Expansion of the Investor Base for the Energy Transition

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Abstract

Despite the emergence of the green bond market, the Energy Service Company (ESCO) model and green investment banks, the opportunities which the world's capital markets present to increase the pool of potential investors and reduce project financing costs for renewable, energy efficient and low carbon assets remain under-exploited. This has been a persistent concern for policy-makers. We review the appeal of this sector to different classes of investor and assess the successes and failures of several innovative products including securitisations, yieldcos, green bonds, green investment banks and crowdfunding. We analyse the experiences with these products and suggest that policy needs to recognise how fiscal initiatives can leverage their inherent appeal.

Keywords: investment, returns, renewable energy, green bonds, green investment banks, yieldco, crowdfunding, energy efficiency.

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1. Introduction

Translating the Paris Agreement into action by the finance sector requires significant private capital to be mobilised for investment in renewable energy, energy efficiency, and clean technologies (OECD, 2016). Whilst direct public funding through grants, and market intervention policies such as feed-in tariffs, capacity payments and performance standards, have been successful in motivating the energy transition, ultimately the capital markets will need to sustain its development. In this context, market investors across the wide spectrum of

institutional, strategic, retail and communities will need a variety of attractive investment products and this raises a policy question of how they can be facilitated. This is a challenging prospect since, despite the size of the global capital markets, publicly-traded equity and bond markets have played a relatively small role in renewable energy financing (Hamilton and Zinder, 2016). Some of the challenges in attracting investment, particularly for energy efficiency and energy retrofit projects, include adequate scale, standardization, liquidity, transferability, information asymmetry and investors unwillingness to assume development risk, OECD (2014). The implication is that it is not through a lack of potential capital, but the lack of appeal in matching projects with conventional market products (Eleftheriadis and Anagnostopoulou, 2015; Haigh, 2011; OECD, 2016).

Investors can invest in specific stocks, but this has significant single asset risk. For diversified portfolios, there are various publicly traded alternative energy and cleantech indices including RENIXX World, Credit Suisse Global Alternative Energy Index, DAX global Alternative Energy Index and the S&P Global Clean Energy Index. However, there has been significant volatility in these assets particularly compared to investing in traditional energy utilities and institutional investors are often looking for low risk, steady returns.

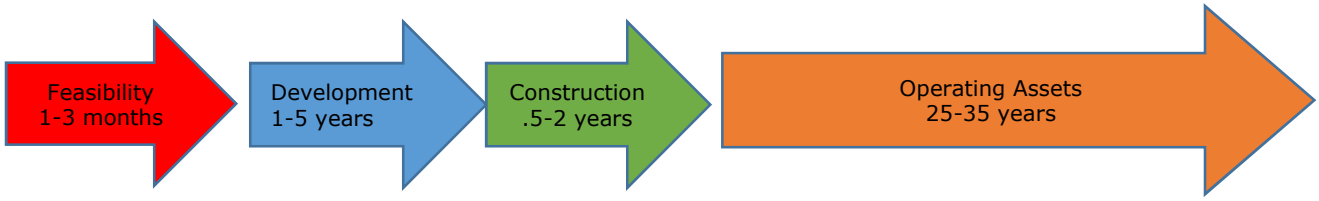
In this review, we critically assess the existing investment products for low carbon and renewable assets and consider the relevance of fiscal incentives to attract investors to these assets, particularly as direct government subsidy levels are being reduced. In section 2 we summarise the returns which various capital providers demand at different stages in renewable project lifecycles. Section 3 critically analyses the development and current state of the green bond market. In section 4, we explore the role of Green Investment Banks in promoting investment in low carbon assets. Section 5 examines securitisation and in particular the yieldco model. Section 6 examines the crowdfunding model and suggests ways

this model could be further developed to promote investment in low carbon assets. Section 7 concludes and discusses the wider considerations in facilitating financial products.

2. Capital Providers and Return Requirements

There are wide views upon what rate of return is required by investors in low carbon assets (Donovan and Nunez, 2012; Stratton, 2015, Salm et al., 2016) and this is mainly due to the heterogeneous engagement of different kinds of investors. Thus Figure 1 shows (in arrows) the timeline for a typical wind farm development while, underneath, the returns required (in 2016) by various investors at different stages in the project lifecycle. Higher returns are demanded in the early stage compared to much lower returns required once the assets are operating. The recycling of early stage high risk capital with lower cost capital for operational assets is critical to attracting further capital and reducing the cost of capital overall.

Figure 1: Typical Windfarm Development Timeline and Representative Cost of Capital at Various Stages (from Hamilton and Zindler, 2016)



Venture Capital	Private Equity	Pension Funds / Insurance	Infrastructure Funds	Public Equity	Bank Mezzanine Debt	Bank Senior Debt
Start-ups; new technology prototypes	Growth PE: pre-IPO companies; PE funds also cover mature-technology projects of company equity investments which take on more risk, such as greenfield development	Proven technology if investing direct in projects. Will look for sizeable low-risk assets delivering predictable yield	Proven technology; private companies. Assets with a low risk profile. Unlikely to take substantial construction risk	Proven technology; low risk assets with predictable yield	Higher leverage for proven technology	Proven technology, established companies
> 50% IRR	15-25% IRR	15% overall return for institution; 6-7% for low-risk assets or vehicles	9-13% IRR	6-8%	LIBOR[1] + 600-650 bps	LIBOR + 215-250 bps

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Whilst the investment model for renewable energy projects is reasonably well developed, as above, the same cannot be said for energy efficient assets. In general, energy efficiency is well known to offer huge scope in the energy transition but progress has mainly been through a steady expansion of mandatory policies, grants and building standards. The IEA (2016) estimated that two-thirds of economically viable[2] energy efficiency potential will remain

[1] London Interbank Offered Rate is the average interbank interest rate at which a selection of banks on the London money market are prepared to lend to one another and is the commonly used reference rate for the cost of borrowing. Cost of borrowing is expressed in LIBOR + bps (where 100 bps equals 1%). The basis points represent the additional cost of borrowing which is a function of the project risk and credit risk of the borrower.

[2] In the IEA's World Energy Outlook 2012 (IEA, 2012) economically viable investments are classified as competitive if the payback period for the up-front energy efficient investment is equal to or less than the amount

unrealised with 70% of the world's energy use being outside any efficiency performance requirement. Aside from the difficulties of quantifying energy savings and capital adequacy rules which may discourage banks' lending to energy efficiency projects, the OECD (2016) suggested that the lack of financial instruments which are attractive to investors is a significant barrier to attracting capital for energy efficient projects. This sentiment is echoed by Hamilton and Zinder (2016) who suggest that energy efficient investments are not recognised as a distinct asset class and lack the scale to attract investors. They call for greater standardisation of products and increasing revenue certainty by using third party entities such as energy service companies (ESCOs) who can analyse and mitigate risk, which in turn, will help attract capital to the sector. They also note the development of securitization and bonds to enable large investments in multiple loans.

In the US, Property Assessed Clean Energy (PACE) programmes which are loans provided for energy efficiency retrofits by states and municipalities often in partnership with private lenders have provided loans at lower cost than conventional lenders. The success of these products has been driven by the fact that the loan is added to the property tax bill and given a superior lien or charge to a mortgage loan. The emergence of pure-play ESCOs such a Hannon Armstrong[3], a publicly listed company which provides debt and equity to fund renewable and energy efficiency projects, suggests there may be further growth opportunities for energy efficiency projects to be funded by the capital markets.

3. Green Bonds

The growth in the green bond market has been one of the most positive developments in capital markets supporting the low carbon energy transition. The Climate Bonds Initiative

of time that an investor might reasonably willing to wait to recover the cost, using the value of undiscounted fuel saving as the metric.

[3] http://www.hannonarmstrong.com/index.php/asset-classes/energy-efficiency

(2018) reported a total of $1.45 trillion of 'climate aligned' bonds financing low carbon and climate resilient assets and projects outstanding at September 2018. However, of these only $389 billion are labelled green bonds with the balance being strongly-aligned or fully-aligned climate issuers[4]. The largest issuers in 2017 were the European Investment Bank ($22.6 billion), German state-owned bank KfW ($12.8bn) and the World Bank ($10.6bn), (Climate Bonds Initiative, 2017a). Investment quality is good with 23% AAA credit rated, 22% AA, 16% A and 23% rated BBB.

One of the main challenges to further market growth and investor confidence is the issue of green bond certification in response to rising investor concerns about "greenwashing" (Bloomberg, 2017a). Under the current system of certification, there is no ex-post analysis or audit to verify that funds were actually used as advertised. A number of competing certification standards have emerged including the Green Bond Principles, and 'green' assessments from ratings agencies World Bank (2017)[5]. While certification of green bonds is increasing in recent years with 65% of green bonds receiving external reviews in 2015, 77% in 2016 and 82% to June 2017, there remains no single standard. The other key issue is returns on green bonds vis-à-vis vanilla bonds. A report on returns to green bond investors by Climate Bonds Initiative (2017b) finds no conclusive evidence of a premium to investors for investing in green bonds.

In summary, whilst the global bond market currently stands at $90 trillion, green bond issuance in 2017 was slightly over $100 billion. It appears that in order to attract more mainstream investors to green bonds, a single credible certification systems need to be

[4] Green bonds if at least 95% of bond proceeds are dedicated to green assets and labelled green by the issuer. Fully-aligned are not designed green by issuer but derive >95% of revenues from climate-aligned assets and green business lines with strongly-aligned deriving 75-95% of revenues from same.
[5] http://treasury.worldbank.org/cmd/htm/Chapter-2-Green-Bond-Principles.html

developed. Ongoing monitoring of the performance of bonds post issuance will also be required to increase investor confidence and for the market to reach its full potential.

4. Green Investment Banks

A green investment bank (GIB) is a publicly capitalised entity established specifically to facilitate private investment into domestic low-carbon and climate-resilient infrastructure and other green sectors such as water and waste management, OECD (2016). GIBs have been capitalised from a variety of sources including carbon taxes, emissions trading schemes, renewable portfolio standards and energy efficiency resource standards. While GIBs have invested directly in low carbon assets and infrastructure using a number of different structures including senior and subordinated loans, bond based financing and equity, arguably a more important role of the GIBs has been the provision of risk-mitigation and credit enhancements such as loan loss reserves, subordination and guarantees.

Loan loss reserves are where the GIB sets aside capital to repay losses which helps reduce repayment risk for private investors. Subordination is where cash flows are paid to investors in order of seniority. GIBs have invested in equity and mezzanine instruments that rank after private investors senior debt investment, meaning the private investors would be repaid first in event of default. By providing a loan guarantee, a GIB agrees to repay a portion of the loan to a senior lender if the borrower cannot. By providing loss reserves, subordination and guarantees, risk is significantly reduced for private sector investors and the probability of repayment is increased. GIBs have also enabled transactions by creating warehousing and securitisation instruments which allows bundling of smaller scale projects to achieve scale and reduce transaction costs. The GIBs have played a significant role in aggregating smaller projects in a single security which otherwise would not be financeable. Through these enabling actions GIBs have been instrumental in overcoming the main barriers to investment in low carbon assets by scaling up smaller investments, by pooling and aggregating, thus

reducing transaction costs and effectively underwriting investment risk through their various credit enhancement actions. Furthermore, GIBs provide confidence as transaction leaders and as co-investors for private investors including local lenders, banks, institutional and retail investors OECD (2016). Nevertheless, being publicly capitalised, they require further policy initiatives to make a bigger impact.

5. Securitisation and Yieldcos

Securitization is a well-understood process in financial markets whereby real assets are pooled and the cash flows from these assets are repackaged and sold as tradeable, interest-bearing securities. Securitization originated in the 1970s when home mortgages were pooled by US government backed agencies, (Jobst, 2008). This created an asset-backed security in which the underlying real estate acted as collateral. The attraction of the securitization model for renewable energy and energy efficient assets is that is allows the translation of cash flows from real assets into financial assets in the form of debt or equity securities. While its reputation may have temporarily suffered during the "subprime crisis", its appeal is very strong in principle.

Since the early 1980s, the so-called yield-based investment vehicles, primarily in the US the "master limited partnerships" (MLPs)[6], have been a popular option for conventional energy companies seeking capital (EY, 2015). MLPs were not available for renewables, but by 2013, the growing investor appetite for products with real yields derived from the cash flows of solar and wind installations led to the spectacular rise of a similar financial vehicle, the "yieldco". A yieldco is formed when a utility or Independent Power Producer bundles a number of fully operational renewable energy assets into a new company (the yieldco) and

[6] MLPs are publicly traded investments which are structured as a partnership so investors are only taxed on distributions and there is no taxation at the corporate level. At least 90% of income must be "qualifying income" from exploring, producing, transporting, storing, processing, refining and certain activities related to certain minerals and natural resources (EY 2015).

sells a minority stake (usually 30-40%) in the yieldco to public market equity investors (Strattan Report, 2015). The yieldco distributes the cash flows from these assets as dividends to shareholders. These gave an average dividend yield of 6.2% in 2015 (Jacobs, 2016). They achieved this high yield by generally distributing 70-90% of available cash flows to shareholders (Urdanick, 2014). Moreover, yieldcos proved a tax efficient vehicle for renewable energy projects as dividends are sheltered from tax due to high capital costs and generous capital and depreciation allowances. Taxes are often paid upon sale of the asset at the long-term capital gains rate as opposed to income tax which is generally taxed at a higher rate. Due to net operating losses, cash distributions are often considered return of capital, which lowers an investor's cost basis (EY 2015).

A further attraction of the yieldco is that investors' portfolio risk is reduced as the single asset risk from investing in just one renewable project is eliminated (Climate Policy Initiative, 2016). Operating renewable energy assets are attractive to capital market investors due to stable cash flows, often through government subsidies, which allow for high dividend payments. They also provide a long-term inflation hedge, and represent investment in a mature technology with low risk and a low correlation with other asset classes (Hamilton and Zindler 2016). From a project developer perspective, hiving operating assets into the yieldco structure allows the developer to free up their balance sheet, improving the debt to equity ratio which is important for the company's credit rating and cost of debt (Moody's, 2016). Reynolds (2015) suggests that yieldcos are an alternative to traditional project finance that offer better value through lower cost of capital. From a valuation perspective, the rationale for the yieldco structure may also be explained by Nanda's (1991) carve out theory: firms that resort to equity carve outs are generally undervalued by the market and the sale of equity to a subsidiary is good news for the value of the parent. While the attractions of the yieldco

model are understood by capital market participants, the structure has received very little attention by researchers (Srinivasan and Reddy, 2016).

The key point that we make is that it was the tax and accounting arrangements that facilitated the growth of the yieldcos, and by extension brought extra capital into renewable projects. Tax treatment is a significant factor in attracting investment but it is not a well-developed theme in energy policy research. Yet, Bobinaite and Tarvydas (2014) suggest that tax incentives are the most widely used policy instrument globally to promote investment in low carbon assets. The most commonly used tax incentives are deductions, exemptions or reduced corporate tax rates for businesses and income tax rates for individuals, but some countries have also introduced reduced property taxes and VAT rates to promote investment (Cansino et al., 2010; Cansino et al., 2011; Mundaca and Luth Richter, 2015; Solangi et al., 2011). Tax relief targeted at individuals can in some instances effectively double the post-tax return on investment, Bergstresser and Poterba (2002). The partnership structure which allows financial losses in the early years of a project to be offset against all other income has been particularly effective in attracting retail investors to renewable energy projects in Denmark (Tranaes, 1996) and Germany (Yildiz, 2014).

However, one of the problems with the yieldco structure and the expectations of high performance is that yieldcos will typically need to acquire new assets in order to maintain high annual depreciation expenses. This can tempt the rapid acquisition of over-priced assets and was indeed the main reason for the drop in value which yieldcos experienced after their early enthusiasm. Some yieldcos took higher risks than investors anticipated, and the high profile bankruptcy of Sun Edison (Financial Times 2016) created more caution in the sector. Whilst it is clear that securitisation appears to be essential to re-cycle capital in large volumes along the timeline of renewable energy projects, and that yieldcos are a viable mechanism, they should not need to rely on the rapid acquisition of assets and instead have more

established favourable tax treatments, such as the MLPs, in order to become stable and sustainable financial vehicles.

6. Crowdfunding

Crowdfunding can be defined as "*the collective effort by people who network and pool their money together, usually via the internet, in order to invest in and support efforts initiated by other people or organizations*"; Ordanini et al (2011), Andrea et al. (2011). Data from the Cambridge Centre for Alternative Finance (2016)[7] shows that the total European online alternative finance market, which includes crowdfunding, peer-to-peer lending and other activities grew by 92% to reach €5,431 million in 2015. There is considerable research and policy interest in the behavioural element of how sharing local value in renewable projects can build social support for the low carbon transition, (Devine-Wright, 2014, Ricardo Energy and Environment, 2017, Toke et al., 2008, Curtin, 2016). Solar PV and wind power work well for a crowdfunding model because of the technology maturity, modularity, high reliability, the simplicity of the power generation process, and availability of technical service providers for these technologies (Yildiz, 2014). Debt based crowdfunding has become the dominant form of lending but there is very little liquidity for retail investors, (Harder and Friggens, 2015).

For the crowdfunding model to reach its full potential, issues around licensing and regulation of crowdfunding platforms need to be resolved[8]. Codes of conduct need cover due diligence, risk management and information disclosures to protect investors. Tax reliefs may also be an important element. In the UK for example, investors in certain crowdfunded assets can invest through a tax efficient Individual Savings Account.

[7] https://www.jbs.cam.ac.uk/fileadmin/user_upload/research/centres/alternative-finance/downloads/2016-european-alternative-finance-report-sustaining-momentum.pdf

[8] http://eurocrowd.org/2017/11/02/ec-legislative-proposal-eu-framework-crowd-peer-peer-finance-now-open-feedback/

7. Summary of Success and Failures of Innovative Products

	Successes	Failures
Green Bonds	✓ Standardised ✓ Highly liquid asset – traded on exchange ✓ Price transparency ✓ Information asymmetry reduced due to information disclosure through exchanges / credit rating agencies	× Concerns re 'greenwashing' × No single accreditation standard × No ex poste audit to verify use of funds
Green Investment Banks	✓ Reduced risk for equity investors through credit enhancement ✓ Aggregation allows for risk reduction ✓ Scale reduces transaction costs ✓ Role as transaction leaders gives confidence to other investors	× Publicly capitalised entities so need further funding to have a bigger impact
Securitizations / Yieldcos	✓ Aggregation and scale ✓ Reduces single asset risk ✓ Allows for early stage expensive capital to be recycled with lower risk capital as projects are built ✓ Improves credit quality of project developer ✓ Tax efficient structure maximises return to investors	× Model is unsustainable unless tax structure become more MLP-like
Crowdfunding	✓ Investment opportunities for small retail investors ✓ Enhances buy-in and social acceptance	× Model does not scale × Single asset risk × Illiquid investment × Typically does not allow for aggregation of project risk

8. Conclusion

The development of mature and sustainable financing mechanisms is critical to the success of the energy transition. As central government support through grants becomes more focussed upon research and development and early stage demonstration projects, and subsidies become less generous for mature technologies, investors in large volumes will need to be attracted to the products which the capital markets provide. In this review we have looked at the scope, successes and problems of the emerging financial products for this sector, including green bonds, green investment banks, securitisations and crowd-funding. They are all showing substantial potential but also difficulties. Green bonds face certification and trust issues; green investment banks require a mature financial sector to work alongside government policy initiatives, yieldcos need tax benefits and crowdfunding has community appeal but may remain local in scale.

From a policy perspective, it is clear from this review that regulatory oversight and fiscal incentives need further development. Tax benefits may be more effective than subsidies, as demonstrated by the rise of the yieldco model at the institutional level and the potential for crowdfunding growth at the local levels. Implementation of regulatory and legislative changes to allow the creation of publicly listed investment vehicles which would eliminate taxation at the corporate level would clearly be a step forward. The emergence of such vehicles, akin to what MLPs provided for US oil and gas investors, would allow investors to utilise any tax losses and would increase the post-tax return on renewable, energy efficient and other low carbon investments. This review has also highlighted the need for certification standards in green bonds and emphasised the positive benefits that policy makers can achieve through facilitating the growth of green investment banks. Evidently, a desire to include a wide variety of different institutional, private equity and debt investors with various risk/return targets requires a sustainable and wide mixture of financial vehicles which could

be well-leveraged by selective policy interventions on tax and standards, and this will be more cost-effective in motivating than persisting with direct and selective subsidies.

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