D-RECs

An assessment of the existing market, commercial models, and potential for impact

D-REC INITIATIVE

I. Introduction

The D-REC Initiative and its role in driving renewable energy investment into developing market*s*

To avoid the catastrophic impacts of climate change, GHG emissions must be cut in half by 2030 and drop to net-zero by 2050. Renewable energy and energy efficiency can meet 90% of the decarbonization efforts and initiatives needed by 2050[1]. The private sector has a crucial role to play in the energy transition, and in recent years we have seen many global corporations stepping up and making ambitious climate goals. An increasing number of global corporations are also taking responsibility for the emissions in their supply chains and encouraging their suppliers to switch to renewable electricity to reduce those emissions. According to the CDP, over a gigaton (Gt) of GHG emissions could be avoided if the suppliers to just 125 global companies increased their renewable electricity by 20%[2]. Despite these pledges and targets, there is a great lack of tangible solutions for companies to immediately adopt to reduce their emissions at the rate we need.

At the same time, energy access is still a critical problem for many areas of the world. Over 759 million people continue to lack access to basic electricity and another 2 billion people suffer from inadequate and unreliable access. According to a new IEA report[3] emissions from emerging and developing countries are set to grow by 5 Gt over the next two decades. To achieve net-zero emissions by 2050, investments in clean energy in these economies must grow to $1 trillion per year by 2030, a 7 fold increase over existing investment levels. In order to achieve universal access to electricity, it would demand annual investments of $35 billion per year for new centralized and decentralized renewable solutions.

Driving renewable energy investment into these developing markets through transformative energy projects is a critical puzzle piece in our path to net zero and a just energy transition. The primary means by which most corporations invest in clean energy is by procuring Renewable Energy Certificates (RECs), electronic records that verify the source of electricity used. This happens either by corporations directly purchasing RECs generated by renewable plants, or through contractual arrangements such as power purchase agreements (PPAs) where it is delivered “bundled” with electricity. However, existing REC frameworks are designed primarily to support utility-scale renewable projects, in part because existing certification mechanisms require data from the grid operator. Electricity from these utility-scale renewable projects often bypasses remote communities in developing countries and therefore fails to serve many of the 759 million people still lacking energy access. The other issue with driving investment to renewable energy deployment into developing markets

[1] Global energy transformation: A roadmap to 2050, IRENA, https://www.irena.org/publications/2019/Apr/Global-energy-transformation-A-roadmap-to-2050-2019Edition
[2] Changing the Chain: Global Supply Chain Report 2019/20, CDP, https://www.cdp.net/en/research/global-reports/changing-the-chain
[3] Financing Clean Energy Transitions in Emerging and Developing Economies, World Energy Investment Special Report 2021,International Energy Agency in collaboration with the World Bank and the World Economic Forum

is the political economy in many of these countries. Many developing & emerging markets do not yet have well-developed legal frameworks or the technical capacity to enable traditional corporate PPAs.

The end result is that distributed off-grid systems, prevalent in many developing countries, are unable to access the REC mechanism. This prevents the electricity providers that serve the rural poor and most vulnerable communities from accessing greater financing afforded by RECs and from participating in global environmental markets.

In response to this issue, the Distributed Renewable Energy Certificate (D-REC) instrument was created. Designed by Positive.Capital Partners (PCP) and South Pole in partnership with myriad stakeholders, the D-REC instrument seeks to address this market gap.

A D-REC is a certified, verifiable and non-tangible environmental attribute. It can be traded as a commodity and will allow distributed renewable energy (DRE) projects to monetize the environmental benefits associated with their energy generation, which for many countries may be located in areas with no access to grid electricity. DRE is critical for energy access because these systems are increasingly used to supply energy to rural and low-income communities, as they often are easier to deploy, are less capital-intensive, and usually require less administrative overhead.

The D-REC instrument will provide DRE system developers and operators access to a new capital stream while allowing the purchasers of D-RECs, namely multinational corporations and other climate investors, to achieve their renewable energy targets. D-RECs therefore harness the ambition of global corporations to drive and deliver renewable energy finance to countries and communities that need it the most.

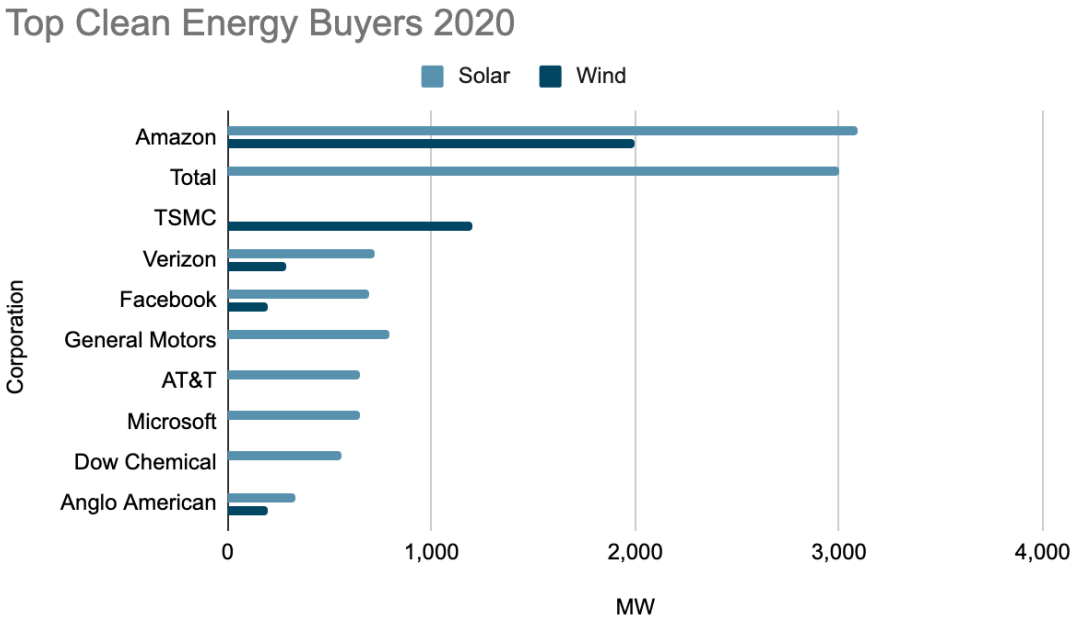
II. Market assessment for estimated corporate demand for D-RECs

Analysing D-REC demand driven by climate pledges

Global corporations interested in renewable energy investment and energy access are the main target audience for D-RECs. Therefore, understanding their climate and renewable energy goals, climate strategies and energy procurement mechanisms is vital. Recent research from the Bloomberg New Energy Finance (BNEF) found that corporations contracted for a record 23.7 gigawatts (GW) of new clean power capacity in 2020, up from 20.1 GW in 2019 and 13.6 GW in 2018. However, much of the resulting new renewable energy capacity to address this demand is occurring in developed markets. There is not nearly enough renewable energy investment into regions such as Sub-Saharan Africa, Latin America, Southand Southeast Asia. In the next phase of the global energy transition, it is critical that corporate climate finance is being driven to areas around the world where it will have the biggest carbon impact.

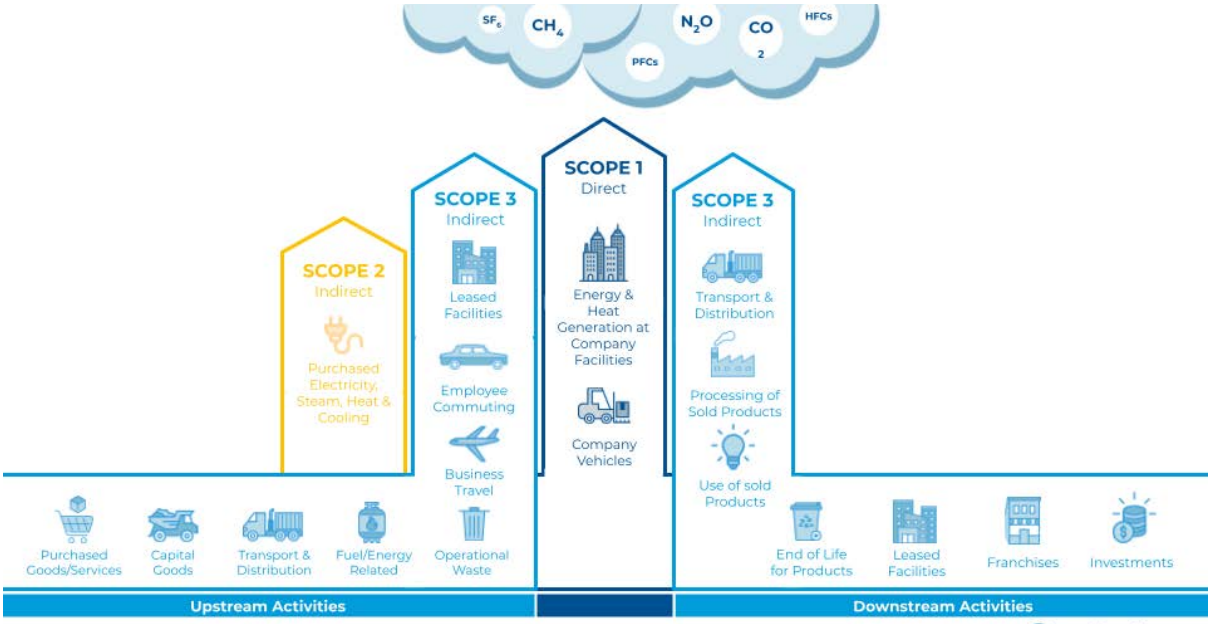
While corporate climate action and renewable energy procurement has grown rapidly in the last few years, it is set to increase exponentially in the next 10 years to meet increasingly

ambitious corporate climate goals. Below is a graph which illustrates the growth of clean energy purchasing from some of the top global companies in 2020.



Corporate energy procurement BNEF

When companies report their greenhouse gas emissions, there are three defined scopes of emissions. These different scopes represent where these emissions come from and where they sit on the supply chain. The diagram below gives an outline of typical scope 1, 2 and 3 emissions.



Source: South Pole

Within the context of this corporate climate and renewable energy boom, D-RECs can be used by global corporations to reduce their scope 2 emissions when they have physical operations in specific developing/emerging markets. They can also be used by domestic companies (in developing/emerging markets) that supply global corporations. In this case, the purchase and retirement of D-RECs will reduce scope 2 emissions for the domestic supplier and reduce scope 3 emissions for the global corporation that purchases goods/services from that supplier.

A preliminary analysis for corporate demand for D-RECs can be done by looking at those companies which have signed climate pledges, and therefore are reporting scope 2 and 3 targets. The D-REC Initiative has used climate pledges such as RE100, Science Based Targets Initiative and The Climate Pledge as primary screeners. As a result of these pledges, global corporations have committed to climate goals where D-RECs could be a useful tool to achieving these targets.

The table below compares the various pledges and gives an overview of the relative size of each pledge and how they overlap. Many corporations, especially large ones, are signatories to more than one pledge.

Pledge	Commitment	Governance	Signatories
RE100	100% Renewable Energy	The Climate Group	300+
SBTi	Consistency with 1.5° World	WRI & WWF	1000+
Climate Pledge	Net Zero by 2040	Amazon-led	100+

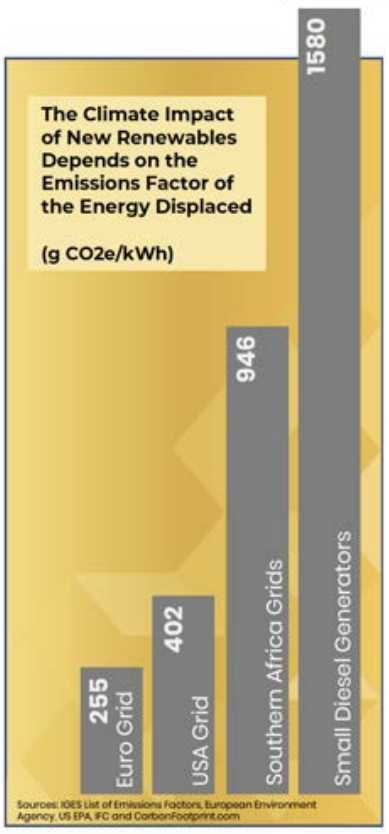
Many companies use the Carbon Disclosure Project (CDP) to report their emission streams. We have used this reporting standard to identify several companies that have disclosed their scope 2 energy emissions. All of the companies in the table below have reported emissions and energy demand in Africa, Asia and/or the Americas and also are signed to at least one of the major climate pledges (SBTi/RE100/The Climate Pledge). This represents a total of 2,307,050 MWh.

Industry	Total MWh	Number of companies
Beverages	736,419	6 companies
Automotive	33,814	3 companies
Financial services	66,108	6 companies
Consumer goods	599,535	12 companies
Pharmaceuticals	151,376	4 companies

Cosmetics	7,916	3 companies
Tech	13,962	2 companies
Telecommunications	605,174	5 companies
Real Estate	41,628	1 company
Construction	3,534	1 company
Hospitality	47,452	2 companies
Media	132	1 company

D-RECs and carbon impact

The D-REC Initiative project team has been working with United Nations (UN) Energy to craft a new "Corporate Compact for Climate Justice." This would sit under the wider UN Global Compact, a non-binding pact that encourages the widespread adoption of sustainable and socially responsible policies, and to report on their implementation. Under the UN Energy Compact, companies would pledge to allocate a small percentage (1-5%) of their annual energy expenditure to transformative energy projects in developing and emerging markets.



The climate impact of any new renewable energy project depends on where it is being built and the carbon intensity of the electricity that it displaces. Traditional corporate PPAs that add new renewables will displace, on average, 402 gCO2e/kWh in the United States, or just 255 gCO2e/kWh in Europe. Much greater climate impact can be achieved by deploying new renewables in developing and emerging markets.

DRE projects in southern Africa that displace coal-fired grid electricity or small-scale diesel generators can achieve 3-6 times the climate impact. For a very small DRE project, the impact can be even higher. For example, a small 40W solar lantern, according to the UNFCCC's Clean Development Mechanism, will offset nearly 0.4 metric tons of CO2 annually, which is more than 14 times the benefit the same DRE system would generate if it were deployed in the United States. While a single such small DRE system will not have a material impact, when this impact is multiplied across millions of such devices, the potential CO2 avoided can be meaningful.

A recent IFC report[4] estimates that there are 20-30 million diesel gensets in 167 developing countries, with a total installed capacity of 350-500 GW. They supply 100-170 TWh of electricity and emit 100 megatons of CO2 each year.

With emission reduction potential like this, there is a very strong climate case for integrating developing and emerging markets into corporate energy procurement strategies and net-zero investment portfolios.

The UN Energy Compact initiative could be one way to present a challenge to all companies to allocate a percentage of their annual energy procurement to transformative energy projects in developing and emerging markets.

For example, corporations that have signed RE100 have an annual demand for renewables of 330 TWh per year. If these companies could be challenged to allocate 2-5% of that volume to transformative energy projects over the next decade, and assuming no further growth in overall energy demand, that would represent demand for D-RECs ranging from $132m to $600m per year.

III. D-RECs and social impact

The case for D-RECs is even stronger when considering the opportunities to advance climate justice and social impact. DRE projects can deliver power where it's needed most: at hospitals & health clinics, schools & colleges, rural communities, farms, and small to medium sized businesses, with great potential to improve lives and livelihoods.

In many cases, these new renewable energy assets often provide people with access to electricity for the first time. Despite global energy access increasing over the years, 75% of the global population without energy access live in Sub-Saharan Africa, a percentage that has risen over recent years[5]. As DRE projects are able to deliver power to where it is needed the most, there is a strong case for integrating developing and emerging markets into corporate energy procurement strategies and net-zero portfolios.

The D-REC Initiative is focused on sourcing projects that electrify hospitals, health clinics, schools and colleges, rural communities, farms and small to medium sized businesses. Enabling access to clean and reliable energy in these communities has a far greater social impact than financing renewables in developed countries. Clean, reliable energy is a vital tool in the fight against poverty, and energy access. It is directly linked to economic growth and to a country's GDP.

Below is a table of select developers with whom the D-REC Initiative has been engaged, and examples of the social impacts their renewable energy projects have already achieved *without* D-RECs. *With* D-RECs, even greater impacts can be unlocked for an even greater number of communities.

[4] The Dirty Footprint of the Broken Grid, The Impacts of Fossil Fuel Back-up Generators in Developing Countries, 2019, IFC
[5] IEA (2020), *SDG7: Data and Projections*, IEA, Paris https://www.iea.org/reports/sdg7-data-and-projections

Developer	Social Impact
Bboxx	• 642,236 tons of CO2e emission avoided • 113,806 people with access to additional income generating opportunities • 467,694 school-aged children with access to electrified school facilities • 14 MWHs of energy generated daily
RURAL SPARK	• 48,000 metric tons of CO2e avoided • 3,000 jobs created • 45 million additional hours of light generated
ENGIE	• 30MWs of new capacity powering HHs • 10 jobs created per village per mini grid install • $4 USD saved per HH per month in energy cost
stella	• Electrification of hospitals in Ghana • "Women on Roofs" –women to execute operations & management

IV. D-REC Commercial Model

The commercial models underpinning the D-REC instrument include two primary means by which corporate buyers and other investors can buy D-RECs.

Mechanism A: D-REC transactive agreement

In this approach, a corporate buyer agrees to purchase D-RECs from a project as they become available. In its simplest form, such an agreement may be that the corporate buyer makes a spot market purchase of D-RECs once they are generated. In other instances, it may take the form of an upfront agreement where the corporation agrees to purchase D-RECs from one or more projects over a certain time period, but to only pay upon delivery.

Mechanism B: Bundled D-REC purchase with upfront investment

In this second procurement mechanism, a corporate buyer will provide money to a project upfront in exchange for D-RECs and possibly a financial return. For example, a corporate buyer may provide 5% of the project CAPEX upfront, with a commitment from the DRE developer that all D-RECs generated will be delivered to the corporate. Alternatively, this upfront D-REC purchase agreement may be bundled into an equity or debt investment, in which case the corporation is getting both a financial return as well as the stream of D-RECs. Regardless of the purchase specifics, the DRE developer will receive money upfront which can be used to obtain more favorable terms from other financiers.

Mechanism A/B Hybrid

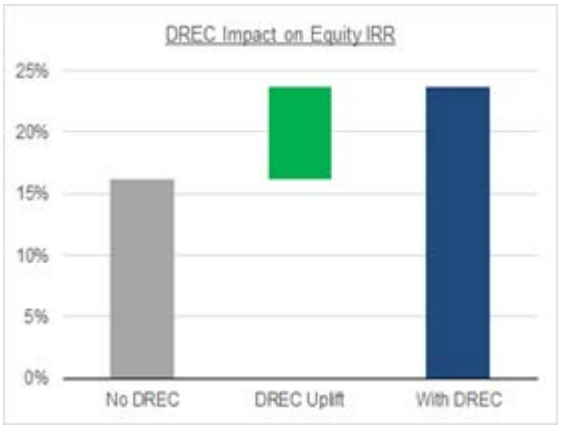
The hybrid mechanism involves a combination of an upfront investment in a project (either with or without an expected financial return) along with a transactive purchase of D-RECs as they are generated. Such an approach may involve a single buyer or multiple buyers.

Impact on Project Economics

In collaboration with IFC's Climate Finance team, the D-REC Initiative project team developed a model to analyse how a DRE project's economics are affected by D-REC procurement. In the following theoretical example, a corporate buyer commits to a hybrid approach, in which part of the purchase agreement is executed upfront (with no expected financial return), while the balance of the agreement is pay-up-on-delivery.

The resulting cash flow below indicates how the DRE project developer first receives cash from the corporate buyer - equivalent to two years' worth of D-RECs at $0.02/kWh. The DRE developer can use such a commitment to close project financing and commission the system; after the two years' worth of D-RECs are transferred to the buyer, the corporate buyer then purchases D-RECs as they are generated at $0.03/kWh.

The resulting impact on project internal rate of return (IRR) to equity investors as a result of the Mechanism A/B approach is a 750 basis point improvement in project IRR, as noted in the graph below:



V. Key Findings from stakeholders

The D-REC Initiative involves a large range of stakeholders which are critical to the long-term success of the Initiative. Feedback and key findings from stakeholders is an important part of the growth and development of the D-REC Initiative.

The table below summarizes the key stakeholders that the project team has engaged with by category.

Stakeholder Type	Select parties
Standards Organizations	I-REC Standard, Gold Standard, VERRA
Quality labels	P-RECs, Eco Energy
Investors and Financial Intermediaries	SunFunder, responsAbility, CrossBoundary Energy Access, Persistent Energy, CDC Group, Shell Foundation, NXT Grid, IFC, Trine,
Associations and Facilitating organizations	World Economic Forum, Alliance for Rural Electrification, Sustainable Energy for All, GSMA, Africa Minigrid Developers Association, RE100, Renewable Energy Buyers Alliance, Catalyst Offgrid Advisors, Rocky Mountain Institute, World Resources Institute
DRE Project Developers	PowerGen Renewable Energy, Okra Solar, Candi Solar, d.light, Engie , Husk Power, mPower, Yoma Micropower, NexGrid, Konexa, Nuru, Nayo Tropical, Bboxx, SPARK Energy, UNDP- Uganda, Trent, Angaza, Solaris Offgrid, Vitalite, Biolite,
Technology providers	Odyssey Energy Solutions, New Sun Road, Solaris Offgrid, Energy Web Foundation, Angaza, SustainCERT
Non-Government Entities	UNDP, UN Energy, ESMAP
Corporates	Microsoft, Signify, Google, Salesforce, Netflix, Apple, Heineken, Novzymes, Amazon, AB InBev, Infosys, Autodesk, McKinsey & Company, Goldman Sachs, Caterpillar, State Street, Coca Cola (HBC), Nike

Among the input provided by key stakeholders, the key takeaways on the on the D-REC instrument and its potential/feasibility include:

- While existing renewable energy mechanisms and pledges have provided a strong basis for companies seeking to meet their past climate and sustainability goals, as companies begin to set ever more ambitious targets (e.g. addressing scope 3 emissions or focusing on REC purchases with the highest impact) so too is there a

strong need for instruments that enable this greater ambition. D-RECs have the ability to fill this gap.

- The D-REC instrument is being designed not as a new environmental standard, but rather as an extension to existing standards, such as the I-REC Standard and the Gold Standard. As a result, the D-REC's design is familiar to stakeholders. It can be integrated into existing environmental certificate procurement practices, and provides a venue for additional impact without introducing a high learning curve for users.
- The various D-REC purchase mechanisms are seen by various stakeholders as having a strong likelihood to enable the development of projects that would otherwise face challenging economics.
- While an upfront D-REC purchase will provide the most impact to project financial returns, corporates and other buyers are not keen to provide money upfront. Rather, D-REC buyers would like to pay upon delivery, aligned with existing unbundled REC purchase processes. Therefore, there is a need for financial intermediaries to translate corporate purchase agreements - which will be paid upon delivery - to upfront catalytic capital.
- The D-REC can enable low transaction costs through employing technology to automate the issuance of D-REC certificates. Moreover, many stakeholders, and D-REC buyers, see great value in the high level of data fidelity offered by the D-REC platform, such as identifying the specific projects from which the D-REC certificates are being purchased.
- Many stakeholders find the current rules around GHG accounting for Scope 2 to be rather limiting with respect to incentivizing investment in high-impact transformative energy projects. The D-REC Initiative's UN Energy Compact may be one way to provide a framework to enable corporate buyers to go above-and-beyond existing accounting rules, but a more comprehensive adjustment in renewable purchase incentives may incline more corporates to support high climate impact renewable energy rather than continue to place more renewables on developed grids.