms: Guarantee Contribution

Project Summary	
Project / Use of Funds	Off-grid distributed solar project (possibly via mini-grids)
Project Lifespan	20 years
Total Investment Amount	\$27,500,000
Total Equity Financing	\$6,875,000
<i>Equity Financing IRR</i>	25%
Total Debt Financing	\$20,625,000
<i>Average Cost of Debt</i>	7.5%
Guarantee Coverage	\$20,625,000 (100%)
<i>Assumed Interest Rate Reduction on Guaranteed Portion</i>	2%
<i>Implied Blended Cost of Debt</i>	7.8%
WACC Pre Article 6 Financing	10.8%
WACC Post Article 6 Financing	9.6%
Percentage of ITMO Transferred	10.5%
Total Additional Investment Mobilized	\$2,500,000

The sensitivity table below shows these results based on the extent of guarantee coverage, ranging from no guarantee to the guarantee being provided on 100% of the total debt financing. While we assume in this example that Israel's guarantee reduces the overall interest cost of any portion of debt covered by 2%, in the real world this would of course be dependent on a multitude of factors, including the pre-guarantee interest rate, the type of guarantee provided, and the credit rating of the entity providing the guarantee.

Table 8. IRR Sensitivity Table: Sovereign Guarantee (USD / % Coverage) vs Additional Capital Investment (USD)

		Guarantee Size				
		-	5,156,250	10,312,500	15,468,750	20,625,000
		0.0%	25.0%	50.0%	75.0%	100.0%
Additional Capital Investment	500,000	27.2%	28.4%	29.6%	30.8%	32.0%
	1,000,000	25.6%	26.7%	27.8%	29.0%	30.2%
	1,500,000	24.0%	25.1%	26.2%	27.3%	28.4%
	2,000,000	22.5%	23.6%	24.6%	25.7%	26.8%
	2,500,000	21.1%	22.1%	23.2%	24.2%	25.3%

VI. NEXT STEPS & CONCLUSION

This paper has presented a new understanding of how states can use Article 6 of the Paris Agreement. We saw how, currently, most policymakers understand an Article 6 transaction as a direct purchase, where a financing state government buys ITMOs from a host state. This Direct Purchase approach, however, is inappropriate for many governments, and even amongst the more developed financing countries it is politically and financially unfeasible to allocate a budget to buy ITMOs. It also fails to maximize de-risking of private sector investment to support the energy transition. We therefore proposed two alternative modalities: the Project Investment and Private Sector approaches. To substantiate these new approaches, we developed an adaptable financial model that can be used to understand the impact of Article 6 on the cost of financing, and hence to quantify additionality. This quantification is used in our Emissions Reduction Allocation Calculator (ERAC) by host and financing states as a common framework to negotiate the division of ITMO credit. We then applied these insights cases from the MENA region, showing a financial and political perspective on how Article 6 could work in practice.

What is presented here is a high-level financial framework for Article 6. However, in order to move from hypothetical analysis to new infrastructure being financed and built on the ground, there are critical next steps governments must take. The first stage will be discussion between potential financing and host states. We hope this will begin the Egypt's COP presidency, and continue through COP28 and the UAE presidency. From our conversations with the Egyptian and Emirati governments, it is clear that finance is top of their agenda, and officials we spoke to responded enthusiastically about incorporating the Project Investment and Private Sector approaches into the Article 6 debate. While negotiations at previous COPs were conducted at the UNFCCC level, now that the focus has shifted from finalizing the rulebook to actual implementation, governments must begin to negotiate bilateral and multilateral arrangements for actual transactions. Ad hoc regional groups may be of use here, especially as the Article 6.4 Sustainable Development Mechanism remains a long way off. One example for how this could work was proposed by the World Bank in 2016, where states participate in 'climate market clubs.'³² These clubs would be 'a group of national governments and non-sovereign members that agree on common principles and jointly develop modalities for piloting activities

³² World Bank, "Carbon Market Clubs and the New Paris Regime" (2016) <https://thedocs.worldbank.org/en/doc/323531476453676433-0020022016/original/1700505CarbonMarketClubsWeb.pdf>

under Article 6.2.³³ Countries would collaborate on Article 6.2 pilots,³⁴ with administrative support from multilateral development banks serving as secretariats.³⁵

Outside of international coordination, governments should also pursue Article 6 readiness. Readiness is a concept explored in much academic literature around Article 6, the first prerequisite for which is a political mandate. As argued in this paper, moving to the Project Investment or Private Sector approach, rather than spending political and financial capital on direct purchases, may be an effective way to make progress. Our research has indicated that a useful strategy may be linking Article 6 efforts to existing environmental and diplomatic initiatives. In Israel, for example, the current exploration of a carbon tax on imported fuel could serve as a basis for the Private Sector approach. At the same time, the success of the Abraham Accords offers the opportunity for regional partnership, for example through Israeli President Herzog's Climate Forum, which brings together experts from government, private sector and civil society. In another example from the UAE, the Foreign Ministry may be a resource for Article 6 development in the context of COP28, tying into the Emirati emphasis on regional MENA. Such opportunities exist in every country, whether Saudi Arabia's Vision 2030 and Middle East Green Initiative, or Morocco's newly set up Designated National Authority, created in 2022 to expand international climate collaboration.

To promote Article 6 readiness, states should also update their NDCs to indicate their preferences for Article 6 use, both as a signaling effect internationally and to create a mandate for Article 6 internally. A benchmarking of MENA NDCs is included in Appendix II, with analysis of optimal language around Article 6 plans. Larger transformations are also needed at the institutional level, along lines not dealt with in this paper. These include, for example: having in place the 'capacities and systems to engage in Article 6', including a strategy, and guiding principles; an 'institutional framework to manage cooperation'; and 'monitoring procedures and tools'.³⁶

33 <https://www.theclimatewarehouse.org/work/climate-market-club>

34 World Bank, "Unlocking Climate Ambition Through a Carbon Market Club" <https://blogs.worldbank.org/climatechange/unlocking-ambition-through-climate-market-club> (2021)

35 It is worth noting that in our conversations with national ministries, many civil servants displayed skepticism of such multilateral arrangements, believing them to add larger institutional burdens: coordination between multiple stakeholders can often come with more friction, rather than less

36 IMichaelowa, Axel, Aglaja Espelage, Lieke t'Gilde, Sandra Dalfiume, Nicole Krämer, Philipp Censkowsky, Sandra Greiner, Hanna-Mari Ahonen, Federico De Lorenzo, and Stephan Hoch. "Promoting Article 6 readiness in NDCs and NDC implementation plans." Final report (2021): 3

On a granular level, in order to move beyond the Direct Purchase approach, states must create implementation plans for actual Article 6 transactions. For financing states this means identifying financial resources, whether carbon taxes or an ETS for the Private Sector approach, or a sovereign wealth fund or state energy company for the Project Investment approach. For host states, on the other hand, moving to implementation may require a database of investable projects, including financial and environmental data. There are many possibilities here, including leveraging the expertise of private actors such as exchanges, environmental rating agencies or financial institutions. Alternatively, bodies such as the World Bank or IMF could take on a new role in supporting Article 6 financing, with the World Bank already seeking to help register Article 6 transactions through its Climate Warehouse. From both a technical and financial perspective, Article 6 engagement could fit into an updated mandate for these Bretton Woods institutions, calls for which were seen prominently in the 2022 UN General Assembly.³⁷

Adopting the Private Investment or Private Sector approach is neither a silver bullet for Article 6 use, nor for meeting NDCs. While moving away from direct purchases offers benefits to financing countries, not least a financial return in addition to carbon credit, Article 6 investment is necessarily additional, meaning it is always made at a concessionary rate. The Project Investment approach thus to some extent represents a fiscal transfer from the financing to the host state, and the Private Sector approach represents lost revenue. Success is therefore contingent on financing countries, i.e. the developed world, having the political will to view reaching their NDCs as a necessity worth paying for. Progress is being made on this front, and The Economist has reported on the ‘growing trend’ of legal suits aimed at governments missing their declared climate targets, a trend that could bring more force to international commitments.³⁸ Our conversations with UK policymakers, for example, reflected this, and the codification of government NDC commitments into domestic law is being taken extremely seriously, not least because of the risk of legal action.³⁹

37 Financial Times, “Global climate leaders push for overhaul of IMF and World Bank” (2022) <https://www.ft.com/content/e0f65580-8d84-49ec-82b7-47c1b06563b0#myft:my-news:page>

38 Financial Times, “Global climate leaders push for overhaul of IMF and World Bank” (2022) <https://www.ft.com/content/e0f65580-8d84-49ec-82b7-47c1b06563b0#myft:my-news:page>

39 Financial Times, “Global climate leaders push for overhaul of IMF and World Bank” (2022) <https://www.ft.com/content/e0f65580-8d84-49ec-82b7-47c1b06563b0#myft:my-news:page>

This paper has focused on the financial aspects of our new Project Investment and Private Sector approaches. Our intention is to present this framework for more detailed discussion and consideration by potential financing and host states, as well as other market participants. As a next step, it will be necessary to apply the approaches to individual countries and understand how our models will work in practice. This will include appraising logistical and operational challenges, but also understanding environmental data: this paper has not dealt with how the proportion of a project's emissions reductions calculated through the ERAC will translate into actual tonnes of carbon. As a next step, we intend to understand the implied cost of carbon using our approaches in different jurisdictions, based on local data.

While there are challenges to the approaches presented here, our ambition is that the introduction of the Project Investment and Private Sector approaches could nonetheless have far-reaching effects. First, we hope that as a consequence of understanding the full potential of how Article 6 might be used, states will move towards actually executing Article 6 transactions. This could lower net global carbon emissions and bring new funding to developing countries. Second, we hope that tangible progress on Article 6 could demonstrate developed countries' willingness to support the developing world in its transition, moving forward the Paris process and potentially bringing success in areas outside carbon markets. Third, we hope these approaches will marshal the private sector towards productive and environmentally rigorous carbon mitigation investment. This would ensure political capital achieved at COP26 through initiatives such as the Glasgow Financial Alliance for Net Zero would actually translate into the financing of additional projects.⁴⁰ Finally, as outlined in detail in our case studies, we believe the political co-benefits of Article 6 could be great, extending even beyond the environmental sphere. The 2022 Breakthrough Report from the IAE, IRENA and UN was clear: 'without international collaboration, the transition to net zero global emissions could be delayed by decades. The costs of critical low carbon technologies could be significantly lower in a fast global transition, which can only be achieved by the collective action of many countries.'⁴¹ Article 6, if executed correctly, could be the vehicle for this collective action.

40 GFANZ, one of the major accomplishments of COP26, has run into practical issues, including with pension funds leaving due to data requirements. A robust use of Article 6 could shift the focus of private sector groups away from reporting to investment. This being said, these voluntary groups will not be enough, and the Private Sector approach relies on regulation to compel firms to make sustainable investments.

41 IEA (2022), Breakthrough Agenda Report 2022, IEA, Paris: <https://www.iea.org/reports/breakthrough-agenda-report-2022>

Appendix I - Discussion of MENA's NDC Ambition

Article 6's success depends on financing and host states setting up partnerships for bilateral transactions. While this paper has relied on interviews to understand government attitudes to Article 6, a state's language in its public NDC is also crucial as a signaling effect to potential partners. To understand how this signaling manifests currently, we analyzed MENA countries' NDCs for language pertaining to Article 6 and carbon markets. Of the 19 MENA countries, 15 directly mentioned Article 6 or a similar financing mechanism. We classify states into four broad categories of Article 6 readiness based on this analysis.

The first category is 'Interested Financing Countries.' These countries' NDCs describe Article 6 as a means of fulfilling their objectives, over and above a primary intent to rely on domestic abatement. Of these states, Qatar and Saudi Arabia were the most forthright, with the latter viewing Article 6 as an 'essential mechanism for achieving climate ambitions.' Other developed states such as Israel and the UAE emphasized the importance of domestic efforts, but were clear they viewed Article 6 as a possible supplementary mechanism. This NDC language corresponds to our interviews with these financing states, for example Israel, where the Ministry of Environment is leading engagement on Article 6, or the UAE, where Article 6 implementation is high on the agenda for COP28.

The second category is 'Interested Host Countries.' This group includes Oman, Bahrain, Morocco, Jordan, Palestine and Kuwait, and mostly present favorable Article 6 readiness in their NDCs, indicating that international cooperation is vital. These states express a clear reliance on international financial support which would be provided through the cooperative approaches of Article 6.

The third category is 'Potential Host Countries.' This includes Syria, Yemen, Egypt, and Tunisia that make no direct mention of Article 6 but recognize that national effort alone will not be sufficient to achieve their climate targets. The countries express the importance of international financing and technology transfer and request the creation of financial products to implement international cooperation. Syria, for example, demands 'full and serious commitment from developed countries to provide adequate and predictable financial support to developing countries.'

Finally, the fourth category includes countries that have either made no mention of Article 6 or carbon markets or have not submitted NDCs at all: Libya, Algeria, Sudan, and Iraq.

Table 9.

Country	Article 6 Language	Category
Saudi Arabia	“The Kingdom of Saudi Arabia considers voluntary cooperation and approaches referred to in Article 6.2 as well as the mechanism referred to in Article 6.4 of the Paris Agreement as essential for international climate goals.”	Interested Financing State
UAE	“While the UAE intends to primarily rely on domestic efforts to fulfill its NDC objectives, it may consider using voluntary cooperation under Article 6 of the Paris Agreement to partially fulfill these objectives.”	Interested Financing State
Israel	“Israel is planning to achieve its NDC mitigation objectives through domestic means but is following Article 6 negotiations so that this option remains open should it be relevant in the future.”	Interested Financing State
Qatar	“Qatar supports the development and operationalization of Article 6 of the Paris Agreement to serve as a driver for sustainable development.”	Interested Financing State
Bahrain	“Bahrain will consider voluntary cooperation and cooperative approaches that involve the use of internationally transferred mitigation outcomes as per Article 6 of the Paris Agreement. For the Kingdom of Bahrain such cooperation and cooperative approaches will be multi-metric in their nature and include not only GHG but also other related parameters such as renewable energy, energy efficiency etc.”	Interested Host State
Oman	“Article 6 of the Paris Agreement is an additional mechanism for the Sultanate of Oman to achieve cost-efficient emission reductions, facilitate the transfer of carbon mitigation technology, and deliver significant sustainable development co-benefits.”	Interested Host State
Kuwait	“The State of Kuwait also hopes that financial technical and technological support will be provided through the mechanisms of the convention in particular market, non market mechanisms, and cooperative approach under article 6 of the Paris Agreement.”	Interested Host State
Morocco	<p>“The implementation of the NDC requires important investments that exceed the capacity of a single actor, and as such requires deep collaboration between the State of Morocco, the private sector, international financial institutions and must be supported by new sustainable financing mechanisms, including the Green Climate Fund and financial instruments from multilateral development banks.”</p> <p>“Morocco considers, moreover, that it is essential to establish market mechanisms in order to promote cooperation between the Parties, as provided for in Article 6 of the Agreement, and in particular to reduce the total costs of achieving the objective of limiting the rise in temperatures.”⁴²</p>	Interested Host State
Jordan	“The government pursues to fulfill the NDC pledges with the domestic and international support and is interested in building the national stakeholders capacities in utilizing the international cooperative mechanisms in Article 6 of the Paris Agreement to meet the national development and climate policy objectives.”	Interested Host State

⁴² Translated by authors from French

State of Palestine	<p>“Indeed, carbon markets can be a cost-effective way of abating emissions while accessing finance, as they enable emission mitigation to occur in countries that find it cheapest to do so, and then sell these to countries where paying for carbon credits is cheaper than reducing emissions.</p> <p>The Paris Agreement contains provisions under Article 6 for the creation of an international carbon market under a central UN mechanism (Article 6.4) as well as for enabling country-to-country exchanges of emission credits, called internationally transferred mitigation outcomes (ITMOs) under Article 6.2.</p> <p>Given the funding gap outlined above, and Palestine’s significant mitigation potential, there are opportunities for Palestine to participate in the Article 6 mechanisms.”</p>	Interested Host State
Syria	No direct mention of Article 6. “The Syrian Arab Republic strongly reaffirms that implementation of these contributions, requires full and serious commitment from developed countries to provide an adequate and predictable financial support to developing countries, under the international environmental conventions, including UNFCCC”	Potential Host State
Yemen	Conditional target depends upon “Access to new sources of finance and enhanced support, compared to that received over the past years, to be mobilized through new climate finance mechanisms, such as the Green Climate Fund”	Potential Host State
Egypt	“Egyptian national efforts alone will not be sufficient to fulfill the country’s aspirations described in this updated NDC to contribute to the international climate change GHGs reduction targets. Therefore, Article 9 of the Paris Agreement, which states that developed parties shall provide support to developing countries, should be enacted. The required finance could be disbursed through international and regional development partners, funds, and investors in multiple types of financial modalities and channels, such as blended finance, green bonds, and grants.”	Potential Host State
Lebanon	“While at present, the use of Article 6 mechanisms is not envisaged, Lebanon does not exclude the possibility of making use of international market mechanisms to achieve its NDC targets”	Potential Host State
Tunisia	No mention of Article 6, but a clear need for financing. “The total financing needed to achieve Tunisia’s climate change adaptation goals would be about 848 million dinars over the 2017-2030 period, i.e. around 353 million of dollars. These costs are mainly “soft” costs linked to supporting and popularizing new practices (institutional support, capacity building, etc.) to face climate change impacts.”	Potential Host State
Algeria	No mention of Article 6. Very few details provided about means of implementation.	TBD
Sudan	No mention of Article 6.	TBD
Iraq	No mention of Article 6.	TBD
Libya	Did not submit an NDC	TBD

Appendix II - MENA Countries NDC Target Benchmarking

For Article 6 to become operational, countries must eventually converge on homogeneous reporting of their NDCs. By this we mean targets expressed in tonnes of CO₂-equiv., as an absolute emissions volume per year. At present, there is wide variation in how countries report their emissions targets. Many countries report emissions targets as a percentage reduction, for example of a previous year's reported emissions. While this is convertible to tonnes of CO₂-equiv, within MENA many countries use the percentage reduction formulation but referencing theoretical 'business as usual' as a baseline, i.e. the theoretical emissions that would have occurred had the country grown as normal. In several cases this number is not quantified, meaning it is unclear what emissions reductions are being targeted in tonnes of CO₂-equiv. This makes it hard to calibrate how many tonnes of ITMO credit a country might have to sell.

In this appendix, we have used the best available data to generate a homogenous unit that expresses the climate ambitions of MENA countries in tonnes of carbon dioxide abated per capita. We used data from each country's NDC for 2018 emissions and 2030 targets to quantify the emissions of MENA countries in millions of tons of CO₂ eq. While some countries such as Oman, Kuwait, Israel and the UAE specify quantitative emissions targets in their NDCs, as discussed above, most countries do not report their 2030 targets directly. In these cases, we used data from Climate Resource, which uses interpolation and extrapolation based on historical and what NDC information is available to derive quantifiable future emissions.⁴³ The data from Climate resource provided us with quantifiable 2030 conditional scenarios emissions targets for all countries that did not self-report an estimate. With this data, we then subtracted the 2018 level of emissions from the projected 2030 level of emissions and divided the result by the population of that country in 2018. This produces a value that expresses how many tonnes of carbon dioxide are abated per capita between 2018 and 2030.

In Figure 11, we can see how our methodology results in a homogenous tonnes of CO₂-equiv. reductions for each financing state. Crucially, we can examine the 'conditional' segment of these countries' NDCs, as these rely on international

⁴³ <https://www.climate-resource.com/>

financing, including Article 6. Several states - Kuwait, Bahrain, Tunisia, Palestine and Sudan - indicated that achieving their NDC at all is dependent on international financial support, so we have categorized these as having an ‘unknown split’ between conditional and unconditional targets. If we include these problem cases, amongst these 11 MENA states alone, Article 6, if implemented just to the level of conditional commitments, would reduce net emissions by 148 million tonnes of CO₂-equiv. by 2030.

Figure 11. Unconditional & Conditional Reduction Targets of MENA Financing States

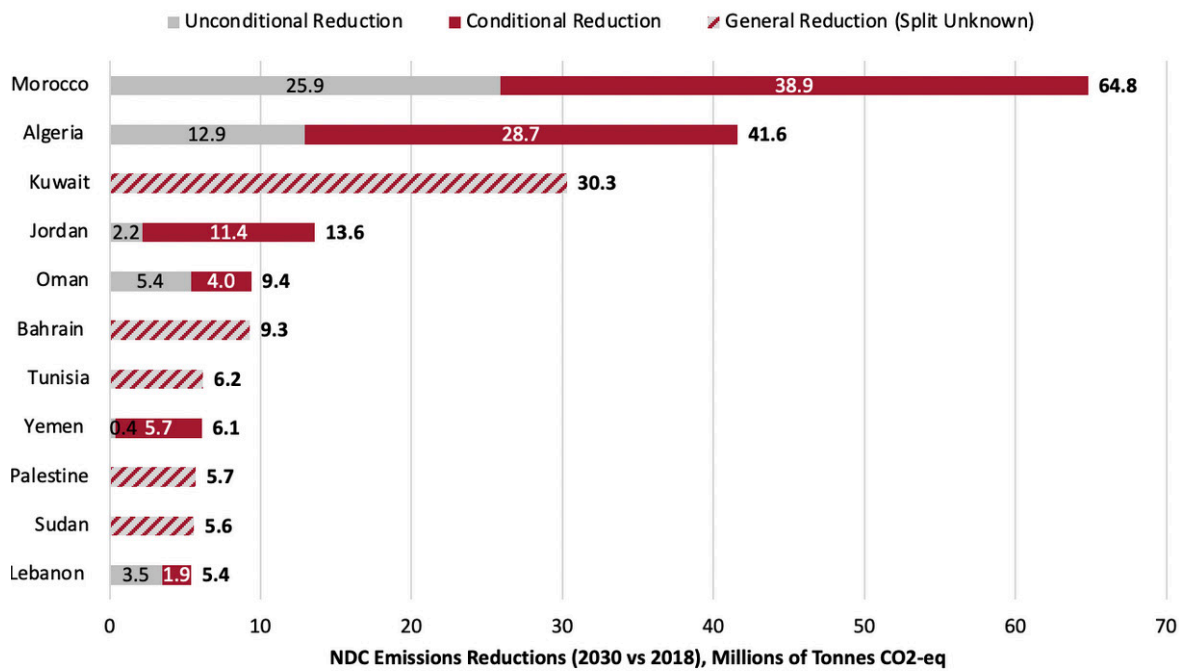


Table 10.

Rank*	Country	2018 Base Year Emissions	2030 Target (IPCC BAU Estimate)	Total Reduction	2018 Population	Per Capita Reduction by 2030 (2018 Baseline)
1	Qatar	178.5 Mt CO ₂ eq	114.1 Mt CO ₂ eq	-64.4 Mt CO ₂ eq	2.78 million	-23.16 Tonnes CO ₂ eq
2	Saudi Arabia	750.6 Mt CO ₂ eq	310.4 Mt CO ₂ eq	-440.2 Mt CO ₂ eq	33.70 million	-13.06 Tonnes CO ₂ eq
3	Bahrain	59.2 Mt CO ₂ eq	46.4 Mt CO ₂ eq	-12.8 Mt CO ₂ eq	1.57 million	-8.15 Tonnes CO ₂ eq
4	Kuwait	141.5 Mt CO ₂ eq	123.4 Mt CO ₂ eq***	-18.1 Mt CO ₂ eq	4.23 million	-4.27 Tonnes CO ₂ eq
5	UAE	277.5 Mt CO ₂ eq	246.0 Mt CO ₂ eq	-31.5 Mt CO ₂ eq	9.63 million	-3.27 Tonnes CO ₂ eq
6	Israel	87.0 Mt CO ₂ eq	58.0 Mt CO ₂ eq	-29.0 Mt CO ₂ eq	8.88 million	-3.26 Tonnes CO ₂ eq
7	Sudan	131.6 Mt CO ₂ eq	27.9 Mt CO ₂ eq****	-103.7 Mt CO ₂ eq	41.80 million	-2.48 Tonnes CO ₂ eq
8	Algeria	262.5 Mt CO ₂ eq	208.1 Mt CO ₂ eq	-54.4 Mt CO ₂ eq	42.23 million	-1.29 Tonnes CO ₂ eq
9	Lebanon	34.5 Mt CO ₂ eq	26.8 Mt CO ₂ eq	-7.7 Mt CO ₂ eq	6.86 million	-1.12 Tonnes CO ₂ eq
10	Tunisia	42.6 Mt CO ₂ eq	31.0 Mt CO ₂ eq	-11.6 Mt CO ₂ eq	11.57 million	-1.00 Tonnes CO ₂ eq
11	Morocco	101.2 Mt CO ₂ eq	77.6 Mt CO ₂ eq	-33.9 Mt CO ₂ eq	36.06 million	-0.65 Tonnes CO ₂ eq
12	Jordan	35.4 Mt CO ₂ eq	30.3 Mt CO ₂ eq	-5.1 Mt CO ₂ eq	9.97 million	-0.51 Tonnes CO ₂ eq
13	Yemen	30.48 Mt CO ₂ eq	37.7 Mt CO ₂ eq	+7.2 Mt CO ₂ eq	28.50 million	0.25 Tonnes CO ₂ eq
14	Oman	120.0 Mt CO ₂ eq	125.3 Mt CO ₂ eq	+5.3 Mt CO ₂ eq	4.83 million	1.10 Tonnes CO ₂ eq
15	State of Palestine**	2.9 Mt CO ₂ eq	10.25 Mt CO ₂ eq	+7.3 Mt CO ₂ eq	4.86 million	1.50 Tonnes CO ₂ eq
16	Egypt	398.7 Mt CO ₂ eq	610.9 Mt CO ₂ eq	+212.2 Mt CO ₂ eq	98.42 million	2.16 Tonnes CO ₂ eq
17	Syria	42.6 Mt CO ₂ eq	83.8 Mt CO ₂ eq	+41.2 Mt CO ₂ eq	16.95 million	2.43 Tonnes CO ₂ eq
18	Libya	79.2 Mt CO ₂ eq	99.2 Mt CO ₂ eq	+20.0 Mt CO ₂ eq	6.68 million	2.99 Tonnes CO ₂ eq
19	Iraq	351.3 Mt CO ₂ eq	615.6 Mt CO ₂ eq	+264.3 Mt CO ₂ eq	38.43 million	6.88 Tonnes CO ₂ eq

* Countries ranked by Per Capita reduction by 2030

** Status Quo Emissions and Projections considered for the State of Palestine

*** Kuwait set a target for 2035, assumed it achieves 2/3rd of its goal by 2030

**** Massive discrepancies in data reporting for Sudan

Appendix III - Adaptable Financial Model

Our Emissions Reduction Calculator (ERAC) shows users the impact of an Article 6 investment on project additionality. This is based on the difference between Weighted Average Cost of Capital (WACC) at the prevailing market rate, and the WACC after the Article 6 investment is made, i.e. the point where the private sector invests. This shows us the extent to which concessional Article 6 investment lowered the cost of capital from an unaffordable rate to where the project is financially viable.

While both the WACC_{pre} and WACC_{post} must ultimately be agreed upon by the host and financing states, we have developed a financial model for use by market participants and policymakers. The model can be adjusted for each specific jurisdiction or project, and includes operational data such as costs, capital requirements, expected project life, or power produced. The model also uses financial inputs such as tariffs, cost of financing, and financial structure. The model analyzes these inputs to forecast project returns and costs over a 20 year period.

Our model shows how each Article 6 investment mechanism (equity, debt, guarantees, or grants) either reduces a project's cost of financing, or frees up additional capital. In Figure 6, we show the mechanics of how our financial model can be used to understand Article 6 project financial dynamics. The model, as shown below, uses a sample set of data to illustrate the potential impact of Article 6 financing. An income statement is built using local data and line items such as expenses, interest, taxes etc. This generates net income, which determines cash flow and IRR.

Figure 12. Financial Model Snapshot

Income Statement						
USD	Year 0	Year 1 2020	Year 2 2021	Year 3 2022	Year 4 2023	Year 5 2024
Price per Kwh (USD)		0.10	0.10	0.10	0.10	0.10
Kwh Generated		55,000,000	53,900,000	52,800,000	51,700,000	50,600,000
Total Income (USD)		5,500,000	5,390,000	5,280,000	5,170,000	5,060,000
Depreciation & Amortisation - Base		(1,250,000)	(1,250,000)	(1,250,000)	(1,250,000)	(1,250,000)
Depreciation & Amortisation - Additional		(125,000)	(125,000)	(125,000)	(125,000)	(125,000)
Operations & Maintenance - Base		(500,000)	(500,000)	(500,000)	(500,000)	(500,000)
Operations & Maintenance - Additional		(50,000)	(50,000)	(50,000)	(50,000)	(50,000)
Total Operating Expenses		(1,925,000)	(1,925,000)	(1,925,000)	(1,925,000)	(1,925,000)
Interest Expense		(2,062,500)	(2,015,831)	(1,883,920)	(1,738,315)	(1,577,595)
Taxes		(302,500)	(289,834)	(294,216)	(301,337)	(311,481)
Net Income		1,210,000	1,159,335	1,176,864	1,205,348	1,245,924
Cash Flow Statement						
USD	Year 0	Year 1 2020	Year 2 2021	Year 3 2022	Year 4 2023	Year 5 2024
Net Income		1,210,000	1,159,335	1,176,864	1,205,348	1,245,924
(+) D&A		1,375,000	1,375,000	1,375,000	1,375,000	1,375,000
Cash Flow from Operations		2,585,000	2,534,335	2,551,864	2,580,348	2,620,924
Base Capital Expenditure		(25,000,000)	-	-	-	-
Additional Capital Expenditure		(2,500,000)	-	-	-	-
Cash Flow from Investing		(27,500,000)	-	-	-	-
Grant Financing		-	-	-	-	-
Equity Financing		6,875,000	-	-	-	-
Issuance of Debt		20,625,000	-	-	-	-
Repayment of Debt		-	(1,270,659)	(1,402,569)	(1,548,174)	(1,708,895)
Cash Flow from Financing		27,500,000	(1,270,659)	(1,402,569)	(1,548,174)	(1,708,895)
Net Increase / (Decrease) in Cash		2,585,000	1,263,677	1,149,295	1,032,174	912,030

Income

Revenue model, here showing a solar project
Kwh generated per year multiplied by price per Kwh

Operating Expenses

Includes depreciation & amortization (here 20 years) and operations and maintenance (here 2% investment p/a)

Assumptions adjustable for both infrastructure and 'additional'; investment unlocked through Article 6 (e.g., grid upgrades for a solar projects)

Net Income

Total income for the project after all costs, including debt interest payments and tax (set in this model to 20%)

Capital Expenditure

Includes investment for project infrastructure (in this case a solar field) as well 'additional' infrastructure (assumed here to be grid connection upgrades)

Capital Expenditure

Equity, debt, and grants to fund the project, as well as debt repayment forecast

Net Cash Flow

Net cash flow to project – assumed to be paid out 100% as dividends to equity holders for IRR calculation purposes

Bibliography

Aldy, J.E. and Halem, Z., 2022. The Evolving Role of Greenhouse Gas Emission Offsets in Combating Climate Change. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4203782

Allen, M. and others (2020). Oxford Principles for Net Zero Aligned Carbon Offsetting. University of Oxford <https://www.smithschool.ox.ac.uk/publications/reports/Oxford-Offsetting-Principles-2020.pdf>

Boehm, S., K. Lebling, K. Levin, H. Fekete, J. Jaeger, R. Waite, A. Nilsson, J. Thwaites, R. Wilson, A. Geiges, C. Schumer, M. Dennis, K. Ross, S. Castellanos, R. Shrestha, N. Singh, M. Weisse, L. Lazer, L. Jeffery, L. Freehafer, E. Gray, L. Zhou, M. Gidden, and M. Gavin. 2021. State of Climate Action 2021: Systems Transformations Required to Limit Global Warming to 1.5°C. Washington, DC: World Resources Institute: <https://doi.org/10.46830/wriprt.21.00048>

Bordoff & O'Sullivan, "Yes, We Need to Talk About Cutting Energy Demand" (2022) <https://foreignpolicy.com/2022/06/29/energy-demand-supply-efficiency-conservation-oil-gas-crisis-russia-europe-prices-inflation/>

Calel R, Colmer J, Dechezleprêtre A, Glachant M (2021) Do carbon offsets offset carbon? Center for Climate Change Economics and Policy Working Paper 398/Grantham Research Institute on Climate Change and the Environment Working Paper 371. London: London School of Economics and Political Science <https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2021/11/working-paper-371-Calel-et-al..pdf>

Carmon, O., Fischhendler, I. A friction perspective for negotiating renewable energy targets: the Israeli case. *Policy Sci* 54, 313–344 (2021). <https://doi.org/10.1007/s11077-021-09419-1>

Edmonds, James, Sha Yu, Haewon Mcjeon, Dirk Forrister, Joseph Aldy, Nathan Hultman, Ryna Cui et al. "How Much Could Article 6 Enhance Nationally Determined Contribution Ambition Toward Paris Agreement Goals Through Economic Efficiency?" *Climate Change Economics* 12, no. 02 (2021): 2150007. <https://www.worldscientific.com/doi/epdf/10.1142/S201000782150007X>

European Commission (2021), EU Legislative Proposal for a Carbon Border Adjustment Mechanism, 2021/0214 (COD).

Financial Times, "Global climate leaders push for overhaul of IMF and World Bank" (2022) <https://www.ft.com/content/e0f65580-8d84-49ec-82b7-47c1b06563b0#myft:my-news:page>

Generation Investment Management LLP, Sustainability Trends Report (2022)

Government of Israel, "Government steps up efforts to tackle climate crisis: Israel to introduce carbon pricing for the first time" (2021) https://www.gov.il/en/departments/news/press_02082021_b

Hahn, R.W. and Stavins, R.N., 1999. What has Kyoto wrought? the real architecture of international tradeable permit markets. *The Real Architecture Of International Tradeable Permit Markets* (February 1999)

International Energy Agency, Africa Energy Outlook 2022 (2022)

IEA (2022), Breakthrough Agenda Report 2022, IEA, Paris <https://www.iea.org/reports/breakthrough-agenda-report-2022>

IPCC, 2022: Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. https://report.ipcc.ch/ar6wg3/pdf/IPCC_AR6_WGII_FinalDraft_FullReport.pdf

Kortum S. and Weisbach D. (2017), "The design of border adjustments for carbon prices", *National Tax Journal* 70(2).

Kossoy, A., Peszko, G., Oppermann, K., Prytz, N., Klein, N., Blok, K., Lam, L., Wong, L., and Borkent, B. (2015). State and trends of carbon pricing 2015. Technical report, World Bank.

Mehling, M. A., Metcalf, G. E., & Stavins, R. N. (2018). Linking climate policies to advance global mitigation. *Science*, 359(6379), 997–998. <https://doi.org/10.1126/science.aar5988>

McKiney & Company, "Impact of the financial crisis on carbon economics: Version 2.1 of the global greenhouse gas abatement cost curve" (2010)

Michaelowa, Axel, Aglaja Espelage, Lieke t'Gilde, Sandra Dalfiume, Nicole Krämer, Philipp Censkowsky, Sandra Greiner, Hanna-Mari Ahonen, Federico De Lorenzo, and Stephan Hoch. "Promoting Article 6 readiness in NDCs and NDC implementation

plans.” Final report (2021) https://www.climatefocus.com/sites/default/files/PCG-CF_Article%20%20in%20NDCs_30.06.21_final%20version.pdf

Mitchell, Ronald B. and Parson, Edward A. “Implementing Joint Implementation: Developing a Management and Performance System for the Kyoto Protocol’s `Clean Development Mechanism’.” BCSIA Discussion Paper 98-06, ENRP Discussion Paper E-98-06, Kennedy School of Government, Harvard University, June 1998. <https://www.belfercenter.org/publication/implementing-joint-implementation-developing-management-and-performance-system-kyoto>

Mohammad Al-Saidi, Esmat Zaidan & Suzanne Hammad (2019) Participation modes and diplomacy of Gulf Cooperation Council (GCC) countries towards the global sustainability agenda, *Development in Practice*, 29:5, 545-558, DOI: 10.1080/09614524.2019.1597017

NDC Partnership, “Climate Finance: Enabling Climate Action” (2020) <https://ndcpartnership.org/sites/default/files/Understanding%20NDC%20Financing%20Needs%20Insight%20Brief.pdf>

Salzman, Hunter & Zaelke, *International Environmental Law and Policy* (2021, 6th ed.)

Schneider et al., “Robust Accounting of International Transfers under Article 6 of the Paris Agreement” (2017)

Tal, “Sustainable Israeli Politics: The Monthly Newsletter of Knesset Member Alon Tal, April 2022” (2022)

Tal (2020): Unkept Promises: Israel’s Implementation of Its International Climate Change Commitments, *Israel Journal of Foreign Affairs*

UN Climate Press Release, “COP26 Reaches Consensus on Key Actions to Address Climate Change” (2021) "<https://unfccc.int/news/cop26-reaches-consensus-on-key-actions-to-address-climate-change>

World Bank, *State and Trends of Carbon Pricing 2022* (2022)

World Bank, “Unlocking Climate Ambition Through a Carbon Market Club” (2021)

World Bank, “Country processes and institutional arrangements for Article 6 transactions” (2020)

World Bank, “What You Need to Know About Article 6 of the Paris Agreement (2022)

World Bank, Carbon Asset Development Process. Article 6 Approach Paper Series;No. 3. World Bank, Washington, DC. © World Bank. <https://openknowledge.worldbank.org/handle/10986/36246> License: CC BY 3.0 IGO (2021)

Yosef, G.B., Navon, A., Poliak, O., Etzion, N., Gal, N., Belikov, J. and Levron, Y., 2021. Frequency stability of the Israeli power grid with high penetration of renewable sources and energy storage systems. *Energy Reports*, 7, pp.6148-6161. https://www.g-nrg.com/_files/ugd/079750_96c3877d9b724c588923d38fae4d507a.pdf



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