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Climate Inclusion

Driving the transition for the low-income consumer



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KEY THEMES:

- Low-income consumers are disproportionately likely to experience the physical impacts of climate change.
- Climate-mitigating technology can provide significant cost savings to this customer base, but current distribution and financing channels are insufficient to facilitate their access.
- There is a significant commercial opportunity in helping these consumers access the savings created by climate-mitigating technologies.
- Businesses in this market are at an inflection point to scale, well positioned to generate financial returns, and contribute to positive social and environmental outcomes.

CLIMATE CHANGE AND INEQUALITY ARE INEXTRICABLY LINKED.

Climate change is poised to disproportionately impact low-income and vulnerable populations. Global temperature increases, increasingly severe storms, and irregular patterns of drought and rainfall are estimated to push up to 130 million people into poverty by 2030. By 2050, as many as 200 million may be forced to migrate¹. This highlights the universal nature of climate change; it doesn't respect borders-impacting vulnerable regions and populations regardless of where emissions originate. Although global investment in energy transition technologies reached a record high in 2022, by 2030, cumulative investments must amount to \$44 trillion².

Equally important to acknowledge: existing inequality will make addressing climate change all the more challenging. Emerging economies are growing rapidly — their citizens joining the middle class, gaining access to goods and services. This rapid growth will inevitably generate incremental emissions. Stopping economic growth in service of reducing emissions, however, is not an option on the table. Within developed and developing economies alike, small businesses and low-income consumers are disproportionately affected by climate change and lack the resources to stay resilient using climate change mitigation and adaptation technologies. As we take urgent action to address climate change, we must do so without further disadvantaging those already struggling.

OPINION PIECE. PLEASE SEE IMPORTANT DISCLOSURES IN THE ENDNOTES.

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Fortunately, new business models are gaining momentum, specifically ones that serve low-to middle-income individuals and medium-to small- enterprises. These business models are particularly attractive due to their cost per unit of devices and services being distributed and the capital expenditure profile for scaled energy generation. We believe that many of these models exist, today, in emerging markets such as India. Even accounting for currency, the higher the growth and massive total addressable market creates a strong relative value calculation for the market. In fact, climate tech investments are surging in India, growing 4x in 2021 to \$7 billion³. There is a growing pipeline of fast growing and profitable tech sectors largely focused on electric vehicles, renewable energy, agritech, food tech, and the circular economy.

These differential impacts of climate change on low-income consumers and small businesses are both intra-country and inter country.

Intra-country Impacts

Low-income consumers in the United States are between 10 and 20% more likely than the general population to experience climate change-related extreme temperature deaths, traffic delays from flooding, property damage from storms and sea level rise, and new asthma diagnoses from particulate air pollution. They are 25% more likely to experience loss of labor hours because of climate change-related natural disruptions.⁴ Responding to these disruptions and shocks is differentially challenging for these individuals – with a reported 1 in 3 turning to high-cost credit cards and other predatory financial products to meet spending needs.⁵

Inter-country Impacts

High-income countries like the United States are better prepared to respond to the physical impacts of climate change – despite generating, on average, 8x the per capita emissions of India, a lower-middle-income economy per the World Bank. These countries are faced with the challenge of providing their citizens with basic services like electricity, high-quality education and healthcare, and financial services, but without the benefit of fossil fuels enjoyed used by developed nations. All the while, India remains acutely exposed to the physical impacts of man-made climate change – a direct result of the cumulative 1.5 trillion tons of CO₂ emitted due to human activity – roughly 60% of which has come from developed nations that represent less than 14% of the world population.⁶ More than 80% of individuals in India are at risk of climate-induced disasters including rising temperatures, changing rainfall patterns, and declining groundwater levels.⁷

Simply put, as incomes rise, consumption rises. Consequently, so do emissions. No demographic group or country has demonstrated a path to middle-income life or access to basic necessities without significantly relying on fossil fuels. If, for instance, India were to match the per capita emissions of the United States (14.4 tons of CO₂/person/year) by 2050, that would account for nearly 100% of the allowable emissions in that year under the 2-degree scenario laid out in the Paris Agreement.⁸ Given India's population and GDP growth rates, there is no other option than a rapid transition to low-carbon development.



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ADDRESSING CLIMATE CHANGE AND INEQUALITY CONCURRENTLY VIA COMMERCIAL SOLUTIONS

To make progress, we must recognize that climate change and inequality can be addressed concurrently through commercial solutions. In this market environment, there are a range of tailwinds to commercial business models that are seeking to do so. These include:

Decreasing costs of renewable energy technologies, particularly solar.

Since 2010, the cost of solar cells have dropped by more than 90%, and global installed volume has roughly doubled each year⁹ leading to two beneficial impacts on the market:

1. For **Independent Power Producer (IPP) and developers**, the high-level cost benefit has become attractive to produce renewable energy relative to fossil-fuel-based energy (from sources like coal, oil, and natural gas). Unlike prior cycles, renewable energy's environmental case now more clearly aligns with the commercial case.
2. For **consumers**, renewable energy sources such as solar can provide cost savings. The average U.S. consumer who installs rooftop solar may save between \$20,000-\$30,000 on energy throughout the life of their solar system. For those without access to their own rooftop, community solar models may help save between 10 and 20% on their monthly utility bills, without any upfront costs. In emerging markets that lack access to universal energy, this cost reduction is especially impactful. Customers in India can save roughly 60% when switching from unsubsidized kerosene to solar powered lanterns.¹⁰
3. These cost differentials are driving a significant increase in installed capacity and novel applications of solar panels – including provision to low-income individuals around the world as their first access to electricity.

Government and international subsidies

Recognizing that the Paris Agreement's carbon budget will not allow for low-income countries and customers to electrify along the same path that developed nations and high-income customers have followed, government and multilateral development groups have developed massive subsidy programs to drive renewable energy adoption. These new enabling regulations differ across key geographies:

1. In the United States: Dedicated provisions in the Inflation Reduction Act and Infrastructure Bills support renewable energy developers and operators to access the low- and middle-income (LMI) consumer segments. This includes nearly \$9 billion in rebates for efficiency improvements, more than \$27 billion in funding for community development financial institutions and green banks to mobilize for carbon mitigation that benefits low-income and disadvantaged communities, and nearly half a billion to support resilience-retrofits for low-income Americans.^{11,12}
2. In India: Subsidies for gas and diesel were eliminated in the early 2010s, and electric vehicle subsidies that provide more than \$600 million to support affordability of electric two- and three-wheelers began in 2019. For instance, a range of federal incentives have provided more than \$4 billion to smallholder farmers to purchase renewable energy assets for productive use on farms.

BELOW ARE SOME OF THE KEY BUSINESS MODELS AND SECTORS WE ARE TARGETING:

Product innovation to meet the needs of small business and low- income customers

Decreased costs of solar panels and other climate mitigating technology improve affordability for low-income customers. Incentivized by government programs, designers and manufacturers of this technology have started to recognize that the needs of the low- and middle-income customer are likely to look different than their historical consumers. Novel technologies and products that are designed to reduce renewable energy supply costs, improve the efficiency of energy transmission and distribution, and reduce energy consumption, are recognizing that the needs of the low- and middle-income customer are a compelling commercial opportunity.

As a result, we are witnessing rapid product and business model innovations such as distributed renewable energy systems, advanced metering infrastructure, energy management software applications, and last mile circular services. These technologies can deliver meaningful financial benefits to low- and middle-income customers while also generating compelling unit economics and corporate margins for the businesses focused on developing these solutions.

Renewable energy assets for the low-income consumer segment

While certain innovations like rooftop solar financing allow more consumers to access lower-cost renewable energy, many low-income customers still lack the physical assets necessary for such interventions. More than 70% of U.S. households don't have access to their own rooftop¹³. Many households do not own their home and many live in an apartment building with a shared roof. Alternative modes of renewable energy access for these customer groups are popping up in emerging and developed markets. One method includes aggregating energy supply and distributing, either directly or indirectly via net metering, to low-income customers. Methods like this provide cost savings while simultaneously electrifying and reducing the carbon intensity of grid-based energy.

Case study: Perch Energy

Perch Energy, a portfolio company of the Nuveen Private Equity Impact Investing Team, is a servicer for community solar developers that identifies and maintains subscribers for community solar assets with a particular focus on attracting and retaining low-income customers. In many states, LMI subscribers are a requirement to receive tax credits, and Nuveen's large portfolio of affordable housing has helped decrease the cost of customer acquisition for Perch, while providing significant energy savings to tenants.

Leveraging financial inclusion for climate change mitigation and adaptation

Among the largest challenges in serving a low-income consumer segment is financing. With lower levels of savings, emerging customers tend to lack the upfront capital required to outright purchase climate-mitigating technology like solar panels; however, financing partners such as MSME lenders, microfinance banks, and affordable housing finance businesses, have inroads to these clients and a strong understanding of their creditworthiness. These capital providers are driving an inclusive transition to a low carbon economy. In addition, these businesses are well positioned to help their customers build resilience to the physical impacts of climate change through insurance distributions and just-in-time financing products that alleviate customers responses to natural disruptions.

Case study: Annapurna

Annapurna, a portfolio company of Nuveen Global Impact Fund I¹⁴, is among the largest microfinance institutions in India, serving more than 2.5 million, mostly women borrowers with working capital loans to help them grow their businesses. Annapurna also provides loans directly to micro, small- and medium-enterprises (MSMEs). Both of these groups are acutely vulnerable to the physical impacts of climate change, because of their location, access to basic services like energy and sources of income (in many cases related to agriculture). Recognizing this, Annapurna leveraged their existing knowledge of their borrowers to develop dedicated financing products for climate-mitigating technology, including rooftop solar financing.

Off-grid electrification for productive use – climate tech for the low-income consumer.

As a result of decreasing prices in renewable energy generating assets, we are seeing a ‘leapfrog’ of traditional energy generation and distribution in favor of off-grid renewable energy. This shift is particularly robust in markets with underdeveloped energy access. Solar home systems allow low-income customers access to basic lighting and charging; renewable energy powered farm equipment can improve yields, income, and climate resilience; and electric vehicles (EVs) can lower ongoing costs for customers for whom transport is an essential component of their income generation. Providing a range of capital to these underserved low-income customers provides myriad social benefits related to income, education, healthcare, and physical safety and ensures that economic growth does not come at the cost of emissions.

Case study: Ecozen

Ecozen is a provider of solar-powered irrigation and cold storage devices to smallholder farmers in India. Their technology supports the avoidance of more than 500,000 tons of CO₂ per year, as farmers switch from grid-based and diesel- powered agricultural technology to Ecozen’s renewable offerings. Ecozen’s products also support increases in incomes and livelihoods for farmers, with more than 90% reporting an increase in income as a result of their use of a solar-powered irrigation pump.

For more information, please visit our website, nuveen.com/impact

Endnotes

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