A ROAD MAP TO INVESTING IN SUSTAINABLE ENERGY

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AP/Wide World Photo

Schoolchildren walk under wind turbines in Pennsylvania.

A well-designed regulatory environment and a solid financial infrastructure are required to support large-scale implementation of clean energy technologies. International organizations, governments, and private financial and risk management providers are seeking ways to participate in this monumental task through creative financing mechanisms and alternative investment vehicles.

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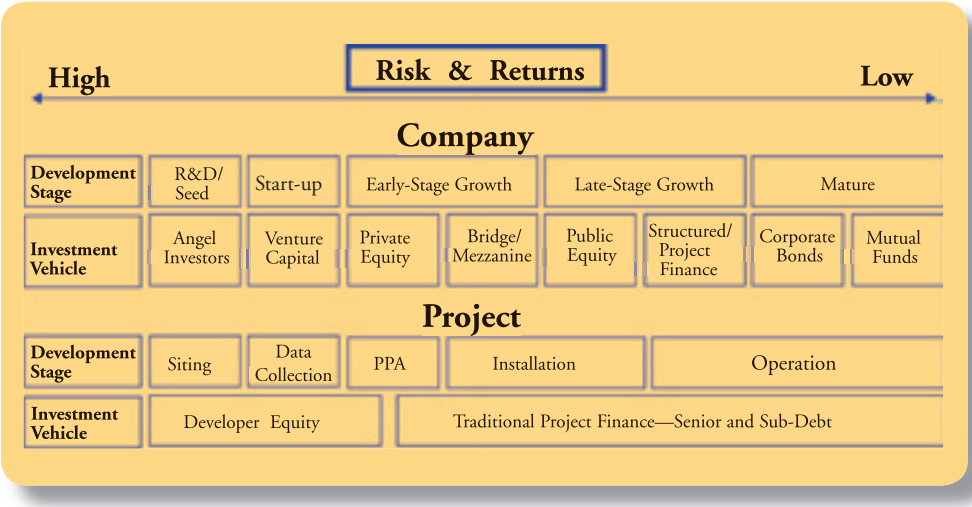
Despite the flood of stories on climate change and the technology boom in the energy sector, little is reported on how we are going to finance the implementation of new technologies. The scale of this issue may dwarf the technological challenges—the International Energy Agency estimates a need for $17 trillion to finance global energy expansion, including clean energy projects, over the next 25 years. Some $5 trillion will be required in developing nations alone.

Sources of Energy Finance

Finance for sustainable energy is either company or project related. It can be provided at any phase of project development, from the earliest stages, where risks and return expectations are high, to the later stages of mature operation, where risks and returns are commensurately lower. A chart illustrates the roles these sources of finance play.



At the company level, sources of capital include these:

• individual, or "angel," investors and venture capitalists at the highest risk, early stage of company development where research and development (R&D) and start-up capital is required;

• private and public equity investors, who usually enter the field once revenues are established to provide growth and expansion capital;

• secured and corporate debt for late-growth-stage and mature companies with established history and balance sheets.

At the project level, development is funded via these:

• project equity, which is provided early in the project cycle for siting, data collection, and project formation and which confers ownership interests to the investors, who then become shareholders in the enterprise;

• mixed debt and equity, also known as "mezzanine finance," which is typically provided for the construction or installation of the project;

• senior debt, provided for the construction of larger projects and the ongoing expansion and operation of the project enterprise, and usually supplied in the form of traditional project loans offered by major institutional lenders requiring conventional interest and principal repayments over the term.

The scale of the project also impacts the source of capital. Large projects based on established technology, such as hydroelectric power or onshore wind power, are traditionally funded by large financial institutions and require pools of debt, mezzanine, and equity financing from multiple sources. In such projects, risk is both measurable and can be insured. Frequently, these projects are financed "off balance sheet," meaning that those loaning money to the project cannot recoup their loss through claims on the project owner if the project fails.

Smaller-scale projects or projects utilizing new technologies, such as solar power and small-scale biomass, are different. These forms of energy technology involve a technical risk in addition to the risks associated with all energy projects, so they tend not to attract the traditional sources of capital from private markets. Financing in such cases is usually provided in the form of equity because lenders generally view the cash flows to repay debt as being high risk, the perception that makes them reluctant to extend loans. Thus, solving the risk challenge is critical to bringing sustainable energy production up to meaningful volumes.

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Assessing Risk

Financing sustainable energy technologies necessarily entails taking risks. Some of these are typical for the energy sector, while others are particular to sustainable energy technology and the myriad technical, performance, regulatory, and contractual issues that surround it. These risks include the following:

• pricing—uncertainties of project economics in the face of deregulation and the trend from long-term contracts to short-term, or "spot," power pricing, where pricing and payment occur at or near the same time;

• currency risk—exposure to adverse exchange rate movements against assets held in foreign currencies;

• country/political risk—potential for governments to renege on the power purchase agreements (PPA) that provide the long-term revenues for power projects against which debt and mezzanine financing are supplied;

• poor insurability—lack of underwriting experience and historical data on loan loss, which renders insurance expensive and limits coverage;

• technical performance—lack of historical performance data and scarcity of proven operators;

• intellectual property (IP) protection—potential for patent infringement and IP theft in developing markets;

• servicing and maintenance—lack of specialized engineering services, skilled labor, and replacement equipment;

• primary resource availability—uncertainties over, for example, wind performance, biomass feedstock sourcing, and hydro availability;

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Solar powered pump in India installed as part of an Indian Renewable Energy Development Agency project.

• infrastructure risks—grid connectivity problems and lack of access to transmission and distribution systems;

• credit risk—poor credit quality of many smaller project developers and power contract counterparties;

• contractual risk—immaturity of legal environment surrounding clean technology;

• regulation and public policy—changes in political attitudes toward tax incentives for clean energy technologies (for example, uncertainties over investment tax credit and production tax credit extensions in the United States).

Mitigating Financing Risk

Today, many of these risks are poorly understood or inadequately addressed in the marketplace. As a result, many mainstream finance providers feel unable to back sustainable energy technologies over more traditional investments. These financiers believe—often erroneously—that sustainable energy financing is a socially motivated pursuit that is inconsistent with their fiduciary duty to pursue the best risk-reward combinations.

Recently, a number of alternative investment vehicles have emerged that target sustainable energy financing and that are comfortable with the attendant risk equation. This has given rise to significantly enhanced levels of investment by the venture capital community in the broader clean technology category, which includes sustainable energy. Venture capital firms now direct 10 percent of their annual investment total to clean technologies. Companies such as SunEdison LLC are pursuing a fee-for-service model—providing the initial capital for solar projects in exchange for monthly billing to the customer. This surge of commercial innovation is coinciding with other trends—record high volatility in fossil fuel markets, technology advancement, power market regulatory reform, and deepening environmental concerns—to make investing in sustainable energy increasingly attractive.

Currently, however, the vast majority of initiatives still require a combination of regulatory and third-party participation. In developing countries and economies in transition, key players in this quasi-public-private partnership approach include multilateral organizations such as the World Bank and its financing arm, the International Finance Corporation; bilateral organizations such as the Export-Import Bank of the United States; and unilateral national programs. In the United States, Canada, Asia, and Europe, governments pursue risk mitigation through tax subsidies, direct and indirect financial support, and the use of market mechanisms. Some important examples include these:

• the Indian Renewable Energy Development Agency, which is providing financial assistance to solar projects;

• the World Bank's Asia Alternative Energy Program, which has contributed more than $1.3 billion to sustainable energy programs;

• investment tax credits and production tax credits in the United States, which provide capital and operating-cost tax offsets to lower the unit costs of sustainable energy production;

• the Carbon Trust, an independent company set up and funded by the government of the United Kingdom to help the country move to a low-carbon economy;

• Sustainable Development Technology Canada, a multimillion dollar foundation established by the govern-

ment of Canada in 2001 to foster the development and demonstration of clean technologies.

Future program opportunities, particularly for small-scale projects, include development of new forms of insurance, such as price protection programs and bundled energy purchase derivatives that provide buyers and sellers of power with greater price certainty, innovations in financing, and, finally, securitization of clean energy risk. Programs at the national level designed to help finance end-user sustainable energy projects are beginning to appear as well.

Ultimately, none of these programs will succeed without a favorable and well-designed regulatory environment. Countries will succeed only where the rules are consistent and long term, where protection of intellectual property is assured, where contracts are honored and regulations are enforced, and where financial support for sustainable energy projects includes long-term pricing clarity.

The Carbon Finance Alternative

Environmental market mechanisms that attach a financial value to the environmental benefits created by clean energy projects are proving to be an effective means of catalyzing additional financing. In particular, cap-and-trade-type emissions markets—where total emissions across a number of regulated entities are capped but individual entities are free to trade among themselves to meet their own targets at lowest economic cost—have diverted hundreds of millions of dollars into clean energy projects and given rise to entire industries dedicated to the monetization of emissions credits. Project-based programs—in which emissions credits are awarded to projects in amounts equal to the quantity of emissions avoided relative to a baseline business-as-usual scenario—have also proved to be effective at diverting capital to clean energy projects.

Some successful programs are the U.S. cap-and-trade sulfur dioxide allowance program, the European Union's Emissions Trading Scheme, and the Kyoto Protocol's Clean Development Mechanism and joint implementation schemes. Over time, these markets have the potential to materially alter the economics of power generation in favor of clean energy and emissions-reducing technologies. The trading of renewable energy certificates (RECs) or their equivalent ("green tags") is a similar market that creates additional cash for qualifying clean energy projects based on the sale of units of renewable power (typically one REC equals one megawatt hour of renewable energy-based electricity) to wholesale power producers regulated under renewable portfolio standards (RPS). In the United States, several states, including Texas, New Jersey, and the New England states, have adopted, or are in the process of adopting, REC trading programs. Regulated utilities in Connecticut, Maine, Massachusetts, and Rhode Island are allowed to satisfy their RPS requirements by purchasing RECs from renewable power generators anywhere within the New England Power Pool.

Transition to a New Era

Technology improvements are rapidly driving down the costs for sustainable energy technologies toward price parity with traditional sources of energy. The question remains whether the financial infrastructure will be in place to support significant rollout of new technologies as this happens. The financial and risk management providers are actively seeking ways to participate in the monumental task of supporting these new technologies, but they will do so only when the rules are clear, when government policy makers provide long-term commitments, and when the risks are appropriately balanced with rewards. The successful countries will be those that provide this clarity with long-term, thoughtful regulatory environments and stable, risk-mitigated financial markets. ■

The opinions expressed in this article do not necessarily reflect the views or policies of the U.S. government.