

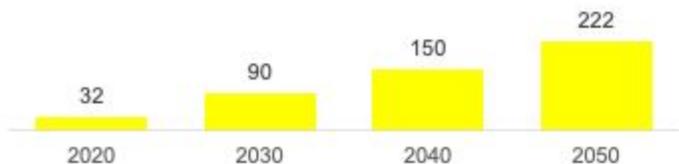
SOLAR CYCLE

FUND

THE CHALLENGE

In the United States in 2020, an estimated 26,000 tons of solar modules (~400 MW) ended up as waste and the annual number is expected to nearly quintuple by 2030. However, many of these solar panels are still able to produce power. If solar capacity grows 3x by 2030 and ~7x by 2050 as expected by Bloomberg New Energy Finance (see chart below), the amount of waste will increase significantly from 2020. The challenge is how to avoid sending these solar panels to the landfill, while still capturing value.

Installed U.S. Capacity of Small Scale Solar Panels (in GW)



THE OPPORTUNITY

In the U.S., there is huge potential for obtaining older panels for refurbishment and reuse. In California alone, thousands of non-residential (i.e. larger-scale) Power Purchase Agreements (PPAs) were executed between 2010-15, totalling up to 679 MW (AC) worth of panels. These customers are now paying high escalated PPA energy rates from when that solar power was expensive (like at the author's 661 kW-AC rooftop array site shown below, now paying \$0.24c/kWh vs. current \$0.08-0.10/kWh for renewable power). Thus, such customers are beginning to buy out their PPAs and replace their older panels with new ones, to get 2-3x more energy from the same footprint (and lower equivalent electricity tariffs).

In our proposed solution, these panel providers would pay a typical module-removal cost (~2.6¢/W for commercial scale 100kW-5MW) to our partner developers for deinstallation. The Solar Cycle Fund (SCF) would then acquire the panels and identify farming cooperatives, manufacturing facilities and utilities in the Caribbean (with high fossil-energy prices) and Latin American countries (with poor energy resources in rural locations) to deploy "refurbished" solar facilities.

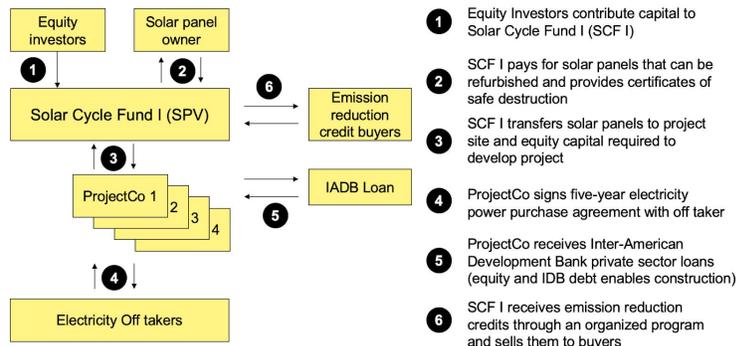
Solar Panels to be "Refurbished"

Nicaraguan Agriculture Solar Facility



Our pilot will initially deploy solar projects in locations like Haiti, where energy rates are extremely high (\$0.36/kWh) and only 12.5% of the population is electrified, and Nicaragua, where that business tariff is also high at \$0.24/kWh (and pro-solar policies allow excess solar generation can be sold back to the grid for \$0.056/kWh). Further, we would work with local partners and developers such as 10POWER in Haiti to ensure support of the community and that we incorporate local lessons learned in project development. The solar projects would execute 5 year PPAs with the local utilities, businesses or farming cooperatives for \$0.16/kWh. Project level private debt would be provided by the Inter-American Development Bank in order to support its climate change and environmental sustainability goals.

FUND STRUCTURE



INNOVATIVE ELEMENTS

- **Capture value by extending life cycle of solar panels and minimizing waste**
- **Generate clean energy** in low-renewables countries
- **Partner** with the Inter-American Development Bank (IADB) to private debt financing at the project level
- **Reduce emissions** and contribute to global carbon offset program (i.e. Gold Standard or UN Clean Development Mechanism if revised) with revenue streams that could bring in \$12M/yr during the pilot period

FUND PROFILE

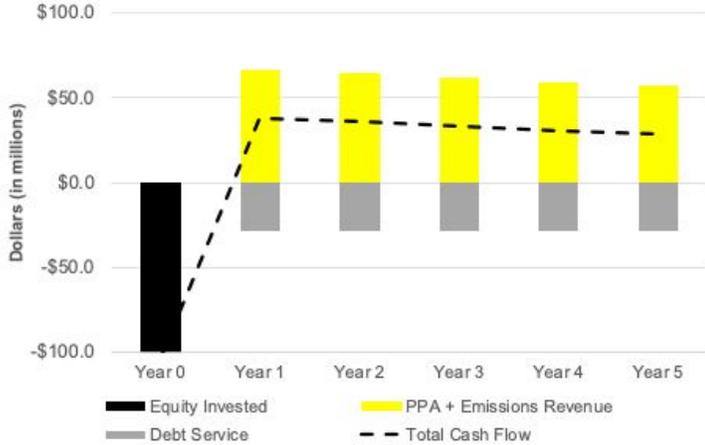
Investment Vehicle	Private Equity Fund
Size	SCF I: \$100 million (200 MW pilot) SCF II: \$500 million (1 GW)
Investment Criteria	<ul style="list-style-type: none"> • Countries with high fossil energy prices and limited reliability in Latin America and the Caribbean • Diversify with various off-taker risk profiles: Farming cooperatives, small businesses, manufacturing facility and/or local utility
Geography	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Haiti</p>  </div> <div style="text-align: center;"> <p>Nicaragua</p>  </div> </div>
Investment Period	5 years (based on project life)
Fund Life	10 years
Target IRR	20%
Fee Structure	2% management fee + 20% performance fee over target return
Target Investors	Retirement / pension funds, family foundations, Inter-American Development Bank
ProjectCo Target Leverage	2.0x (DSCR)

KEY ASSUMPTIONS

- Solar panel acquisition costs are zero or very minimal - we suspect that existing customers with PPAs can write off this expense with a new PPA at a lower rate
- Research indicates that these aging solar panels still have usefulness and can be refurbished
- Enough partner developers can be identified both to remove the solar panels in the US and to install in Latin America and the Caribbean

CASH FLOWS AND RETURNS

The fund targets a 20% return for equity investors after paying its debt service (principal and interest). The following 5-year cash flow profile, represents a 200 MW of projects with a construction costs of \$230mm funded with \$130mm of Inter-American Development Bank debt and a \$100mm of SCF I equity contribution. It is based upon build costs of \$1,150/kWh (including refurbishment and transportation) and a PPA of \$0.16/kWh in Haiti or Nicaragua.



RISK, MITIGATION AND DUE DILIGENCE STRATEGIES

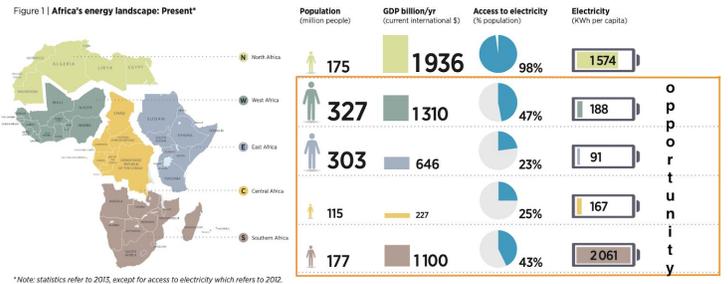
Category	Risks	Mitigation Strategies
Political	Political risk and uncertainty	Closely monitor political risk and work with local organizations
Operational	Poor engineering solutions to refurbish the solar panels	Procure solar panels with seasoned developers
	Construction quality/completion	Pay most of installers' fees on completion
Financial	Off taker credit worthiness concerns	Select highest-rated buyers first (in pilot) Reserve fund to cover delayed payments
	Solar production could lower local electricity prices, competitiveness	Pursue countries with favorable NEM/solar policies and goals
Regulatory	Local utilities and government add permitting or tariff disincentives to solar, like Mexico in 2020	Actively work to get buy-in from local/regional stakeholders
Environm.	Natural Disasters (esp. hurricanes)	Short-Term Insurance

SCALABILITY

Solar waste will be ample and so we expect a strong supply of panels that can be refurbished and used to provide electricity in Latin America and the Caribbean, with high commercial electricity tariffs.



If we can prove the economic model and manage transportation costs, we can scale this model to Africa which receives more solar insolation (and needs cheap, renewable electricity) than any other continent in the world. Africa has a high 1000GW of solar power generation potential (International Renewable Energy Agency) and there is a large unmet demand for electricity in the African continent.



IMPACT BENEFICIARIES AND MEASUREMENT

By powering local communities, we generate enterprise activity and create wealth: this is a crucial step towards accelerated and inclusive growth in countries like Haiti and Nicaragua. This fund will support many United Nations Sustainable Development Goals (SDGs): 7. Affordable and Clean Energy, 11. Sustainable Cities/Communities, 12. Responsible Consumption/Production, and 13. Climate Action.

- **Economic Impact:**
 - *Small Business Growth:* Stimulate business growth and job creation in the agricultural industry
 - *Local Economy:* Spur the entire economy, since agricultural growth not only stimulates agro-industries but also contributes the most to manufacturing and service activity in countries like Haiti and Nicaragua
- **Social Impact:**
 - *Job Creation:* Wealth creation and improved living standards (poverty and health) by increasing the income of farmers, who represent 68% of the workforce (Haiti)
 - *Improved Quality of Life:* Health improvement as solar energy production does not cause any air pollution, unlike burning fossil fuels
- **Environmental Impact:**
 - *Waste Reduction:* Save an estimated ~13,000 tons of solar panels from ending up in landfills and causing chemical pollution
 - *GHG Emissions Reduction:* ~300,000 tons of carbon dioxide emissions