# Private Sector Development PROPARCO'S MAGAZINE

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# PRIVATE EQUITY AND CLEAN ENERGY: HOW TO BOOST INVESTMENTS IN EMERGING MARKETS?

How can private equity funds be a part of the answer to the climate challenge? What is the role of private equity funds in financing clean energy in emerging markets? Can they trigger additional private investment? What barriers do they face? This issue compares experts' views on these questions.

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# **Editorial**

By Luc Rigouzzo, Chief Executive Officer of Proparco

*It is imperative to develop a low-carbon economy* in order to meet two major challenges that our societies will be facing over the next decade: how to guarantee an energy supply (under threat from the increasing scarcity of oil resources), and how to meet the climate challenge. It is likely that the combination of these two constraints will lead to a "new industrial revolution" where priority will be given to low-energy consumption and competitive solutions, thus paving the way for new growth strategies in numerous economic sectors. The fight against climate change does not constitute a brake to economic development. This has been fully grasped by many emerging countries, the first being China. A full-fledged sector of industrial activities has come into being in just a few years; Chinese and Indian companies have now become major global players in the wind power, photovoltaic solar energy and electric car sectors. In Africa – a continent facing a *formidable challenge for energy growth – the most* competitive solutions are often renewable energy solutions (hydropower, cogeneration, geothermal energy) which come with cost prices that are much lower than thermal solutions. Finally, the Keynesian recovery plans implemented by developed countries in 2009 are all characterized by the will to make long-term investments for future generations and the certainty that sustainable growth will only be possible if our economies curb their carbon consumption.

Considerable financing will be required if this paradigm shift is to work. Massive private financial flows are essential in view of the scale of needs and the budget constraints that increasingly weigh on public finance. The scarce amount of public flows must also be oriented so as to ensure optimal knock-on and leverage effects. Emerging countries – due to their future weight in the rising demand for fossil fuels – are at the center of both climate and energy issues, and yet they need to maintain a strong pace of economic growth. In this context, this issue of Private Sector and Development focuses on the place of private equity – a peg for private financing – in the total amount of flows earmarked for clean energy development in emerging countries. What is its share in the total amount of these flows? How has it evolved in recent years? What are the brakes to private investment? How can they be removed? What feedback can private players in these countries provide, what project typologies do their strategies focus on?

We are extremely pleased to have been able to gather a diverse, relevant and dedicated community of players for this sixth issue of *Private Sector and Development. All the articles – which characterize our magazine – clearly* reflect our will to take an objective look at the *key issues for the development of the countries* where we operate. We have, as usual, decided to include a wide range of views by giving the floor to researchers, development players and private players. We would like to thank all these contributors that have whole-heartedly taken part in a difficult exercise. The relevance and quality of their analyses inevitably lead us to objectively question our action. And yet they actually enhance the relevance of Proparco's model as a catalyst for private investment in areas neglected by markets and our strategy to act as an interface between public policies and private players' constraints. Finally, they remind us of the pressing need for global action in all countries – developed, emerging and developing alike – in order to face these challenges.

# Private Sector Development

PRIVATE EQUITY AND CLEAN ENERGY: HOW TO BOOST INVESTMENTS IN EMERGING MARKETS?

Agence française de développément (AFD) promotes economic growth in emerging and low income countries. AFD has recently developed an approach focused on energy efficiency that is compatible both with its clients' development strategies and the aim of preserving the environment. In this article, Eric J.F. Francoz, a project manager, underlines both the profitability of investments made in this sector and the need to develop them

> Éric J.F. Francoz Agence Française de Développement

Éric J.-F. Francoz graduated from the École normale supérieure, holds the highlevel agrégation teaching qualification in biochemistry and has a PhD in molecular biology. He began his career in project financing at Société Générale and went on to set up and manage teams for specialized financing at Groupe Caisse d'Epargne, then CDC Ixis. He joined Agence Française de Développement (AFD) in 2005 when the Asia region office was opened in Bangkok. His work has focused on renewable energies and energy efficiency financing in both China and Southeast Asia

<sup>1</sup> Forcing refers to changes in climate conditions, particularly temperature. Anthropogenic forcing concerns aspects of climate change caused by human activities (greenhouse gas effect, aerosols of human origin, etc.).

# Renewable energies and energy efficiency: Beauty and the Beast

Policies to develop renewable energies and energy efficiency are essential in order to tackle the looming energy crisis. Although least developed countries enjoy real potential, the required transformations are hampered by the scarcity of public and private resources. In developed and emerging countries, renewable energy subsidies create "windfall effects" and despite being more profitable, energy efficiency takes second place to the rush for renewable energies and institutional tools are unable to integrate its specificities.

By Éric J.F. Francoz, Agence Française de Développement (AFD)

hile emerging countries are just beginning to taste the joys of the consumer society, the latter would already appear to be under threat. Over the past 15 years, the bulk of the increase in the global consumption of fossil fuels (roughly 80%) has been in emerging countries. By 2050, it is estimated that Asia alone will consume more hydrocarbons than all industrialized countries put together consume today. How can this "energy binge" be satisfied with limited resources and how can we prevent anthropogenic climate forcing<sup>1</sup> from drawing us into irreversible changes?

Reactions to these major challenges would appear to oscillate between two extremes - some negate the threat, while others promote degrowth. Since it would be untenable to extend the energy model of developed countries to the whole planet and since degrowth is not credible, a paradigm change is required. We consequently have to rethink our energy model and make massive investments in both energy efficiency and renewable energies. However, although both these sectors share the common aim of reducing greenhouse gases, the means employed to develop them are different. This is something that most institutional financing tools tend to ignore. In reality, these sectors obey extremely different logics and investors need to take this into account.

#### Are investors "ecologists" or bounty hunters?

With the current price of fossil fuels – which is still relatively low – most renewable energies have low profitability levels. These energies are diffuse, often intermittent which sometimes means it is necessary to double investments in order to guarantee a continuous production. Profitability in this sector consequently depends on the feed-in

tariff policies implemented by States. For example, Électricité de France (EDF) buys wind power production at a tariff set under a decree in 2006 for 15 years at EUR 0.082 per kilowatt-hour (kWh) against an average production cost of EUR 0.04 per kWh for EDF's entire fleet. This way of securing income makes it possible to provide huge amounts of financing for wind projects via bank loans; it guarantees an internal rate of return in the region of 8% and an average return on equity of 22%, according to the Energy Regulation Commission (2006). One may question the relevance of incentives that produce such "windfall effects". Indeed, it is not certain that this is an optimal way of using public funds because it generates "green rents" that benefit subsidy hunters. This exists in wind power, but is even more prevalent in the case of photovoltaic solar power generation.

Of course, to give a comprehensive argument it would be necessary to consider the cost of the "avoided ton" of  $CO_2$ , the inevitable loss in the comparative advantage of fossil resources as they become increasingly scarce, the upfront investment cost for technologies which will become more and more efficient and profitable over the years, etc. With the exception of very specific cases (hydropower, remote sites that are not hooked up to the grid, biomass reserves), the fact remains that renewable energies are profitable in Europe only because of the massive subsidies.

#### Are LDCs "sentenced" to public investment?

The context of renewable energy financing in developed countries is fairly clear, but in developing countries there are two different logics at work. Some emerging countries, such as China, have adopted a subsidy system which is similar to the European model, although there are slight differences: ...

# Renewable energies and energy efficiency: Beauty and the Beast

By Éric J.F. Francoz, Agence Française de Développement (AFD)

... for example, in the wind power sector, there are geographical differences in the kilowatt-hour purchase price paid by the Chinese State which ranges from CNY 0.51 (USD 0.0746 at 17 May 2010) to CNY 0.61 (USD 0.0893), *i.e.* a bonus of between 50% and 79% if we compare it with the average kWh purchase price for coal energy (CNY 0.34, *i.e.* USD 0.0497). China is clearly banking on the development of its domestic market with the aim of becoming a world leader in renewable energies and, subsequently, a major exporter thanks to the competiveness of its labor.

The so-called "least developed" countries (LDCs) have a completely different type of problem. A subsidy policy is not possible at all due to the heavy constraints that weigh on public finances. Therefore, projects cannot rely on subsidies in order to reach financial equilibrium and must be based on economic profitability alone. This profitability may sometimes be easier to find in Africa than Europe for several reasons. For example, there is considerable unexploited hydrological potential (Congo Basin, Ethiopian plateaus, Cameroon). Moreover, there can be massive biomass reserves from crops, forests and waste. Due to the low level of population density in some areas, small-scale decentralized production (biomass-fired plants, hydropower, wind power or, in some cases, photovoltaic energy) is less costly than a grid link-up. But it is especially thermal generation (slow speed diesel engines, generators) that is much more costly in Africa than in Europe. With an average production cost of USD 0.18 per kWh, Africa's electricity is indeed one of the most expensive in the world and this is a major stumbling block to development. Finally, the production deficit comes with a cost: when for instance, South Africa's national electricity producer carries out load-shedding - which brings mining production to a standstill at a time when raw material prices are the most attractive - the country's economy is obviously penalized.<sup>2</sup> As for rural electrification, it remains widely constrained by a lack of supply. In such a situation any kWh is worth taking: it is better to have expensive energy than no energy at all.

Although some renewable energy production projects in LDCs are profitable even without subsidies, it remains difficult for them to obtain fi-

nancing as private investors are first and foremost interested in the risk-reward ratio. And yet power generation projects have extremely long life spans - between 20 and 30 years - which rarely coincide with business models that have more immediate targets. In addition, these projects are more exposed to political risks as the producer's client is generally a public entity. Exit strategies (particularly via initial public offerings) are difficult due to the low level of liquidity on financial markets.<sup>3</sup> Although private funds do invest in emerging countries<sup>4</sup> (China, Southeast Asia, Brazil), they continue to be reluctant to do so in LDCs due to a high level of risk that – without public subsidies - is not offset by a sufficient level of profitability. Today - and for a long time to come - public development players are the only ones in a position to make equity investments in this context.

#### Energy efficiency, high but undervalued profitability

Energy efficiency entails producing the same goods or the same services, but by using as little energy as possible. McKinsey Global Institute (2008) estimate that USD 170 billion will need to be invested every year by 2030 in order to improve energy productivity and halve the growth rates of global energy consumption. Lower energy demand would also reduce the need to invest in production infrastructure, as well as the pressure on fossil resources. The International Energy Agency (IEA, 2007) estimate that every dollar invested in energy efficiency reduces by two dollars the amount invested in generating capacity. For local authorities, energy efficiency can lead to huge savings in infrastructure, high levels of profitability and a great potential to reduce  $CO_2$  emissions. It is estimated that most of this potential (65%, including 16% for China) can be found in developing countries (McKinsey Global Institute, 2008).

And yet despite being highly profitable, energy efficiency financing continues to face a difficult situation. Looking at the 28 member countries of IEA (mostly industrialized countries), we see that energy efficiency gains stood at 2% *per annum* prior to 1990 for only 1% since that date. In China, "private" investments (most often made by companies with a public shareholding) in energy efficiency only accounted for 4% of total investments ...

<sup>2</sup> Mining production was paralyzed all over South Africa for five days in March 2008 The Chamber of Mines estimates the cost for South Africa's economy at some USD 242 million a day. <sup>3</sup> On this topic, see issue number 5 of the magazine Private Sector and Development entitled "Africa's financial markets: a real development tool?" <sup>4</sup> On this topic. see the article by Jean-Pascal Tranié and Vivek Tandon in this issue of Private Sector and Development.

# Renewable energies and energy efficiency: Beauty and the Beast

By Éric J.F. Francoz, Agence Française de Développement (AFD)

... in the energy sector in 2008, against 13% in 1982. This significant fall in private investment can be observed in most developing countries.

This can be explained by factors that stem from human resources (production engineers carry little weight in companies, the payment method for operators is unsuitable and does not reward this performance factor, etc), technical resources (the energy performance of equipment is badly measured) or the budgetary logic (separation between investment budgets and operating costs preventing trade-offs, etc.). But of course, the limited access to financing most certainly plays a major role in the lack of interest for energy efficiency. In countries where sources of financing are scarce (LDCs), where investment needs are high (emerging countries), there is internal competition within companies to gain access to the limited financial resources. Most of the time companies give priority to developing their business to the detriment of energy rationalization – as the latter reduces costs rather than generating turnover.

Moreover, the institutional tools implemented to develop energy efficiency, such as equity investment funds, are often the same as those concerning renewable energies. Energy efficiency has less "clarity" and suffers as a result. Energy service companies,<sup>5</sup> for example, are often small and find it difficult to raise both financing and capital; focused on the service sector, their industrial results are very limited because the systems are more complex and not so easy to reproduce from one plant to another.

### **Beauty and the Beast**

Renewable energies and energy efficiency are an odd couple, with renewable energies being "the Beauty" in the tale. They are very much in fashion, yet they can sometimes be costly and their results can be questionable. In emerging countries, like in developed countries, these energies manage to

break even through subsidies; in LDCs they are often only competitive by default and take advantage of the inefficiency of "classic" energies. Energy efficiency – the Beast, to remain with the metaphor – does not benefit from the same keen interest. It looks like an old and replaced refrigerator, a set of compact fluorescent light bulbs or cogeneration plants and is not very attractive. Annual reports prefer to showcase pale white wind turbines or dark silicon in order to exhibit their conversion to the green revolution. Energy efficiency may be profitable and enjoy sound potential, yet it still remains the poor cousin that does not necessarily inspire confidence.

Both sectors are essential, yet in a context where financial resources are limited, choices in terms of which policies to implement necessarily have an impact on their development and the scale of crowding out effects. The debate about the best possible allocation of these resources cannot be avoided. Although energy efficiency concerns projects of a limited size, it does often generate faster returns on investment than renewable energies. It is consequently more suited to the resources available at the local level, particularly in developing countries. Energy efficiency must become a priority (again) for decision-makers; development agencies unquestionably have a role to play in promoting it – and in prompting a revolution in this sector.

<sup>5</sup> An energy service company (ESCO) is a company that offers a wide range of energy saving solutions.

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PRIVATE EQUITY AND CLEAN ENERGY: HOW TO BOOST INVESTMENTS IN EMERGING MARKETS?

The International Energy Agency (IEA) provides its 28 member countries with expertise that helps them guarantee a supply of reliable, clean and affordable energies. Philippine de T'Serclaes and Cédric Philibert (senior analysts at IEA) identify the different barriers preventing the development of efficiency energy projects in developing countries and go on to demonstrate that the private sector's contribution to financing this type of project can certainly be improved.

Philippine de T'Serclaes International Energy Agency

Philippine de T'Serclaes holds an MSc in Law and Finance from the London School of Economics and a BA from McGill University. She works in the Sustainable Energy Policy Technology division of the International Energy Agency (IEA). Her expertise notably deals with financial mechanisms for clean technology projects in major emerging economies. Philippine was an expert reviewer for the Intergovernmental Panel on Climate Change (IPCC) in 2007. Prior to the IEA, her work experience includes three years at Rothschild Bank and JP Morgan.

<sup>1</sup> The viewpoints expressed in this paper are solely those of the authors; they do not represent those of the IEA or its member countries.

# The challenges of triggering private investment into the energy efficiency sector

If global targets to reduce greenhouse gas emissions are to be met, it is essential to scale up energy efficiency development. Yet several obstacles prevent investors from getting involved and it is imperative to reduce risks (real or perceived). Although some donor initiatives have been successful, governments must get more involved, for example, by participating in the implementation of risk mitigation instruments and supporting awareness raising campaigns and training.

### By Philippine de T'Serclaes and Cédric Philibert, International Energy Agency<sup>1</sup>

he transition to a sustainable-energy future calls for a significant increase in energy efficiency (EE) levels worldwide. World scenarios charting a path towards a sustainable-energy future suggest a maximum of 450 parts per million (ppm) CO<sub>2</sub> atmospheric concentrations (1 ppm represents 0.0001% of atmospheric volume). The International Energy Agency (IEA) analysis estimates that end-use efficiency would contribute over 50% of the total CO<sub>2</sub> savings needed to achieve the 450-ppm scenario. The IEA developed 25 recommendations, which together represent a saving potential of 8.2 Gigatons/CO<sub>2</sub> (equivalent to 1.5 times the current US emissions of CO<sub>2</sub> annually) by 2030, pending full implementation without delay. To date, this implementation has been limited among member countries. Despite recent progress, public funds are still insufficient for the financing of EE technologies. Consequently, the private sector can potentially play a large role, especially through private equity funds. However, in spite of the profitability of EE technologies and their numerous advantages, private investors face several important barriers. Governments and international donors need to further incentivise the participation of these investors.

# Barriers contributing to suboptimal use of EE technologies

EE presents energy security, environmental benefits and economic advantages. By reducing dependence on fossil resources, countries reduce their energy dependency, thereby increasing their security. The implementation of higher EE levels will reduce the energy bills of consumers and could create many jobs. It has been estimated recently that 150 000 jobs could be created in India if traditional cooking stoves were replaced with biomass cooking technologies in 9 million households (UNEP, 2008), and close to 1 million jobs could be created in the EU by 2020 through reducing emissions by 20%. Considering the present economic crisis, EE measures could result in immediate job creation, energy savings, energy security and environmental benefits.

Although EE technologies are commercially available and financially viable, existing households continue to use and purchase less efficient technologies (IEA, 2006). Why do consumers and investors shy away from paying marginally more<sup>2</sup> for the energy-efficient alternative? Part of the problem is that saved energy is difficult to see and measure, especially for consumers, making it particularly difficult to finance. Energy-saving technologies may look and perform the same as inefficient technologies, so consumers need help in making informed purchase decisions.

Energy consumption is also deeply rooted in economic activities. These are governed by embedded incentive structures, consumer behaviour, rules and regulations, infrastructure design and construction practices, investment decision-making and even cultural considerations. These factors combine to form the market barriers that contribute to suboptimal use of EE technologies in existing buildings (IEA, 2007). Split-incentives - or what economists call 'principle-agent'3 problems - are an example of such barriers. In such instances, consumers do not have access to the price signal, i.e. in a landlord-tenant situation. This barrier is estimated to account for 3 800 petajoules (PJ) of wasted energy each year, equivalent to around 85% of the total energy used by Spain in 2005 (IEA, 2007).

Technical and availability barriers hold when there is a lack of affordable and available EE ...

# The challenges of triggering private investment into the energy efficiency sector By Philippine de T'Serclaes and Cédric Philibert, International Energy Agency

... technology suitable to local conditions; insufficient local capacity to identify, develop, implement, and maintain EE investments; or no distribution or delivery network to get energy-efficient goods to consumers. This is particularly important in developing countries.

In developing countries, regulatory policy can also be a major barrier, notably when the profitability of energy providers relies on energy sales, thus creating a disincentive to participate in supporting or delivering EE improvements to consumers. Other regulatory barriers occur when there is a lack of capacity to consider, develop, or enforce minimum energy performance standards or codes; prices of service are set below their marginal costs; or there is uncertainty on recovery of EE program costs.

#### The twofold challenge of EE financing

Finding the appropriate finance at the right time is also an increasing challenge. The IEA estimates that to reach the 450-ppm scenario, an incremental estimated investment of USD 411 billion would be needed from 2010 to 2030, two-thirds of which should be invested from 2010 to 2020. While both public and private financing levels need to be leveraged to reach these levels, the challenge of EE financing is twofold.

Firstly, private investors – whose responsibility is estimated at 86% for covering the incremental financing needed in order to reach the 450-ppm scenario – are still wary of small, scattered and highly technical projects (UNFCCC, 2007). The small size of EE projects, their difficulty in being bundled and their perceived high risks have discouraged investors such as private equity funds and commercials banks; because of a lack of technical understanding of EE projects, they turn away from them.

EE projects are often a challenge, more specifically for private equity funds, because they do not lend themselves well to short-term exit strategies. Also, the majority of EE financial requirements are for small loans to cover the upfront costs<sup>4</sup> – which are higher than those of less energy-efficient technologies – of insulation, appliances, windows, heating, ventilation and cooling systems. These costs, despite a sometimes rapid payback period (from six months to a year), can prove detrimental. The absence of an internationally recognised measurement and verification protocol, which would allow the translation of technical savings into certain streams of financial revenues, means that investors end up considering EE projects too risky – they are perceived as too much hassle for too little profit.

Secondly, the only official link with investors to the carbon market through the United Nations Framework Convention on Climate Change (UNFCCC) - the Clean Development Mechanism (CDM) – has failed as an appropriate mechanism for increased investments in EE projects. While EE projects represent close to 15% of submitted projects to the CDM, they account for only 11.4% of the registered projects and 5.4% of issued certified emission reductions (UNEP/RISOE, 2009). Copenhagen has not resolved the debate around possible reforms to the CDM. No proposal for the facilitation of the financing of end-use EE projects has been put forward. The meeting also fell short of formalising an alternative approach to the CDM through the creation of sector-wide target approaches.

# What role can governments and aid agencies play?

Fortunately, mechanisms and instruments to increase private sector involvement in EE projects already exist and are cost-effective; most of them revolve around risk mitigation.

Risk mitigation instruments, which focus on reducing the actual risk of EE projects, have been very successful in increasing private sector participation. Loan guarantee programs (LGPs) that have been implemented by the International Finance Corporation (IFC) in China for three years with great success, as well as in Eastern Europe for at least a decade, target the perception that investors have of the operational risks of EE projects. By guaranteeing the counterparty and default risk by up to 75%, the IFC entrust a local private bank to lend money towards an EE project. To date, more than 20 years after the implementation of such a mechanism in Eastern Europe, only two projects have failed. Mechanisms such as the LGP build trust in investors by reassuring them and creating favourable conditions for their increased involvement. ...

#### Cédric Philibert International Energy Agency

A former science journalist, Cédric Philibert, is qualified in political sciences and economics. He has published numerous papers in journals and books on climate change and renewable energies. He advised the French environment minister between 1988 and 1990 and the CEO of the French Agency for the Environment and Energy Efficiency from 1992 to 1998. He then joined UNEP and, in 2000, the IEA, in charge of the "evolution of climate policy". Since 2007, he teaches Energy and Climate at Sciences-Po Paris. In April 2009 he moved into the Renewable Energy Division at the IEA.

<sup>2</sup> Energy-efficient technologies tend to be more expensive; for example, compact fluorescent lamps are, on average, five times more expensive than their incandescent counterparts. <sup>3</sup> 'Principal-agent' problems refer to potential difficulties that arise when two parties engaged in a contract have different goals and different levels of information; for example, when a landlord provides energy-using appliances but the tenant pays the electricity bill. In this situation, there is little incentive for the landlord to choose the most energyefficient appliances. <sup>4</sup> These costs referred to expenses incurred at the beginning of a new project.

# The challenges of triggering private investment into the energy efficiency sector By Philippine de T'Serclaes and Cédric Philibert, International Energy Agency

... Other successful mechanisms include training, raising awareness, and information dissemination to the private sector on the advantages of EE. The implementation of Public Private Partnerships (PPPs), which induces a tight collaboration between local private financial investors and larger public financial institutions, enables indirect training of private institutions in EE, and reinforces the confidence of the private sector in EE projects. As such, risk mitigation instruments, as well as increased information dissemination, go a long way in setting the basis for increased EE financing. Whereas these initiatives are essentially those of international donors<sup>5</sup>, governments, on their part, have, to date, made little effort to further improve EE financing.

#### Sustaining the momentum

Even if the economic meltdown and ensuing stimuli packages have created a momentum towards EE financing - an estimated USD 183 billion is being allocated to 'clean energy', of which USD 61 billion is being allocated to energy efficiency (IEA, 2009) - this momentum needs to be sustained. Governments cannot expect a robust recovery without a more energy-efficient economy. Increased independence from energy sources, as well as long-term economic sensibility, render EE projects sound investments for both consumers and governments, if not for financial institutions. Governments should ensure that the post-crisis momentum is sustained, as too little money is being allocated to capacity building, training and establishing of institutional experts to gauge the potential long-term success of these new projects.

This shortcoming of EE financing means that, to date, no member country has implemented more than 57% of the 25 IEA recommendations. Two countries actually report less than 10% 'substantial implementation'. Interestingly, evidence shows that government intervention is most successful when targeting the leveraging of private money. The newly created Clean Technology Fund (CTF)<sup>6</sup>, with an overall pledged amount of USD 4.7 billion, should strive towards such an end through identified tools and instruments.

The missed opportunity in the EE market is most significant for private equity investors and venture capitalists. Lacking appropriate exit strat-

egies, they have not yet fully stepped into the market. Governments should focus on creating enabling environments – through risk-mitigation instruments, raising awareness, training and capacity – and viable conditions for the emergence of a secondary market in EE financing for private equity investors and venture capitalists.

The time for EE – and the opportunity to trigger a transition to a cleaner-energy future – is now. In the aftermath of the Copenhagen meeting, governments need to focus on the quickest and most cost-effective road towards  $CO_2$  emission mitigation. With political willingness to implement and direct money towards creating a sustainable, virtuous circle of investments, a winwin situation will result.

<sup>5</sup> For further initiatives from donors, see the article by Susana Garcia-Robles, Rogerio G. Ramos and Tatiana Chkourenko in this issue of Private Sector and Development. <sup>6</sup> Initiated by the World Bank, the CTF promotes scaled-up financing for the demonstration, deployment and transfer of low-carbon technologies with significant potential for long-term greenhouse gas emission savings. It is expected that the CTF will finance programs in 15 to 20 countries or regions.

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# Private Sector © Development

accelerating commercial activity. Emerging pri-

vate business models able to face existing con-

straints are also helping private finance to play

a larger role. To help policymakers better understand the public policy side of scaling up RE in

emerging markets, an evidence base of issues was

sought<sup>2</sup> as an important grounding for the next

Rising global investment in RE and strong expo-

nential growth were experienced between 2004

and 2007. In 2008, for the first time, global invest-

ment in new RE power generation capacity (in-

cluding large hydro) was greater than investment

in fossil fuel generation. Financial investments

reached USD 37.7 billion in 2008, a 27% increase

from 2007, and the share of global investment

in emerging markets increased to 31% in 2008

There was also significant annual growth in RE in-

Facilitating returns and reducing risk

PRIVATE EQUITY AND CLEAN ENERGY: HOW TO BOOST INVESTMENTS IN EMERGING MARKETS?

Founded in 1920, **Chatham House** is the United Kingdom's Royal Institute of International Affairs. Kirsty Hamilton, an associate fellow, is leading a project at the Institute on the conditions for financing technologies relating to renewable energies. Since perceived risks private investment in developing countries, the author emphasizes the key role played by international institutions and governments and the need to innovate in terms of business models

# Kirsty Hamilton ACC Chatham House

Kirsty Hamilton currently leads the Renewable Energy Finance Project, working with financiers on policy conditions for investment. She has 20 years' experience at the UN, and has held board positions with UNEP's Finance Initiative (climate change) and the World Economic Forum's Global Action Council on Sustainable Energy. From 2005 to 2007, she was an expert reviewer for the Intergovernmental Panel on Climate Change.

<sup>1</sup> The paper outlines perspectives of the financiers and investors involved. Notwithstanding existing capital flows to emerging markets, and even in the context of strong national policies, developing countries present a range of risks. In this context, multilateral banks and public financing play key roles in enabling or

ronment, including incentives such as feed-in tar-

iffs and clarity and stability of energy policies, can

contribute to attracting the private sector.

# Scaling up private equity investments in renewable energy in developing countries

To attract private investors, returns on renewable energy projects in developing countries must offset the risks that are taken. Incentive policies, promoting loans with affordable guarantees and providing a wide range of banking products can all help the sector to develop. Public authorities could enhance their role as mediators between investors and project initiators. When the context is favorable, the private sector can create innovative business models with a capacity to meet the challenges of renewable energies.

### Summary of a round-table conference By Kirsty Hamilton, Associate Fellow, Renewable Energy Finance Project, Chatham House<sup>1</sup>

A ccessing greater finance and investment is essential to achieving higher levels of renewable energy (RE) in developing countries. The scale of capital flows required is significant, indicating that, together with domestic sources of capital, private finance from outside national boundaries will be required.

There is already activity and interest for RE in many developing countries, but private investors need to deliver attractive commercial returns for risks taken. This article provides evidence for the views of private financiers and investors already engaged in RE from late 2008 to early 2010. They noted that to attract private equity, RE is still a low-return proposition, generating returns of 8-15%, whereas generally a 25% return would be expected. RE is rarely able to compete with conventional energy sources due to the high start-up costs, the higher perceived risk as technologies and project developers lack track records, and an existing policy environment that often favours or subsidises conventional energy.

subsidises conventional energy. These and other challenges reinforce the central role of effective national policy in creating attractive investment conditions. A well-designed policy environment can be one of the most effective ways of reducing risk for investors. Although there is no 'one size fits all' policy formula, the overall envi-

(UNEP et al., 2009).

steps required.

Although the global financial crisis slowed growth in 2008/09, the decline was smaller than predicted. Statistics indicate that the market was upheld by strong growth in the Asia-Oceania region, with investment in Chinese wind and solar plants increasing by 27% and 97% respectively in 2009 over 2008, partly offsetting investment declines in the US and Europe (Bloomberg New Energy Finance, 2010). For the first time, Asia-Oceania investment had overtaken US investment. ...

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# Scaling up private equity investments in renewable energy in developing countries By Kirsty Hamilton, Associate Fellow, Renewable Energy Finance Project, Chatham House

... However, several challenges, particularly access to affordable debt, exist in new markets. Financial conditions affected bank deals, and severely constrained the availability of debt in many markets. Instances of this are expensive, slower processes and loans available for short periods (six or seven years compared to 15 years). A period of 'nationalism' also followed as some international banks repatriated money back to home territories, particularly those recapitalised by governments.

Although financial conditions had improved by mid-2009, the general view is that conditions have not normalised, and constraints may continue over the next two to three years. Similar to the role of public stimulus packages in OECD countries linked to RE, the role of public finance in emerging markets has increased in importance, as has clarity over the policy environment and its stability.

Private financiers expect multilaterals and public finance entities, such as Export Credit Agencies (ECAs), to provide a scaled-up set of current products and facilities (loan guarantees, revolving credit facilities, etc.) to reduce risks and facilitate returns.

Government-backed national banks, sub-national entities (*e.g.* local government) and private domestic financial institutions also play important roles in providing local currency-based lending. Significant additional public support will be required, with a clearer understanding of energy market development.

#### Public funding: unlock untapped potential

Issues include 'valley of death' projects – getting technology development from the R&D phase towards commercialisation. These projects are too capital-intensive for venture capital and too risky for private equity in that they require investors to bear technology and scale-up risks.

The role of specialised public funding is to help create conditions that attract more private sector actors, make the process shorter and easier, and make capital more affordable for technology developers.

Accessing debt and equity finance is difficult due to small or new developers having no track

records. Concessionary equity financing to start developers on their first projects is identified as one means of opening up private equity finance to them, but attention to the smaller 'enterprise level' deal with significant untapped potential is needed from multilaterals and other public finance entities.

Investors highlight the importance of intermediation and aggregation at the enterprise level, and having the right range of products in place. This needs to be demand driven – getting recognition from governments and getting banks comfortable with smaller projects. In this area, a more targeted focus on public finance by multilaterals and public finance institutions is as important as efforts for larger projects. Greater engagement with local financial institutions, alongside international lending and private equity entities, is seen as key to arriving at solutions. Kenya, for example, has recently announced a 'Green Energy Fund' that will provide low-interest loans to SMEs wanting to invest in RE.

Another issue is driving technology costs down once technologies have a track record. One topdown approach involves working with a country with the right industrial and energy policy framework that has the right resources and conditions for financing, and has driven costs down through implementation. The case of concentrated solar power (CSP) was raised by financiers and investors with private sector, EU (the European Commission–linked Mediterranean Solar Plan) and multilateral (World Bank and European Investment Bank) interest in developing CSP – alongside wind in the Middle East and North Africa – with the possibility of transmission to European markets.

Efforts at large-scale implementation are seen as a means to getting from 'roadmap' to 'road-test' stage, from where scale and experience can drive costs down. However, public financing instruments need to identify and tackle actual issues faced on the ground. Five main areas are highlighted by one international bank as challenges for new CSP technology: demand and price certainty; availability of debt and equity at the right scale; financial instruments (ideally local) that can bring this in (*e.g.* a guarantee facility on the debt side);... <sup>2</sup> This work was executed through three round-table conferences in India, Brazil and London in 2008 and 2009, involving leading, mainstream, transactions-focused financiers in infrastructure and RE (both in banking and private equity), as well as public financing organisations. Additional input and review from other regions and financiers also contributed to the final report.

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... managing technology risk; and attention to the later-energy nexus. The first area indicates the importance of clarity over the institution that power will be sold to.

Laos was singled out as having one of the most attractive regimes, namely, the simplest offtake contract and tariff arrangements, and a state-guaranteed obligation from the Electricity Generating Authority of Thailand (EGAT) for the power off-take. However, even relatively mature markets, such as India, with a history in electricity and utility policy, can experience obstacles due to the complexity of contracts.

There are methods of finding credit-worthy Power Purchase Agreements (PPAs)<sup>3</sup> including with multilaterals such as the Multilateral Investment Guarantee Agency (MIGA)<sup>4</sup> potentially able to cover contract revocation. To drive scale, systematic solutions are required through policy or national regulators.

#### Modern energy calls for new business models

With a stable policy environment and public finance, new business models are emerging from private investors to overcome existing constraints.

Some examples were raised during the roundtable, one being solar technology linked to infrastructure in the telecommunications sector, combining solar investment with the 'soaring growth' in numbers of telecommunications towers installed as part of a high-growth mobile phone industry in India. Solar technology is installed as the solar infrastructure for the towers; the telecommunication companies pay for the towers, and the cost model for the infrastructure installer does not require income from charging local communities for energy use. This results in charges being cut by 50% or more at a community level, and provides a different model for providing energy via RE in areas where grid connection is not competitive.

Another example raised was using a portfolio approach to reducing new technology risk.<sup>5</sup> Linked to the 'valley of death' discussion, technologies

that are not commercially proven are finding it difficult to get finance, a situation exacerbated by the financial crisis. One private finance entity creates a portfolio of projects where a small segment is given over to a commercially unproven technology. This approach allows the risk to be spread across the entire portfolio. By taking this approach, the firm can still produce commercially viable returns while gaining experience and a track record in the unproven technology. The advantage is that for the next deal, a previous financing benchmark exists.

Enterprise-scale financing has been pioneered by the company E+CO.<sup>6</sup> With poor access to energy in developing countries, there is a 'true market' for renewable electricity when sources are available locally. People may already pay significantly higher rates for their power through dry cell batteries, kerosene, etc; the higher up-front cost of RE is still competitive relative to those costs. The load levels are also lower, and this, coupled with higher transmission losses, leads to better economics for the more modular RE sources compared with large generation sources such as coal. The capital formation opportunity is as significant as micro finance, yet few institutions are seen to be tackling this.

Financiers are looking for clearer signs from government regarding their intentions and commitment to RE and energy efficiency - the scale and timeframe policymakers want to achieve, the investment required and mechanisms for facilitating this - particularly given the scale associated with mitigating climate change and by fundamental energy demand. A shared agenda - rather than a single roadmap - is required between policymakers and financiers to enable investment plans to be made and capital to be mobilised. This will need to be at a national/regional level, particularly to develop an effective national energy policy and lay a foundation for international policy or public finance mechanisms. Regular direct exchange between policymakers and financiers will be an important part of delivery and a valuable method of getting feedback on, or anticipating factors that may impact capital flows.

<sup>3</sup> A PPA is a legal contract between an electricity provider and purchaser, whereby the provider secures funding for a project, maintains and monitors energy production and sells electricity at a contractual price for the term of the contract. <sup>4</sup> As a member of the World Bank Group, MIGA's mission is to promote foreign direct investment (FDI) in developing countries by providing political risk insurance to the private sector. <sup>5</sup> See Adeline Lemaire and Christophe Scalbert's article in this issue of Private Sector and Development. <sup>6</sup> E+Co is a US-based NGO that invests services and capital in small clean energy businesses in developing countries through investment funds. See Susana Garcia-Robles's paper in this issue of Private Sector and Development.

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PRIVATE EQUITY AND CLEAN ENERGY: HOW TO BOOST INVESTMENTS IN EMERGING MARKETS?

The Multilateral **Investment Fund** (MIF) was set up in 1993 and is administered by the Inter-American Development Bank. It focuses its support on helping small and medium-sized enterprises in Latin America and the Caribbean. Its investments have been decisive for several venture capital funds dedicated to clean energies. Susana Garcia-Robles, **Rogerio Ramos and** Tatiana Chkourenko from the Equity . Department analyze MIF's involvement and its consequences.

#### Susana Garcia-Robles Multilateral Investment Fund

Susana Garcia-Robles has an MA in International Economic Policy, Philosophy and Education and is lead investment officer of the MIF at the Inter-American Development Bank (IDB) where she works with venture capital investments in Latin America, the Caribbean, Argentina and Uruguay. She was on the Executive Council of Diplomacy in Washington, and has worked with NGOs on economic development at the UN.

<sup>1</sup> E+CO now has funds in Asia and Africa, and has won annual UN and Clinton Giustra awards in recognition of their work.

# Can venture capital funds be a source of investment for clean energy SMEs?

The Multilateral Investment Fund (MIF) finances clean energy projects led by small and medium-sized enterprises in developing countries. MIF's experience in Latin America highlights some prerequisites for the success of these projects: there must be a favorable regulatory environment, the fund manager must be experienced, the financial tools must be tailored to the context, entrepreneurs must be well informed, etc. Donors, for their part, must fully play their role as catalysts for investment.

Susana Garcia-Robles, Lead Investment Officer; Rogerio G. Ramos, Investment Officer and Tatiana Chkourenko, Consultant - Multilateral Investment Fund (MIF)

ecause improving access to clean energy in Latin America and the Caribbean (LAC) is part of its strategy to improve access to basic services, the MIF has used Venture Capital (VC) funds to invest in small and medium enterprises (SMEs) since 1996. Improved access to energy is needed in LAC as 40 million people do not have access to electricity, and 83 million people use traditional biomass such as wood and dung (IEA, 2002 and 2009). Furthermore, investing in energy efficiency could cut consumption by 10% over the next decade, saving USD 37 billion in deferred investments in new power generation (IDB, 2009). Developing high-tech sectors could also help diversify economies away from commoditybased business and generate jobs. However, making such an impact solely through VC investment is not possible as building infrastructure needs investment beyond the scope of VC funds. Yet, clean energy SMEs can make a difference by commercialising new technologies and responding to consumer demand.

According to the UN Environment Program (UNEP), in 2008, new VC/Private Equity (PE) investment in LAC totalled USD 590 million, of which USD 10.7 million was provided by the MIF (UNEP *et al.*, 2009). Over 90% of this was invested in Brazil (the world's largest renewable-energy market due to its hydropower capacity and established ethanol sector which has developed alongside its sugar cane industry) consisting mostly of PE for expanding ethanol production. Investment opportunities exist beyond Brazil, with countries like Chile, Peru, Mexico and Costa Rica making regulatory changes conducive to investment and/or developing their clean energy generating capabilities.

The MIF has played a catalytic role in attracting investment in the LAC, most notably in Central

America and Andean countries that have problems accessing credit. The MIF's investments are leveraged with other Development Finance Institutions (DFIs), institutional investors and high-net-worth individuals at a ratio of about 4:1. Having invested in several clean technology companies in LAC, the MIF is today able to draw lessons from its experiences.

#### MIF - pioneer investor and supporter of clean energy development in LAC

The MIF was a pioneer investor in the area of clean energy VC investing in LAC. From 1996 to date, it has committed USD 18.5 million to seven VC funds that have invested at least part of their capital in clean energy, supporting 43 clean energy SMEs. About half of these are in Central America or Bolivia. The MIF has also been the anchor investor in four VC funds dedicated exclusively to clean energy. These investments have been made through different VC/PE funds, such as E+CO LAC, FLACES and CAREC, whose managers are all based in the region.

Initiated by E+CO, a US-based clean energy NGO, and with the help of the MIF, E+CO LAC was established in 1996, investing mainly in Central America, Bolivia and Mexico. Its capitalisation was USD 4.3 million, of which the MIF contributed USD 2.3 million. This was a pilot project that included the use of a revolving technical assistance facility for prototype development. Through this first pilot, E+CO gained expertise in managing funds.<sup>1</sup> Despite the novelty of this pilot experience, E+CO LAC returned capital and a modest gain to the MIF.

Tecnosol, a renewable energy SME operating in Nicaragua, was one of E+CO LAC's loan investments. It provides home solar energy systems of around 60 watts (W) at an average cost of USD 660, as well as low-cost wind generators ...

# Can venture capital funds be a source of investment for clean energy SMEs?

Susana Garcia-Robles, Lead Investment Officer; Rogerio G. Ramos, Investment Officer and Tatiana Chkourenko, Consultant – Multilateral Investment Fund (MIF)

#### Rogerio G. Ramos Multilateral Investment Fund

Rogerio G. Ramos is an Investment Officer of the MIF at the IDB. He has an MBA, an MA in International Trade and Investment Policy, and a BA in International Relations. He has over 12 years' experience sourcing, structuring and monitoring private equity and venture capital funds in Latin America. Prior to this, he supervised the private equity portfolio of the Inter-American Investment Corporation (IIC).

<sup>2</sup> As sunshine hours are plentiful, solar systems represent more than 95% of company sales. <sup>3</sup> While the second category constitutes wealthy urban clients with environmental concerns, the first category constitutes poorer clients from rural areas with annual incomes below USD 3 000. Tecnosol agreed to 'special programs' with other institutions, i.e. the 'Program of Solar Credit', negotiated with the Minister of Energy and Mining of Nicaragua, where the World Bank provides a subsidy of USD 120 for each beneficiary of a 50-100 W solar system. <sup>4</sup> For more on this subject, refer to Duncan Ritchie's paper in this issue of Private Sector and Development. <sup>5</sup> Honduras is one of the country's poorest regions with over 30% of the population living without electricity. <sup>6</sup> A PPA is a legal contract between an electricity provider and purchaser, whereby the provider secures funding for a project, maintains and monitors energy production and sells electricity at a contractual price for the term of the contract.

... and small hydro-energy generators for pumping and irrigation purposes.2 The company serves clients without access to an electricity network (e.g. in Nicaragua, 30% of the population do not have access to electricity) and those seeking energy savings.3 After E+CO LAC exited this investment in 2004, Tecnosol received investments through the MIF's Social Entrepreneurship Program in 2009, and from CASEIF II, another VC fund where the MIF is an investor. These new investments have been motivated by the fact that unsatisfied demand could easily be served by Tecnosol, with appropriate adjustments and enhancements to its operational activities. Since its inception, Tecnosol has installed more than 48 000 renewable energy systems, benefiting over 280 000 people, and offset 1 539 tons of CO<sub>2</sub>. The company has 72 employees and has created more than 65 jobs.

E+CO applied the lessons learned from its early experiences when raising and managing its second fund, CAREC, which was not designed as a VC fund, but as a leveraged facility providing mezzanine-type financing for SMEs. The facility has a total capitalisation of USD 17 million, of which USD 5 million in equity has been committed by the MIF.

CAREC is one of the few financial entities targeting small, clean energy deals in Central America, which gives it a 'first mover' advantage but also subjects it to risks untested by other players.<sup>4</sup> One of CAREC's investments is La Esperanza, a 13.5 megawatt (MW) small-scale hydroelectric plant located in Intibucá, Honduras.<sup>5</sup> In 2007, CAREC made a quasi-equity investment in the company to improve its infrastructure, providing electricity to 10 000 homes and creating 75 jobs in the process. The La Esperanza plant has reduced CO<sub>2</sub> emissions by more than 90 000 tons, thereby creating additional revenue.

The MIF has also invested in energy efficiency through the FLACES fund, established in 2001 to invest, throughout LAC, in innovative SMEs operating as energy service companies (ESCOs) or using clean technologies to enhance efficiency and reduce emissions. The fund had a total capitalisation of USD 31.7 million, of which the MIF committed USD 10 million. FLACES had a major impact on ESCO, which was incipient at the time.

Optima Energia, an SME providing energy-saving solutions to hotels in Mexico helped jump-start ESCO in the country by financing and carrying out changes in energy consumption patterns (*e.g.*, light savings schemes) in more than seven hotels, resulting in reduced energy consumption and costs. The savings realised by the hotels were used to pay Optima.

#### Lessons learned through experience

The MIF has broad experience and has learned important lessons pertaining to business expertise and choice of financial instruments.

Invaluable lessons have been learned and applied in business. An enabling ecosystem is key to successful investing and particularly important for VC/PE investment in clean energy (Figure 1). Regulatory issues and permit delays can have an impact on clean energy investments, and several Latin America countries recently made regulatory changes. In 2008, Peru introduced legislation requiring that 5% of electricity production be derived from renewable resources over the next five years, including financial incentives such as preferential feed-in tariffs and 20year Power Purchase Agreements (PPAs).<sup>6</sup> Chile has approved legislation requiring electricity generators of more than 200 MW to source 10% of their energy mix from renewable sources, and Mexico signed a decree promising a national renewable energy plan, which could set the country's renewable energy target to 16%. A USD 230-million fund will invest in projects from next year. Brazil, Colombia, Argentina and Peru are supporting the development of biofuels through legislation.

Experience has guided choice of expertise and partnerships. The quality of fund manager is the most important influence on the quality of a VC fund and its deal flow. The difficulty is combining positive social and environmental impact with financial returns. Fund managers must have both financial and clean energy expertise and be fully committed to becoming established in the VC industry. While NGOs generally do not make good fund managers, VC/PE funds can work in partnership by providing technical assistance. NGOs such as E+CO, however, have been able to become fund managers after learning from initial VC fund pilots. NGOs need to relinquish their grant mentality and become financiers if they want to succeed.

Knowing the best financial instruments to use comes from experience. Facilities combining grantbased technical assistance with investment can work well for clean energy SMEs and start-ups. The grant could be used to fund the development of promising concepts while preserving the capital and avoiding losses (if a prototype develops into a viable ...

# Can venture capital funds be a source of investment for clean energy SMEs?

Susana Garcia-Robles, Lead Investment Officer; Rogerio G. Ramos, Investment Officer and Tatiana Chkourenko, Consultant - Multilateral Investment Fund (MIF)

# Figure 1: Elements of a conducive VC ecosystem



Figure realized by the authors for Private Sector and Development

money to the grant facility attached to the fund). Used for E+CO in 1996 when the VC industry was nonexistent and replicated with other funds, this choice has been relevant, as out of 11 grants, only four returned some money back to the facility. The investment side, while investing in other clean energy companies, would have the option of eventually investing in concepts that could be effectively commercialised.

Clean energy projects tend to require significant investment. Although it is possible for VC funds to invest in smaller deals, larger PE funds tend to be better vehicles as they are able to leverage their investments.

Whereas equity is predominantly used in developed VC/PE markets globally, a mix of investment tools, including equity, quasi-equity and debt should be considered when investing in a young VC/PE industry. The reasons are that fewer entrepreneurs are familiar with equity investment and/or are willing to sell shares in their company to a VC/PE fund, and the regulatory and legal frameworks may not protect equity shareholders. Quasi-equity allows the fund manager and entrepreneur to get to know and trust one another, and delays discussions on the value of the company until the fund manager is more familiar with the company's operations and able to value it more accurately.

... product, the company has to return the grant Exits are also a concern in LAC as capital markets are not conducive to Initial Public Offerings (IPOs). A strategic sale to another company is the most common exit option. In a high-tech industry such as clean energy, global networks are vital to finding strategic investors and creating exit opportunities. Investing through quasi-equity is another option as this kind of deal is self-liquidating. This proved relevant for E+CO LAC when exiting from Tecnosol in 2004.

> Being nascent in LAC, clean energy is still developing as an industry. Because DFIs and multilaterals have a role to play in building the industry, from the lessons mentioned above they should pay more attention to VC/PE funds, particularly in countries lacking a financial sector. Their catalytic role is essential to attracting private investors, often reluctant given the risks. Moreover, DFIs and multilaterals need to work with governments to improve the regulatory environment.

> Entrepreneurs do not always understand the need for structure (boards with independent members, financial audited statements, certification processes) and equity as partnership, and would benefit from training and professionalisation. Universities and governments also need to fund more clean energy R&D so that more scientific findings and inventions with commercial potential are generated.

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Tatiana Chkourenko has a Master's degree in International Finance and Policy from Columbia University and a BA from Smith College in the US. She is a consultant for the MIF at the IDB, and since 2003, Ms Chkourenko has worked on matters relating to investing in emerging markets, having held operational, research and transactional positions.

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PRIVATE EQUITY AND CLEAN ENERGY: HOW TO BOOST INVESTMENTS IN EMERGING MARKETS?

Key data

Although developing countries (DCs) hold the bulk of global renewable energy potential – especially for solar and biomass energy – they have not benefited from the same level of private investment as developed countries. Such investments remain two times lower, which can partly be explained by the cost of developing energy production technologies. Clean energy-focused funds are still reluctant to invest in DCs and prefer to concentrate their operations in certain emerging countries, such as India and China. Both renewable energies and energy efficiency in DCs consequently hold a truly "unexploited potential" for investors. These figures provide an overview of private equity investment in clean energy financing in DCs.

# World potential capacity of renewable energy



Source: Private Sector and Development, 2010

# Investment in clean energy by region, 2002-2008 (USD billion)



Investment includes money from venture capital and private equity, public markets, asset financing and mergers & acquisitions. Total values include estimates for undisclosed deals. Source: UNEP, SEFI, NEF, 2009

# Costs of clean energy and traditional technologies in 2008 (USD/MWh)



Source: World Economic Forum, 2009

# Breakdown of worldwide investments in renewable energy by type of financial instruments, 2002-2008 (USD billion)



For Venture Capital (VC) and Private Equity (PE), buy-outs are not included as new investment. For VC/PE and Asset financing, total values include estimates for undisclosed deals. Source: UNEP, SEFI, NEF, 2009

# Emerging markets cleantech private equity investment by country in 2009 (USD million)



Source: EMPEA, 2010

# Venture capital and private equity new investment in clean energy by region and sector, 2002-2008 (USD billion)



Source: UNEP, SEFI, NEF, 2009

# Potential of CO<sub>2</sub> emissions reduction in the energy sector



	Abatement (Gt CO <sub>2</sub> )		Investment (USD 2008 billion)	
	2020	2030	2010-2020	2021-2030
Efficiency	2.517	7.880	1 999	5 536
Renewables	0.680	2.741	527	2 260
Biofuels	0.057	0.429	27	378
Nuclear	0.493	1.380	125	491
Carbon Capture and Storage	0.102	1.410	56	646

The 450 scenario consists in a stabilization of GHG concentrations in the atmosphere to 450 ppm in CO, equivalent. Source: IEA, 2009

Private Sector 

Development

PRIVATE EQUITY AND CLEAN ENERGY: HOW TO BOOST INVESTMENTS IN EMERGING MARKETS?

Aloe Private Equity (APE) manages EUR 175 million companies with high environmental impacts, whilst simultaneously providing their investors with high financial returns. By comparing clean energy projects implemented in China and India Jean Pascal Tranié and Vivek Tandon explain how to best support this type of project in emerging countries. While they point out the type of obstacles that can be encountered, they do outline their strong profitability.

Jean-Pascal Tranié

Jean-Pascal Tranié graduated from the Ecole Polytechnique and the ENA (Ecole Nationale d'Administration). He is an experienced venture capitalist and held senior executive positions in Veolia Energy during the early 1990's. He then managed Vivendi's Media and Multimedia divisions and went on to become CEO of the venture capital branch Viventures Partners. In 2003, Jean-Pascal Tranié co-founded Aloe Private Equity, an Europebased private equity group focused on environment and renewable energy investments, with an emphasis on China and India. He sits on the board of several firms in Aloe portfolio.

<sup>1</sup> Under the Global Compact, companies pledge to align their operations and strategies with 10 internationally accepted principles concerning human rights, labor standards, environment and the fight against corruption.
<sup>2</sup> Read the article on this subject by Duncan Rtichie in this issue of Private Sector and Development.

# Investing in clean energy in developing countries: can it pay off?

The two clean energy companies set up by Aloe Private Equity in Asia have demonstrated that investment in clean energies in developing countries can indeed pay off. Whilst Greenko Group in India has surely proven that this high profitability can go hand in hand with environmental and social gains, the example of Longmen in China highlights how important local expertise is. Beyond this, if projects are to be successful, it seems essential for fund managers to have the capacity to get directly involved in the businesses as one team with management, build local partnerships and comply with a series of key principles.

### By Jean-Pascal Tranié and Vivek Tandon, Founders and Managing Directors of Aloe Private Equity

Private funds continue to be overcautious when it comes to investing in developing countries – particularly in the clean energy sector. For many, the key issues are profitability and security of such investments.

Answers on how to tackle these issues most certainly lie in specific cases which can allow us to learn a lot about the reality of the field. Founded in 2004, Aloe Private Equity (APE) is an investment fund specialized in sustainable development. It makes equity investments in companies experiencing strong growth in their business; in 2008 APE made 40% of its investments in the recycling sector, 50% in clean energies (especially run-of-river hydropower) and 10% in sustainable agriculture. A key feature of this investment strategy - which has also allowed APE to set up companies from scratch - is the support it provides to management teams throughout their business development. It is also based on strong social and environmental commitments. All investments are consequently appraised in terms of social responsibility and the principles set out in the United Nations Global Compact<sup>1</sup> are systematically complied with - something which its investors appreciate and demand. APE's Limited Partner base spans both family offices in Asia and Europe, banks, insurance companies and international institutions such as the International Finance Corporation (IFC), Swedfund and Proparco. APE is actually the first privately managed third party environmental and climate change fund that the IFC has invested in.

APE has offices both in Europe (Paris and London) and Asia (Mumbai and Beijing). Its core expertise resides in building bridges between projects and promoting two-way technology transfers. Asia is obviously interesting for its economic and demographic growth, but also for the prospects for profitability and high-potential business opportunities it offers companies that help preserve natural resources or make them sustainable. This geographical focus, notably on Asia, is reflected by its shareholding. This means that shareholders are not only informed about "local" investment opportunities, they are also keen to contribute to the development of their region.

APE currently manages three private equity funds which are all partly or completely located in Asia. This sets it apart from most management teams in the North which are generally overcautious about investing in developing countries – especially when it comes to clean energy – due to the entailed technical, economic, financial and political risks.<sup>2</sup> Yet the extremely solid financial situation of the energy producing companies in APE's portfolio demonstrates the high level of profitability these investments can achieve and highlights the positive impacts they have on the development of the local economy.

#### Targeting economic, social and environmental profitability: the case of Greenko Group in India

Given the steady growth of its young and dynamic population, India offers wonderful opportunities for investors, particularly in infrastructures. Its electricity production capacity in terms of installed capacity remains for example roughly 15% lower (against 17% in 1998) than peak demand. This deficit prevents it from being able to meet sharply rising demand. Still, the country enjoys an enormous and yet unexploited potential for green waste which could be used to produce clean electricity. Using biomass<sup>3</sup> is not only an interesting alternative to fossil fuels – which, *via* thermal power plants, provide roughly ¾ of the country's electricity production – it also creates local ...

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# Investing in clean energy in developing countries: can it pay off?

By Jean-Pascal Tranié and Vivek Tandon, Founders and Managing Directors of Aloe Private Equity

### Table 1: Greenko projects (at 30 April 2010)

Operational projects	120.25 MW
including hydropower projects (a total of 6)	78.75 MW
including biomass projects (a total of 6)	41.50 MW
Projects under development	336.35 MW
including hydropower projects (a total of 10)	304.35 MW
including biomass projects (a total of 2)	32 MW
Projects in the final negotiation phase	47 MW
including wind projects	41 MW
including solar projects	6 MW

Source: calculations made by Private Sector and Development using data from the website: www.greenkogroup.com, 2010

... jobs for people as waste collectors and operators for electricity generating units. It was in this context that APE set up the company Greenko Group in February 2006 with a EUR 3 million investment from its AEF I fund. It was also heavily involved in designing Greenko and helping it start up - it even chaired the company at one stage and holds a seat at the Board of Directors. The most urgent need was to overhaul and raise the capacity of several biomass-based electricity generating units which were operating well below their nominal capacity. Following several acquisitions, the company went on to build new plants using both biomass and hydropower. APE was convinced by its success and renewed its financial support to Greenko via its AEF II fund.

Building on its success, Greenko wished to raise more funds and was listed in November 2007 on the AIM<sup>4</sup> market of the London Stock Exchange. This listing allowed it to raise EUR 45 million from new investors. In 2009, it also benefited from a USD 46 million investment from the Global Environment Fund and a GBP 72 million investment from private investors such as TPG, M&G and Blackrock. Greenko has become one of the pure play renewable energy leaders in India thanks to these successive fundraisings. Greenko is constantly growing and its total generating capacity now tops the 120 megawatt (MW) mark. Infrastructure with a total additional capacity of 336 MW is also currently being developed (Table 1).

Greenko's activities have a significant impact on local employment and consequently help reverse the tide of rural exodus which plagues modern India. Greenko recruits its staff locally and agricultural waste collection also creates indirect jobs. The company now directly employs over 600 people, generates 2 860 800 megawatt-hours (MWh) annually and reduces  $CO_2$  emissions by 1 488 909 tons a year. According to forecasts, these figures could increase fivefold in the next three years.

Greenko's share price at mid-March 2010 shows it has increased fourfold in just 12 months, offering investors extremely high returns. APE has played a key role in Greenko's success throughout its expansion by providing it with seed capital, supporting, and allowing it to benefit from its expertise (particularly in turnaround acquisitions and at the time of its initial public offering). Conversely, the funds managed by APE have really benefited from the increase in Greenko's financial value. Indeed, in addition to social and environmental spillover effects, the company provides an extremely high return on investment. The positive effects of this support can also be seen in other contexts or situations - Longmen Group in China is a case in point.

#### **Relying on local skills: the case of Longmen Group in China** Longmen Group is a Chinese producer of non-conventional gas:<sup>5</sup> Coal Bed Methane CBM – a gas ...

**Vivek Tandon** Aloe Private Equity

Vivek Tandon, holds a PhD in Physics from the University of London. Prior to Aloe, Vivek co-founded a number of high technology companies such as VICOM Group International. He has held several senior executive management positions including at Viventures, a USD 700 million Venture Capital Fund as UK Managing Director. Vivek Tandon is also the vice-chairman of Allied Technology Group, a 140 person environmental engineering company, focused on waste water and air pollution treatment for power plants and coal gasification.

<sup>3</sup> The term biomass covers all organic materials that can become sources of energy. These organic materials are of plant origin and can be seen as a form of solar energy storage, captured and used via the photosynthesis process. Alternative Investment Market (AIM) is a sub-market of the London Stock Exchange which was set up to allow SMEs to raise funds by issuing shares. <sup>5</sup> In order to face the exhaustion of so-called "conventional" gas (easily accessible gas in porous and permeable rocks), there is interest in other less accessible deposits that are called "non-conventional".

# Investing in clean energy in developing countries: can it pay off? By Jean-Pascal Tranié and Vivek Tandon, Founders and Managing Directors of Aloe Private Equity

... (present in coal seams). Using gas - which is cleaner than coal - reduces the carbon intensity of China's energy mix. CBM is mainly made up of methane. It used to be considered as waste, whereas it is fully interchangeable with natural gas and is now recognized as an extremely precious resource. The way it is exploited has been improved thanks to recent technological progress, particularly in the development of prospecting methods - especially seismic prospecting – and drilling techniques. It can be used by both Chinese industries and households. In view of these prospects, APE participated in the creation of Longmen in 2005 and made it possible for the company to enter into negotiations with China United Coal Bed Methane (a public company which holds the exploring, development and production rights for methane in China). The aim was to obtain a 470 km<sup>2</sup> concession in Shaanxi Province. An initial agreement was signed in May 2005 thanks to the presence of APE's local partners and the determination of the teams. Other acquisitions have since completed Longmen's reserves which now total nearly 1000 km<sup>2</sup> of concessions. After raising USD 45.5 million from investors, the Group is expected to benefit from a new investment of between USD 30 and 50 million which will support its growth. Longmen has consequently proved that it is attractive for investors.

The Group very quickly sought to secure the technology required to develop its concessions in the most effective possible manner. APE contributed to this research by identifying American experts and entering into partnership with a Chinese company, Orion, which has exhaustive experience in the CBM drilling sector. Longmen bought shares in Orion which allowed the latter to modernize its prospecting and drilling tools. Longmen is now seeking to secure outlets for its business downstream by launching a gas compression activity for vehicles and its distribution to specialized gas stations.

#### Different approaches, but similar profits

Investments in clean energy can clearly be economically profitable – Greenko and Longmen are just two examples that prove this. In addition, this equity can provide real social and environmental profitability: it participates in the development of local economies – for example, by generating employment – reduces greenhouse gas emissions, helps diversify the energy mix, etc.

The example of Greenko shows that it is possible to successfully launch an activity by improving the output of existing plants that are running below capacity and, at the same time, building new production units. Longmen did not use existing infrastructure, it very rapidly obtained new concessions by relying on local players while making sure it benefited from the expertise it required *via* local participation (drilling, transport).

Clean energy production relies on local expertise in both cases. These investments also help reduce rural exodus and make it possible to develop a direct and indirect economic activity. Finally, they are truly profitable: the two companies were recently set up from scratch and have now reached extremely high values: over USD 100 million for Longmen and double that amount for Greenko.

Beyond these two examples, many lessons may be learned from the more symbolic successes. The success of investments would appear to depend on a few recurrent factors. The first is the need to rely on local expertise and network in order to implement and develop activities; moreover, the presence of local players in funds increases their capacity to have access to information and closely follow the activities that are implemented. Fund managers must be extremely reactive and have the capacity to be directly involved in managing and supporting the management teams. Ideally, they will comply with a series of standards or principles in force today (for example those of the Global Compact). Another key to success is unquestionably their capacity to seek, evaluate and enter into partnerships with local players, and their own entrepreneurial instincts and track record. •

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# Private Sector Development

PRIVATE EQUITY AND CLEAN ENERGY: HOW TO BOOST INVESTMENTS IN EMERGING MARKETS?

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.

# Duncan Ritchie Aequero

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.

<sup>1</sup> 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).

# 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<sup>1</sup>

I uch 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 earlystage 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 lowcarbon 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)<sup>2</sup> that over two-thirds of total mitigation<sup>3</sup> 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. ...

# Barriers to private sector investment in the clean energy sector of developing countries By Duncan Ritchie, CEO of Aeguero

### 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 projectdevelopment 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 ... <sup>2</sup> There are 192 countries worldwide that have joined an international treaty that sets general goals and rules for confronting climate change. <sup>3</sup> 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.

# Barriers to private sector investment in the clean energy sector of developing countries By Duncan Ritchie, CEO of Aeguero



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

... 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 crease total project costs by an estimated 8-23%. ...

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 in-

Source: Ritchie, 2009

# Barriers to private sector investment in the clean energy sector of developing countries By Duncan Ritchie, *CEO of Aeguero*

### 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<sup>4</sup>, 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.<sup>5</sup> 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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Ritchie, D., 2009. Deploying Low Carbon Technologies: Private Sector Costs of Readiness, Aequero, report prepared for the United Nation Environment Program, Stockholm, Sweden. UNFCCC, 2007. Investment and Financial Flows to Address Climate Change, UNFCCC, secretariat technical paper. <sup>4</sup> 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. <sup>5</sup> 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.

# Private Sector Development

PRIVATE EQUITY AND CLEAN ENERGY: HOW TO BOOST INVESTMENTS IN EMERGING MARKETS?

Proparco supports private investment in emerging and developing countries. In the framework of the fight against climate change, one of the priorities of the French development finance institution is to reduce greenhouse gas emissions. The authors, from the Private Equity Division, propose to review the analysis grid generally used to assess funds specialized in clean energies in emerging countries

# Adeline Lemaire

Adeline Lemaire graduated from ESSEC and has been working at Agence Française de Développement since 2003 where she began as an infrastructure and urban development project manager in Senegal. She went on to work in the Infrastructure and Urban Development Department at headquarters before joining Proparco's Private Equity team as an investment officer in 2008. She has made a total of some EUR 70 million of equity investments in several funds, including in clean tech and infrastructure funds in Africa and Asia.

<sup>1</sup> That year, Brazilian Renewable Energy (ethanol production and distribution) raised USD 200 million and Yingli Green Energy (photovoltaic panel manufacturing and distribution) mobilized USD 118 million. <sup>2</sup> These amounts include amounts invested in equity, stock markets, asset financing, mergers-acquisitions and carbon markets.

# Clean energy investment funds: moving beyond magic formulas to sound risk analysis

Developing countries' clean energies are attractive for investors, yet there are few specialized local funds. Analytical tools are undoubtedly inappropriate and underrate four specific areas of risk: fund size, management team skills, strategy balance and portfolio liquidity. If investors set out to analyze these risks and managers implement mechanisms to mitigate them, it is likely that the private sector would scale up its investments in developing countries' clean energies.

#### By Adeline Lemaire and Christophe Scalbert, Investment Officers at Proparco

Ver 270 private equity funds are operating in the clean technologies (clean tech) sector today, against seven in 2003 (Preqin, 2009). In 2009, USD 5.6 billion of private equity investments were made in this sector worldwide, against 8.5 in 2008 and 4.5 in 2006 (EMPEA, 2010). The sector may not have been spared by the financial crisis which began in 2008, but the fall in activity has been lower than in the rest of the private equity industry (Preqin, 2010), which demonstrates investors' growing interest in the sector.

Emerging countries only host 19% of clean tech fund managers (against 45% in the United States) and attracted less than 15% of amounts invested in 2008 and 2009 (EMPEA, 2010). In addition, the amount of funds raised in these countries is falling: only USD 300 million in 2009 against 1.9 billion in 2007. However, some emblematic deals have been made in the clean technologies sector in emerging countries: in 2007, two of the five biggest investments were made in Brazil and China.1 Moreover, in 2009 Asia moved up to second place in the clean energy sector with USD 41.4 billion invested<sup>2</sup> (Bloomberg, 2010a). Yet although emerging countries are generally attractive for clean energy investors, they are underrepresented in the landscape of private equity funds in this sector.

It would appear that this paradox cannot be explained by a lower performance of private equity funds – all sectors taken together – in emerging countries. For example, over the past three years the performance index for private equity funds in emerging countries has constantly been higher than European and American indexes. It was the only one to be positive in 2008 and stands at 8.1 for the past three years, against 1.3 to 3.4

in Europe and the United States (Cambridge Associates, 2010). Moreover, as the perceived risk is higher in emerging countries, investors revise up their expected level of return in order to ensure the risk-return ratio remains attractive.

This paradoxical situation could then be explained by the need to make adjustments to the risk analysis grid applicable to an equity investment into a clean energy private equity fund in emerging countries. Although external factors (regulatory framework, infrastructure quality, transaction costs)<sup>3</sup> may contribute to the investment deficit, a greater understanding could be gained of certain specific risks: beyond traditional risks (country risks, recent nature of the sector, risk of sector concentration), the analysis must be adjusted in terms of the following elements: critical fund size, composition of its management team, balance of its investment strategy and liquidity of its portfolio. An approach tailored to these four criteria could allow investors to make a better analysis of investment proposals and managers to calibrate their projects better.

#### **Targeting critical size**

The critical size of a fund depends first and foremost on the type of target: the fund's equity requirements will be greater when the target companies are well established and/or the chosen sectors are highly capital-intensive.

The question of critical size is even more acute in the clean energy sector. A fund investing in renewable energy projects – with similar characteristics as infrastructure projects – must have the capacity to commit tickets of a high minimum size due to the highly capital-intensive nature of the ...

# Clean energy investment funds: moving beyond magic formulas to sound risk analysis

By Adeline Lemaire and Christophe Scalbert, Investment Officers at Proparco

... projects that are financed. In addition, the fund must be able to anticipate financing for successive project extensions, since raising capacity is one of the levers for optimizing the return on investment once the project is in the operating phase. Finally, a certain size is required when the strategy aims to build – within the same holding company – a diversified portfolio of renewable energy assets. All this explains why in emerging countries, particularly Southeast Asia, many specialized funds' strategies focus on sizes ranging between USD 100 and 300 million.

For some managers, an interesting differentiation strategy could involve setting up a smaller fund – between USD 50 and 150 million – focused on targets where competition is limited: small subcontractor businesses and suppliers of major renewable energy producers, for example, or small-scale generation projects, such as mini hydropower plants and small wind farms. Funds that are under USD 50 million will sometimes face difficulties when they seek to diversify their portfolio and build synergies between their investments.

### Articulating skills within teams

There are real operational risks relating to the way investment teams operate. As with other funds, they should seek to align stakeholders' interests and develop mechanisms that help ensure the stability of teams. The analysis of a team's expertise could go beyond classical assessment criteria (capacity to identify and structure deals, valueadd to portfolio companies, etc.) in order to focus the appraisal on the complementarity that exists between the profiles of the investment team. Investors will expect teams to have sound technical knowledge of the energy sector and technological issues - part of the team could specialize in specific technologies. Indeed, the team will need to have a capacity to build a quality technical dialogue with a project developer, supervise the technical and regulatory engineering of the project (particularly during the decisive construction phase), develop the investment as much as possible, by benefiting, if possible, from experience in project financing for the financial and legal aspects.

Yet even in developed countries it is hard to come by individuals with such versatility, particularly due to the fledgling nature of both the sector and ...

# The different sectors and how they link up

The term **clean energy** or "low carbon" covers power generation (electricity, heat...) using renewable sources, as well as energy efficiency.

**Renewable energy** is produced using wind, solar, hydro, tidal, geothermal or biomass energies. Renewable energy projects account for 80% of global investments in the clean energy sector (Bloomberg, 2010b).

**Energy efficiency** refers to the relationship between energy generated by a system for a specific purpose and the energy consumed. Measures that increase energy efficiency include reducing line losses on electricity grids, thermal insulation in buildings and optimizing energy consumption in industrial processes.

The term **clean technologies** (clean tech) covers all technologies that make it possible to replace or improve materials, products or processes while reducing the environmental impact, particularly in terms of greenhouse gas emissions. Although the main input is from clean energy, it does cover other sectors, such as environmental services.

## How clean tech, clean energy and infrastructure link up



<sup>3</sup> On these points, read the articles by Éric J.F. Francoz, Duncan Ritchie and the article by Philippine de T'Serclaes and Cédric Philibert in this issue of Private Sector and Development.

# Clean energy investment funds: moving beyond magic formulas to sound risk analysis

By Adeline Lemaire and Christophe Scalbert, Investment Officers at Proparco

# Figure 1: Investment opportunities in the clean energy sector



Source: Carmody and Ritchie, 2007

... the teams that have been set up.<sup>4</sup> In clean energy, the "first teams" are often sector experts that have no experience as equity investors, while experienced teams enjoy expertise in private equity investment, but lack sectoral skills. It is consequently advisable to count on the complementary nature of profiles, while ensuring that there is cohesion among teams.

Advisors could also support the team. If they are formally put together as a committee, this will be seen favorably by investors, especially if the fund receives support from academic and/or political personalities with sound knowledge of the sector, institutional contacts and a capacity to anticipate strategic and regulatory changes.

#### Balancing the investment strategy

As with any fund, it is recommended to implement diversification ratios imposing limits by country, sector, etc. The balance of a specialized clean energy fund's investment strategy is particularly important as its sectoral targeting heightens the risk of concentration. A fund that is exclusively dedicated to renewable energy generation projects will be exposed to the same types of risk on its entire portfolio. These risks will be much greater

in emerging countries (risks relating to construction, duration, raw material price increases, credit risk on the off taker, etc). However, a fund specialized in clean energy can adopt a diversified strategy based on both power generation projects – which, moreover, can be acquired at different development stages in order to provide vintage diversification– and by acquiring companies that provide products and services to the renewable energies sector.

Funds can also diversify by investing in both renewable energy projects and acquiring companies in the energy efficiency sector. The return periods will consequently differ within the same vehicle (Figure 1).

#### **Exit strategies**

Finally, the question is raised of how to optimally manage the sale of the portfolio of clean energy funds in emerging countries where there is less liquidity than elsewhere. Some initial public offerings have been successfully conducted, such as, for example, the one made by China Longyuan Power in 2009 in Hong-Kong. This wind power producer raised USD 2.2 billion on the Hong-Kong Stock Exchange. It is also possible to group power ...

### Christophe Scalbert Proparco

Christophe Scalbert graduated from EDHEC and IEP in Paris and joined Agence Française de Développement (AFD) in 2006 after having worked as an associate in the Mergers and Acquisitions Department of Lazard Frères Bank in Paris. After spending several months in various AFD departments, he joined Proparco's Private Equity team as an investment officer in 2007 His activities mainly focus on investment funds and direct equity investments.

<sup>4</sup> In 2007 and 2008, 27% of infrastructure funds were raised by "first teams" and 42% by managers that had not previously invested in infrastructure (EMPEA, 2010). One can reasonably estimate that this trend applies to emerging countries and clean energy funds.

# Clean energy investment funds: moving beyond magic formulas to sound risk analysis By Adeline Lemaire and Christophe Scalbert, Investment Officers at Proparco

... generation projects together and list them on the stock exchange.<sup>5</sup> However, the possibility of listing the entire fund would today seem quite unrealistic, despite a slight recovery on markets. Few funds are listed, with the exception of a few major funds specialized in infrastructure.

Exit routes for most clean energy funds will consequently consist in trade sales. The renewed increase observed<sup>6</sup> in the volume and number of acquisitions is a promising sign in this direction.

The international financial environment continues to be uncertain and managers will consequently need to ensure they structure their deals in the best possible manner – particularly through put options if the financial surface gives a certain value to this option – and build and maintain contacts with strategic investors, especially production and distribution companies working in conventional energy. The latter have a financial capacity to purchase assets in the renewable energy sector, thus contributing to gradually "decarbonating" their activity.

Private capital provision already plays (and will increasingly play) a major role in implementing efficient and low carbon energy structures in

emerging and developing countries. Investors seeking to develop their exposure in the clean energy sector in areas experiencing strong growth could overhaul their analytical tools by paying specific attention to four risk areas: critical fund size, team expertise and investment and exit strategies. If, at the same time, managers implement human, legal and financial mechanisms capable of mitigating these risks, then developing and emerging countries should fully enjoy a favorable context for projects and investments to be scaled up in clean energies. •

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<sup>5</sup> The example of the initial public offering made by the company Greenko, presented in the article by Jean-Pascal Tranié and Vivek Tandon in this issue of Private Sector and Development illustrates this strategy well. <sup>6</sup> In India, Green Infra, an electricity producer held by the IDFC fund, acquired three wind farms with a total capacity of 100 megawatts (MW) from BP Energy India in September 2009 for almost USD 75 million. Moreover, in October 2009, the BTG Pactual fund invested some USD 170 million in ERSA, a Brazilian hydropower producer, whose total project portfolio capacity tops the 500 MW mark.

AND CLEAN ENERGY: HOW TO BOOST INVESTMENTS IN EMERGING MARKETS?

# Lessons learned from this issue

By Arthur Foch and Nathalie Yannic

The 2008 oil shock and prospects of expensive oil for the long haul, combined with repeated warnings from the scientific community over the risks of climate change, have put the impacts of energy on the global environment and energy security issues right back on the agenda. This return of energy to the economic and political scene calls for a paradigm shift, breaking with over 25 years of low oil and gas prices.

This is an opportunity for emerging countries to engage upon an energy transition towards low energy intensive, low-carbon development models while, at the same time, supporting their strong economic growth and demographic dynamism. Choices available today in terms of investment in urban development, transport or infrastructure can put them on a development path that is different from the one taken by developed countries - characterized by the diversification of energy sources and demand management. The challenge for the other developing countries (DCs) is of a different nature, but it is equally important. Most DCs pay some of the highest oil bills in the world and will be the first victims of climate change. There is real potential for local energy to be developed (particularly biomass energy) and, in many cases, the use of diffuse renewable energies would provide affordable solutions to the challenge of access to energy for rural dwellers - less than 50% of populations in most African DCs have access to electricity.

The steady rise in oil prices since 2002 has made clean energy investments competitive, particularly for the private sector: the volume of global investments rose from USD 4 billion to USD 50 billion between 2002 and 2008. In 2007, 80% of investments directed towards renewable energies in emerging and developing countries came from the private sector. Specialized investment funds are developing. Clean energies may have withstood the crisis better than other asset classes, yet equity investments in developing and emerging countries remain widely insufficient to meet needs. Moreover, the international financial crisis that began in 2008 and the macroeconomic crises of 2010, along with the recent fall in oil prices in 2009, can all jeopardize the dynamism observed in this sector. In all cases, the amounts invested via private equity funds in these countries' renewable energies sectors either match or are widely above those registered on stock markets. This is in marked contrast to the situation in developed countries where funds play a more marginal role.

Despite the fact that DCs concentrate the bulk of global potential for renewable energies and energy efficiency, funds tend to focus their investments on emerging countries, wind and solar energies and biofuels, to the detriment of geothermal or biomass energy and energy efficiency (and yet the last two are often less costly). In addition, they focus on the most advanced phases of projects or avoid smallerscale projects that are seen as being too innovative. This situation can be explained by both external and internal constraints. It costs two to three times more to develop renewable energy projects than for conventional energies (projects that are relatively smaller, very specific sources involving high transaction costs, technologies that remain expensive and have been proven little or not at all, etc.). Investment funds consequently attribute a higher risk premium to these projects - and it is higher still for DCs (high political and liquidity risks, shortcomings in the regulatory framework, etc). Moreover, specialized clean energy funds often show internal weaknesses: difficulties to reach a critical size, attract teams with complementary profiles, sufficiently diversify their portfolio and identify the right exit strategies.

Donors and development finance institutions have a role to play in making developing countries more attractive for private equity funds and helping them diversify their traditional target sectors by mitigating risks and galvanizing investments.

Donors can help governments with strong financial constraints deploy technical assistance tools in order to consolidate national energy strategies - or even strategies for regional integration. Sectoral analyses - comparisons of the real economic costs of each energy source, setting sectoral targets, planning distribution networks - are indeed complex and require a high level of technical skills. Investors can also be consulted when contractual frameworks are defined. The latter guarantee long-term political commitments and, in particular, are a sign of satisfactory long-term prices and guarantees. Governments with more favorable financial situations can also use financial levers (transparent or incentive price policies, abolish subsidies for conventional energies, etc.). Development finance institutions can follow these initiatives and help set up financial instruments that can support small and medium-sized enterprises - target companies for funds specialized in clean energies – in their investments in the sector. They can ...

# Lessons learned from this issue

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... also help build the capacities of funds seeking to invest in developing and emerging countries (for example, by financing the smaller funds or being among the first investors), or they can provide technical assistance in order to build the capacities of holding company managers. Supporting the creation of international cooperation mechanisms such as the Clean Development Mechanism can also help promote technology transfers from developed countries to DCs, thus encouraging funds to invest in projects at an earlier stage of their development.

Finally, there is a pressing need to improve the image of energy efficiency which investors do not find attractive. And yet energy efficiency projects provide higher financial returns than

renewable energies and often carry fewer risks. Donor support for financial intermediation is a decisive factor and helps teams to be set up in local banks and raise their awareness (renewable energy portfolio management and simplified appraisal tools for energy efficiency projects). If massive investments are made in energy efficiency projects it will be possible to halve greenhouse gas emissions by 2030.

Thanks to the sectoral support they provide to governments and local banks, donors can consequently galvanize investments by private equity funds, particularly for clean energies where resources are more plentiful and costs more competitive than in developed countries, and for energy efficiency, the ferment of sustainable growth.

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# In our next issue

# Impacts of tourism in developing countries

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