Aequero is an advisory firm specialized in energy and infrastructure projects in Asia. CEO and founder of Aequero, Ducan Ritchie works in partnership with the United Nations and Asian Development Bank in the framework of consulting and research missions relating to the environment. The author demonstrates how important private investment is for the development of clean technologies, while emphasizing the specific costs they carry – especially for their implementation.

Barriers to private sector investment in the clean energy sector of developing countries

The preparation phase is essential in clean energy projects; it is also comparatively more costly, particularly in developing countries. Investment volumes continue to be insufficient as a result of the transaction costs and the higher level of risk. Moreover, being a "pioneer" in this sector and these countries carries very few advantages – differential costs are, in this case, even higher. Governments and development institutions can help reduce preparation costs, reward "pioneers" and secure a future for the sector.

By Duncan Ritchie, ***CEO of Aequero***[1]

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Duncan Ritchie has over 20-year experience in investment banking, finance and project development. During his career, he has led many financial advisory engagements in the energy and infrastructure sector, including in clean and renewable energy. He has also advised governments and multilateral development agencies on issues relating to renewable energy, low-carbon technology deployment and public-private partnerships (PPP) in the development of infrastructure.

Much discussion on climate negotiations revolves around the concept of creating readiness: readiness on the part of governments to develop, deploy and refine needed policies and institutional capacities; and readiness on the part of 'first movers' in the private sector to begin developing and investing in projects, playing a 'pathfinder' role for mainstream private sector investors to follow.

It is generally understood that readiness costs (learning and early transaction costs) of low-carbon technology roll-out are significant, although little real data presently exists. While some of these costs should be borne by the private sector, the commercial drivers for innovation and early-stage risk-taking are poor. As markets are imperfect, private investors are not guaranteed a reward for the risks and costs undertaken; it therefore does not pay to be a 'first mover'. This creates a shortage of bankable projects for the investment community (including private equity investors) and has led to a slower-than-optimal pace of low-carbon sector development.

The situation is particularly acute in developing markets where policy environments tend to be at an earlier stage of evolution. This is important, given the estimate of the United Nations Framework Convention on Climate Change (UNFCCC, 2007)[2] that over two-thirds of total mitigation[3] potential, and over 80% of low-cost potential are located in developing countries.

Historically, the private sector has provided the vast majority of financial flows to climate change projects, especially in the area of mitigation. According to UNFCCC (2007), worldwide, 86% of these flows have been provided by the private sector (this drops slightly for developing countries to about 80%). While this is expected to continue, several barriers limit private financing flows to clean energy projects.

This is mainly due to the characteristics of these projects: while they have similar characteristics to those of conventional energy projects, they do differ in five important areas, namely (i) transactions tend to be smaller, (ii) development activity tends to be led by non-traditional project developers, (iii) the availability and assessment of resources is very project-specific, (iv) projects typically have a heavy reliance on regulatory support and carbon pricing mechanisms, and (v) in some instances, projects rely on new or emerging technologies.

These characteristics tend to give rise to barriers that then lead to higher transaction costs and risks over extended development periods, especially for 'first mover' project developers initiating clean energy projects. Because projects based on renewable energy technologies generally have a higher cost, the cost of delivered energy is also higher. More specifically, three areas in which clean energy projects experience incremental costs of readiness have been identified and will be discussed in the article.

Reducing the readiness costs of these projects will make them more attractive to private investors. This underscores the need for policy and regulation to direct investment in low-carbon transactions. ...

[1] *This article is based on a paper written by the author entitled "Deploying Low Carbon Technologies: Private Sector Costs of Readiness" for the United Nation Environment Program (UNEP).*

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Higher project readiness costs

... Clean energy projects have proportionately higher development costs due to their smaller size. The scale of costs during this phase of development tends not to be linked directly to the size of the transaction – for example, it takes about the same resources to develop a 10 megawatt (MW) project as it does to develop a 100 MW project (Ritchie, 2009). Analysis undertaken recently by IIGCC *et al.* (2009) suggests that project-development costs would typically fall within the range of 3-5% of total project costs. As clean energy projects typically have a higher cost per unit of installed capacity, this implies a significantly higher project-development cost per unit of installed capacity.

The technology also has a significant bearing on the capital cost and the ratio of capital and project development costs to total-project cost. Clean energy projects will usually have higher grid interconnection and related infrastructure costs per unit of output, because locating sites for these projects is driven by the availability of resources (*e.g.*, wind, solar and biomass) and, thus, is done independently of demand centres and transmission infrastructure.

A comparison of development costs per unit of installed capacity – USD/kilowatt (kW) – suggests that clean energy projects have project development costs of about USD 60-80/kW, 2 to 3.5 times those of conventional energy projects (USD 17.50-30/kW). This means that readiness costs are significantly higher, and are even greater for 'first mover' transactions.

Incremental costs of readiness for 'first mover' transactions

In many developing countries, climate change policy and regulatory regimes are still evolving. In theory, this creates opportunities for developers to initiate projects and to 'lead' policy in support of the project activity. These projects have the potential to act as 'pathfinders' by instigating policy change and building capacity for subsequent projects. The developer can guide the government on the type of policy support that is required and provide them with information on experience in other markets and analyses on how to structure policies, tariffs, etc. This is time-consuming and resource-intensive for the 'first mover' developer, but if done successfully, can create the embryonic policy/regulatory environment for future transactions. In this sense, it acts as a 'pathfinder' for subsequent transactions and leads investors into the market.

In practice, however, there are few, if any, 'first mover' advantages in clean energy project development. The reality is that the absence of policy and a constructive regulatory framework in support of clean energy project activity (*e.g.*, feed-in tariffs and renewable portfolio standards) results in significant incremental time and costs to the project development cycle, which act to directly increase total project costs and delay the realisation of the project (and, therefore, carbon mitigation). Analysis suggests that 'first mover' project development costs are about 1.3 to 3 times the project development costs of a clean energy project in an advanced policy environment (baseline projects). The effect is that project development costs increase to about USD 100-180/kW of installed capacity (*vs* USD 60-80/kW for baseline projects and USD 15-30/kW for conventional energy projects) – about 6% to 10% of total project costs (*vs* 3%-5% for baseline projects).

Generally, project developers tend to underestimate the time and high costs, particularly for 'first mover' projects in markets with nascent policy environments. Non-traditional project developers are particularly susceptible, as they lack the experience to anticipate the many challenges, high transaction costs and extended development cycles. As a result, many 'first mover' clean energy projects fail to be realised because project developers simply do not have the financial and human resources to endure the cost and time of the development activity. And when projects are successfully developed, they are more expensive than projects developed in more mature markets with evolved policy environments.

The cost of capital amplifies incremental readiness costs

An investor's return requirement (or cost of capital) reflects the risk premium that the investor attaches to a particular investment. The cost of capital is typically higher for projects in developing countries where risk is perceived to be higher. Experience also suggests that investors ...

[2] There are 192 countries worldwide that have joined an international treaty that sets general goals and rules for confronting climate change.
[3] Climate change mitigation refers to measures or actions that reduce the concentrations of greenhouse gases, either by reducing their sources or by increasing carbon sinks.

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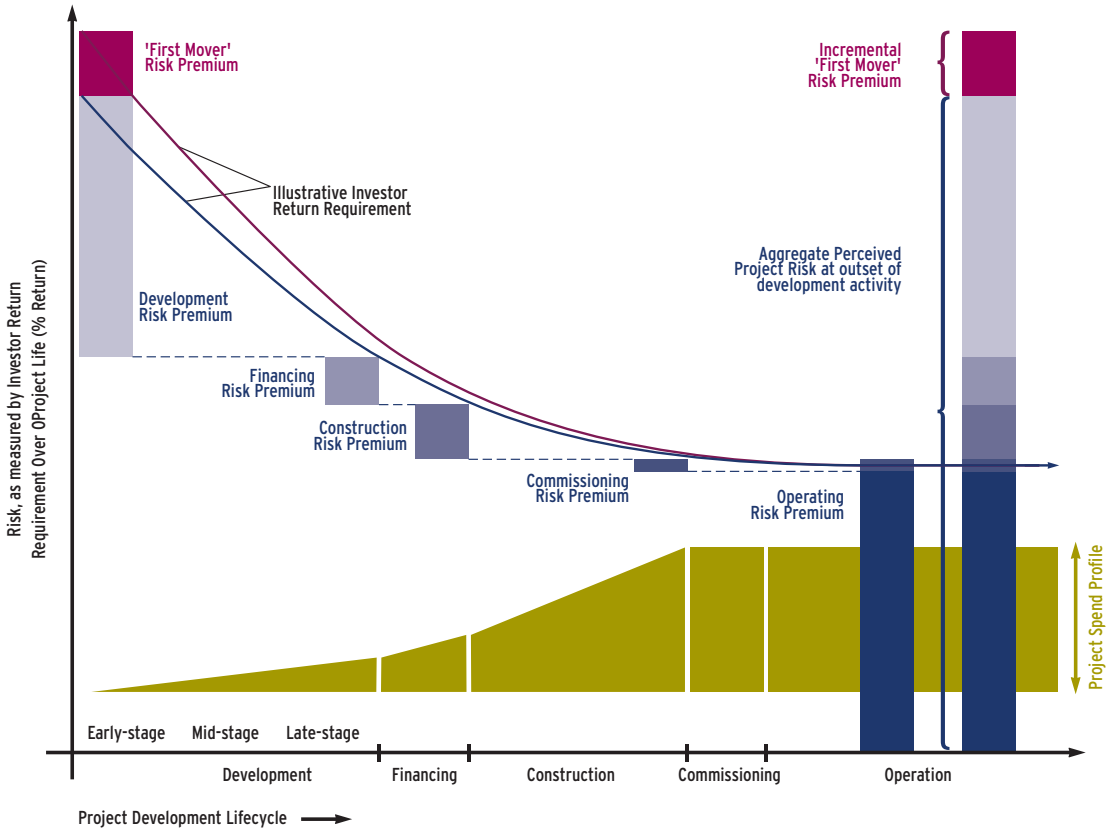
Figure 1: Project development cycle and risk-return profile (not to scale)



Source: Ritchie, 2009

... generally regard clean energy projects to be riskier than conventional energy projects. Consequently, incremental risk premiums of 2-5% are not uncommon, depending on specific market circumstances.

There is a relatively small universe of capital providers prepared to commit capital to projects that have residual development risk. This capital demands a higher risk premium, reflecting the higher risk of the transaction at the earlier stage of its development life. Project development is essentially a 'venture' activity. The rates of return required by project developers, therefore, will tend to be in the range of those sought by venture capitalists, *i.e.*, upwards of 30% (compared with a return of 18%-25% typically required by "traditional" private equity and infrastructure funds).

The achievement of milestones – development, financing, construction and commissioning – removes elements of risk from the project, thus lowering the required rate of return (Figure 1). Figure 1 also illustrates the effect of a 'first mover' risk premium for the 'first mover' projects discussed in the previous section.

The cost of capital and the time value of money have a 'double whammy' effect on 'first mover' projects, amplifying the impact of higher costs and elongated development timeframes. It would also be expected that a 'first mover' risk premium could be applied to 'first mover' transactions during the development, financing, construction and commissioning of such transactions (Figure 1), further amplifying the incremental development costs of these projects.

These impacts increase the cost of clean energy projects and translate, for example, into higher tariffs for mitigation projects in the supply of renewable energy. For a 'first mover' project, the impact is to increase total project costs by an estimated 8-23%. ...

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Reducing private sector readiness costs

... The estimated increase in total costs borne by project developers is significant in the context of energy projects, especially in regulated markets that set strict boundaries on tariffs[4], and therefore, project return parameters. The increased cost may limit the prospect of a developer selling the project to a later-stage investor (*e.g.*, a private equity investor), enabling the developer to achieve an adequate return on investment.

Policymakers and regulators generally underestimate the cost of capital, basing their expectations on the conventional energy sector where large utility investors are active and prepared to accept typically lower 'utility' rates of return – given the stable cash flow of utility assets. The different risk/return profile may also be a mismatch to the conventional project development community. Evidence outlines the need for policy and regulation to direct investment in low-carbon transactions. As perceived political, financial and other risks tend to be higher in developing countries, the development of national policy and regulation is one area where governments can provide the right economic signals to direct private sector investment towards low-carbon technologies.[5] This is reflected in a 2009 investor statement which noted that the single most important driver of private sector investment is strong, stable, transparent and credible national policy (IIGCC *et al.*, 2009).

Mitigating clean energy project costs could be done through the implementation of well-adapted climate change policies and regulatory regimes in developing countries. Policymakers and regulators can reduce costs to 'first mover' project developers by implementing well-considered, comprehensive climate change policy supported by regulation – for example, appropriate feed-in tariffs.

The development community can support governments in these activities through, *inter alia*, information dissemination, targeted technical assistance and capacity-building programs. Public finance interventions aimed at expanding access to finance will also be crucial to accelerate deployment of low-carbon technologies in developing countries and provide the necessary platform for later stage investors. ●

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[4] While this concerns all markets, as most countries regulate the electricity sector, this is especially true in developing countries where energy tends to be subsidised and the cost of electricity is not reflected in the tariff/price.

[5] Absence of a supporting regulatory framework will mean that the projects will not be feasible. This is especially true in developing countries where energy tends to be subsidised and so the economic cost of electricity is not reflected in the tariff/price. State-owned power companies will typically reference pricing (tariffs) to the lowest cost alternative (whether viable or not), e.g., coal-fired generation and renewable technologies are simply unable to compete.