TOWARDS A SUSTAINABLE INFRASTRUCTURE SECURITISATION MARKET:

THE ROLE OF COLLATERALISED LOAN OBLIGATIONS (CLO)

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G20 SUSTAINABLE FINANCE STUDY GROUP

1. Preface

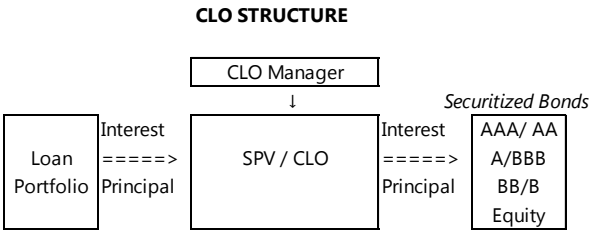
This White Paper has been commissioned by the Co-Chairs of the G20 Sustainable Finance Study Group to provide important financial market content to support the Group's research under the G20 Argentinian Presidency. The goal of this White Paper is to understand how collateralised loan obligations (CLOs) and other securitised and structured financial products could play a critical role in financing global sustainable infrastructure investments at scale and pace. Providing the banking sector with recyclable liquidity will become increasingly important as demand for sustainable investments accelerates. The ability of banks to replenish sustainable capital crucially underpins economic growth and sustainable development in the 21st century and securitisations are a robust mechanism of achieving this. This White Paper focuses in particular on how loans for sustainable energy infrastructure projects can be incorporated into a CLO structure and thus be converted to a liquid asset class designed for the global debt capital markets. It also examines the context and technical aspects of how CLOs can emerge as an efficient and powerful force of sustainable finance and how the model can connect aggregated collections of bank loans to deep pools of institutional investor capital. This White Paper will thereby demonstrate how securitisations and other types of structured products may help drive the global real economy to meet the sustainable growth needs of the future.

2. Executive Summary

Transitioning the world to a sustainable economy as envisaged by the Paris Agreement will require a USD 100 trillion investment in sustainable infrastructure over the next 15 years. This enormous investment requires critical action today for there to be any chance of limiting the global temperature rise to below 2°C, as agreed upon under the Paris Agreement.. According to the IPCC, investment in sustainable energy infrastructure alone will need to be scaled up by a multiple of seven to USD 2.4 trillion per year in order to meet the goals of the Paris Agreement. The amount of capital needed to meet the challenge is so large that banks alone cannot finance this required investment. Fortunately, there is a deep pool of capital in the hands of institutional investors who are the key participants in the USD 100 trillion bond markets. This White Paper demonstrates how sustainable securitisation and financial aggregation techniques can support this objective.

Whilst sustainable securitisation initiatives (e.g. green mortgage and asset-backed securities) are already underway in the market and discussed herein, this paper examines in particular a previously unexplored area of how, by applying tried and tested securitisation technology, a new market of sustainable bonds issued by CLO asset managers can be developed to turn infrastructure loans into a liquid asset class connected to the global bond markets. The transfer of sustainable loans from bank balance sheets into CLOs will replenish bank lending capacity. Given the size and magnitude of the challenge, it is imperative to create a sustainable CLO market which will require the support and participation of all market stakeholders. This paper, written by private sector market participants on behalf of the G20 Sustainable Finance Study Group, explores the opportunities and challenges associated with the development of a sustainable infrastructure CLO market.

Connecting the bond market with sustainable assets



The generic CLO structure envisages the purchase of a pool of loan participations by a Special Purpose Vehicle (SPV) financed by the issuance of tranches of rated securitized bonds (CLO tranches) and unrated "equity". The CLO tranches are rated by credit rating agencies according to their seniority within the capital structure with the senior most tranche considered the least risky and the equity being the riskiest tranche. A broad range of investor groups purchase the tranches based on their individual risk and return preferences and investment criteria. An asset manager typically manages the underlying pool of loans by constructing a portfolio and optimizing portfolio performance. By transferring the credit risk of the underlying loan portfolio to bond investors via securitization, CLOs have accelerated loan issuance, freed up bank lending capacity and thereby expanded overall credit formation. The same principles can be applied to the sustainable loan market to accelerate credit formation for sustainable projects.

Despite the enormous projected funding needs, the bond market currently provides little of the overall funding to the infrastructure sector (around 15% of the total funding to the sector). With the development of a sustainable CLO market, the quantity of liquidity and its alignment with long-term investors will advance sustainable energy, transportation and other sustainable infrastructure projects as sustainable infrastructure becomes an asset class in its own right. The bond market could provide USD 1-1.5 trillion annually in additional private capital for

sustainable projects – half of the current annual investment gap. However, some structural challenges and market barriers will need to be removed and policies and incentives put in place to ensure adequate returns for investors.

Currently most infrastructure projects are funded by bank loans. Infrastructure projects require long term financing which is sub-optimal from a risk weighting perspective; further, most banks are funded on short-term debt or on demand deposits thereby creating a maturity mismatch with longer term projects. Therefore, a mechanism is needed to move project loans from bank balance sheets to bond market investors who are the natural long-term investors in sustainable infrastructure. This mechanism is securitisation, and more specifically for the purposes of this analysis: the sustainable CLO.

Sustainable projects can offer institutional investors a range of desirable financial characteristics and funding horizons. For example, the debt repayments from completed projects are typically equivalent to investment grade credit risk and feature stable and predictable cash flows, often with inflation protection due to power price linkage. Wind and solar projects also have an estimated 25-year lifespan with manufacturer warranties and long-term contracts with power purchasers and government support. Assets like these provide the long-term income preferred by many institutional investors and CLOs can provide institutional investors access to these assets while improving the risk-adjusted returns with an optimum liability structure which works through economic cycles.

Leveraging existing sustainable loan portfolios via sustainable CLOs

The sustainable CLO market can be jumpstarted by the purchase of existing sustainable infrastructure loans from banks by CLO asset managers. The purchase price of the loans will come from funds raised from a bond issuance by the CLO. The notes will be tranched to meet the risk-adjusted return preferences of investors with most tranches being of high investment grade targeted at insurance companies and pension funds. The leverage provided by the investment grade notes will create attractive equity returns for the equity investors in the sustainable CLOs. The current market for leveraged loan CLOs has proved itself to be a stable and robust liability structure through the cycle (there were zero defaults on the investment grade tranches of CLOs throughout the financial crisis): the sustainable CLO will connect the bond market to sustainable assets using a similarly robust liability structure which provides the optimum level of leverage for the assets through the cycle.

The proceeds from the sales of the loans by the originating banks may be redeployed by the banks to finance the construction phase of new sustainable assets which, once completed, can again be sold to the bond market via the CLO structure: thus a ‘sustainable finance loop’ is created. In this way, sustainable CLOs should become the primary source of financing for sustainable projects and a key tool in arresting irreversible climate change.

Defining sustainable CLOs and sustainable securitisation

To support and maintain the integrity of the new sustainable CLO market, markets will need to develop a universally recognised sustainable assets taxonomy that sets mutually recognised standards and definitions for sustainable eligibility. The European Commission’s Action Plan on Sustainable Finance has the key objective of developing such a taxonomy which could provide a frame of reference to develop the taxonomy for the global sustainable CLO market. That said, until such time as taxonomies are agreed upon, full transparency of the pool of collateral is essential. Pipelines must be established to ensure supply and liquidity to asset pools, and finance provided at a fast pace and scale to keep up with demand. In the short term, transparency with the aid of technology must be the bridge until the global taxonomies and definitions are agreed.

Policy and regulatory support for the sustainable CLO market

The development of sustainable infrastructure is strongly aligned with global, sovereign and local objectives. As the sustainable CLO market develops, support will be needed from policy makers and regulators. Policy makers should maintain and elevate their efforts to foster framework conditions and criteria to expedite pipelines of bankable sustainable infrastructure projects. These pipelines must emerge at scale, on the order of magnitude that is commensurate with the challenge. While beyond the focus of this paper, there is a vast body of literature that describes how the public sector can put in place efficient, effective, predictable and stable enabling environments that are "investment-grade".

Beyond this, the G20 has set an example by creating the SFSG and other work streams to examine and support the development of sustainable finance. As sustainable finance through structured products moves into the capital markets, there will be a meaningful role for central banks and regulators to play in areas of liquidity support and regulatory capital rules. As the sustainable CLO market develops, policy and regulatory frictions can be identified and addressed to further advance sustainable growth.

Paris Agreement and sustainable CLOs

Almost every government has signed up to the Paris Agreement and set national targets for reductions in national greenhouse gas emissions. Sovereigns stand to benefit significantly from sustainable CLOs as they can close the existing public funding gap, allow for an injection of funding for sustainable development and climate resilience projects, facilitate meeting national emissions targets, and help national economies adapt to a low-carbon future.

Sustainable CLOs could emerge as the most important financial tool to combat climate change by mobilising and leveraging the previously untapped bond market and connecting it with sustainable assets, which cannot otherwise be financed by the banks and public sector with the pace and scale required to avoid irreversible climate change.

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3. List of Acronyms and Abbreviations

ABS	Asset-Backed Securities
ALM	Asset Liability Management
AUM	Assets under Management
BIS	Bank for International Settlements
BNEF	Bloomberg New Energy Finance
BPS	Basis Points (1/100th of 1%)
CBI	Climate Bonds Initiative
CLO	Collateralised Loan Obligation
CO_2	Carbon Dioxide
COP	Conference of the Parties
EPC	Engineering, Procurement and Construction
FSB	Financial Stability Board
G20	Group of Twenty
GBP	Green Bond Principles
SFSG	Sustainable Finance Study Group
GP	General Partner
ICMA	International Capital Market Association
IEA	International Energy Agency
LCBM	Local Currency Bond Market
LCR	Low-Carbon and Climate-Resilient
LEV	Low-Emission Vehicle
LP	Limited Partners
MBS	Mortgage-Backed Securities
MW	Mega Watt
PACE	Property Assessed Clean Energy (United States)
PBoC	People's Bank of China
PBCE	Project Bond Credit Enhancement
PE	Private Equity
PPA	Power Purchase Agreement
PPRFs	Public Pension Reserve Funds
PRI	Principles for Responsible Investment
PV	Photovoltaic
SAA	Strategic Asset Allocation
SSA	Supranational, Sub-Sovereign and Agency
SWF	Sovereign Wealth Funds
UNFCCC	United Nations Framework Convention on Climate Change
WACC	Weighted Average Cost Of Capital
WHEEL	Warehouse for Energy Efficiency Loans (United States)
2DS	Two Degree Scenario

4. Acknowledgements

This White Paper was commissioned by the G20 Sustainable Finance Study Group Co-Chairmen: Michael Sheren and Dr. Ma Jun (People's Bank of China). The Paper was written by a private sector team of Knowledge Partners conscripted by the G20 Sustainable Finance Study Group and under the supervision of Michael Sheren. The Knowledge Partners and authors consist of: Skandinaviska Enskilda Banken (SEB) (Dr. Christopher Kaminker and Kristoffer Nielsen); White & Case (Chris McGarry and Mindy Hauman); and S&P Global Ratings (Michael Wilkins Emanuele Tambarrano and Jekaterina Muhametova). The White Paper draws on previously published and forthcoming research conducted by SEB, White & Case and S&P Global Ratings as well as already published research by the OECD and University of Oxford (authored by Christopher Kaminker), and other respected researchers in the field of sustainable finance and growth. This White Paper has further benefited from input and comments from Adeel Shafiqullah (Och-Ziff Capital Management), Nicholas Pfaff and Leland Goss (ICMA), Dr. Ulf Erlandsson (Strukturinvest), Joshua Linder (APG), and Christopher Flensborg, Christoph Plattenteich, Rickard Werner, Emma Sandblad and Magnus Svensson (SEB).

5. Context and investment needs for sustainable infrastructure

5.1 The dynamics of financing infrastructure investment

Infrastructure is at the heart of economic growth and yet there has been chronic underinvestment in most G20 countries (OECD, 2017). It is increasingly well understood that monumental levels of infrastructure investment will be required to sustain growth and meet the basic needs generated by rapid population growth and urbanisation in developing countries, even before considering the Sustainable Development Goals (United Nations, 2015). The OECD (2017b) estimates that around USD 95 trillion of investments are needed from 2016 to 2030 in infrastructure (energy, transport, water and telecoms), equating to approximately USD 6.3 trillion per year without taking into account environmental concerns. For this infrastructure to be consistent with a Sustainable Development scenario, investment needs will need to reach USD 6.9 trillion per year in the next 15 years, an increase of about 10% in total infrastructure investment from the reference estimate.[1]

5.1.1 Sustainable finance and sustainable energy infrastructure

In 2017, G20 members adapted the work of the Green Finance Study Group (GFSG) under Argentina's Presidency to the broader concept of 'sustainable finance'. Sustainable finance can be broadly understood as financing, as well as related institutional and market arrangements, that contribute to the achievement of strong, sustainable, balanced and inclusive growth through supporting directly and indirectly the framework of the United Nations Sustainable Development Goals (SDGs). In adopting the more inclusive term of sustainable finance, G20 members renamed the work stream focusing on these topics as the 'Sustainable Finance Study Group' (SFSG).

The SFSG defines 'sustainable assets', as "sustainable loans, sustainable debt and sustainable bonds as specific financial products or debt linked to assets or investments that target environmental and social sustainability; however, the more general consideration of financial sustainability is also contemplated" (G20, 2018). As to what type of infrastructure investments may be considered as sustainable, the Synthesis Report refers to, inter alia, "green mortgages, electric vehicle loans, green technology corporate lending, sustainable mass transport, electric storage technology, sustainable agriculture and clean energy, among other investments" (G20, 2018).

While sustainable infrastructure is generally examined throughout this White Paper including how securitisation may be utilised, e.g. in the context of green buildings (i.e. green MBS), this White Paper focusses its attention on the narrower 'sustainable energy infrastructure', which includes infrastructure relating to power generation from solar, wind, small hydro[2], geothermal, marine, biomass and waste-to-energy, biofuels, and 'energy smart technologies' (such as smart grids, inter-connectors, energy efficiency, storage and electric vehicles). The above subsectors are where the majority of bank lending activity tracked is occurring and as such, where the data is most readily available.

[1] The additional capital cost is low overall and could be offset over time by fuel savings reaching USD 1.7 trillion per year up to 2030 – further reinforcing the case for robust low-emission economic growth (OECD, 2017).

[2] Although large hydro-electric power generation is a form of sustainable energy and has attracted significant institutional investment, it is outside the scope of this research, as this research relies primarily on the BNEF database (BNEF, 2017) for investment transactions and its associated definition of "clean energy" which excludes large hydro. BNEF excludes large hydro arguing that this technology has been mature for decades and is at a very different stage of its roll-out than, for instance, Solar PV.

In recognition of the fact that climate change represents an urgent and imminently irreversible threat to human societies and the planet, the overwhelming majority of countries around the world adopted the Paris Agreement in December 2015. The central aim of the Paris Agreement is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5°C. One of the other core aims of the Paris Agreement (under Article 2 c) is "to make all financial flows consistent with a pathway towards low-emissions, climate-resilient development". This is the first time countries have collectively agreed to this goal. As such, the Paris Agreement sends a strong signal that all finance—both public and private—needs to be directed towards the climate challenge.

Another aspect of the Paris Agreement was that countries, through the United Nations Framework Convention on Climate Change (UNFCCC), also invited the the Intergovernmental Panel on Climate Change (IPCC) to provide a Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emissions pathways. The request was that the report, known as SR1.5, should not only assess what a 1.5°C warmer world would look like but also the different pathways by which global temperature rise could be limited to 1.5°C. The report also examined the issue of finance, and found that in order to meet a 1.5°C scenario, the world must invest USD 2.4 trillion in clean energy every year until 2035 and cut the use of coal-fired power to almost zero by 2050 (IPCC, 2018).

The USD 2.4 trillion needed annually until 2035 is almost a sevenfold increase from the USD 333.5 billion Bloomberg NEF estimated was invested in clean energy last year. With these statistics as context, it is clear that the current rate of market finance will fall considerably short of requirements both in scale and methodology if the status quo remains.

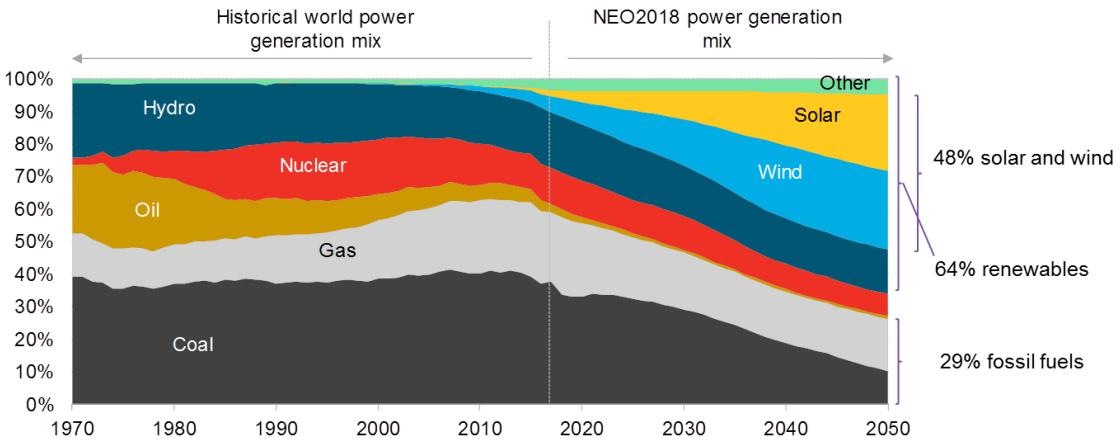
From a microeconomic perspective, sustainable energy sources are becoming more cost-competitive every month and deployment is rapidly scaling up. The IEA Medium-Term Renewable Energy Market Report 2016 shows that in 2015, for the first time, renewables accounted for more than half of net annual additions to power capacity and overtook coal in terms of cumulative installed capacity globally. Record deployment in 2017 was accompanied by continued sharp reductions in generation costs, with announced long-term remuneration prices ranging from USD 20/megawatt hour (MWh) to USD 30/MWh for both onshore wind and solar (photovoltaic, PV) plants (BNEF, 2017).

These trends are underpinned by a combination of sustained policy support, technology progress and expansion into newer markets with better renewable resources. The IEA projects renewables will become the leading source of new energy supply from now until 2040 (IEA, 2015). As shown in Figure 1, BNEF's New Energy Outlook (2018) sees cheap renewable energy and batteries fundamentally reshaping the electricity system from one dominated (two-thirds) by fossil fuels in 2017 to two-thirds renewable energy by 2050. BNEF's outlook projects that between 2017-2050 79% of new generating capacity will be renewable and 81% zero-carbon, with solar PV seeing a 17-fold increase and wind a sixfold increase.

Underpinning these projections are ongoing cost declines in solar and wind technology. The forecasted cost of an average PV plant falls 71% by 2050 to around USD 25/MWh. As of 2018, PV module costs are down 84% since 2010 and BNEF expects another 52% decline from 2018 to 2025 as manufacturers make further efficiencies throughout the production chain. Similarly, wind turbines are down 32% since 2010 while machine efficiency is up, and the use of sensors and smart data is helping to optimise operational efficiency and reduce costs. New models are also entering the market, opening up access to sites developers considered uneconomic not long ago. As such, BNEF expects the cost of wind energy to come down by another 40% by 2030, and 58% by 2050.

BNEF finds solar PV and wind are already cheaper than building new large-scale coal and gas plants in major markets. These include India, Germany, Australia, U.S. and China. By 2030, BNEF sees this 'tipping point' being reached almost everywhere on the planet. New wind and solar are getting cheaper to run than running existing coal or gas plants. In China, this second tipping point is forecasted to occur for coal in around 2028. In the U.S. it will occur for existing gas-fired power from 2027. Batteries are seen as key to completing the 'triumvirate' of new technologies that will transform the electricity sector over the next 33 years. BNEF reports battery prices are already down 79% since 2010 and expects the ongoing build-out of battery manufacturing for electric vehicles to continue to drive down the price of batteries for stationary applications, reaching USD 70/kWh by 2030, some 67% down from today. It has been recently described that as technologies decrease in cost and become less subsidy-dependent, conservative institutional investors feel more comfortable allocating capital to these projects (Kaminker, 2017; Clean Energy Pipeline, 2014).

Figure 1. BNEF forecasts two thirds of power generation as sustainable by 2050



Source: BNEF (2018)

5.2 Dynamics of investment financing sources for sustainable energy

The scale of the investment needed for sustainable energy (and sustainable infrastructure more generally) is so large that it will, inevitably, have to rely in large part on mobilising private capital flows. Public finance can and does play a critical role to 'jump start', leverage and guide this investment, but transformational change will require large-scale private sector engagement.

However, traditional sources of financing for sustainable infrastructure – governments, utilities, project developers and financial sector sources – face significant financial, regulatory and structural constraints. While the banking sector remains a key provider of investment financing, significant attention has been focused on the potential for institutional investors – including pension funds, insurance companies, investment funds, asset managers and sovereign wealth funds – to significantly increase their investments in sustainable infrastructure and to work to recycle bank capital for sustainable project lending. Institutional investor participation in directly financing sustainable energy projects accounts for less than a tenth of the annual amount of activity (BNEF, 2017).

Introducing a new capital markets asset class tied to sustainable infrastructure could not come at a more auspicious time. Given the prevailing low interest rate environment and weak economic growth prospects in many OECD countries, institutional investors are increasingly

looking for asset classes which can deliver long-tenored, low-correlation, steady, preferably inflation-linked, income streams. Sustainable infrastructure projects in general have the potential to deliver attractive risk-adjusted returns to these long-term investors, whose liabilities and funding requirements can stretch over decades.

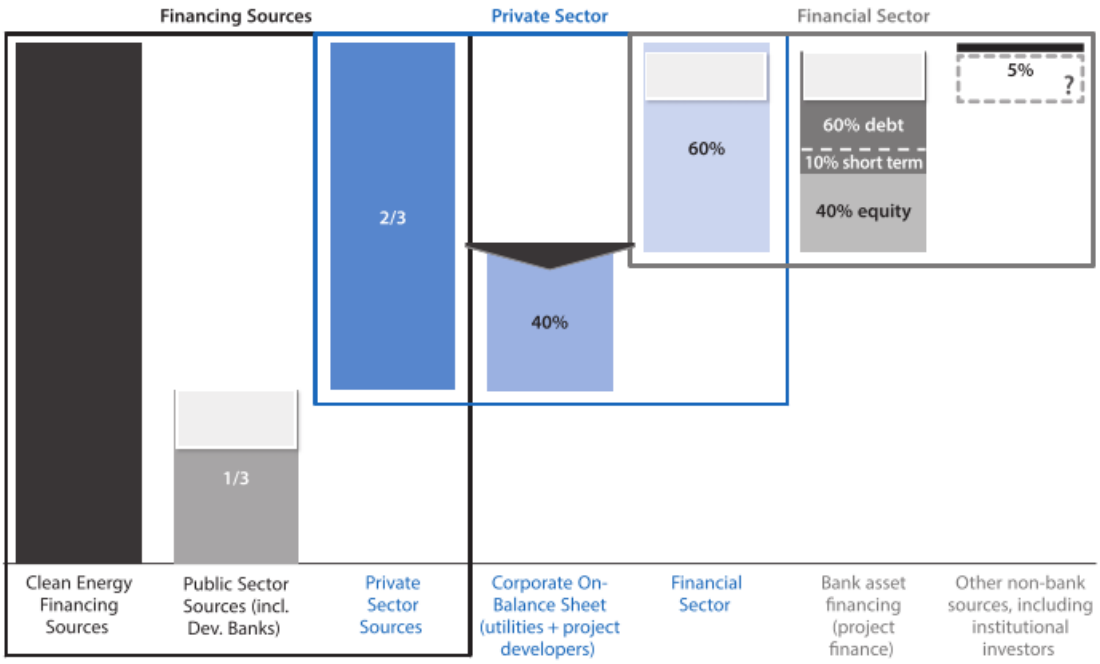
At the same time, long-term asset owners are uniquely placed to overcome some of the traditional barriers to investment in unlisted infrastructure projects encountered by other types of investors, e.g. barriers to entry, illiquidity, and size of investment (Clark, *et al.*, 2014). Institutional investors already account for USD 350 billion to USD 400 billion of annual infrastructure spending globally across their portfolios (out of USD 2.5-3 trillion of total infrastructure spending), but mostly as the major owners of the listed stocks and bonds of infrastructure operators and developers with a market capitalisation of around USD 3.4 trillion in AUM (Bielenberg *et al.*, 2016). Institutional investors are also actively innovating to create more aligned, partnership based vehicles for long-term investment that provide for more direct access to infrastructure projects (as well as other types of long-term investments such as private equity, venture capital, real estate, timber and agriculture) (Clark and Monk, 2017; Monk, Sharma and Sinclair, 2017).

As presented in Figure 2, across the OECD, the private sector accounts for roughly two-thirds of investment financing (through debt or equity) for sustainable energy infrastructure and public sector sources (i.e. local, regional and national governments, and national development banks) provide the remaining one-third.

In developing countries and emerging economies, the picture would be roughly reversed, with the public and 'quasi-public sector' (state-owned banks and corporations) providing two-thirds of investment financing. As these economies grow, however, they come under pressure to expand the provision of pensions and healthcare. Demographic trends imply these systems will require an increasing share of public expenditure creating more competition for capital and scarcer resources for investment finance (Benoit, 1996; Kaminker *et al.*, 2013; IEA, 2014; Inderst and Stewart, 2014)

Across the OECD, the private sector share of investment is divided between corporate sources such as electric utility companies (40%) and the financial sector (60%). Bank asset financing, including project financing, consists of approximately 60% debt and 40% equity and accounts for roughly 95% of the financial sector's contribution and mostly consists of long-term loans. There is significant variation among countries; however, the 60% of investment transactions in non-hydro sustainable energy in 2013 that disclosed financial information to BNEF shows that financing of capital expenditures through retained earnings and equity represented around 40%, a share far lower than what is observed for financing conventional power plants in OECD countries (IEA, 2014b). Most of the remainder was financed with long-term loans and 10% by short-term loans, such as bridge finance (BNEF Database). The final 5% is provided "directly" by non-bank entities, including institutional investors. As mentioned above, institutional investors are of course the major owners of listed stocks and bonds, so as such stand behind the on-balance sheet financing of corporates and banks "indirectly".

Figure 2. Landscape of investment financing sources for sustainable energy and dynamics across the OECD 2008-14 (illustrative example, varies by country)



Note: white boxes indicate where investment financing has decreased and are figurative representations that do not represent actual quantities. The black triangle represents a cap and downward pressure on corporate sources of financing. Bank asset financing includes a smaller share of project finance.

Source: Kaminker, C. et al. (2015) citing OECD Analysis based on Kaminker and Stewart (2012); Feyen and González del Mazo (2013); Kaminker et al. (2013); OECD (2013); IEA (2014b); BNEF database.

5.2.1 Strains on traditional sources of sustainable energy finance

The global financial crisis, and responses to it, led to a transformation of the financial landscape, with changes in behaviour by the public and banking sectors. Public, corporate (e.g. utilities, project developers) and financial sector sources of investment financing for sustainable energy projects face significant constraints, and investment from these sources is expected to diminish in coming years.

Long-term financing by banks has declined as they de-risk (deleverage) globally; although bank lending in some areas is beginning to revitalise (ECB, 2017). In the capital markets, a range of factors including ambiguous macroeconomic prospects and declining forecasted returns for equity investments in publicly traded companies have had adverse effects on demand for long-term equity capital (OECD, 2016). In addition to constraints in the banking sector, other traditional sources of finance such as corporate actors also face their own constraints (OECD, 2016).

The economic and financial crisis has constrained government budgets in many OECD countries, putting downward pressure on public sources of investment financing for sustainable energy infrastructure. The fiscal consolidation efforts to reduce the share of government debt in GDP has also been accompanied in some countries by pressure to cut support to sustainable energy (IEA, 2014).

Utility companies and project developers have little capacity to expand their investment in sustainable energy; their balance sheets are constrained due to the negative impacts which an increase of debt could have on their credit rating and cost of capital. The Economist (2013) notes EU utilities have suffered vast losses in asset valuation, with their market capitalisation (see glossary) having fallen by over EUR 500 billion over the last five years. In May 2014 Barclays downgraded all high-grade bonds issued by the entire American electric utility sector because they 'believe that a confluence of declining cost trends in distributed solar photovoltaic (PV) power generation and residential-scale power storage is likely to disrupt the status quo' (Aneiro, 2014, p. 1). As a further illustration of these dynamics, utility companies have even started to split into renewables and "legacy energy" companies, (e.g. in the case of RWE and E.On). The result of these splits may have ironically lowered headroom for renewable investments due to write downs on fossil assets.

More specifically, it is expected these trends will reduce the profitability and credit-worthiness of utilities, which are generally vulnerable to decreasing electricity prices caused by the increased deployment of renewable energy. The IEA (IEA, 2014) confirms the extent to which utilities can provide investment faces constraints. In addition to new project development, utilities have often played an important role in acquiring operating sustainable energy assets, allowing developers to recycle their capital for new projects.

The financial crisis has affected the maturity transformation process in financial markets and the ability of banks to channel long-term financing. Recently exposed funding vulnerabilities, deleveraging and new regulations such as Basel III and Capital Requirements Directive (CRD IV) have prompted banks to reduce investments across illiquid asset classes and shorten tenors (i.e. the term or duration of loans).

Deleveraging in the EU is particularly relevant because EU banks had been large domestic and international 'specialist' financiers of infrastructure and their reducted liquity has been difficult to replace. The post-crisis Basel III rules aimed at strengthening the global banking sector have elicited concern, particularly in Europe, that new rules could result in reduced readiness from banks to provide long-term project and corporate loans, including for sustainable energy projects (Narbel, 2013; UNEP Inquiry into the Design of a Sustainable Financial System, 2014).

Despite these constraints, the banking sector remains a key provider of investment financing, but it likely will not be able to compensate for constraints among other traditional sources and fill the massive financing gap for sustainable infrastructure on its own. Within banks resides technical underwriting and development expertise that is critical to the construction phase of infrastructure. Bank involvement will remain essential during this stage and only after construction is complete and cash flows have commenced can alternative investors step in to off-take the permanent financing.

Given the need for increased investment in sustainable energy infrastructure and the pressures on existing sources of financing, there is keen interest in exploring the extent to which institutional investors can expand their investments in this sector (see dotted box in Figure 2). An optimal path would see institutional investors playing a greater role in directly filling the investment gap while also acquiring operating projects from banks. As stated above, banks are

expected to remain important project financiers, therein, it is important to help them to recycle their capital for re-investment in new projects.[3]

At the same time, the debt capital markets are the world's largest and deepest pool of capital, valued at well over USD 100 trillion in outstanding securities. The timely and efficient shift of infrastructure financing to the capital markets will free up banks' limited balance sheets capacity for recycling capital back into early-stage sustainable projects financing, where banks are best suited to handle greenfield project risk.[4] It thus becomes important to build pathways to institutional investors who possess structurally long-term balance sheets that can naturally hold long-term sustainable debt related or linked to sustainable assets.[5] This impact will be maximised if the appropriate sustainable assets meet the institutional investor's investment preferences.

A range of debt capital market products can act as a pathway to finance or refinance sustainable loans linked to sustainable investments for institutional investors. Banks could benefit from re-purposing[6] capital market products that aggregate and transform loans for sustainable projects[7] into asset-backed bonds. Bonds are the preferred investment debt product of institutional investors and are a investment consistent with financial stability and existing regulations. Underpinned by new and enhanced regulatory regimes for securitisations and with techniques refined over the last decade, the aggregation and transfer of such loans into the debt capital markets (DCMs), will enable banks and corporates to refresh their balance sheets and apply the proceeds of the transfer to underwrite new sustainable investments.[8] As discussed by the BIS, European Parliamentary Research Service, IMF, OECD, and others (*see Box 1 and references*) a sound and efficient market for securitisation support the financial system and broader economy in various ways such as lowering funding costs and improving the capital utilisation of financial institutions - benefits which may be passed onto borrowers; helping issuers and investors diversify risk; and transforming pools of illiquid assets into tradable securities, thus stimulating the flow of credit.

This process will serve to enhance both the volume and acceleration of sustainable capital formation, as it increases and optimises balance sheet efficiency. A second pathway to develop sustainable debt capacity would see institutional investors underwrite sustainable debt on their own, or invest in asset management funds that underwrite sustainable assets.

It is also well understood there has been an increasing interest, demand and allocation by institutional investors for green/sustainable financial products, providing a suitable opportunity to explore these pathways. It is important, as demand and information about sustainable debt assets accelerates, market participants should continue to enjoy the full range of investment options available, including investment choices that promote responsible social and environmental policies.

[3] Although activity has decreased since the financial crisis, banks remain important providers of infrastructure finance, particularly when capital markets are thin and secondary debt markets nascent. Although their involvement varies substantially by region, banks have historically participated in the debt financing – and, to a lesser extent, equity financing – of projects. As the banking sector recovers from the financial crisis it is expected step in increasingly as project arrangers and facilitators, or to provide bridge financing (S&P Global Ratings, 2013).

[4] Carney, M (2016) The Sustainable Development Goal imperative, https://www.bis.org/review/r160523b.htm

[5] Although some banks can hold long term debt (especially state owned or guaranteed), many rely upon on demand deposits and short/mid-term corporate financing to fund their balance sheets. Hence, there is a general maturity mismatch between many sustainable investments and many banks.

[6] Many debt capital market products such as asset-based securities and covered bonds have a long history with certain debt assets such as credit card receivables, auto loans or corporate loans. However, these products have not been used for sustainable debt assets. Hence, they can be "re-purposed" to advance sustainable lending.

[7] For the purpose of this section, sustainable loans, sustainable debt and sustainable bonds refer to specific debt linked to sustainable assets or investments, however, the more general definition of sustainable debt also applies.

[8] Carney, M (2016) The Sustainable Development Goal imperative, https://www.bis.org/review/r160523b.htm

Box 1: The potential benefits of securitisation

The European Parliamentary Research Service (2016) recently provided an in-depth introduction to securitisation which can be referred to for more comperehensive information on the techniques discussed in this White Paper. The research describes the parties involved, the types and main products of securitisation, the potential benefits for issuers, investors, financial markets and the broader economy, as well as some of its risks, which played a role in amplifying the recent financial crisis. It also presents the current state of the EU securitisation market and looks at some of the main stakeholders' proposals to revive the market and make it less risky.

The research provides an overview of the potential benefits of securitisation seen from the perspective of the entity involved in securitising an asset, the investor, or the broader markets, securitisation can generate benefits.

Original lenders and originators

Originators can use securitisation:

- to increase their funding capacity while still satisfying regulatory capital requirements: banks are required by regulators to maintain capital according to the size and type of their assets. 'Tying' capital this way increases the institution's ability to absorb the potential loss of value of the loan(s), but reduces its opportunities to use that capital for other purposes that may generate better returns for shareholders. By securitising the assets and removing them from their balance sheet, banks in effect lower the amount of capital they need to keep and can therefore use it for other purposes;

Original lenders or originators use securitisation:

- to transfer to investors (and thus 'eliminate') the risk that loans will not be serviced in a timely manner; and more broadly, partly reduce the problem of asset-liability mismatch;
- to decrease their interest costs, by de-linking the rating of the securitised products from their own rating;
- to diversify funding sources, since securitisation extends the investor pool available to an entity.

Investors

From the standpoint of investors, securitised instruments:

- cater to the needs of both conservative and less risk-averse investors, since they provide a wide variety of product choices and can offer interesting yield premiums over securities of comparable rating and maturities (such as AAA sovereign or corporate bonds);
- can be tailored in a manner that responds to specific, and sometimes unique, investor needs.

Markets

Finally, from the perspective of the markets:

- According to Marc Levinson[9], the sale of securitised assets 'creates publicly available prices, which can be useful for some types of assets (such as property or equipment leases) which are complicated to trade and can be difficult to value';
- securitisation offers a useful mechanism by which financial institutions can transfer concentrated (credit, interest rate and market) risks associated with their portfolio activities to the more broadly dispersed capital markets, thus reducing risks to individual institutions.

Potential economic and social benefits

According to the European Securitisation Forum, a number of social and economic benefits have been realised in markets where securitisation has been employed on a broader scale. For example, 'liquid and efficient secondary securitisation markets can reduce geographical and regional disparities in the availability and cost of credit throughout a particular jurisdiction by linking local credit extension activities to national, and increasingly global, capital markets systems'.[10]

Source: European Parliamentary Research Service (2016)

[9] M. Levinson 'The Economist Guide to Financial Markets: Why they exist and how they work' (2014) chapter 5 'Securitisation'.

[10] See European Securitisation Forum, 'European Securitisation - a resource guide' http://people.stern.nyu.edu/igiddy/ABS/resourceguide.pdf

5.3 Institutional investors and their potential to finance sustainable energy investments

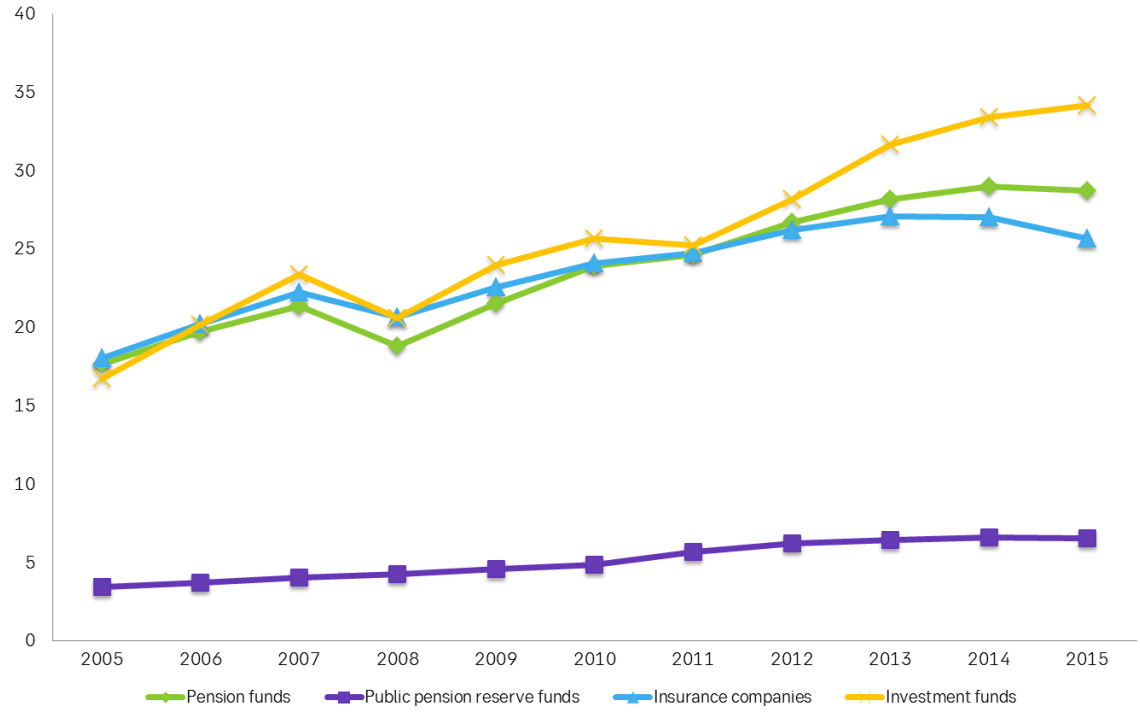
Much attention has been focused on the potential for institutional investors – including pension funds, insurance companies, investment funds, sovereign wealth funds, public pension reserve funds, foundations, endowments and other forms of institutional saving – to significantly increase their investments in sustainable energy and other green infrastructure.

For instance, McKinsey & Co. (Bielenberg *et al.,* 2016) estimates institutional investors could provide USD 1 trillion to USD 1.5 trillion in additional private capital for sustainable projects — up to half of the current annual infrastructure investment gap. But that will happen only if a range of structural challenges and market barriers are removed, new investment vehicles are created, and if policies are put in place to ensure adequate returns to meet institutional investors' liabilities.

As is shown in Figure 3, in OECD countries institutional investors managed USD 95 trillion in assets in 2015, which are projected to grow to USD 120 trillion by 2019 (OECD, 2015, 2016).[11] In emerging and developing countries, institutional investors managed USD 4.5 trillion in 2016 (Inderst and Stewart, 2014), with sovereign wealth funds in particular being key sources of capital (Clark and Knight, 2010) managing USD 7.4 trillion in assets globally as of 2017 (SWF Institute, 2017).

[11] Note that there is a double counting issue with this number as investment funds manage some assets from pension funds and insurance companies. Total assets of institutional investors (excluding investment funds) amounted to USD 57.7 trillion in 2015. This lower Figure excludes assets of investment funds that are managed alongside pension and insurance funds.

Figure 3. USD 95 trillion in assets under management by institutional investors in the OECD (2015)



Source: OECD Global Pension Statistics, Global Insurance Statistics and Institutional Investors databases, and OECD staff estimates.

Note: Book reserves are not included in this chart. Pension funds and insurance companies' assets include assets invested in mutual funds, which may be also counted in investment funds. Total investments by pension funds are used as a proxy for total assets and may be a low estimate. Assets of insurance companies include assets of direct insurers and reinsurers.

For public pension reserve funds, data include Argentina's Sustainability Guarantee Fund (2011-2015), Australia's Future Fund, Belgium's Zilverfonds (2008-2015), Canada Pension Plan Investment Board, Quebec Pension Plan, Canada (2011-2015), Chile's Pension Reserve Fund (2010-2015), China's National Social Security Fund (2011-2015), Valtion Eläkerahasto, Finland (2013-2015), France's Pension Reserve Fund (2003-2012), Sustainability Fund, Germany (2015), Employees' Provident Fund Organisation, India (2012-2015), Ireland 's National Pensions Reserve Fund (2005-2013), Japan's Government Pension Investment Fund, Korea's National Pension Service, Fonds de Compensation Commun au Régime Générale de Pension, Luxembourg (2015), New Zealand Superannuation Fund, Government Pension Fund - Norway, Government Pension Fund - Global - Norway (2011-2015), Poland's Demographic Reserve Fund, Portugal's Social Security Financial Stabilisation Fund, National Wealth Fund, Russian Federation (2011-2015), Spain's Social Security Reserve Fund, Sweden's AP1-AP4 and AP6, Unites States' Social Security Trust Fund.

The decision to invest in sustainable energy depends on the characteristics of each institutional investor. A central challenge for institutional investors is to access sustainable energy as a public, market based asset class that meets their investment preferences. Only recently has sustainable infrastructure started to appear in configurations that fit into their asset allocation criteria.

As a granulation of 'infrastructure as an asset class', sustainable energy projects have the potential to provide institutional investors with a number of sought-after financial characteristics. Bankable sustainable energy projects can offer stable and predictable long-term cash flows (not being subject to fuel price volatility and frequently backed by long-term contracts with investment grade counterparts). Many of these investment come with inflation protection due to power price linkage. For instance, wind and solar projects also have an estimated 25 year lifespan, with manufacturer warranties, long-term contracts with power purchasers and government support.

In a low interest-rate environment, sustainable infrastructure projects should, in principle, be highly attractive to institutional investors. These investors have the potential to play a much greater role, especially as 'recyclers of capital' (i.e. being able to acquire and hold assets for the long term from the creators of those assets who can then proceed to create more assets having freed up financial capacity on their balance sheets). In many cases, institutional investors must invest for the long-term to fund liabilities that are multi-generational in nature.

These liabilities can be met in part through long-term investments, including investments in sustainable energy assets structured in a form so as which to provide steady, inflation-linked, income streams with low correlations to the returns of other investments (Kaminker and Stewart, 2012; Kaminker *et al.*, 2013; Nelson and Pierpont, 2013). Morgan Stanley (2013) finds that in rising interest rate environments associated with inflation, 'real assets' including infrastructure and sustainable energy have historically performed well, given their inflation-linkage and that such periods are associated with expanding economies and subsequent growth in demand for energy and power. S&P (2018) finds, over the longer term, infrastructure assets show a lower likelihood of default and higher ratings stability than other non-financial corporates, and Moody's (2018) finds on aggregate, sustainable (green) energy projects are less financially risky than conventional power projects, with ten-year cumulative default rates at 5.7% (consistent with the 10-year cumulative default rate for Baa3-rated corporates) compared to 7.6% for conventional power projects.

Sustainable energy projects offer many of the attributes of 'core' infrastructure assets as previously described. Sustainable energy is also increasingly competitive with conventional forms of power generation and there is eveidence of increased investment by institutional investors in line with decreasing cost. Globally, sustainable energy is the fastest growing source of new electricity generation capacity and sustainable projects are emerging as a discrete, 'investable' asset class for these investors with increasingly available instruments and funds that are overcoming some barriers.

In particular, sustainable energy projects have a number of unique characteristics which can appeal to these investors and are not monetised in internal rate of return calculations. For instance, institutional investors require stable and predictable cash flows to meet their liabilities. Some sustainable energy projects can now provide sufficient collateral, probability of success, and predictability of future cash flow to offer institutional investors the 'pledgeable future income' they need. Additionally, most sustainable energy loans are long tenored and well situated to match long term liabilities possessed by many institutional investors. Additionaly , moving long term stable debt to the balance sheet of regulated institutional investors with similar long term liabilities such as insurance companies and pension funds may prove to have

positive macro prudential consequences. Further, as most banks still obtain their funds from on demand deposits and short term commercial financing (under three years), removing the maturity miss-match on bank balance sheets can only lessen liquidity issues in times of stress. In short, the movement of long term sustainable assets from bank balance sheets to those of long term asset holders could ultimately contribute to financial stability.

Within sustainable energy (i.e. excluding CCS power generation) renewable energy power generation sources are not subject to fuel price volatility and are typically backed by long-term contracts with investment-grade counterparts, the cash flows streaming from power sales allow for asset-liability matching and help hedge the risks of long-dated liabilities[12]. At the same time, it is also important to recall that historically renewable energy projects have tended to suffer from regulatory and policy risk changes that can undermine long term contract certainty.

Sustainable energy assets could reduce exposure to the effects of inflation on pension funds' long-term liability (the pension benefit) if, for example, they are linked to Power Purchase Agreement contract structures which have protection against inflation. Another benefit of investments in sustainable energy projects is that if they are held through the economic life of the project, the returns should be minimally correlated with those of the general market (e.g. with broad stock market indexes).

6. The need to mobilise debt capital for sustainable energy

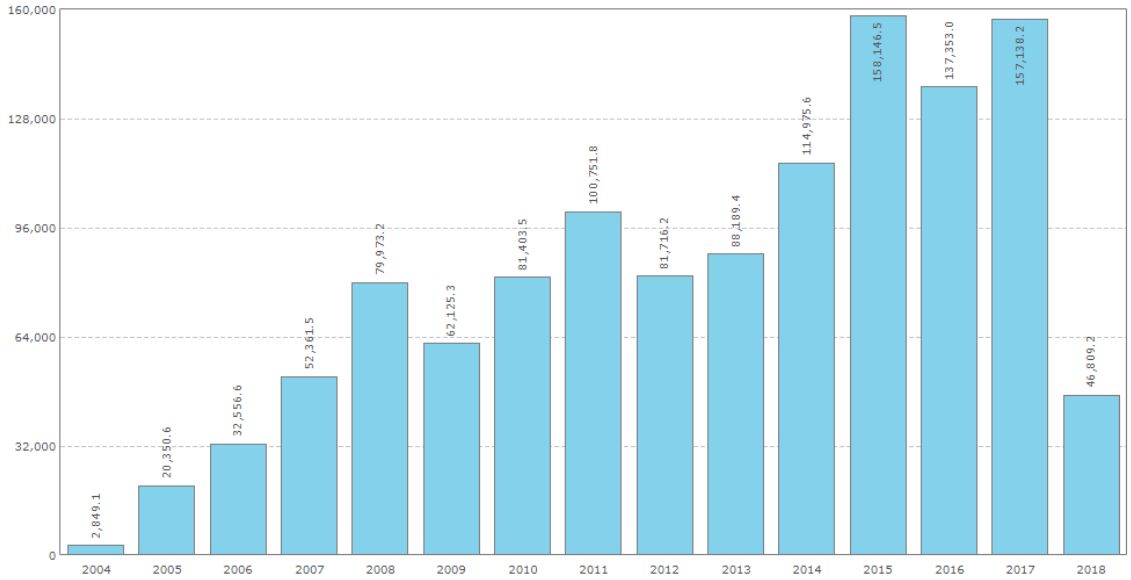
While the scale of investment needs is relatively well known, a clearer understanding of how investment needs can feasibly be financed from private sources of debt and equity capital is still emergent. The typical debt-to-equity ratio in overall infrastructure project finance is 70:30 (Dobbs et al., 2013), with either the same ratio of debt in sustainable energy financing as estimated by Zindler and Locklin (2016), or a somewhat higher proportion of debt as estimated by McKinsey (75:25). The ratio is approximately 50:50 for financing energy efficiency and low-emissions vehicles.[13] According to Zindler and Locklin (2016), in 2015 a record USD 266 billion was invested in new renewable power generation (with USD 200 billion in new build asset financing, and the remainder split between refinancing and acquisitions of assets), up from an average of USD 250 billion per year over the last four years.

Within the sustainable energy finance space, the trend over the last decade is clear. All types of debt financing for sustainable energy new build, acquisitions and refinancing; including term loans, bridge, construction, development, min/semi perms and short term facilities; have risen from USD 80-100 billion range p.a. to the USD 140-160 billion range p.a. in the last three years. This has led to a considerable stock of sustainable energy loans.

[12] A section of the balance sheet that lists obligations of the company that become due more than one year into the future.

[13] As context, the global project finance market for all types of infrastructure included USD 298 billion in loans and USD 55 billion in bonds in 2013 (S&P Global Ratings, 2014).

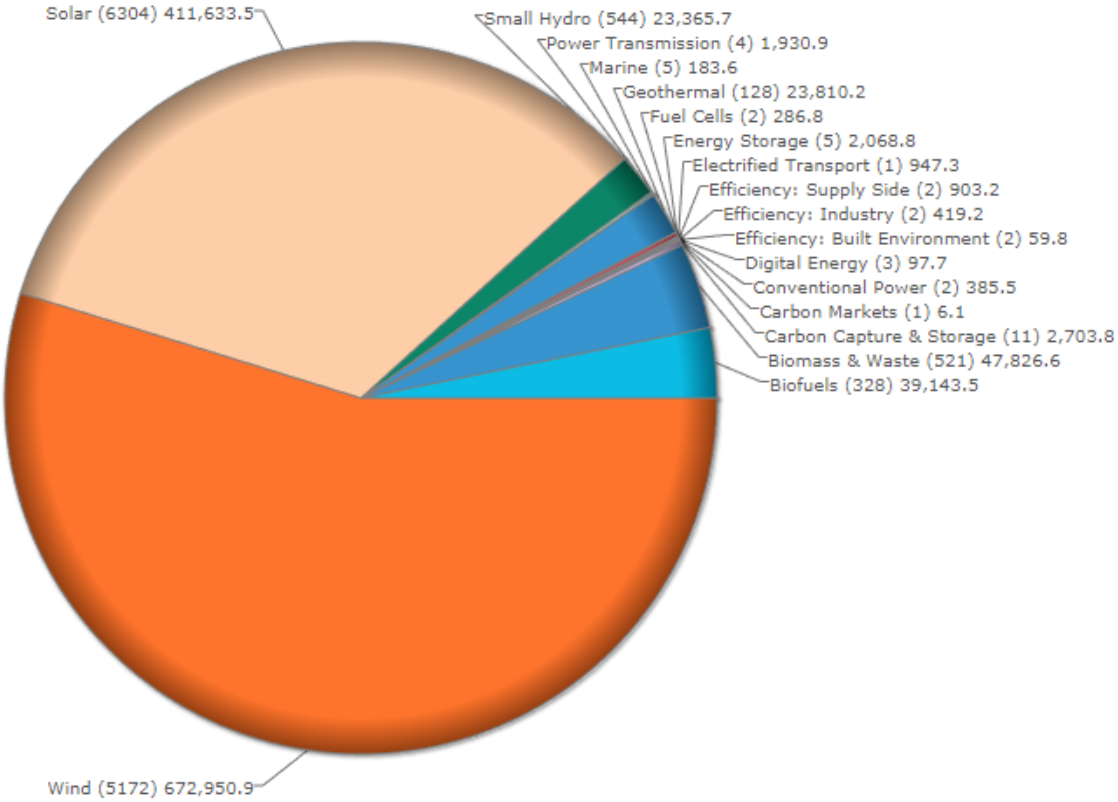
Figure 4. Debt financing of sustainable energy (USD millions)



Source: SEB analysis based on Bloomberg BNEF data

These debt financing flows have led to cumulative issuance of sustainable energy debt on the order of USD 1.2 trillion (N.B an unknown percentage of this stock figure will have reached maturity). This stock is dominated by on-shore, off-shore wind and solar PV; but a variety of other sustainable energy sectors are also included e.g. USD 48 billion of biomass & waste energy, USD 40 billion of biofuels facilities and over USD 20 billion each for small-scale hydro and geothermal.

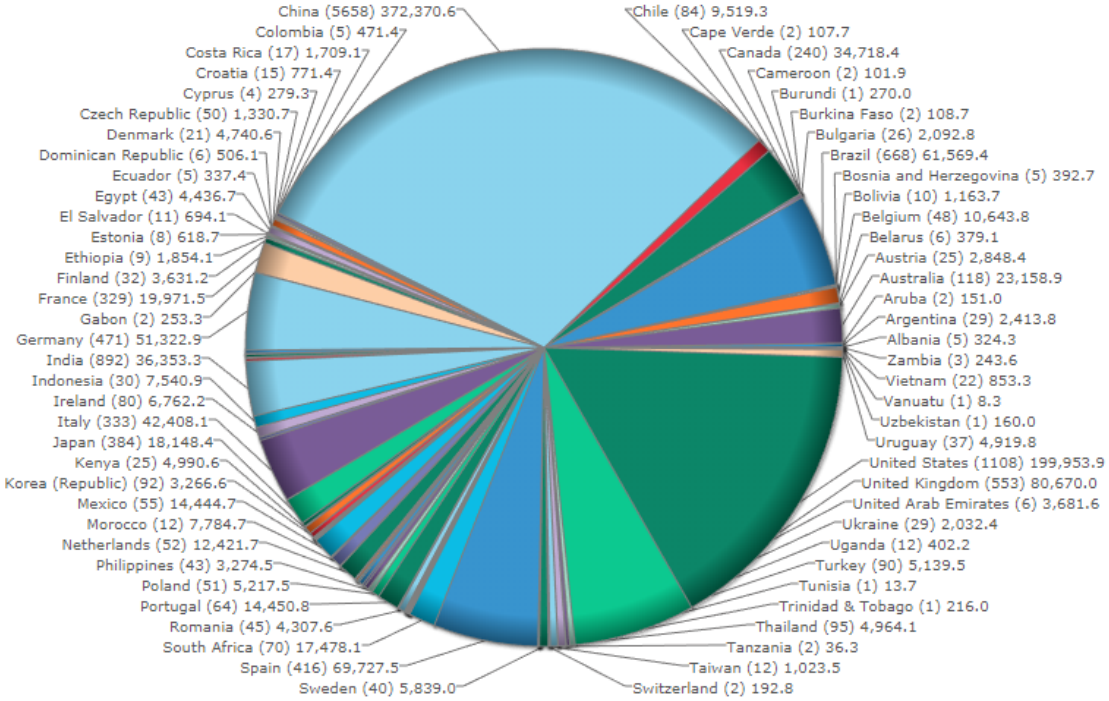
Figure 5. Cumulative sustainable energy debt financing by project type (USD millions) 2004- July 2018



Source: SEB analysis based on Bloomberg BNEF data

From a geographic perspective as seen in Figure 6, the funds are committed to a vast range of jurisdictions; with China, the United States and the EU accounting for the majority of investment financing.

Figure 6. Sustainable energy debt financing by geography (USD millions) 2004- July 2018



Source: SEB analysis based on Bloomberg BNEF data

6.1 The sustainable loan market

The total volume of global loans in 2017 was USD 4.3 trillion[14] and significant prospects have emerged recently for sustainability-aligned lending. The key input opportunity for the emergence of sustainable CLOs is the stock (and flow) of green, social and sustainability bank loans.

On 21 March 2018, the Loan Market Association (LMA) and the Asia Pacific Loan Market Association (APLMA) released with the support of ICMA a first edition of the Green Loan Principles. The principles are a set of voluntary guidelines established to create a common governance process around the labelling of green loan products. The principles have adopted the architecture of the Green Bond Principles promoted by the ICMA, which have carried a similar green governance task for the bond community since their development in 2014. The convergence of green principles for bonds and loans represents a significant step in the development of a common framework for green debt. Both sets of principles cover four areas: the use of proceeds, the internal framework to select and evaluate projects, the management and monitoring of green proceeds, and the reporting of both proceed allocation and impact of projects funded.

[14] (Global Syndicated Loans League Tables- Full Year 2017, Bloomberg Professional Services)

What the Green Loan Principles are expected to do:

- Raise awareness of the underlying environmental benefits of projects financed by loans – including clean energy, as well as climate change adaptation and mitigation.
- Widen the potential investor base for loans by increasing visibility of products to lenders with environmental, social and governance investment factors
- Encourage corporations to improve and standardise the impact reporting and disclosure of loans they take to finance clean energy and other green-related projects.

What the Loan Principles could do:

Increase demand for green loans beyond supply, impacting debt pricing in some instances, altering the liquidity and secondary market performance of securities in others.

Inspire government bodies to implement local policies on green loan regulation and disclosure toward a global alignment.

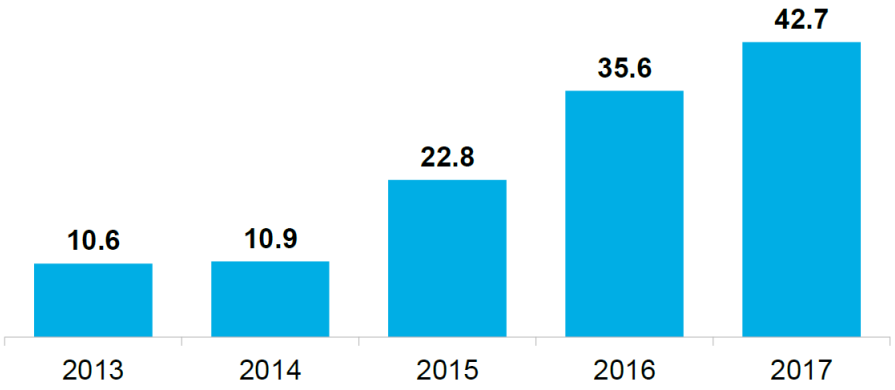
What the Loan Principles will not do:

Act as a regulator of green loan labels, nor enforce alignment to the Loan Principles.

Provide a standardised or contextual view on what constitutes green activity.

Issuances of green loans, as defined by the use of proceeds for market-accepted green activities (back-tagged by Bloomberg), totalled USD 42.7 billion in 2017 and labelled green lending appears to be growing quickly. This trend is also visible in the growth of financial sector green bond issuance, to over USD 60 billion in 2017, which is funding a share of these loans. However, when compared to the figures just for sustainable energy debt financing in the previous section, it is clear that only a portion of potentially eligible loans have been tagged as green to date.

Figure 7. Tagged Green Loan Issuance prior to the establishment of the Green Loan Principles ($bn)



Source: Bloomberg

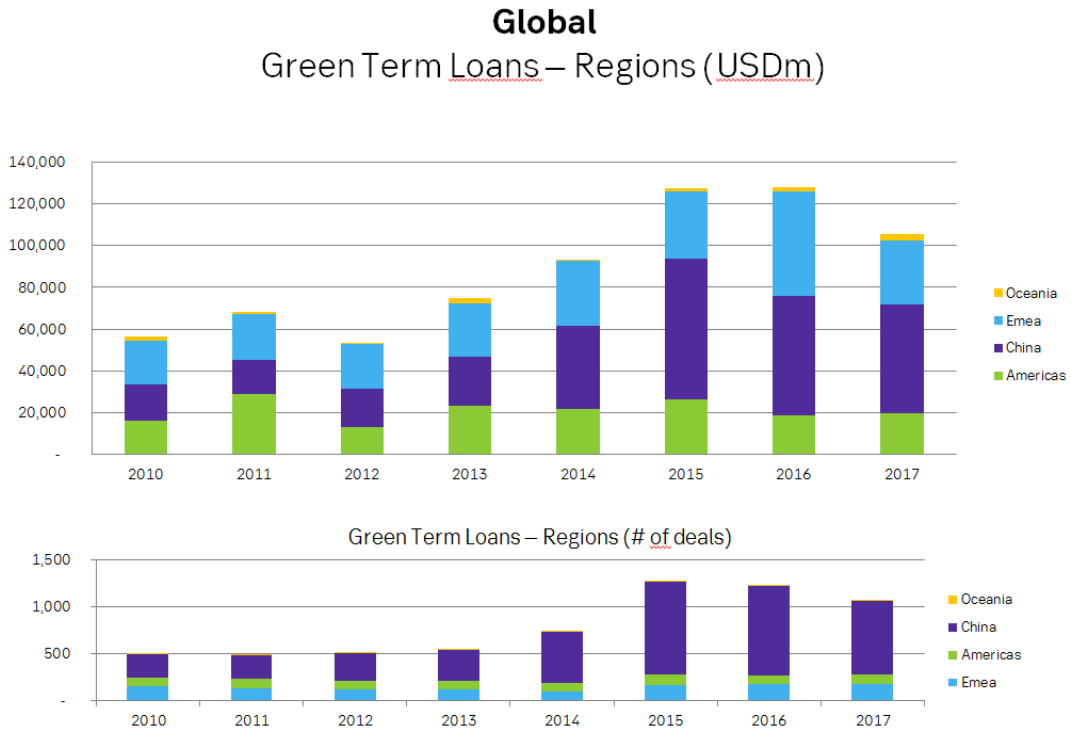
As a *conservative* proxy for the sustainable loan market that could be relevant for securitisations, the below term loan pool analysis is derived from loans that have been marked

as green term loans by Bloomberg New Energy Finance. The analysis covers loans closed between 2010 and 2017 in the four regions EMEA, the Americas, China and Oceania.

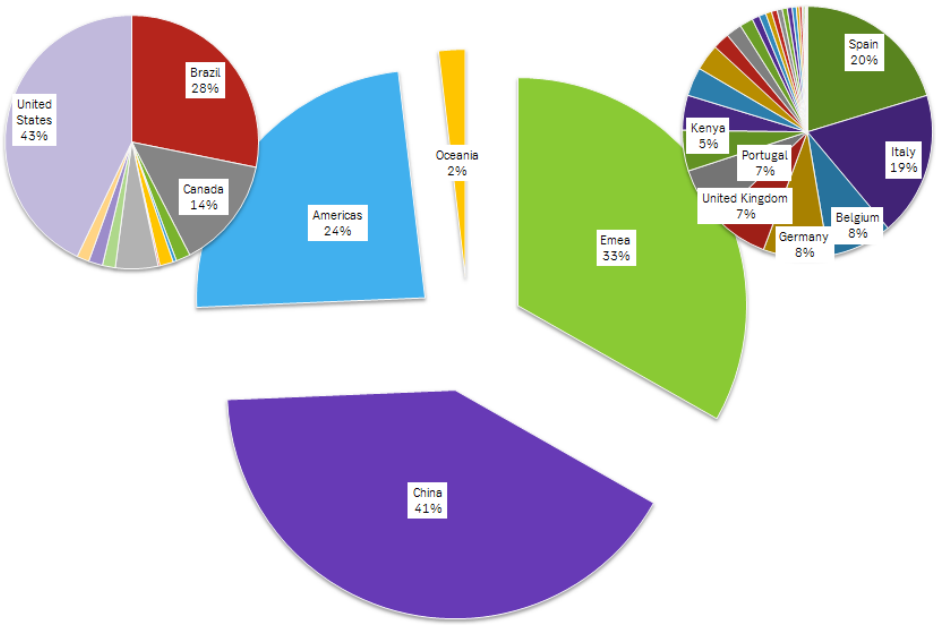
6.1.1 By region

As Figure 8 illustrates, there is a large and geographically diverse potential pool of green term loans that could be used as collateral in sustainable CLOs and other securitisations. The total pool of outstanding green term loans was valued at more than USD 120 bn in 2015 and 2016, of which China accounts for c. 41%.

Figure 8. Green Term Loans by Region



Green Term Loans in 2017 – Regions (USDm)

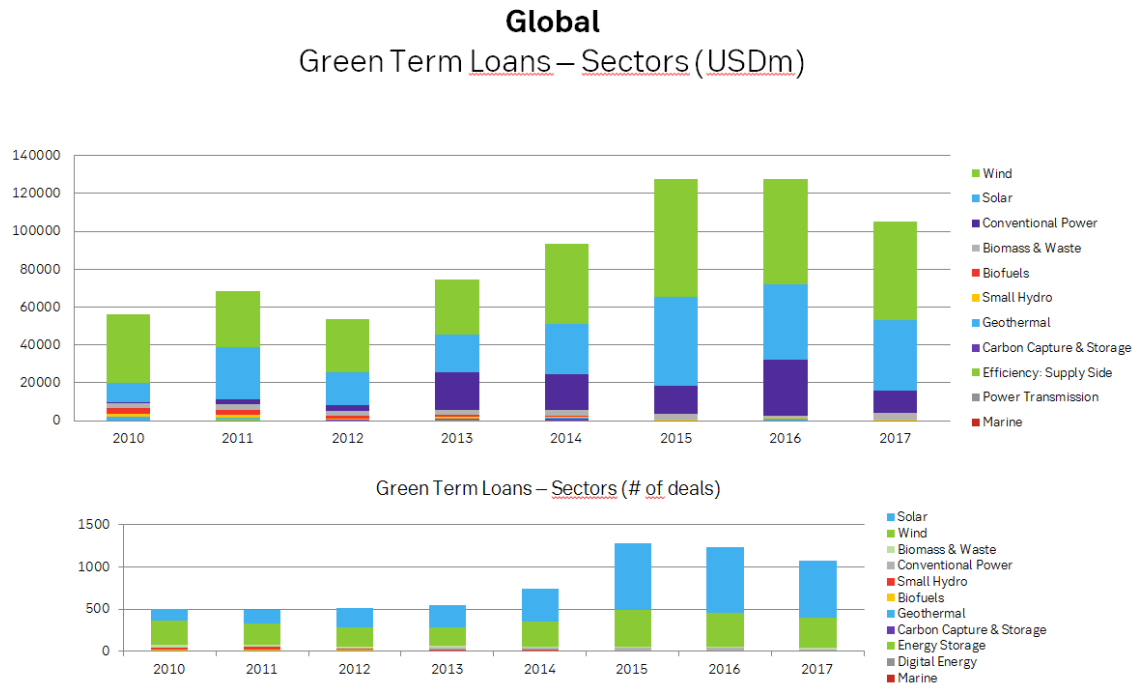


Source: SEB analysis based on Bloomberg (BNEF) data

6.1.2 By sector

The wind and solar sectors dominate the global green term loan market in terms of value and number of deals, although their share in terms of value is smaller due to relatively small deal sizes.

Figure 9. Green Term Loans by Sector

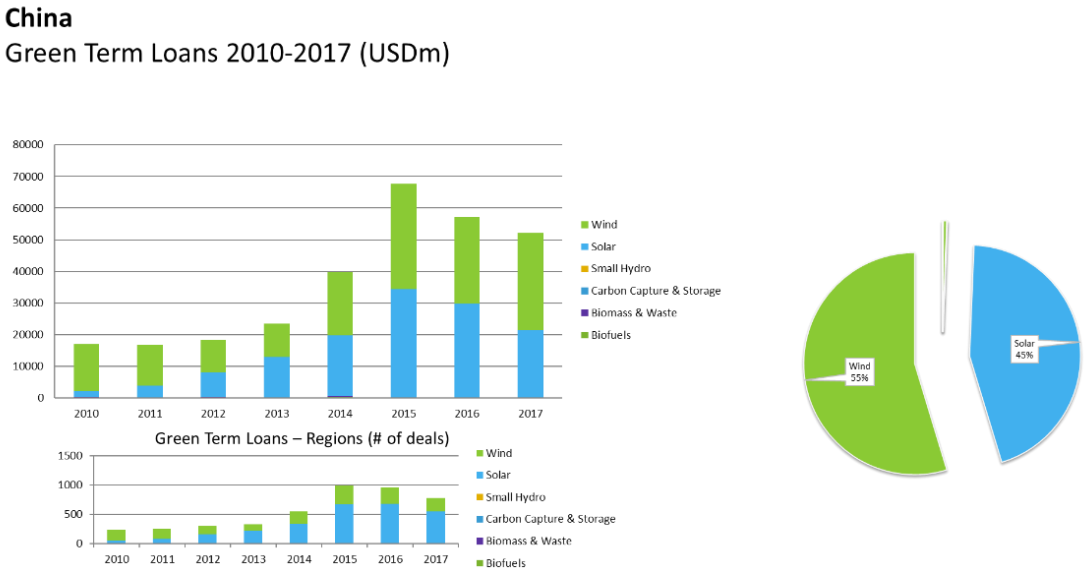


Source: SEB analysis based on Bloomberg (BNEF) data

6.1.3 China

The Chinese green term loan market has increased significantly in recent years to the extent that it has surpassed both EMEA and Americas. This has mainly been through large wind projects and a high number of solar projects as indicated by the charts below.

Figure 10. Green Term Loans in China

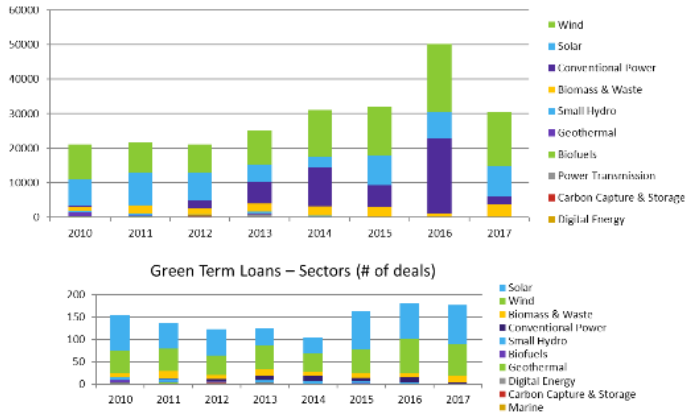


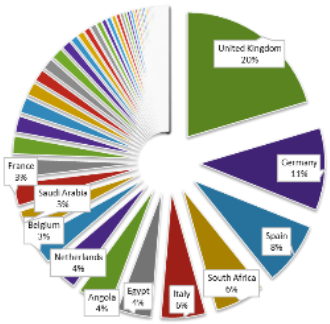
Source: SEB analysis based on Bloomberg (BNEF) data

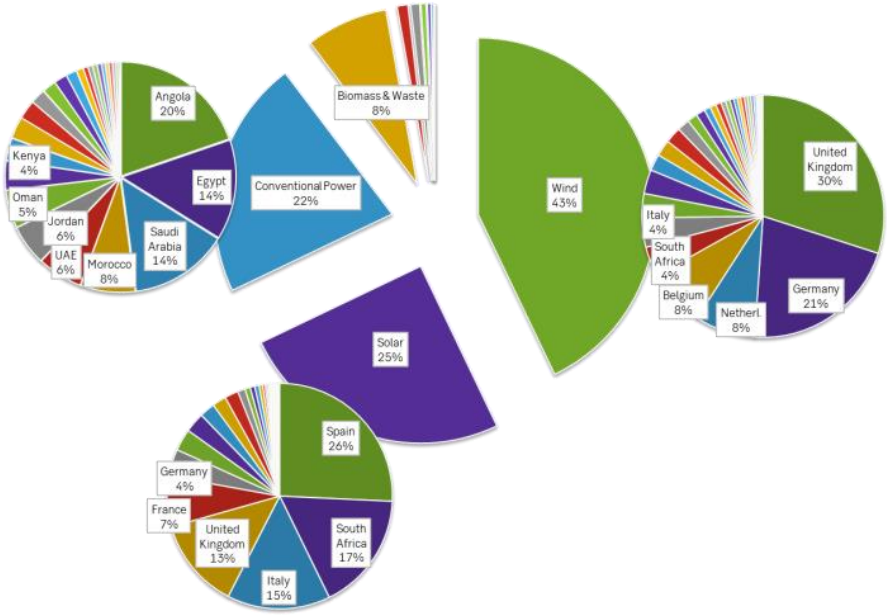
6.1.4 EMEA

Wind is the largest recipient of green term loans in Europe, Middle-East and Africa. **Figure 11. Green Term Loans in EMEA**Not surprisingly, the largest market for wind financing is in the UK, followed by Germany and the Netherlands, while the largest market for solar financing is in southern Europe and South Africa. Conventional power financing is mostly directed towards Africa and the Middle East.

EMEA
Green Term Loans (USDm)





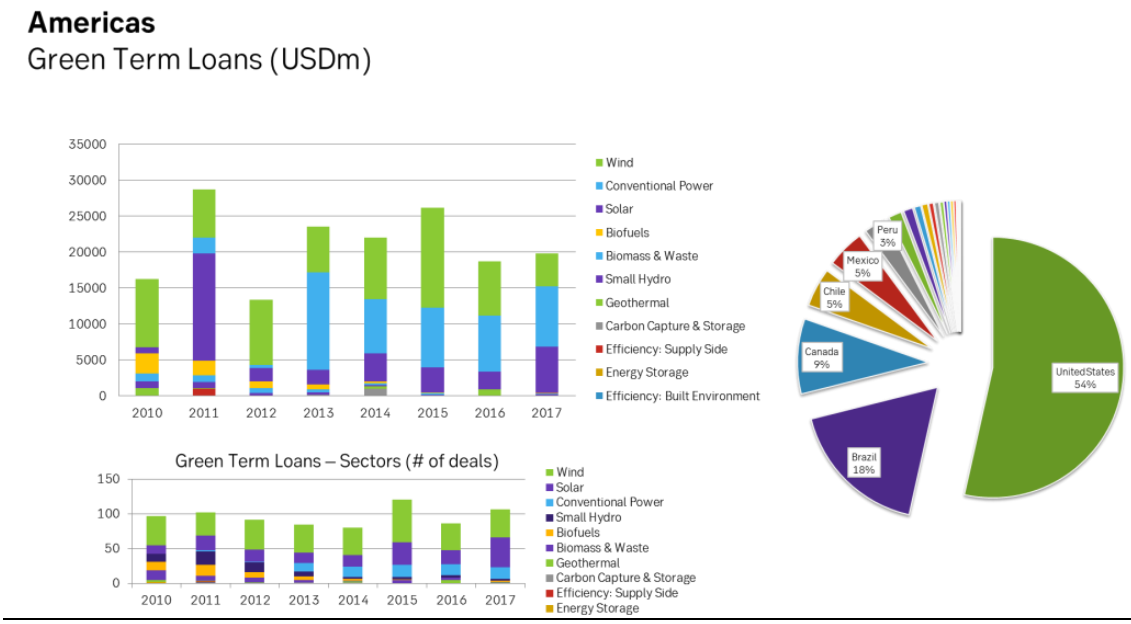


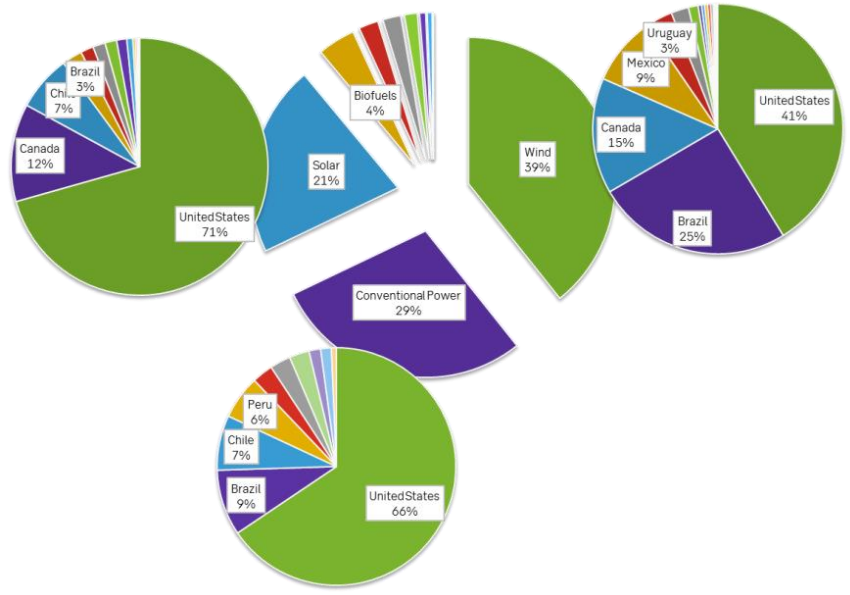
Source: SEB analysis based on Bloomberg (BNEF) data

6.1.5 Americas

The Americas green loan market is dominated by the United States, Brazil and Canada. Wind is the largest sector followed by conventional power, while the share of solar financing has been significantly reduced since 2011.

Figure 12. Green Term Loans in the Americas



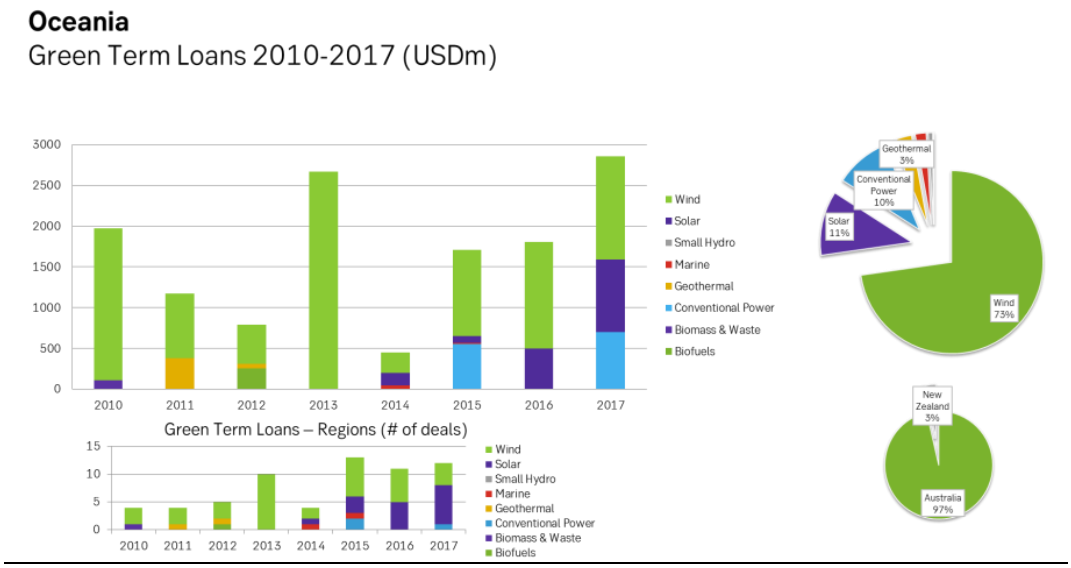


Source: SEB analysis based on Bloomberg (BNEF) data

6.1.6 Oceania

Oceania is a relatively small market but there has been rapid growth of green financing for wind, solar and conventional power after 2014.

Figure 13. Green Term Loans in Oceania



Source: SEB analysis based on Bloomberg (BNEF) data

6.2 The debt securities markets

In 2014 the total amount of capital held in global debt securities (i.e. bonds, notes and money market instruments) markets issued by all types of entities (banks, governments, corporations, etc.) was estimated at USD 97.2 trillion. The broader debt capital markets include a further USD 66 trillion in loans outstanding in 2010 (the most recent estimate available) (Roxburgh, Lund and Piotrowski, 2011). Bond finance is a natural fit for sustainable infrastructure assets. The case is especially clear for sustainable energy infrastructure, which is characterised by high upfront capital costs and long-dated and frequently inflation-linked income streams. Many cities and municipalities rely on bonds to raise the financing for their low-carbon development plans.

Banks and corporates will continue to be an essential source of direct sustainable infrastructure finance, *especiall*y at earlier stages of project finance. However, the scale of investment needs along with the 'maturity mismatch' (short-term funding of long-term assets) in asset financing significantly exceeds the capabilities of a post-financial crisis banking sector and an electric utility sector with increasingly constrained balance sheets (Buehler, Noteboom and Williams, 2013; Alvarez et al., 2013; Gerken et al., 2013). Bond markets, which provide a funding source and an alternative to bank and corporate financing, will need to play a pivotal role.

Bonds can raise capital directly for sustainble projects, or they can refinance bridge/construction loans via a long tennored permanent take out loan at a lower cost. For instance, in 2015, the Blackstone Group refinanced the construction loan provided by a consortium of banks to build a German offshore wind park by selling USD 1 billion of 144a green bonds to institutional investors. The bonds provided a lower interest rate, better covenants and liqudity that would could not have been provide by syndicated bank loan. Lowering the cost of capital for sustainable energy is important because an estimated 50-70% of the costs of electricity generation are in the financial cost of capital, with only the balance being the physical or operational costs of the installation (OECD, 2015). Thus, even small changes in the WACC can have substantial impact on the long-term levelised cost of capital-intensive sustainable energy projects and their competitiveness.

A bond market provides flexibility and options for early project phase capital to be freed up after it has been deployed (an 'exit'), as well as for the longer term project finance debt held by banks constrained by deleveraging and regulations. In this way, bonds can help to increase the velocity at which capital can be 'recycled' back into development, construction and early-stage risk, and also help to attract additional early-stage finance. Investors are more likely to invest their capital in construction if there is a credible and predictable low-cost exit once assets become operational (Caldecott, 2012).

Financial institutions can use bonds to resolve maturity mismatches between loans and liabilities. This is a particular priority in China, where the average liability maturity in the banking industry is six months. This leads to a maturity mismatch with the need for green infrastructure lending where average loan maturities needed are of five to ten years. To address this issue and promote increased green lending in the banking sector, the PBoC established a green bond system for the inter-bank market which enables the issuance of green bonds with longer maturities, that also help banks to hedge 'duration risk' (PBoC/UNEP, 2015).

Bonds also provide the advantage of already being a well-established asset class in the investment portfolios of mainstream institutional investors that have significant potential to finance a low-carbon transition as analysed by the OECD (OECD, 2015; Kaminker and Stewart, 2012). Institutional investors in the OECD managed USD 93 trillion of assets in 2014, with bonds being the asset class favoured by OECD pension funds and insurance companies, allocating 53% and 64% respectively of their portfolio to bonds in 2013 (simple average).[15] Bonds with longer maturities are potentially a good fit with institutional investors' long-term liabilities, allowing for asset-liability matching.

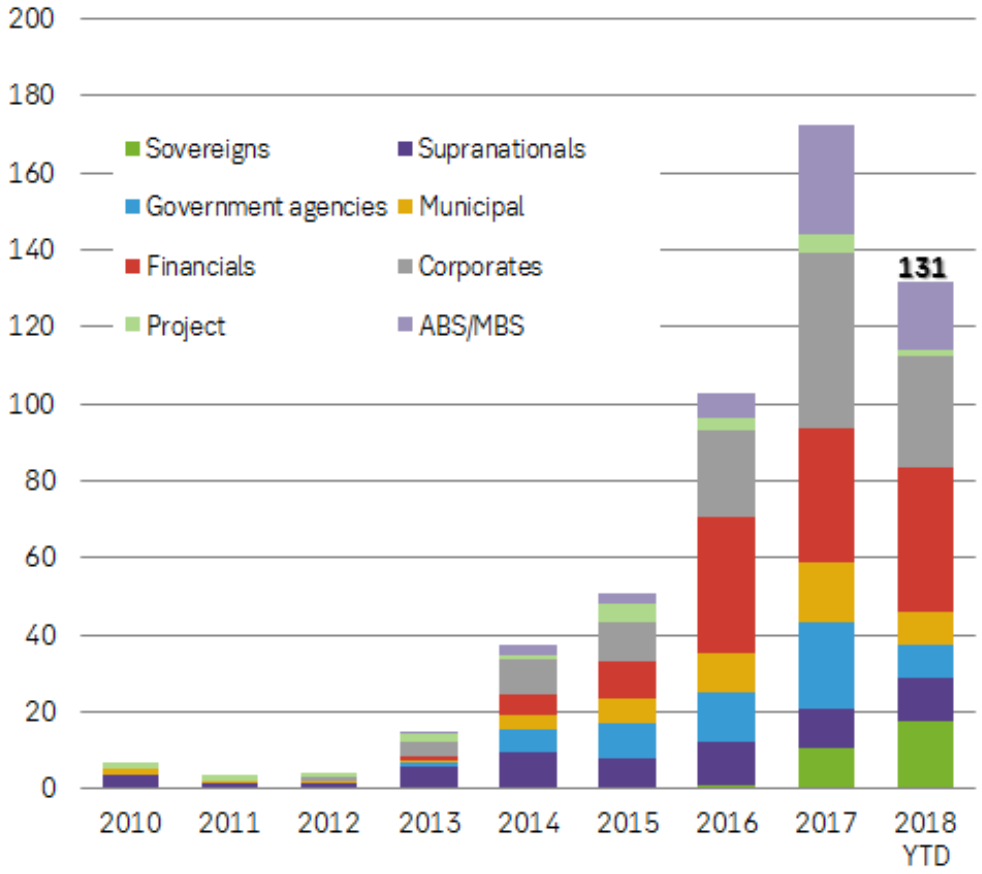
Green bonds in particular can reconcile the fast emerging demand from institutional investors for sustainability-themed and environment, social and governance (ESG)-screened investments with infrastructure investment needs. Green bond issuance has increased significantly in recent years. From a total issuance of USD 39bn in 2014, the market saw issuance pass USD 100 billion in 2016 and reached USD 173 billion by the end of 2017.

Green bond issuing entities can make use of a variety of structures related to the 'use of proceeds' (according to the GBP, four 'types' of green bond at present, although additional types may emerge). The most common structures used have been standard 'recourse-to-the-issuer' debt obligations (i.e. if the principal is not returned to the investor in full for whatever reason, the investor can recoup unreturned principal from the issuer). While the use of funds is targeted, the repayment obligation is backed by all of the issuer's assets. Most SSA and corporate green bonds are characterised by this 'plain vanilla' structure.

However, the sector with the highest growth rate and with the highest scaling potential in 2017 was green securitisations. Issuance of green securitisations exceeded USD 28 billion in 2017 and SEB sees the potential for USD 34-46 billion of new green securitisations in 2018. Despite having only emerged recently, green securitisations already account for close to USD 50 billion of the USD 478 billion green bond market (as of July 2018), and involve financial structuring techniques to simultaneously present institutional investors with the opportunity to invest in green/sustainable assets and free up bank balance sheets. These are green debt securities backed by specific cash flows which are pledged as the basis for repayment (such as the revenue of a project). A green debt security may be issued by a special purpose entity responsible for a specific project and without recourse to the issuer or it can be a securitisation with collateral from a collection of many green assets.

[15] OECD Global Pension Statistics, Global Insurance Statistics and Institutional Investors databases, and OECD estimates.

Figure 14. Green bonds issued (USD Bn) over time and by issuer type (October 2018, YTD)



Source: SEB analysis based on Bloomberg (BNEF) data

6.3 The need for sustainable securitisations

As previously discussed, currently most sustainable infrastructure projects are funded by bank loans. Further, many sustainable investments require long term loans which are at odds with the capital and deposits that make up bank balance sheets. To provide alternative funding and release balance sheet capacity for sustainable assets, illiquid sustainable bank loans can be repackaged into a more liquid format to appeal to sustainable investors in the global capital markets.

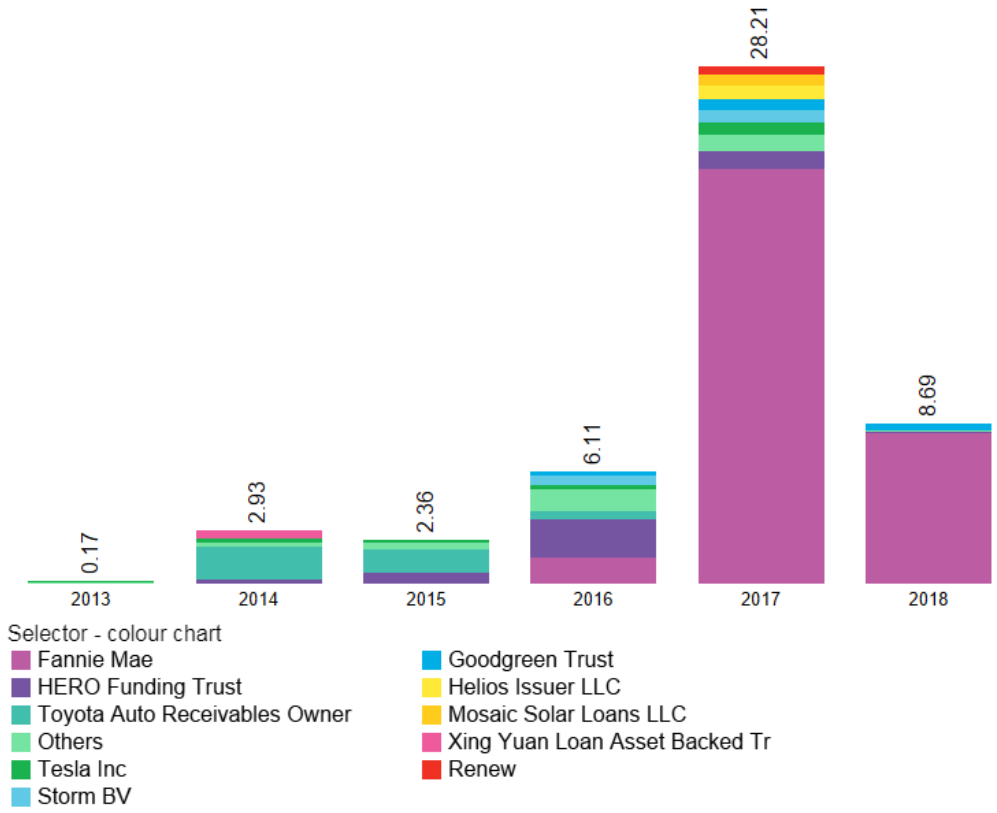
The process of securitisation was tarnished during the 2007-2008 financial crisis but remains important to the scaling up of sustainable infrastructure finance and has emerged as a key area of focus for policy makers generally (Segoviano et al., 2015). A healthy market for securitisation can deliver significant financial benefits. The concept and certain products have endured and proven resilient for good asset classes and solid structures like in the CLO space or Primary Auto ABS. Thus it is already a functioning market and there is strong investor demand for established asset classes such as these. Rejuvenating securitsation markets and applying them to the sustainable infrastructure challenge may be achieved in large measure by standardising the assets and by making the process, and the market activity it spurs, safer,

simpler and more transparent. Any efforts to support green securitisation must be undertaken in a prudent, judicious and transparent manner so that ABS markets emerge with integrity and with due consideration for any financial stability issues (OECD, 2017). Promoting 'sustainable securitisation' is as such a realistic target that could be achieved through harnessing momentum that builds on proven successful and resilient techniques and by following the latest securitisation regulations.

Market participants are already starting to work on this revitalised process for aggregating and leveraging sustainable infrastructure assets through more sustainable securitisation. The characteristics differentiating sustainable securitisations from conventional securitisations are: the sustainability of the assets backing the securities; the potential to amalgamate sustainable assets into pools to fund sustainable structures; the sustainable use of proceeds of the securities (under the Green Bond Principles promoted by ICMA); and the constituents of the investor base. The types of sustainable assets are growing, with some more readily available than others. It is these assets that will likely form the underlying collateral of sustainable securitisations in the short term.

Broadly, these may be divided into sustainable CLOs; which are sustainableABS made up of sustainable energy loans, sustainable auto loans, and Property Assessed Clean Energy (PACE) loans; and sustainable MBS made up of sustainable residential and commercial mortgages. Figure 15 visualises the sustainable and green securitisation market by issuer.

Figure 15. Sustainable securitisations issued (USD Bn) over time and by issuer name (July 2018, YTD)



Source: SEB analysis based on Bloomberg (BNEF) data

Low emissions vehicles, large-scale, distributed and small-scale sustainable power generation and green mortgages could all eventually be securitised. Projects within each of these categories share financial characteristics and can be standardised and homogenised, allowing for pooling of projects.

Though the sustainable securitisation market has expanded over the past few years, much of its potential remains latent. This is due to a perceived lack of readily available sustainable assets to collateralise. However, as shown in the next sections, there is now a critical mass of eligible assets such as sustainable corporate loans, sustainable mortgages, and loans for hybrid and electric vehicles to make sustainable securitisations viable, profitable and saleable. It is now just a question of market education and re-examining potentially eligible assets for sustainability.

There is potential for a significant expansion in the origination and subsequent issuance of sustainable securitisations as perceived risks fall. Standardisation of projects and policy support can enable the pooling of individual loans, which effectively ties bonds to a group of assets, rather than individual assets. Compared to project bonds that generally back individual projects (or collections of larger scale assets concentrated in wind and solar "farms"), ABS are more efficient vehicles for aggregating pools of individual loans.

The prominent role that could be played by securitisation and issuance of ABS and CLOs rests on two arguments. First, as new technologies mature and financial track records develop (as some renewable and low carbon technologies are still evolving), the perceived risks of structures that bundle these projects together will decrease. While continued vigilance on monitoring the underlying credit quality will be essential, standardisation of technologies, contracts and improved statistics on financial characteristics will make it technically more feasible to pool loans and leases (and monitor them), and for bonds to be backed by a group of assets, rather than individual assets. Second, there is a need to move away from the constraints of balance sheet financing in order to scale up investments to the quantum needed in a 2DS or Sustainable Developmet Goals scenario. If market forces and policy makers come together to facilitate and rejuvenate the securitisation process in a judicious and transparent way, a pipeline of financially attractive projects (due to a mix of policies, policy support, standardisation and technology cost reductions) will emerge that can benefit from increased financing flows beyond the limits imposed by balance sheet constraints of a structural and regulatory nature on power companies and banks.

6.3.1 Sustainable infrastructure CLOs

The generic CLO structure envisages the purchase of a pool of loan participations by a Special Purpose Vehicle (SPV) financed by the issuance of tranches of rated securitised bonds (CLO tranches) and unrated "equity". The CLO tranches are rated by credit rating agencies according to their seniority within the capital structure with the senior most tranche considered the least risky and the equity being the riskiest tranche. A broad range of investor groups purchase the tranches based on their individual risk and return preferences and investment criteria. An asset manager typically manages the underlying pool of loans by constructing a portfolio and optimizing portfolio performance. Sustainable infrastructure loans are more complex and long dated that assets generally used to populate ABS such as leases, credit card recivables and mortages. It is due to this complexity that requires monitoring and actions by a manager well aquatinted with the underlying asset, hence, why a CLO issued by an asset manager is optimal to sustainable infrastructure. By transferring the credit risk of the underlying loan portfolio to bond investors via securitisation, CLOs have accelerated loan issuance, freed up bank lending capacity and thereby expanded overall credit formation. The same principles

can be applied to the sustainable loan market to accelerate credit formation for other sustainable projects.

Sustainable infrastructure CLOs are warming up to take their rightful place as a pillar of the sustainable securitisation revolution. As discussed in the following sections, the supply of assets for this product is plentiful and given the vast commitments by financial institutions to increase the quantity of sustainable loans on their books[16], this trend looks set to continue. Sustainable borrowers are becoming increasingly diverse in terms of profile and use of sustainable use-allocated funds. For example, oil companies are increasingly investing in renewable projects and innovations such as electric aircraft are on the horizon.

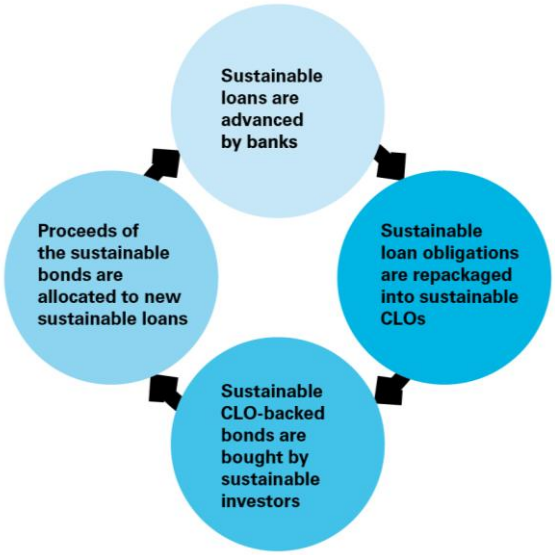
CLOs are typically characterised by broadly syndicated loans issued by highly leverage companies whose credit rating is in the B category. The tenor is usually around 7 years and the pay a margin of the main index. The overwhelming majority of the portfolios are composed by assets which are senior secured loans/first lien. Sustainable infrastructure CLOs are different in that issues are expected to be backed by loans to sustainable infrastructure and which meet ESG factors. The issuers of such debt are typically high investment grade with longer tenor and lower yield. It is also worth noting that often the issuance are unsecured bonds, with a fixed coupon.

As such, sustainable infrastructure CLOs are made up of existing sustainable loans on banks' balance sheets and can become a valuable tool to remain within regulatory capital limitations on the amount of loans banks can have on their balance sheets at any given time. A feature of CLO-backed securities is that they are issued by an SPV, which effectively 'buys' the loan obligations off the originating bank. Importantly, this means the loans are moved off the balance sheet of the originating bank via a true sale into an SPV, freeing up capital and enabling the bank to originate and provide more sustainable loans.

This gives CLOs the ability tocreate a "sustainable finance loop" for originating banks which can, through this process, generate sustainable assets on a rolling basis (see Figure 16). The proceeds from the sustainable CLOs form the basis of new loans from the originating bank with its clear balance sheet. The loop is formed as these second generation loans are themselves aggregated and transferred to an SPV to issue more CLO-backed securities and the process may be repeated.

[16] E.g. https://ftalphaville.ft.com/2017/11/06/2195581/ft-opening-quote-hsbc-pledges-100bn-green-finance/ E.g.

Figure 16. The "Sustainable Finance Loop"



Source: White & Case

Where loan assets are less readily available, they can be warehoused by the SPV until a critical mass has accumulated to make issuing CLO-backed securities viable. This warehousing feature will also ensure a consistent supply of sustainable loans forming the basis of the CLO in the event that individual assets in the pool cease to meet the sustainability criteria.

A number of relevant innovations in the CLO space have started to occur. There are two Chinese debt securities that are tagged on the Bloomberg terminal as green CLOs; Xing Yuan and Xing Yin Loan Asset Security Trusts issued over the course of 2014-16; however these vehicles appear to be synthetic regulatory capital trades rather than cash CLOs of the sort discussed in this white paper.

Permira Debt Managers (PDM) is believed to have issued the first European CLO (Providus CLO I) that includes language in the documentation around environment, social, and governance (ESG) and sustainability criteria. The ESG eligibility criteria included restrictions on the nature of industries in which the fund will invest, and a commitment to assess ESG issues ahead of the investment decision. It is viewed not just as a principle but as a preventative approach, sources added — to limit exposure to areas that may be subject to regulation, for example, and thereby reduce risk. This vehicle does not however have a "green bucket" i.e. a bucket for sustainable energy and/or a bucket which otherwise conforms to Green Bond Principles norms that can be demonstrated as having environmental impact. Sustainable infrastructure CLOs could be structured to conform with the Green Bond Principles.

6.3.2 Auto ABS

Several European countries including the UK, France and Germany have now pledged to phase out the sale of fossil fuel-powered cars in the next 25 years and Norway has pledged to do so by 2025. Given hybrid and fully electric vehicles currently make up a very small fraction of those on the road, considerable investment is needed to research and develop green vehicles. Sustainable auto (or battery) ABS will be a vital mechanism to unlock these funds. The potential pools of sustainable auto loans are now sufficiently deep to make sustainable

securitisation of these assets viable and profitable. Several high-profile car manufacturers have recently issued auto ABS backed by leases on existing electric vehicles.

Another driver of sustainable ABS may be ride-hailing companies, which are pouring significant research and development resources into electric autonomous taxis for use in cities across the world. Though more expensive to purchase initially, electric vehicles are considerably cheaper to run and are therefore more economical than fossil-fuel powered cars over their lifetimes. The means of financing these new fleets of vehicles would be prime candidates for forming the basis of sustainable auto ABS.

6.3.3 Solar ABS

Solar energy is one of the front running alternatives to fossil fuel as a source of electricity generation both commercially and for residential use. Unlike fossil fuel-generated electricity, solar energy can be generated by anyone and once the technology is installed, the owner effectively produces free energy, surpluses of which can be sold back to national grids. Solar securitisations topped USD 1 billion in 2017, more than quadrupling issuance from the previous year. In the US, solar installations are often funded through PACE loans, further described below.

As with electric vehicles, significant resources are being pumped into researching and improving solar cell technology. A new material has recently been discovered that is set to convert sunlight into electricity more efficiently than current silicon-based designs and being semi-transparent the new technology will be able to clad buildings and windows[6].

Innovations such as this may significantly increase demand for solar technology at the residential and commercial level. This demand will be funded by loans which may then in turn be leveraged and made available to a broader range of market participants through solar ABS, following the sustainable finance loop – see Figure 16 and the discussion above. This simultaneously shifts solar loans off the finance provider’s balance sheets to allow for more loans to be agreed.

6.3.4 PACE ABS

PACE loans are bespoke mechanisms through which public bodies fund sustainable retrofitting of commercial and residential properties. They incentivise property owners to make upgrades to their homes as the loans are repaid over time through an assessment on the property owner's tax bill. Successful PACE programmes now exist throughout the US, Canada, South Africa and Australia and the concept is now gaining traction in Europe as a solution to the huge investment deficit in sustainable infrastructure.

Like other sustainable loans, PACE loans can be aggregated and securitised, freeing up the originator's balance sheet and facilitating investment in the asset class by institutional investors. Several issuers have taken advantage of the prevalence of the asset class in the US and more debut issuances are expected throughout 2018. One notable and recent example is the GoodGreen 2018-1 SPV created by Ygrene to issue USD 340 million in private placement green ABS, secured by a portfolio of PACE assets in California and Florida. The transaction received the highest score possible under S&P Gobal Ratings Green Evaluation (E1), resulting from a combination of positive climate mitigation impacts, governance and transparency characteristics.

6.3.5 Sustainable MBS

Buildings are responsible for approximately 40% of energy consumption and almost 75% of building stock is categorised as energy inefficient[7] in the EU, but by 2020 all new buildings must be "nearly zero-energy buildings" and by 2050 all existing buildings must meet the same standard. Sustainable mortgages have captured the interest of governments as they prove popular with property owners and provide a means to streamline one of the worst offending sectors in terms of greenhouse gas emissions.

Sustainable residential mortgages can be offered to homeowners under which the money saved through proposed energy efficiency upgrades in the relevant property is added on to the mortgagor's income for the purposes of calculating the level of funds that may be borrowed.

Through sustainable residential MBS (RMBS), these mortgages are securitised and tranched according to prospective investors' desired risk-return profile. Sustainable RMBS has the potential to become a substantial source of funding for green mortgages, which could subsequently free up balance sheets to allow financial institutions to agree more sustainable mortgages. This would also simultaneously help relieve some of the housing sector issues currently facing some EU governments while stimulating economic growth and stability in the housing and mortgage sectors. Sustainable RMBS market was propelled into the market's consciousness following Obvion's "Green Storm" RMBS issuances in 2016 and 2017 and other issuers are gearing up to follow suit. This year, the EU will pilot an energy efficient mortgages programme which should lead to an upsurge in sustainable mortgage origination and may in turn be used to underlie sustainable RMBS[8].

The availability of internationally recognised standards of building sustainability: LEED, BREEAM and Energy Star make it possible to determine the eligibility of these assets to form the basis of a sustainable structured product straightforward. It also gives investors comfort that the assets backing MBS meet their own sustainability requirements.

Fannie Mae launched its first Green Mortgage Loan product in 2011, and issued its first Green MBS in 2012. In 2017 alone, Fannie Mae issued USD 27.6 billion in Green MBS and securitised an additional USD 3.4 billion in Green GeMS (Guaranteed Multifamily Structures) REMICs (Real Estate Mortgage Investment Conduit) – akin to a Collaterlised Mortgage Obligation (CMO) structure, making it the largest issuer of green bonds globally. After a dynamic increase in 2017 the sustainable MBS market is expected to continue to be one of the key drivers of the shift to a global sustainable economy.

As this illustrates, Green Mortgage Backed Bonds can be a significant opportunity for growth. Other examples where macro drivers on sustainability have led to green MBS are:

- In 2016, Obvion issued the first green residential mortgage-backed securities, backed by residential loans on new and retrofitted energy efficient houses
- First green tranches in a US CMBS deal (CSAIL 2017-C8)
- The Covered Bond Label Foundation (CBLF), established in 2012 by the European Mortgage Federation –European Covered Bond Council (EMF-ECBC) implemented in 2017 an enhanced set of features to allow for Sustainable Covered Bonds

In a recent note, S&P Global Ratings (2018) analyses the emergence of green covered bonds, which grew strongly in the first half of 2018. The green covered bond market remains relatively small, but the growth potential is seen as significant. It is expected green covered bond issuance will rise due to a number of factors including: regulators pushing for greener

finance, banks focusing increasingly on underwriting the financing of green assets while improving the identification of the green assets in lending portfolios, legislative initiatives geared at improving transparency and disclosure around green lending, and the expansion of the covered bond model to new asset classes. Some market participants believe investor demand for green issuance could help compensate for some of the effect of the slow but inevitable exit of the European Central Bank from the covered bonds market.

S&P argues projects driven by political initiatives, such as the Energy Efficient Mortgages Initiative (EeMAP), all but guarantee increased growth in green covered bonds. EeMAP is a mortgage-financing mechanism that promotes the green tagging of mortgages, incentivises building owners to improve their building efficiency or acquire new green properties at preferential interest rates, and collects data through a systematic framework.

Identifying the green credentials of existing assets and efforts to expand covered bond funding to new green asset classes will likely reshape the focus of loan underwriting. It will put more emphasis on green attributes and create further requirements for program documentation and public disclosure, while allowing issuers to attract new investors. In turn, new investors may increase total demand or generate more-stable demand, influencing bond pricing and liquidity in green covered bond series. Given the relatively small number of green covered bonds issued to date, S&P expects the demand for green covered bonds to continue to outstrip supply in the near term. These dynamics will likely not only drive growth in green covered bonds but will also incentivise further green asset origination which in turn will enable issuers to have greater flexibility in the type of securitisation structure to leverage.

6.3.6 Synthetic securitisations

While pure securitisation is the transfer of pools of loan exposures to the capital markets, ‘synthetic’ securitisation is where credit risk is transferred through bundled loans via credit derivatives or guarantees to the capital markets. A recent synthetic securitisation demonstrates how this technique can be used for sustainable infrastructure; with the deal seeing the African Development Bank (AfDB) buy credit protection on a USD 1 billion portfolio of renewable energy loans from a group of investors led by New York-based credit fund Mariner Investment Group.

The investors do not acquire the assets – approximately 50 senior loans split between infrastructure and African finance institutions – but take on some USD 152 million of default risk on the USD 1billion portfolio, in exchange for returns. The capital structure has four tranches: the bank which is retaining a junior tranche of USD 20 million which is 0-2%; the investor tranche which represents the next 15.25%, and a 10% tranche from 17.25 to 27.25% which is an unfunded guarantee from the European Commission through the European Fund for Sustainable Development. The loans remain on the AfDB’s balance sheet, but the transaction allows it to hedge credit risk. Most importantly for the AfDB, it retains the most senior tranche with a lower risk weight attributed to it. The lower risk weight allows the AfDB to free up capital to do new lending in Africa under rating agency capitalisation standards, in this case more than USD 600 million of new lending to renewable energy projects.

6.4 CLO market overview

The global securitization market has evolved considerably over the years. The asset class where continuous innovation is most common is collateralized debt obligations (CDOs). CDOs are innovative both structurally and for the type of assets that form the underlying risk to the

investors. Since 1998, Standard & Poor's has seen an increase in interest in CDOs backed by project finance loans as a new way of recycling public finance debt capital.

Since the rebirth of the market, CDOs mainly involved broadly syndicated loans (that is, collateralized loan obligations; CLOs). By the very nature of CLOs the list of underlying assets continues to grow, provided the credit risk of the underlying assets can be properly assessed. When comparing to pre-crisis CLOs, 2.0 CLOs seem to be more standardised and transparent.

CLOs are currently a well established asset class with a large institutional investor following across the US and Europe. The CLO 1.0 market peaked in 2006 with annual issuance of USD 97 billion in the U.S. and EUR 35 billion in Europe, before crashing to USD 0.82 billion and EUR 0.38 billion in 2009. Volumes started to recover strongly in the U.S. market in 2011 and in Europe in 2013. 2017 saw total annual issuance of USD 118 billion and EUR 21 billion and 2018 is on course to set a new issuance records on both sides of the Atlantic. CLOs provide approaching 70% and 40% of the debt capital to non-investment grade companies in the U.S. and Europe respectively, providing USD 1.1 trillion of capital in aggregate and supporting millions of jobs[17].

The risk retention rules were introduced to stop the 'originate to distribute' business model which caused the U.S. subprime mortgage bubble which was the root cause of the financial crisis. The risk retention rules failed to distinguish between different types of securitisation and instead were applied to all types of securitisations in Europe from 2011 and in the U.S. from 2016. The earlier introduction in Europe caused the market to remain depressed for a longer period of time. The financial crisis provided a thorough stress test for the CLO 1.0 product which CLO 1.0 passed with flying colours: *there were virtually zero defaults on the debt tranches of CLO 1.0* and most equity investors in the product also made healthy returns notwithstanding the wider dislocation in global credit markets during the crisis. Despite the zero default track record of CLO's during the financial crisis, some institutional investors still find the risk retention rules desirable. It is likely sustainable infrastructure CLO's will attract bigger but more conservative institutional investors than those composed of LBO loans. Hence, in the early stages of this market, some investors may have a preference towards risk retention. A broad consultation with the market will better help define the investment preferences for sustainable CLOs.

As such, "Cash flow" CLOs, have since their inception in the late 1990s and evolution through the financial crisis proven to be resilient financing vehicles which have provided the majority of the debt capital to non-investment grade corporate borrowers over the last 20 years. The principal features that have enabled CLOs to succeed include (1) embedded asset / liability matching with respect to floating interest rates, currency and tenor, (2) focus on cash flow generation and credit quality of the underlying portfolio (as opposed to market value), (3) relatively superior recovery rates on secured loans and (4) self-repairing mechanics in the form of over-collateralisation tests and cash-flow diversion.

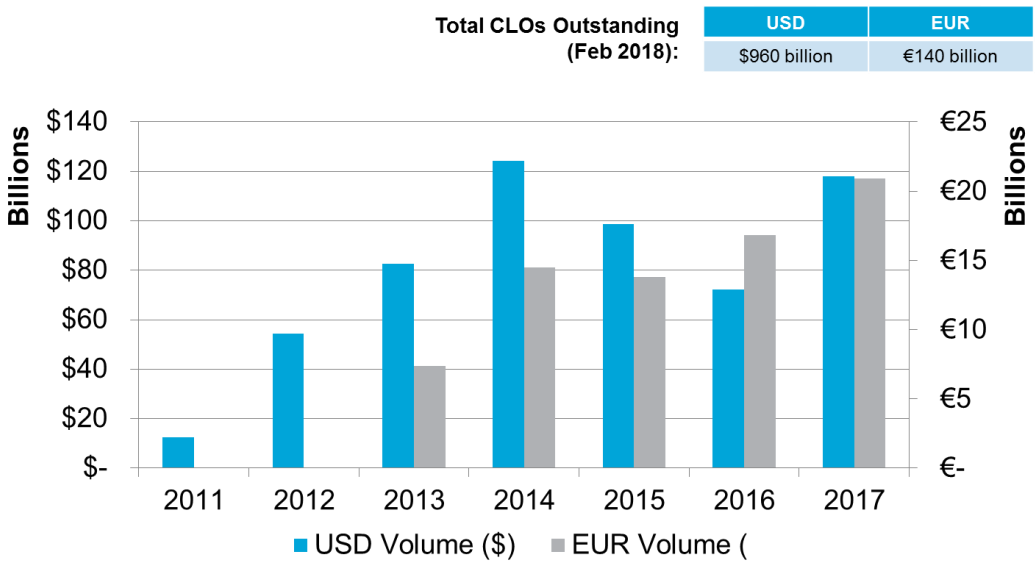
Following a decision from the U.S. Court of Appeals in February 2018, the risk retention rules no longer apply to managed CLOs and there has also been an easing of the Volcker rule in relation to CLOs. However, these rules continue to apply for European investors and thus shutting out their liquidity for US transactions where risk retention has been eliminated. The high water mark has also been passed for European regulation of the securitisation market and while the risk retention rules continue to apply to CLOs, the regulators listened to industry concerns when finalising the new rules and the incoming Securitisation is designed to further

[17] all figures sourced from LCD news CLO Global Databank

promote the growth of the European securitisation market. This change of tone from regulators on both sides of the pond contributed in making 2017 and now 2018 record years for CLO issuance. In the end, global institutional investors interested in sustainable infrastructure will make their preferences known pursuant to their preferred CLO structure.

The CLO structure and financing technology, if applied to a pool of sustainable infrastructure loans, may lead to a similarly successful asset class that accelerates sustainable loan origination. As such, sustainable/green CLOs likewise have the potential to become the natural investors in clean energy and infrastructure and in energy efficient real estate and transportation. With the correct regulatory and policy frameworks in place, sustainable CLOs can rapidly be scaled to a multi-trillion market.

Figure 17. Total CLOs Outstanding (February 2018)



6.4.1 CLO structures

There are two principal ways of structuring a CLO, a Managed CLO and Balance-sheet CLO.

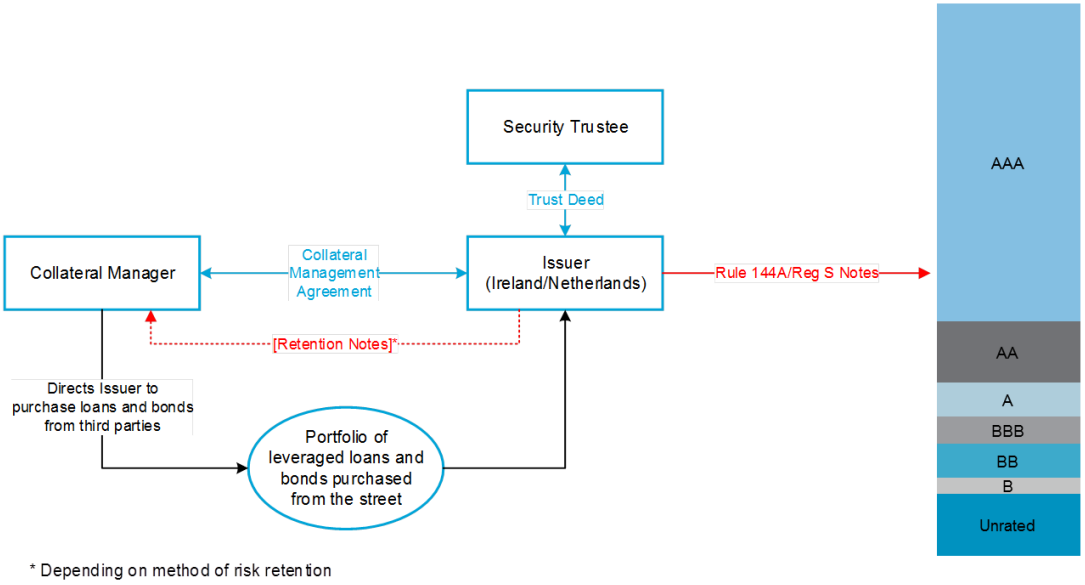
Method 1: The Managed CLO

The portfolio assets are actively managed and capable of being replaced or substituted where the purpose of the CLO is the creation of profit, generated by achieving a rate of return on the CLO portfolio which is higher than the cost of servicing the debt on the CLO securities.

Managed CLOs also tend to be “open market CLOs”, that is, they acquire their assets from arm’s length negotiations and trading on an open market as opposed to balance sheet CLOs where the underlying assets are primarily originated by a single entity. The active management potential of CLOs differentiates them from other types of securitisation, in which new assets may often only be added as principal redemptions occur. Managed CLOs are designed to capitalise on the difference between income from the pool of loans, less the interest payments on the issued securities. CLOs are usually managed, with a reinvestment period where

loans can be purchased and sold with the proceeds of such sales and prepayments invested in further loans.

Figure 18. The Managed CLO

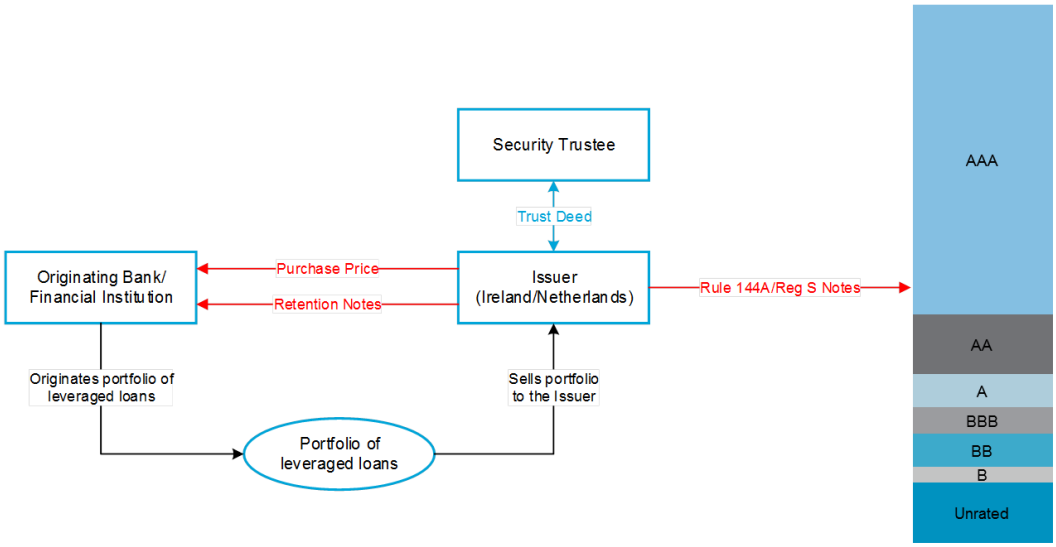


Method 2: The Balance-sheet CLO

In contrast to managed CLOs, balance sheet CLOs are created by the originators or original lenders of the underlying loans. In essence, they are securitisations of core corporate lending from a bank's balance sheet. In addition to being a source of funding for the bank, a fundamental purpose of balance sheet CLOs is to transfer loan assets (and their risk) off the originator's balance sheet, thereby reducing the amount of regulatory capital they are required to hold.

This structure will be a useful tool to enable scaling up the sustainable finance market. Financial institutions with sustainable loans on their balance sheet can use balance sheet CLOs, to create a "sustainable finance loop" which generates sustainable assets on a rolling basis. Sustainable loans are transferred from the originating bank's balance sheet to a special purpose vehicle (SPV) and securitised. The proceeds of these CLOs then form the basis of new sustainable loans from the originating bank with its freed up balance sheet. The loop is closed as these second-generation sustainable loans are themselves transferred to an SPV to issue more CLO-backed securities.

Figure 18. The Balance-sheet CLO

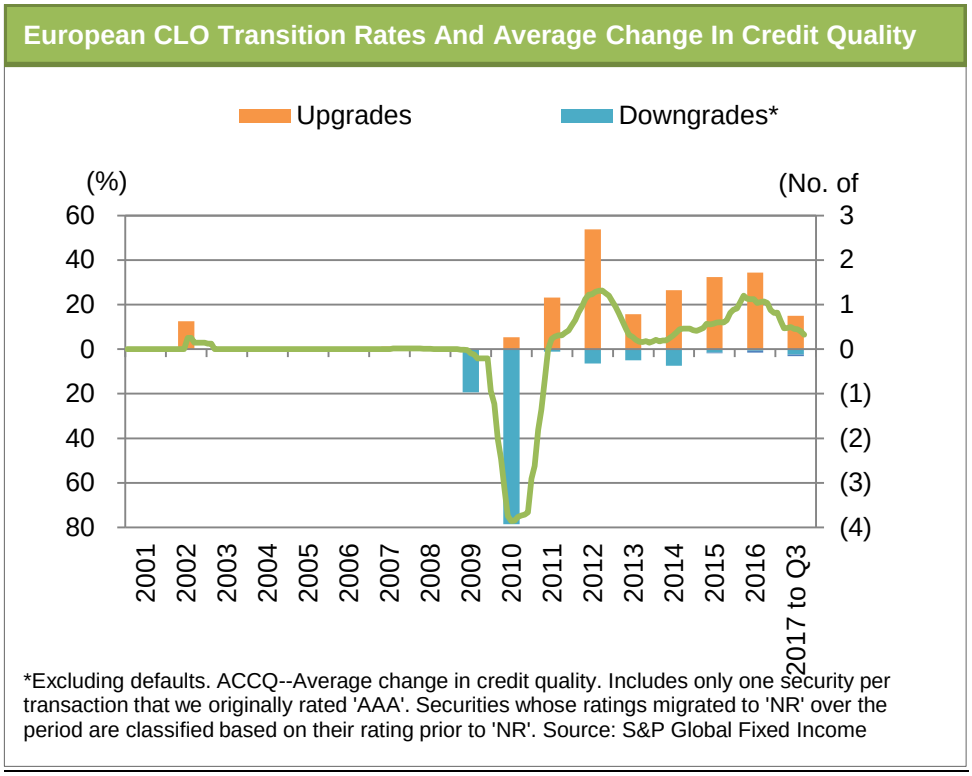


6.5 The Ratings Process for CLOs (S&P Global Ratings)

Over the last 20 years, European CLOs showed a strong credit performance, with minimal defaults (0.7%) and low loss rates. The majority of the CLO tranches that defaulted were originally rated Non Investment Grade (BB+ and below).

CLO 2.0 are characterised by greater credit enhancements levels than CLO 1.0, less convoluted structural features and increase alignment of incentives amongst the parties. As the below graph illustrates, upgrades in 2016 were focused in the European CLO group, with the CLO 1.0 upgrade rate as high as 45.5%, compared with only 3.8% for the 2.0 generation. Likewise, all the downgrades and defaults in 2016 were in 1.0 transactions, with the largest number of downgrades (and all defaults) in transactions from the pre-2005 vintages.

Figure 18. European CLO rating development



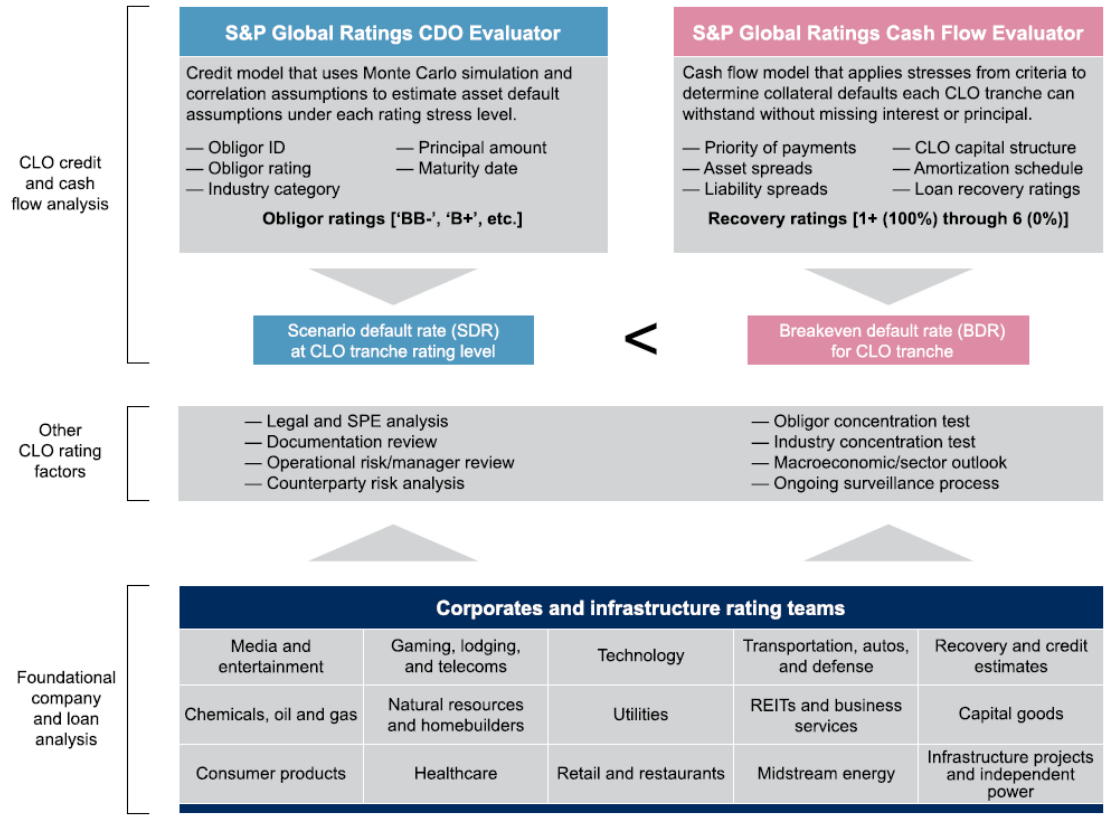
6.5.1 CLO Rating Process

We apply five pillars of analysis to CLO transactions throughout the ratings process as we assess the creditworthiness of the tranches and assign ratings. These include:

- Credit quality of the securitised assets,
- Legal and regulatory risks,
- Payment structure and cash flow mechanics
- Operational and administrative risks, and
- Counterparty risk.

The below chart flow illustrates S&P Global's regular CLO Rating Process.

Figure 19. S&P Global's CLO Rating Process



One of the main criteria that S&P Global use to assign the CLOs ratings is "Global Methodologies And Assumptions For Corporate Cash Flow and Synthetic CDOs" published on August 16th, 2016. This criteria cover two of the five pillars mentioned above- credit quality of the securitised assets and payment structure and cash flow mechanics.

The starting point of the CLO rating process is the analysis of the underlying pool of assets. CLOs are backed by leveraged loans, typically from more than 100 distinct obligors. To meet a transaction's eligibility criteria, most of the loans must have a rating or a credit estimate assigned by S&P Global Ratings. This allows S&P to use the ratings on the underlying obligors as a proxy to quantify the credit quality of every asset in the portfolio. Approximately 95% of the loans backing BSL CLOs have issuer credit ratings assigned and continuously surveilled by S&P Global Ratings analysts on the corporate ratings team.

The credit quality of the corporate entities that support the CLO collateral pool is a key driver in the CLO ratings process. Indeed, the credit fundamentals of a corporate will influence the overall credit quality of any CLO structure, whether the pool is comprised of green or non-green liabilities. Green factors are considered in the context of the corporate credit analysis in a number of ways and are typically reflected in the industry risk and competitive position portions of an entities business risk profile assessment, and in the assessment of an entities management and governance. According to a study by S&P Global Ratings there are numerous references to green factors- both environmental and climate risks and opportunities- across the industry-specific Key Credit Factors (KCFs) used in the credit rating process. These KCFs provide complementary detail, such as how industry-specific risk factors are assessed, for the application of the Corporate ratings criteria. The study found that there were numerous

instances where environmental and climate factors have affected corporate ratings. A review of all 9,000 corporate credit ratings between July 2015 and August 2017 found that climate and environmental factors were referenced in 717 instances in the credit analysis, or in nearly 10% of all credit rating actions, and there were 106 actions that listed an environmental or climate factor as the key driver of the rating action. The study also found that rating actions taken were relatively balanced with 44% in the positive direction and 56% in the negative direction. This is a change from S&P's prior two-year lookback study published in 2015 where 79% of actions were in the negative direction. This suggests that some companies have been able to effectively mitigate their environmental and climate risk or benefiting from various transition opportunities or changes in environmental policy. As market, political, and regulatory drivers continue to drive green and climate initiatives, corporate credit quality will increasingly reflect how entities are mitigating the risks and exploiting opportunities for advantage and thereby influence the credit quality of CLOs.

CLO credit analysis is performed using S&P Global Ratings proprietary model CDO Evaluator that generates scenario default rates (SDRs), which represent the percentage of the portfolio that is expected to default under different economic stresses. SDRs are driven by the credit quality of the assets (average rating), the concentration of the portfolio, and its weighted average life. A higher SDR signifies a higher expected default for a given portfolio.

To analyse the cash flow and structure of a CLO transaction S&P uses its proprietary Cash Flow Evaluator. The model first projects the cash flows generated from the pool of securitised loans under various stress assumptions at different rating levels. The model then follows the transaction-specific waterfall structure and evaluates whether a given structure can fully pay down the classes under the stress scenario commensurate with a proposed rating such that the projected cash flows generated from the assets are sufficient to meet the obligations of the issuer in a timely manner.

Cash Flow Evaluator provides for each tranche a break-even default rate (BDR), which is the maximum default rate that can be applied to the collateral in each stress scenario while still ensuring the rated tranches receive timely interest payments and ultimate principal repayments. Certain stresses are applied to the transaction's cash flows to analyse how each tranche is paid under different stress assumptions. Some of these assumptions include fluctuations in interest rates and the timing of collateral asset defaults. Subordination, average expected recovery amounts and available excess interest are one of the main drivers of BDRs. Combining the cash flow and credit analysis, S&P evaluates the portfolio and how it generates principal and interest proceeds such that, for a tranche to achieve a particular rating, it must be able to withstand the level of defaults projected by CDO Evaluator and still pay timely interest and principal on the rated notes. If the BDR exceeds the SDR, then the cash flows show that the tranche can withstand the amount of defaults predicted by CDO Evaluator. S&P performs its document review, legal review of the SPE, and analysis of the counterparties and transaction participants at the onset of the CLO transaction and then monitors these aspects for impactful changes through the CLO transaction's life.

For the time being, S&P Global will use current published criteria to assess the credit risk of a sustainable infrastructure CLO. The framework is a combination of the Corporate CLO criteria and Project Finance CDO criteria. Sustainable CLOs will follow the same five-pillar analysis under our criteria for CLOs.

In a cash flow CLO transaction, payments to the noteholders are derived from the cash flows realised from the underlying pool of loans in the securitised portfolio. Although most of the CLO transactions rated to date involve the repackaging of corporate loans, the rating process for a transaction with project loans as the underlying asset class is similar.

Rating any CLO transaction requires distinct levels of analysis. The first level of analysis is an assessment of the credit quality of the underlying assets. The second level of analysis focuses on the default- and loss-severity characteristics of the pool. The third level of analysis involves cash flow forecasts, and the last level examines the structural features of the transaction.

In preparation for rating CLOs with green/sustainable infrastructure loans as the underlying assets, S&P Global researches the loan structure and behaviour of the instrument. Based on our analysis, we concluded that green loans may show different fundamental characteristics from corporate financings. As a result, there are difference in the inputs used to perform the analysis of a CLO transaction with sustainable loans as the underlying assets will differ from those for transactions with corporate loans. Such differences are also the key for the difference in the output. The main differences we note are the generally higher average rating as well as the higher recovery rating, especially for project finance loans. These assumptions are hypothetical and will largely depend on the selection of loans by the portfolio manager, investor appetite for green CLOs and the regulatory environment.

Assuming a hypothetical structure:

Credit Model Assumptions

1. 90 obligors in the portfolio
2. 'BBB-' rated assets
3. 12.5 years weighted average life
4. 400 mil target par in EUR
5. Senior secured loans used for recovery assumptions

Class	Size mil. €	Spread over 3 m EURIBOR	S&P Rating	CE	CE for CLO
A	280,000,000	1.20	AAA	30.00%	38%-40%
B	64,000,000	2.50	A	14.00%	20%
C	16,000,000	4.00	BBB-	10.00%	15.5%
Sub	40,000,000				

We note that the credit enhancement differs significantly from a CLO, with a much lower lever, despite the greater tenor. This is driven by better quality of the assets and the expected higher recovery rates.

Cash Flow Model Assumptions:

1. WAS of 2.20% on the assets
2. WAL of 12.5 years, defaults pushed to year 8

3. Half of management fees

4. Senior secured loans

5. No reinvestment period

6. Amortization curve as per current portfolio

Class	Tranche Balance	Rating	Min/%tile BDR	SDR	Cushion	Pass/Fail
A	280,000,000	AAA	54.19%	53.83%	0.36%	Pass
B	64,000,000	A	37.95%	36.33%	1.62%	Pass
C	16,000,000	BBB-	25.64%	24.16%	1.48%	Pass
Sub	40,000,000	NR	N/A	N/A	N/A	N/A

Whilst the equity arbitrage (WAS- WACD) is less important than in a CLO, it is noticeable that the lower level of expected defaults benefits the transaction.

Liability Rating	Scenario Default Rate	Performing Weighted Average Recovery
AAA	53.83%	50.00%
AA+	46.88%	55.00%
AA	43.35%	55.00%
AA-	40.32%	55.00%
A+	37.90%	59.00%
A	36.33%	59.00%
A-	32.73%	59.00%
BBB+	29.86%	63.00%
BBB	27.21%	63.00%
BBB-	24.16%	63.00%
BB+	21.65%	75.00%
BB	19.75%	75.00%
BB-	17.49%	75.00%
B+	16.35%	79.00%
B	14.15%	79.00%
B-	13.00%	79.00%
CCC+	10.62%	79.00%
CCC	9.41%	79.00%
CCC-	7.55%	79.00%

Difference recap

	Sustainable infrastructure CLOs	**Corporate CLOs**
Underlying Asset	Sustainable infrastructure debt and corporate debt that comply with Green Bond and ESG Principles	Corporate Debt issued by highly leverage companies
Average rating	High Investment Grade	Typically B/B+
Tenor	It can vary from 5-20y	Typically 5/7 years
Seniority	Typically Senior Unsecured	Senior Secured Loan/First Lien
Spread	It varies : 0.05% to 10%+	Typical

6.6 The quantitative potential for sustainable securitisation

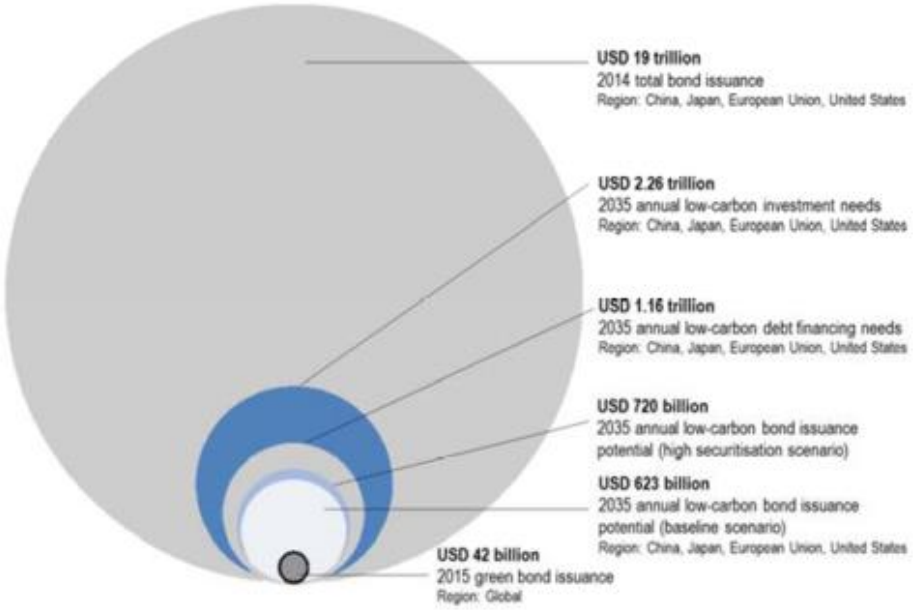
An analysis conducted on behalf of the G20 Green Finance Study Group (Kaminker, 2016a) proposes a quantitative framework for understanding possible directions of bond market evolution and for analysing the potential contribution that the bond markets can make to a low-carbon transition, while mobilising institutional investors. The analysis contains the first quantifications of debt financing, and bond financing in particular, to meet the 2C energy investment scenarios (2DS) set forth by the IEA.

The analysis studies: 1) how much debt finance is needed to meet the IEA's 2C energy investment scenarios (2DS) between 2015 and 2035 in the four markets studied (the People's Republic of China, the European Union, Japan and the United States); 2) how the bond market might evolve in the same period to account for part of these debt finance needs; and 3) the implications for institutional investors that have driven the growth of the green bond market to date.

The IEA has estimated investment needs in the renewable energy, energy efficiency and LEV sectors to 2035, consistent with an expectation that countries will take policy actions leading to a 2C emissions pathway or scenario ('a 2DS'). Building on these investment scenarios, this work applies assumptions based on current trends in regional financial markets to synthetically break down the aggregated investment needs by source of finance and type of financial instrument. The analysis converts investments into their constituent equity and debt components. Focusing on debt, the analysis considers the role that the bond markets can play to finance this investment.

The analysis covers debt securities markets in China, the EU, Japan and the US, which represent almost 70% of the global annual investment needs projected for the next five years. These markets currently have significantly more established debt securities markets than other regions, and are the largest globally, accounting for around 75% of the global debt securities markets valued at 97 trillion in 2014. Debt securities outstanding from all sectors amounted to USD 39 trillion in the US, USD 21 trillion in the EU, USD 9.7 trillion in Japan and USD 4.3 trillion in China. New gross issuance in 2014 amounted to USD 19 trillion in these markets.

Figure 20. Scenario results to 2035 compared with low-carbon investment needs and new debt securities issuance (Annual)



Source: Kaminker (2017) citing OECD analysis based on IEA (2014; 2012) Climate Bonds Initiative, BIS, SIFMA, ECB, JSRI, ADB and Goldman Sachs data. Note: OECD modelling scenarios and annual 'low-carbon' investment needs in the figure cover the renewable energy, energy efficiency and low-emissions vehicle sectors as estimated by the IEA (2014, 2012). The 2015 green bond issuance figure of USD 42 billion is provided as a reference point and extends to all sectors included in Climate Bonds Initiative database. No judgement is made as to the percentage of bonds from these 'low-carbon' sectors that will be labelled as 'green bonds'. Annual total bond issuance is provided as an illustration and just as with green bond issuance, reflects 'gross issuance' figures, i.e. does not account for those securities that reach maturity or are redeemed from previous years (termed 'net issuance'). It includes other types of debt securities such as notes and money market instruments.

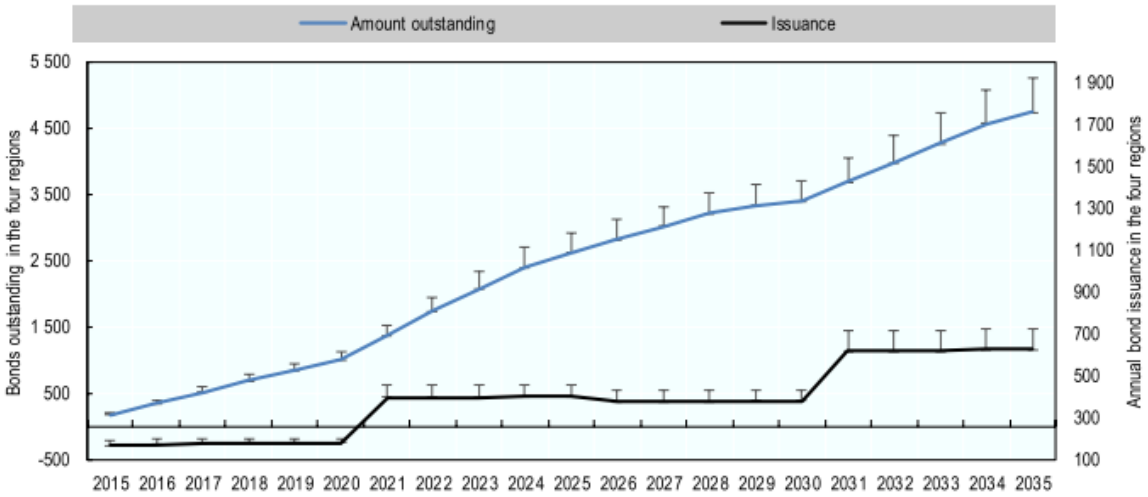
Debt (lending) and bond financing needs are estimated to continue to grow significantly in capital expenditure terms, while decreasing somewhat as a proportion of investment. Debt is seen as covering 60% of total investment needs between 2015 and 2025, while this ratio decreases steadily to 52% in 2035. The mix of financing types ranges significantly across the types of assets. For renewables, the debt to equity ratio remains about level at 75%.

Current financing and purchasing trends show that a significant proportion of energy efficiency and LEV investment is done through consumer finance or equity. Assuming that this continues to be the case, and given the increasingly large size of LEV and energy efficiency investment needs relative to renewables over the period, equity and self (cash) finance are estimated to continue to make a large and growing contribution to financing low-carbon energy investment.

The role of bonds in financing investment depends on the maturity of the technology, the characteristics of the projects including the scale at project level, as well as the type of investor. The results of the analysis suggest that by 2035 in a 2DS, bonds for low-carbon energy investments have the potential to scale to as much as USD 4.7-5.6 trillion in outstanding securities globally and USD 620-720 billion in annual issuance in the markets studied. While

these figures may seem large on an absolute basis, they are small (approximately 4%) relative to the scale of issuance in debt securities markets generally.

Figure 21. Potential for low-carbon bond issuance ranges between USD 620 billion and USD 720 billion per year by 2035 (USD billion)

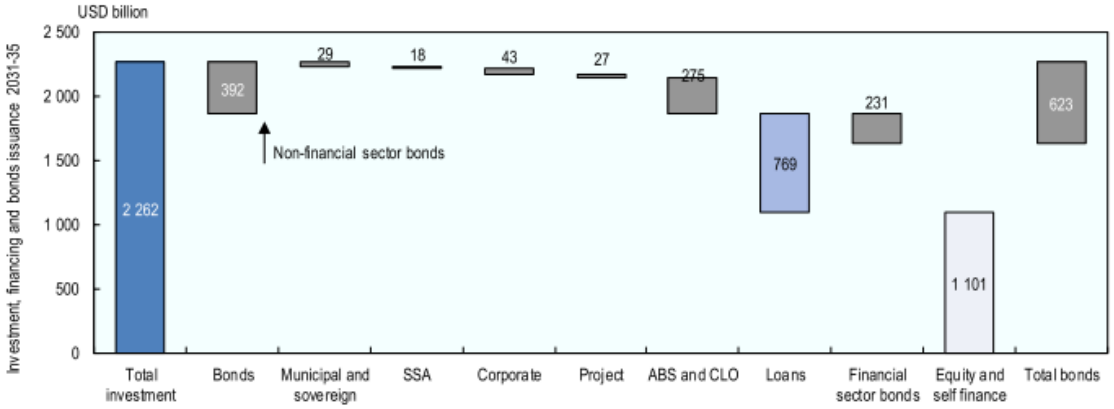


Source: Kaminker (2017)

Note: Error bars represent the enhanced securitisation scenario, based on a 10% increase in asset securitisation rate across all sectors over the baseline scenario, which incorporates a more conservative asset securitisation assumption. 'Outstanding' refers to cumulative amount of bonds issued that have not yet reached redemption or maturity.The analysis suggests that the 2020s have the potential to be the beginning of the 'golden years' for bond issuance in the low-carbon sectors. As low-carbon technologies mature, they become more familiar to bond markets which can become substantial contributors to the financing and re-financing of new-build assets. As the costs of assets fall and as policy stabilises, the role played by bonds could expand rapidly. The analysis examines the potential for different types of bond to finance a range of sectors and sub-sectors of low-carbon investments studied; displaying a picture of the volume of outstanding securities through to 2035 and the speed at which they could potentially scale up.

A particular need to activate and scale up issuance of asset-backed securities (ABS) and Collaterised Loan Obligations (CLO) has been identified by the OECD on behalf of the G20, with sustainable energy assets, green buildings loans and leases of LEVs being seen as a particularly suitable target.

Figure 22. Financing in 2035 by type of capital and bond (baseline scenario)



Source: Kaminker (2017)

Notes: SSA: supranational, sub-sovereign and agency; ABS: asset-backed securities; CLO: collateralised loan obligation. Bonds are coloured in grey and financial sector bonds appear after loans to reflect issuance that finances on-lending via banks.

By 2035 in the baseline scenario, almost a third of outstanding bonds from the low-carbon sectors studied could be in the form of ABS or CLO. Conservative assumptions used for these scenarios based on the literature available in 2015 suggest there is potential to 'surprise to the upside' based on observed market activity in 2015-16 beginning to diverge significantly from forecasts (e.g. in LEV sales and solar PV deployment).

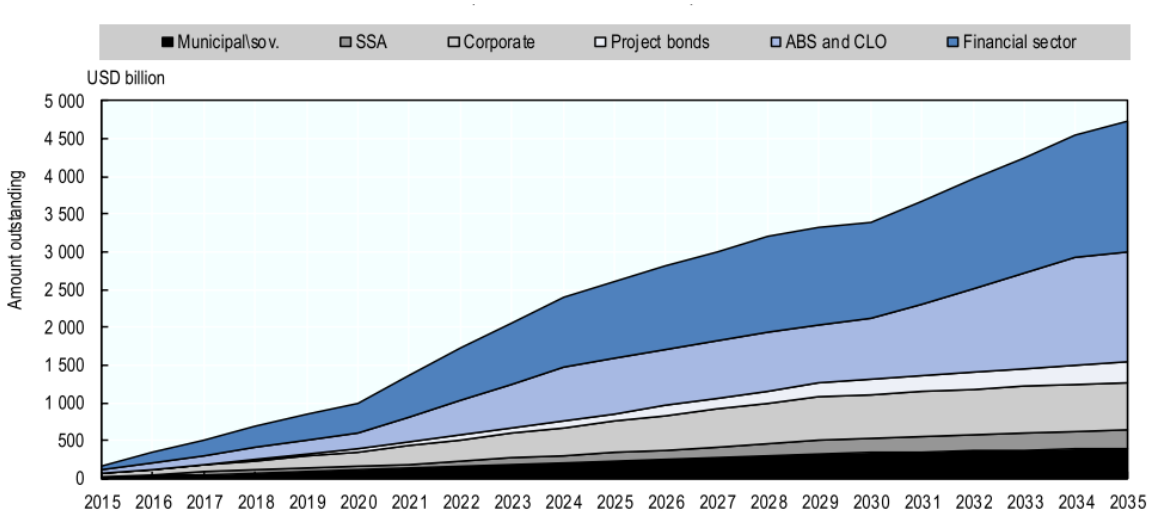
ABS and CLO have a disproportionately large potential to scale since they are less likely to be constrained by government fiscal and budgetary constraints in the case of government (i.e. municipal) bonds, and by balance sheet constraints in the case of corporate and Sovereign, Supranational and Agency (SSA). The OECD also underscores that efforts to support green securitisation must be undertaken in a prudent, judicious and transparent manner so that green ABS/CLO markets emerge with integrity and with due consideration for any financial stability issues.

The automotive market is seen as having the greatest opportunity, driven by current trends in car loan and lease securitisation combined with large replacement investment needs in transport to 2035, except in China where there is an increase in vehicle ownership. Hence, the analysis indicates that ABS increases in market share over time as the ABS market develops in China. Securitisation of LEV leases are seen as a particularly suitable target, as demonstrated by ABS issued in 2014 and 2015 from Toyota. Accordingly, by 2035 in the baseline scenario, almost a third of outstanding bonds from the low-carbon sectors studied could be in the form of ABS. Securitised energy efficiency loans have the potential to make up 18% of ABS outstanding in 2025 and 13% in 2035. These are likely to constitute a minor part of the potential that green mortgages are thought to have to finance the full value of efficient buildings. Green mortgages could eventually be securitised into green collateralised mortgage obligations.

The results also reveal the prominent role loans play in financing low-carbon investment needs to 2035. Financial institutions are expected to continue to be the largest provider of loans to all three sectors given their specific expertise in the arranging of credit for the earlier stages of infrastructure development project cycle through to project operation, at which point other sources of debt capital including bond and CLO markets can be called on to re-finance the debt.

While financial institutions have a major role to play in arranging the debt financing for low-carbon infrastructure through loans and through underwriting and investing in bonds, they notably also can act as issuers of 'financial sector' bonds to raise capital and fund their lending activities.

Figure 23. ABS, CLO and financial sector bonds have the largest potential to scale up (baseline scenario)



Source: Kaminker (2017)

Notes: SSA: supranational, sub-sovereign and agency; ABS = asset-backed security; CLO = collateralised loan obligation. The figure depicts the base case 'low-securitisation scenario'. Bonds in the People's Republic of China, Japan, the EU and the United States.

The scenarios highlight geographical variations and some similarities. For instance, financial sector issuance potential is seen as strong in all four markets accounting for the largest low-carbon bond sector in China, the EU and Japan.

In the US, a higher share of ABS/CLO is possible than in other markets in 2035 representing the largest share followed closely by financial sector bonds. This is due to the higher level of maturity of the financial markets in general and securitisation markets in particular. Over time it is assumed that a portion of corporate borrowing by US utilities will be substituted by project bonds and ABS/CLO.

In the EU, ABS/CLO have the potential to be the second largest bond type, with the financial sector playing a more prominent role than in the US. ABS/CLO could accumulate a large market share but may cede some of this share over time to corporate and project bonds.

6.7 Legal and Regulatory Issues Surrounding Sustainable CLOs

6.7.1 Legal aspects: Terms in transaction documents

"Green" use of proceeds in offer Documentation

As a practical matter an issuer will designate a "green" Use of Proceeds in the prospectus or other disclosure documentation and then provide summarised information about: (i) the "green" (eligible) projects it expects to finance, (ii) any reporting obligations it may have and (iii) the provision of second party opinions (if any). It may include the eligibility criteria and green taxonomy at this point or they may appear in a different section of the offer documentation. These are some of the key differentials from non-sustainable securitisations.

Undertaking or representation on 'Use of Proceeds'

'Green'/sustainable provisions are not typically included in contractual documents, although the inclusion of an undertaking regarding use of proceeds in the Dealer/Subscription/Purchase Agreement is sometimes requested by underwriters. A representation on the use of proceeds is often included in the context of sanction representations e.g. "The Issuer will only use the proceeds of the issue of the Notes, or lend, contribute or otherwise make available such proceeds to any person or entity for the purposes as disclosed in the Prospectus." Such an undertaking or representation may create an obligation and possible liability for ongoing monitoring or enforcement.

Green undertakings

The breach of green/sustainable undertakings may trigger an event of default under documentation, which could result in cross-defaults of other agreements. However, main stream project bonds and structured finance transactions do include similar such undertakings so including one in relation to green/sustainable use of proceeds might be acceptable to this market. If such a clause was called for by institutional investors, usual 'cure' techniques and standstill periods to affect a cure can be included to alleviate risk.

From the investor perspective, one potential upside with handling sustainable assets in a CLO/loan format is that it actually gives the investor a bigger control of the use of proceeds – a common critique on the green bond market is that there are no covenants to protect funds to be used for non-sustainable assets.

Prospectus liability

In many jurisdictions, prospectus liability (either criminal or civil) may be imposed if there is a material inaccuracy in, or omission of information from, the prospectus or other offering document, which causes investors to suffer loss as a result. If the issuer discloses in the 'Use of Proceeds' section, for example, that it would use the proceeds of the issuance for certain eligible projects, and did not, in some jurisdictions prospectus liability may arise if the result of such incorrect or incomplete disclosure is a loss. The same may apply if the disclosure in the prospectus or offering document sets out a mechanism to credit the proceeds of the green bond into a specific sub-account or otherwise track them by a formal internal process.

Specifically in the context of sustainable CLOs, provisions may be included regarding the substitution of underlying loan assets that fall below a pre-agreed minimum standard of sustainability after the CLO-backed securities have been issued as depending on the nature of

the underlying loan obligation, this may not in itself constitute an event of default. CLOs may need to be actively managed to ensure that collateral falling below the minimum standard is substituted. Similarly, where there is a green tranche in an otherwise non-green CLO, it must be considered whether there is a risk that investors in the green tranche could be repaid using non-green collateral in the event of a default of the green collateral, or where it falls below the agreed minimum standards of sustainability.

Other information

In addition to the usual reporting obligations in structured transaction documentation, further information will be expected for sustainable transactions such as details of the process for project evaluation and selection, management of proceeds, reporting in relation to the proceeds of any green bond issuances, the green taxonomy and selection criteria.

6.7.2 Regulatory developments

Certain regulatory measures are being considered to propagate the sustainable finance market, including sustainable CLOs. Complementing the creation of new sustainable finance mechanisms, the 'green supporting factor' (described below) is one such proposal. Discussion to date has focused on applying the green supporting factor post-securitisation; however, applying it pre-securitisation would be more effective to promote the faster creation of sustainable assets and would be welcomed by many stakeholders including non-bank investors in sustainable securitisation. Other proposed measures include a 'brown penalising factor' - higher capital requirements for carbon-intensive assets. In such a scenario, green/sustainable CLOs or ABS will have an institutional investor liquidity advantage over their "brown" counterparts. Such a move would be a strong signal from regulators of their intent to take risk such as stranded asset out of the financial system and this could only further advance sustainable investments.

"Green supporting factor"

The proposed Green Supporting Factor (**GSF**) would be a applied to banks' capital risk-weightings to reduce the relative weighting of sustainable assets. The concept is similar to the SME supporting factor[18] which already exists under EU law. Proponents of the GSF concept, argue apart from helping to stimulate the growth of the sustainable finance market, favourable risk-weightings are often inherently justified as sustainable assets are often less risky than their non- sustainable counterparts. ESG factors are increasingly being viewed as material to the valuation of assets and their performance over time.

However, concerns were raised within the EU High Level Expert Group (**HLEG**) and by central bankers that recommending a GSF would be the thin end of the wedge for further politically motivated fiscal policy. GSF could act as a precedent for further deviations from the principle that capital requirements should be based solely on the riskiness of the underlying asset. It was contended deviation from this principle would lead not only to financial instability in the market but it would also distort competition in favour of countries and entities less reliant or exposed to fossil fuels.

It is the opinion of the EU Commission that the establishment of a robust and transparent sustainability taxonomy is an essential foundation upon which concessionary regulations such

[18] https://www.eba.europa.eu/documents/10180/1359456/EBA-Op-2016-04++Report+on+SMEs+and+SME+supporting+factor.pdf

as GSF could be built upon. This would reduce the risk of favourable capital treatment being abused by "greenwashed" products. Once the sustainability taxonomy has been finalised, the Commission will assess whether more appropriate capital requirements could be adopted to better reflect the risk of sustainable assets held by banks and insurance companies. However, until such a time, full transparency of issued bonds (potentially aided by new technology) will be required to act as a bridge to a fully agreed upon taxonomy.

Alternative– a brown penalising factor

An alternative to the GSF is the concept of a brown penalising factor, i.e. higher capital requirements for polluting and other non sustainable assets. Such a provision would avoid the problem of lowering capital requirements, while still giving a political signal in favour of sustainable finance. This is a win-win outcome according to Finance Watch, an NGO which opposes the GSF which according to them would "leave the banking system weaker". A brown penalising factor would recognise the fact that high carbon, polluting and other assets that generate negative externalities will become increasingly risky financially, as markets are gradually shifting in favour of sustainable options and business models and the risk of stranded fossil fuel assets becomes a real and growing threat.

6.8 APG Sustainable CLO Case Study – Hypothetical Evaluation Approach

Background

APG is one of the largest pension fiduciary asset managers globally. As a long-term, responsible investor, APG has been an advocate for growing the sustainable finance market and is an active participant in discussions on standards and regulatory considerations for new sustainability-linked investment products.

Investment Process

APG conducts financial analysis as the starting point for determining the soundness and safety of all potential investments. Accordingly, we would evaluate the investment merits of a sustainable CLO with the same approach for assessing any new product – with careful consideration of its relative attractiveness and overall fit within our portfolio. Independent of sustainability considerations, the investment team would first review the underlying assets to determine their income generating capabilities, followed by an assessment of the securitization process and CLO structure.

If a particular sustainable CLO meets our requirements from a relative value and structure perspective, we would then evaluate its sustainability features – including the use of proceeds language and impact reporting policies. Further analysis helps us confirm whether the proceeds are properly ring-fenced for the approved green/social expenditures and that there are no other negative externalities associated with the eligible projects that might offset the positive impact. APG could also potentially have a higher standard when it comes to evaluating sustainability impact compared to other market participants. Even if a regulatory-driven taxonomy of green classifications emerges, it's possible that other investors will also continue to rely on internal requirements around project eligibility and impact thresholds.

Risk/Return Analysis

APG invests in CLOs as part of a larger credit portfolio rather than a pure ALM strategy. Therefore, understanding the risk/return characteristics of a sustainable CLO in a benchmark-

relative context is paramount since this product would represent an out-of-benchmark position, potentially with longer duration. If we were to consider a CLO of infrastructure loans, the long-dated maturities and often limited yield offered may make it a less attractive asset class in which to invest. In order to have greater appeal to benchmark sensitive investors in addition to ALM strategies, we would suggest considering opportunities to add shorter-dated projects in these CLOs as well.

Additionally, there are several key components of a sustainable CLO that we would consider as part of our risk/return analysis. First we would seek to better understand the diversification profile of the underlying pool of assets. CLOs are typically structured with a diversification requirement, with the diversity of loans serving as one of the main benefits of investing in CLOs. If sustainable CLOs receive a lower diversification score from rating agencies, further credit enhancement might be necessary. Compounded with a lack of performance history, investors may initially require even greater compensation for potential concentration risk.

Next, we would examine the structural features of a sustainable CLO. The objective here is to ascertain how new sustainable energy infrastructure loans are selected, assess the reinvestment process, and understand the overall mechanics of the active management process – focusing on the origination and servicing capability of the involved entities. Lastly, we would evaluate the capabilities of the sustainable CLO manager, which is an important consideration when investing in any CLO. Perceived differences in managers' level of skill, degree of experience, and track record can translate into meaningful impacts on pricing. For sustainability CLOs there will also be the added challenge of ensuring managers possess credible sustainability expertise in addition to their ability to successfully manage the CLO structure. This may result in investors seeking a complexity premium until some degree of performance history is established.

It is important to note that we do not view these issues as roadblocks to the eventual success of the sustainable CLO market. Highlighting a hypothetical approach to evaluation should help sustainable CLOs evolve over time to address institutional investor concerns and provide a pathway for increased investor demand and market growth over the long-term.

Regulatory Considerations

The regulatory environment, particularly Solvency II, makes it difficult to reduce capital requirements for sustainable CLOs. This particular regulation views CLOs as a riskier instrument because CLOs are generally viewed as an asset type with higher risk premium than Agency MBS due to their complex and actively managed structures. Applicable EU risk retention rules also need to be a requirement to ensure global investor appeal since this is still necessary to allow participation by European investors.

Ongoing Investor Outreach

In order to achieve the greatest success, we believe a broader assessment of institutional investor demand for the underlying assets should be undertaken as a necessary first step. It is our experience that securitizing assets does not necessarily change their relative attractiveness. Important topics would include: how a sustainable CLO fits within overall credit portfolios and how large an allocation for real infrastructure, sustainable or not, makes sense from a strategic point of view. Collaboration with potential sustainable CLO managers will also be crucial in establishing guidelines for the type of sustainability support/resources existing CLO managers may need to appropriately manage this product structure.

7. Conclusions

It is clear the leveraged loan CLO market has great potential to be used as a template for the development of the sustainable CLO market with the pace and scale needed to connect investor demand with the world's USD 90 trillion sustainable infrastructure financing need over the next 15 years. It is also clear a cumulative stock (and increasing flow) of sustainable infrastructure loans already exists on the order of magnitude commensurate with large scale securitisation activity. The sustainable energy market as just one subset example that is already a mature, well-defined and sufficiently deep market to act as a point of departure for this market. The private sector is already developing these markets but global regulatory coordination and policy support in key jurisdictions will be needed to ensure the requisite pace and scale.

Clearly, policy makers must focus attention on the prerequisite framework conditions for pipelines of bankable sustainable infrastructure projects to emerge at scale, on the order of magnitude that is commensurate with the challenge. While beyond the focus of this paper, there is a vast body of literature that describes how the public sector can put in place efficient, effective, predictable and stable enabling environments that are "investment-grade". Any efforts to support green securitisation must be undertaken in a prudent, judicious and transparent manner so that ABS markets emerge with integrity and with due consideration for any financial stability issues.

CLO 1.0 passed the stress test of the financial crisis with flying colours and the CLO 2.0 market is already exceeding pre-crisis levels of new issuance as both investors and regulators continue to demonstrate their appetite and understanding for the product. The outlook for CLOs is strong after years of regulatory uncertainty following the financial crisis and the attitude of policymakers towards securitisation appears to be softening. There are legislative initiatives on the way to support green CLOs. For example, under the simple, transparent, and standardised (STS) framework of European securitisation regulation, sponsors and originators will be required from January 2019 onward to disclose information on the energy efficiency of underlying assets in RMBS and auto loan securitisations in order to receive beneficial regulatory capital treatment.

In its Action Plan published in March, the EC said it would establish a unified EU classification system or taxonomy to define sustainable investments, identify areas where sustainable investments can make the biggest impact, and clarify the duty of asset managers and institutional investors to take sustainability into account in the investment process and enhance disclosure requirements.

While a taxonomy, principles and certifications can create extra costs and operational efforts, they help with due diligence processes to assess an asset's green use of proceeds. They provide the desired transparency so that portfolio managers and investors know how the proceeds are being spent during the life of the structure. In the absence of fully harmonised regional and/or global taxonomies and definitions, transparency is the key. All structured products must clearly and easily allow investors, policy makers and other stakeholders to understand the true sustainability characteristics and risks of the underlying pool of assets.

It is clear that the benefits of holding and developing sustainable assets are manifold, including higher revenue streams, reputational benefits, tax advantages, reduced exposure to fossil fuel-related risk and of course most importantly contributing to the global effort to mitigate climate change and finance sustainable development. These advantages are demonstrated by the increase in availability and prevalence of sustainable finance products in the market. As so many sustainable activities happen on a micro level, the next steps are for

financial institutions to aggregate their sustainable products; sell them into the global capital markets; and clear their balance sheets to make way for the next wave of sustainable loans for businesses and private individuals.

Almost every government has signed up to the Paris Agreement and set national targets for reductions in national greenhouse gas emissions. Sovereigns stand to benefit significantly from sustainable structured products in that they could entail an exponential growth in sustainable development, facilitating their targets being met, and adapting the national economy to a low-carbon future.

Securitisation now has a chance for redemption. With tighter controls and more prudent and judicious frameworks as well as enhanced transparency, it has the chance to make a comeback as one of most important tools to finance sustainable development by mobilising and leveraging previously untapped and unavailable funds for sustainable purposes. The innovative and rapidly evolving nature of sustainable technology means that new assets are eligible for sustainable finance funding which expand and diversify the asset portfolios of sustainable ABS. Structured products are set to greatly accelerate sustainable finance, heralding the next phase of the global green revolution. This acceleration has the potential to be turbocharged with the introduction to fintech tools such as digital contracts, block chain and AI to monitor asset sensors and drive efficiency and cash flows.

7.1.1 Ensuring transparency and integrity of collateral

As already highlighted, a potential hurdle to overcome is ensuring consistency in standards and continuity in supply of the assets forming the basis of the structured products throughout the life of the portfolio. This may be problematic as even assets which appear similar may have very different sustainability profiles, which may be exacerbated as the transparency and visibility of individual underlying assets generally decreases when collateralised.

This may be resolved through the development of an EU sustainable taxonomy which has the potential to set crucial mutually recognised standards and definitions for sustainable eligibility. The Green Loan Principles recently published by the LMA and the APLMA with the support of ICMA also provide some much-needed clarity and consistency in defining the assets that can reliably form the basis of sustainable collateral. However, in the meantime as jurisdictional taxonomies are being developed, the market must progress at pace by the use of clear and transparent definitions associated with each investment.

7.1.2 Regulatory relief and considerations

The market must continue to promote “textbook” regulatory solutions that have the power to fundamentally change the economics of the underlying projects and therefore the financial characteristics of the loans that are made to them. These include “internalising market externalities” through pricing CO_2 and other environmental pollution via taxes and emissions trading systems at levels meaningful to affect economic and investment decision making, and removing inefficient fossil fuel subsidies (see OECD, 2017).

Beyond these “first-best” regulatory prescriptions, certain regulatory measures are being considered to support the sustainable finance market. Complementing the creation of new sustainable finance mechanisms, the 'green supporting factor' and the ‘brown penalising factor' - higher capital requirements for carbon-intensive assets are being actively debasted. Any advantage conferred on sustainable assets (green + or brown -) would be leveraged through securitisation. Combinations of a green supporting factor and a brown penalty could

theoretically be designed to make the total capital requirement neutral so that any changes do not act as a levy or rebate on underlying risk.

Ultimately, the growth and the performance of asset supported structures and the underlying collateral will help direct regulators as to the optimal approach to take. Collecting data on the structures and assets will be critical to support evidence based decisions per the level of risk embedded in the bonds and the assets. All be it early stages, data and performance correlations are being drawn between green assets and performance and default risk.

Moving in this direction, in September 2018, Moody's found that green use-of-proceeds project finance bank loans experienced a lower default rate than non-green use-of-proceeds project loans, with recovery rates being similar for both green and non-green projects in their study (Moody's Investors Service, 2018). Although this finding is subject to a number of caveats related to the study and methodology, it is step in the direction of creating the necessary empirical foundations for evaluating the true financial risk and return charactersitics of green and sustainable projects.

In the real estate space, the first study to empirically examine the relationship between building sustainability features and performance of corresponding commercial mortgages across property types (An and Pivo, 2015) found that several sustainability features are strongly associated with lower default risk after controlling for standard risk factors. Similarly, scholars at the Lawrence Berkely Laboratory conducted the first study of the effects of building-level energy consumption and energy pricing on default risk of commercial mortgages (Issler et al., 2017) and found that building-level energy efficiency and energy price risk do move the needle on default risk.

Many existing portfolios could be made green through re-evaluation or taking advantage of certification systems that may not have existed when the portfolios were originally set up. For example Fannie Mae became the world's biggest issuer of green bonds in 2017 through a multiyear process that involved aligning incentives, and having the buildings underlying its MBS certified as green under a range of monitored standards, including for instance LEED and Energy Star. It is estimated that climate-aligned but unlabelled sustainable bonds are treble the value of those which are labelled. Simply having assets correctly labelled could lead to the emergence of new sustainable portfolios for sustainable securitisation.

7.1.3 Potential regulatory options

1. *Central Bank repo collateral*: Sustainable ABS/CLOs could be treated like sovereign paper, for the purposes of central bank repo collateral: this move would be welcomed by private investors who might otherwise have liquidity concerns due to the tenor of the underlying assets.

2. *Bring in the brown penalising / green supporting factor:* Subject to empirical analysis demonstrating the differential in risk profiles of sustainable assets, lower the risk weights on such assets (green mortgages, low emissions vehicle, loans etc.) pre-securitisation or increase the weights on brown assets that contribute risk to the financial system.

3. *Reconsider application and calibration of Solvency II*: Insurers are the natural buyers of long-dated infrastructure and mortgage ABS, and Solvency II is frequently and widely cited as an obstacle to connecting the natural investors with these assets: it is critical that this barrier is removed so that insurers which have abandoned the market (AFME, 2018) are on a level playing field with other investors for sustainable CLOs/ABS.

7.1.4 Promote capacity-building for asset managers in managing portfolios of sustainable loan assets for long-term investors.

Like institutional investors, asset managers can move into the sustainable loan market for smaller institutional investors that may not have the sufficient internal capacity to manage or originate sustainable loans on their own. Institutional investors eager to obtain exposure to sustainable investments can drive this opportunity. An overarching takeaway from the financial crisis is that originators of leveraged products did not have "skin in the game". Figuring out new constructs for aligning interests will be a critical part of sustainable CLOs.

CLOs have been a powerful means to move loans from banks' balance sheets into the DCM via the issuance of liabilities to gain the funds to purchase the sustainable loans. The asset managers could oversee the loan portfolio like banks by taking the loans into their SPV and in doing so, banks are able to gain balance sheet capacity via a true sale. Bond trade organisations, rating agencies, informed banks and financial service law firms could drive the development of this market opportunity. Generally, available data suggests intermediated investment through funds is a preferred way for institutional investors to enter the market: a database on institutional investments with involvement of actors from the official sector shows close to 90 percent of these investment activities with intermediated investments, both equity and debt.[19] The CLO and institutional investor market in the EU in 2002 was nonexistent and by 2007 had grown into the hundreds. With the correct safeguards on structures and assets, the sustainable debt CLO asset management sector should be a growth sector in the financial markets.

[19] OECD's 2018 update of the database used for "Progress Update on Approaches to Mobilising Institutional Investment for Sustainable Infrastructure" (OECD, 2018 forthcoming), surveying sustainable infrastructure investments involving both institutional investors and the public sector (including public financial institutions).

8. Annex A. The Future Looks Green For CLOs (S&P Global Ratings)

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Key Takeaways

- Green loans are evolving, with the Climate Bond Initiative forecasting nearly $1 trillion in green bond issuance by 2020.
- Despite the uptick in green bond and loan issuance, the market still remains relatively small, especially compared to the universe of assets comprising CLO 2.0 transactions.
- In our view, a green CLO market has large growth potential, boosted by regulatory initiatives and emerging interest from both issuers and investors in 2018.
- We built a hypothetical rating scenario for a green CLO to compare and contrast the underlying portfolio and structure with a typical European CLO 2.0 transaction.
- Our hypothetical green CLO analysis showed that green loans may have different fundamental characteristics to corporate loans, such as lower asset yields, higher credit quality, and higher recovery rates assumptions.

The global collateralized loan obligation (CLO) market has experienced a rebirth (2010 in the U.S. and 2013 in Europe). New issuance continues to increase due to investor familiarity with the product, as well as low historical default rates (see tables 1 and 2 and "2017 Annual Global Leveraged Loan CLO Default Study And Rating Transitions," published on Oct. 9, 2018). While a market for green assets, such as green loans and bonds has been established for a while, although still of a relative size, a sustainable securitization market is still in its infancy. Considering the challenge in financing the amounts, S&P Global Ratings expects green CLOs to play a role in increasing the private sector presence in the sustainable finance market.

Following the Paris Agreement that came into force in November 2016, 184 parties have ratified the action plan to limit global warming. For this purpose, developed nations have pledged to provide $100 billion (about €87 billion) annually until 2025. As part of this deal the EU has committed to decrease carbon emissions by 40% by 2030. In March 2018 the European Commission (EC) proposed the creation of environmental, social, and corporate governance 'taxonomy', regulating sustainable finance product disclosures, as well as introducing the 'green supporting factor' in the EU prudential rules for banks and insurance companies.

Although green CLOs have yet to fully emerge, in this report, we consider the growth potential and attractiveness of this product, as well as some challenges we currently see to the market's development. We also present a hypothetical rating scenario to compare and contrast the credit quality of green CLOs with a typical European CLO 2.0 (post-crisis issued) transaction.

Table 1

U.S. CLO Default History (S&P Global Ratings' Portfolio)

	CLO 1.0 (1996 – 2009)		CLO 2.0 (2010 – Q2 2018)	
Original rating	Tranches rated	Tranches defaulted	Tranches rated	Tranches defaulted
AAA	1,540	0	1,572	0
AA	616	1	1,220	0
A	790	5	1,033	0
BBB	783	9	873	0
BB	565	20	782	0
B	28	3	246	0
Total	4,322	38	5,726	0

Table 2

European CLO Default History (S&P Global Ratings' Portfolio)

	CLO 1.0 (1997 – 2009)		CLO 2.0 (2010 – Q2 2018)	
Original rating	Tranches rated	Tranches defaulted	Tranches rated	Tranches defaulted
AAA	472	0	223	0
AA	225	0	235	0
A	239	0	159	0
BBB	291	3	149	0
BB	205	15	137	0
B	11	1	120	0
Total	1,443	19	1,023	0

What Is Green And How Do We Define It?

There is currently no specific market definition for green bonds or loans or regulatory reporting requirement. Issuers can define what they think constitutes the notion of a green bond or loan. However, in 2014 the International Capital Market Association (ICMA) with support from 13 investment banks, developed Green Bond Principles (GBP) to facilitate guidance and transparency on the market. Later, in 2018 ICMA introduced Green Loan Principles. Both of these principles focus on the usage of proceeds, the project evaluation and selection process, and proceeds and reporting management process.

April 2017 saw the launch of our Green Evaluation that provides a relative green impact score on instruments targeted at financing environmentally beneficial projects (see "Green Evaluation Analytical Approach," published on April 26, 2017). It is not a credit rating, but rather a point-in-time assessment of the relative environmental impact of a financing transaction or portfolio. To date, we have completed 26 public Green Evaluations on individual transactions ranging from green bonds and green loans to asset-backed securities, project, and portfolio financings.

A Green Evaluation for a CLO would consider the weighted-average score of the individual green assets in the collateral pool based on the allocation of proceeds to environmentally beneficial assets such as renewable energy or efficiency projects. We would also take into account the transactions' transparency and governance scores. These scores assess the reporting and disclosure of proceeds allocation, as well as the issuer's commitment to regular monitoring of environmental benefits. It is worth noting that the Green Evaluation of a green CLO would be separate to any credit rating provided and would provide an opinion of relative environmental contribution rather than creditworthiness.

How Does Green Relate To CLOs?

The starting point of our CLO rating process is the analysis of the underlying pool of assets. CLOs are backed by leveraged loans, typically from more than 100 distinct obligors. To meet a transaction's eligibility criteria, most of the loans must have a rating or a credit estimate assigned by S&P Global Ratings. This allows us to use the ratings on the underlying obligors as a proxy to quantify the credit quality of every asset in the portfolio.

Indeed, the credit fundamentals of a corporate will influence the overall credit quality of any CLO structure, whether the pool is comprised of green or non-green assets. We consider green factors in the context of our corporate credit analysis in several ways and typically reflect them in the industry risk and competitive position of an entity's business risk profile assessment, and in our assessment of an entity's management and governance.

According to a study by S&P Global Ratings, our industry specific criteria (or key credit factors [KCFs]) contain numerous environmental and climate risk-related references (see "How Environmental And Climate Risks And Opportunities Factor Into Global Corporate Ratings – An Update," published on Nov. 9, 2017). The KCFs provide complementary details, such as how industry-specific risk factors are assessed, for the application of the corporate ratings criteria in a specific sector. The study found that there were numerous instances where environmental and climate factors have affected corporate ratings. A review of all 9,000 corporate credit ratings between July 2015 and August 2017 found that climate and environmental factors were referenced in 717 instances in our credit analysis, or in nearly 10% of all credit rating actions, and there were 106 actions that listed an environmental or climate factor as the key rating driver.

The study also found that rating actions taken were relatively balanced with 44% in the positive direction and 56% in the negative direction. This is a change from our prior two-year lookback study published in 2015 where 79% of actions were in the negative direction out of 56 cases referring environmental or climate factors as having a material impact on credit quality (see "How Environmental And Climate Risks Factor Into Global Corporate Ratings," published on Oct. 21, 2015). This suggests that some companies have been able to effectively mitigate their environmental and climate risk or benefit from various transition opportunities or changes in environmental policy. As market, political, and regulatory drivers continue to support green and climate initiatives, corporate credit quality will increasingly reflect how entities are mitigating the risks and exploiting opportunities for their advantage.

In the corporate CLO space, we have yet to see green loan buckets as part of portfolio profile tests. However, some recent transactions' eligibility criteria have started introducing industry limitations, which restrict the manager from buying assets from certain industries, such as thermal coal mining, weapons, hazardous chemicals, pesticides and wastes, and tobacco. These documentation limitations would not affect our ratings analysis, but rather restrict the manager in its asset selection.

One area where we have seen increasing interest is in the area of green project finance CLOs. Initially, the issuance of green bonds was a way for projects to raise finance with the

goal to cut/reduce emissions. In addition to the typical corporate debt issuance, debt instruments were issued using project financing, with green projects covering a wide universe, from renewables, energy efficiency, low carbon, to water efficiency.

How Would We Rate Green CLOs?

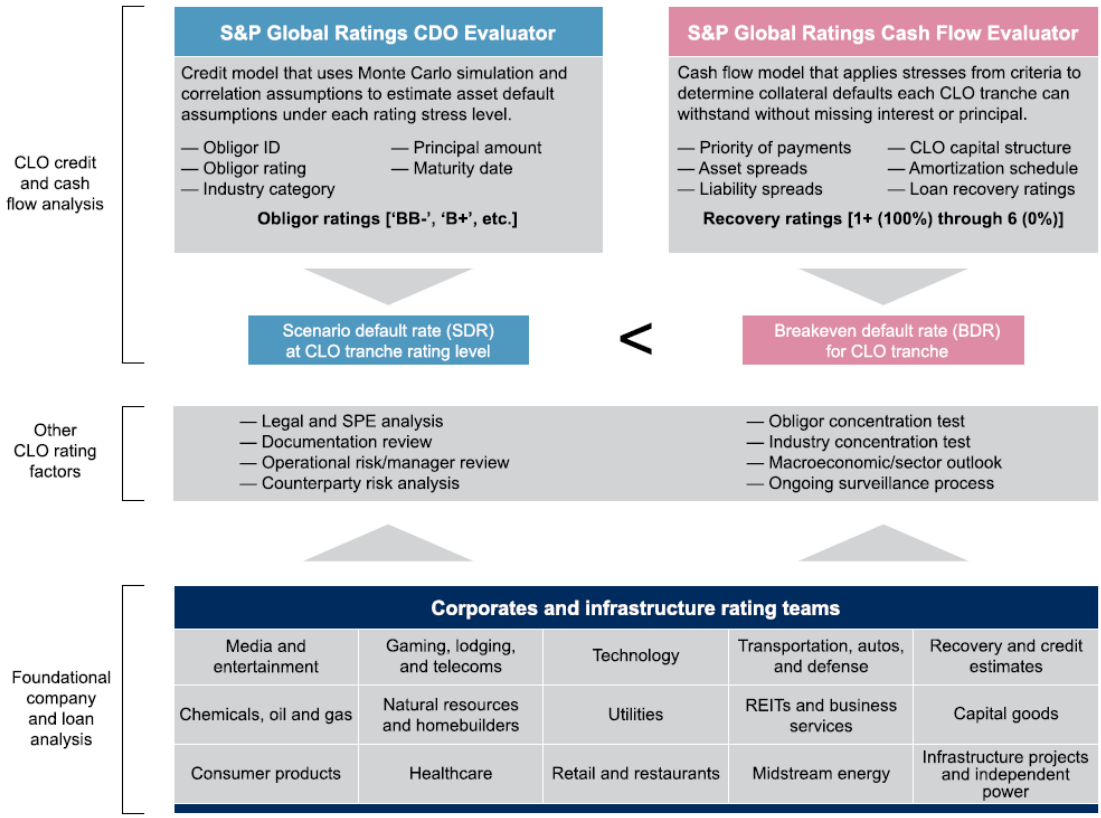
One of the main criteria that we use to assign CLO ratings is "Global Methodologies And Assumptions For Corporate Cash Flow and Synthetic CDOs," published on Aug. 8, 2016 (see chart 1 for the main steps we follow in our CLO ratings process). We would perform the same credit and cash flow analysis and apply the same sensitivity tests as for any other CLO 2.0 transaction.

We expect to see the mix of corporate and project finance assets in the underlying portfolio of green CLOs and we would therefore use both our cash flow corporate and project finance CLO criteria for our credit and cash flow analysis.

Our criteria for rating CLOs of project finance adopt the similar methodologies, assumptions, and modeling parameters currently used to rate cash flow CLOs, with some differences due to the characteristics of project finance debt (see "CDOs Of Project Finance Debt: Global Methodology And Assumptions," published on March 19, 2014). Some of the assumptions we would use for rating CLOs of project finance are the following:

- There are specific project finance asset type classifications.
- We would apply a 12-month recovery delay for project finance loans. Corporate loans have immediate recovery assumptions under our criteria.
- Project finance debt typically has an amortization schedule based on the project's useful life, whereas corporate debt usually has bullet maturities (lump sums paid on a fixed legal maturity date). Consequently, the criteria use the following maturity assumptions, based on the debt's documented principal payment schedule: weighted-average maturity (WAM) if available or asset's legal final maturity date. For cash flow CLOs with a reinvestment period, we determine an expected portfolio amortization profile, considering the closing assets' WAM, the reinvestment period's remaining length, and the portfolio's maximum weighted-average life, as detailed under the CLO's transaction documents.

Chart 1. S&P Global Ratings' CLO Rating Process



How Might A Hypothetical Green CLO Look Like?

In preparation for rating CLOs with green loans as the underlying assets, we researched the loan structure and behavior of the instrument to build a hypothetical green CLO portfolio and structure. Based on our analysis, we concluded that green loans may have different fundamental characteristics to corporate loans. As a result, there are differences in the inputs we used to perform an analysis of a CLO transaction with sustainable loans as the underlying assets compared to transactions backed by corporate loans (see table 3). The main differences are the generally higher average rating and recovery assumptions, especially for project finance loans. These assumptions and results are hypothetical and will largely depend on the selection of loans by the portfolio manager, investor appetite for green CLOs, and regulatory environment.

We created a generic hypothetical transaction based on a highly simplified portfolio and capital structure described in the parameters outlined in table 3.

Table 3. Collateral Characteristics And Structures For Hypothetical Green CLO And CLO 2.0

Collateral Characteristics And Structures For Hypothetical Green CLO And CLO 2.0

	Hypothetical Green CLO	CLO 2.0
Average credit quality	BBB-	B
Weighted-average life	12.5 years	8 years
Weighted-average spread	2.20%	3.60%-3.80%
WARR (AAA-level)	50%	36%
Security type	Senior secured	Mostly senior secured
Industry type	Independent power and renewable electricity producers, building products (green), road and rail	Various. Top 3: media, software, chemicals
Portfolio size	€400 million/90 obligors	€400 million/120 obligors

Table 4 outlines the assumptions we used for the structure that we based on the following:

- We expect the pricing to be wider for green CLOs because it is a new product, which would include new loans to be securitized in the market, and the development of expertise by portfolio managers to manage the green debt.
- The equity returns under our hypothetical structure and portfolio are high single digit, compared to double digit for European CLO 2.0 transactions. This difference results from the lower asset yield, due to higher quality of the underlying assets and wider pricing on the tranches. We expect to see a new investor base emerge for green CLOs on the back of long-term and stable returns.
- A more supportive framework for green finance--for example the introduction of the green supporting factor in the prudential regulation for banks and insurance companies--may also result in a substantial increase in the investor base for green CLOs due to the capital relief provided for these investments.
- Lower credit enhancement for green CLOs results from better credit quality of the underlying assets than corporate credits and expected higher recovery rates.

Table 4. Outputs From Hypothetical Green CLO And CLO 2.0 Comparison

Class	Size (mil. €)	Spread over three-month EURIBOR	Rating	Credit enhancement green CLO*	Credit enhancement CLO 2.0*
A	280	1.20	AAA	30%	38%-40%
B	64	2.50	A	14%	20%
C	16	4.00	BBB-	10%	15.5%
Subordinated notes	40				

*Credit enhancement = (portfolio size minus rated tranche amount including pari passu/senior tranche amount, if any) divided by portfolio size. EURIBOR--Euro Interbank Offered Rate.

We do, however, see some potential challenges for green CLOs. The idea behind every CLO is to generate enough interest from the underlying assets in the portfolio to pay for the tranched liabilities. In a few instances where we have received requests to analyze the green CLOs, we have seen that the proposed portfolio and structure were struggling to generate enough spread to pay for the CLO's liabilities. Where green bonds or loans were originated in the emerging market countries, the ratings on the CLO may also be capped by the application of our ratings above the sovereign criteria (See "Ratings Above The Sovereign - Structured Finance: Methodology And Assumptions,").This is in addition to the limited amount of assets in the portfolio that may qualify for a green CLO today.

Another challenge is for the green assets to show a better performance than the non-green assets. While there is some evidence of those green loans experiencing a lower default rate than non-green, it is difficult to conclude that this is due to the green nature of the assets. The small sample used in our analysis and relatively short history of the green finance market leads us to await further confirmation of the benefit to the credit performance of green CLOs.

Is The Future Green For CLOs?

Despite the uptick in global green bond and loan issuance, the market still remains relatively small, especially compared to the universe of assets comprising 2.0 CLO transactions. We see this lack of collateral currently as the main drawback to the development of a green CLO market. However, we expect the European regulatory and accounting initiative toward preferential treatment of green CLOs to have a positive impact on the market.

Although it's still early days, we expect to see continuous development and evolution of green CLOs, for example, the potential inclusion of green bond/loan buckets in CLO 2.0 transactions. Coupled with the highest post-crisis new issuance in the CLO market in 2018, robust performance in the last two decades, and the Climate Bond Initiative's forecast of nearly $1 trillion in green bond issuance by 2020, we believe that 2019 and beyond looks big for investor and issuer activism in green CLOs.

Related Criteria

Ratings Above The Sovereign - Structured Finance: Methodology And Assumptions, Aug. 8, 2016

Global Methodologies And Assumptions For Corporate Cash Flow and Synthetic CDOs, Aug. 8, 2016

CDOs Of Project Finance Debt: Global Methodology And Assumptions, March 19, 2014

Corporate Methodology, Nov. 19, 2013

Related Research

2017 Annual Global Leveraged Loan CLO Default Study And Rating Transitions, Oct. 9, 2018

How Environmental And Climate Risks And Opportunities Factor Into Global Corporate Ratings - An Update, Nov. 9, 2017

Green Evaluation Analytical Approach, April 26, 2017

How Environmental And Climate Risks Factor Into Global Corporate Ratings, Oct. 21, 2015

This report does not constitute a rating action.

9. Key references

AFME (2018), Securitisation Data Report: European Structured Finance Q1: 2018

An, X. and Pivo, G. (2015) Default Risk of Securitized Commercial Mortgages: Do Sustainability Property Features Matter?, Real Estate Research Institute.

BNEF (2018), New Energy Outlook, https://about.bnef.com/new-energy-outlook/

BIS (2011), Report on asset securitisation incentives, Basel Committee on Banking Supervision, https://www.bis.org/publ/joint26.pdf

European Parliamentary Research Service, Understanding Securitisation Background − benefits – risks, http://www.europarl.europa.eu/RegData/etudes/IDAN/2015/569017/EPRS_IDA%282015%29569017_EN.pdf

G20 (2018), Sustainable Finance Study Group Synthesis Report.

IMF (2015), Securitization: The Road Ahead, Miguel Segoviano, Bradley Jones, Peter Lindner, and Johannes Blankenheim, https://www.imf.org/external/pubs/ft/sdn/2015/sdn1501.pdf

Issler, P., Mathew, P., Sun, K., and Wallace, N. (2017), Impact of Energy Factors on Default Risk in Commercial Mortgages, Lawrence Berkeley National Laboratory, University of California at Berkeley.

Kaminker, C. et al. (2015) Mapping Channels to Mobilise Institutional Investment in Sustainable Energy, OECD Publishing. Edited by C. R. Kaminker. Paris: OECD Publishing. doi: 10.1787/9789264224582-en.

Kaminker, C. (2017) *Mobilising Bond Markets for a Low-Carbon Transition, OECD Publishing*. Edited by C. Kaminker. Paris: OECD Publishing. doi: 10.1787/9789264272323-en.

Kaminker, C. (2018) "Institutional investment in green infrastructure to hedge stranded assets risk". In Caldecott, B.L. (Eds) Stranded assets and the environment: risk, resilience, and opportunity. Routledge (London, UK). ISBN: 978-1138120600.

Kaminker, C. R. (2018) *The role of institutional investors in financing sustainable energy*. Doctoral Thesis. University of Oxford.

Kobylinski, J., Tamburrano, E., Thomson, K., Van Acoleyen, K., Anderberg, S. (2016) Global Methodologies And Assumptions For Corporate Cash Flow And Synthetic CDOs. Available at https://www.capitaliq.com/CIQDotNet/CreditResearch/SPResearch.aspx?articleId=&ArtObjectId=9725046&ArtRevId=4&sid=&sind=A&

Marty, Y., Rautenkranz, C., Postilion, D. (2018) S&P Global Ratings' CLO Primer. Available at: https://www.capitaliq.com/CIQDotNet/CreditResearch/SPResearch.aspx?DocumentId=39817402&From=SNP_RES_PO

McGarry, C., Dey, D. and Hauman, M. (2018) 'Sustainable Securitisation', *White & Case*. Available at: https://www.whitecase.com/publications/alert/sustainable-securitisation.

Moody's Investors Service (2018), Default and recovery rates for project finance bank loans, 1983-2016: Green projects demonstrate lower default risk

Moody's Investors Service (2018), Structured finance – Global: Green finance sprouts across structured finance sectors

Williams, J., Wilkins, M., Kernan, P., De la Gorce, N., Poignant, N., Burks, B. (2018) How Environmental And Climate Risks And Opportunities Factor Into Global Corporate Ratings - An Update. Available at https://www.capitaliq.com/CIQDotNet/CreditResearch/viewPDF.aspx?pdfId=30136&from=Research

10. Glossary

Explanations of these terms are very condensed and may not be complete. Sources used include, inter alia, Duke University's Hypertextual finance Glossary; Brealey, Myers and Allen (2014) and Investopedia.com.

Alpha (α): A measure of risk-adjusted performance. Some refer to the alpha as the difference between the investment return and the benchmark return. However, this does not properly adjust for risk. More appropriately, an alpha is generated by regressing the security or mutual fund's excess return on the benchmark (for example S&P 500) excess return.

Asset-backed security (ABS): A financial security backed by a loan, lease or receivables against assets other than real estate and mortgages.

Asset and Liability Management (ALM): The task of managing the funds of a financial institution to accomplish two goals: *1)* to earn an adequate return on funds invested and *2)* to maintain a comfortable surplus of assets beyond liabilities.

Asset liability matching: Process of managing investing, purchasing, and selling activities to ensure that cash is available for meeting the obligations as they fall due.

Bankable: Projects that have sufficient collateral, probability of success, and predictability of future cash flow, to be acceptable to prospective financiers.

Basel III: The third version of the Basel Accords agreed upon by 27 countries on 12 September, 2010. Among the highlights was the increasing of Tier 1 capital from 2% to 4.5% and the addition of a buffer of 2.5%. The assets that qualify for capital were also redefined. The full implementation of the accord is not due until 2023. Basel I is the Agreement concluded among country representatives in 1988 in Basel, Switzerland to develop standardised risk-based capital requirements for banks across countries. The Accord is also known as the 1988 Basel Accord and it primarily focused on credit risk and is now viewed as outdated. Basel II is currently in the process of implementation.

Benchmark: The performance of a predetermined set of securities, used for comparison purposes. Such sets may be based on published indexes or may be customised to suit an investment strategy.

Beta (β): The measure of an asset's risk in relation to the market (for example, the S&P500) or to an alternative benchmark or factors. Roughly speaking, a security with a beta of 1.5, will have moved, on average, 1.5 times the market return. According to asset pricing theory, beta represents the type of risk, systematic risk, that cannot be diversified away.

Capital recycling: Providing refinancing once a project is at the operational stage so that early-stage investors have an 'exit strategy', allowing them to free up capital to invest in new projects – i.e. to 'recycle' their capital.

Cost of capital: The cost of funds used for financing a business. Cost of capital depends on the mode of financing used – it refers to the cost of equity if the business is financed solely through equity, or to the cost of debt if it is financed solely through debt. Many companies use a combination of debt and equity to finance their businesses, and for such companies, their overall cost of capital is derived from a weighted average of all capital sources, widely known as the weighted average cost of capital (WACC). Since the cost of capital

represents a hurdle rate that a company must overcome before it can generate value, it is extensively used in the capital budgeting process to determine whether the company should proceed with a project.

Coupon: The contractual interest obligation a bond or debenture issuer covenants to pay to its debtholders.

Covered bonds: Debt securities backed by cash flows from mortgages or public sector loans. Covered bonds employ a 'dual recourse structure' where bond investors have a claim over *1)* a 'cover pool' of assets, the quality of which is strictly regulated; and *2)* a general unsecured claim against the issuer. This dual recourse structure enables covered bonds to enjoy superior credit ratings and lower funding costs compared with unsecured debt issued by banks. At the same time, because of strict oversight for what can go into the 'cover pool,' they generally carry less risk than pure asset-backed securities.

Defined benefit: A defined benefit pension plan refers to a type of plan in which certain benefits are guaranteed when you retire.

Deleveraging: The reduction of the ratio of debt in the balance sheet of an economic entity. In this report, deleveraging refers to the attempt to decrease its financial leverage ratio (value of firm's debt to the total value of the firm). Banks have been lowering their high pre-crisis leverage levels and are preparing for stricter regulatory capital requirements, and in the process have been reducing their lending.

Infrastructure fund: Investment fund that is established to invest in infrastructure assets.

Institutional investor: Institutional investors are usually synonymous with 'intermediary investors', that is to say, an institution that manages and invests other people's money. The term institutional investor can be used to describe insurance companies, investment funds, pension funds, public pension reserve funds (social security systems), foundations and endowments among others.

IORP II: IORP comprises solvency rules applicable to Institutions for Occupational Retirement Provision. IORP II is widely known as Solvency II for occupational pension funds.

Investment-grade: In the context of bond ratings, the rating level above which institutional investors have been authorised to invest. Investment-grade bonds are those that are assigned a rating in the top four categories by commercial credit rating companies. S&P classifies investment-grade bonds as BBB or higher, and Moody's classifies Investment-grade bonds as BAA or higher.

Leverage: The use of debt financing, or property of rising or falling at a proportionally greater amount than comparable investments.

Liquidity: In context of a corporation, the ability of the corporation to meet its short-term obligations. In context of securities, a high level of trading activity, allowing buying and selling with minimum price disturbance. Also, a market characterised by the ability to buy and sell with relative ease.

Long-dated liabilities: A section of the balance sheet that lists obligations of the company that become due more than one year into the future.

Maturity transformation: The process of converting short-term sources of finance (e.g. deposits from retail savers) into long-term borrowings (e.g. loans, mortgages, etc.).

Private placement debt: A type of debt that is generated when a bond or some other type of security is sold directly to a limited number of investors in a non-public offering.

Project bond: Private debt issued by a project company to finance a specific off-balance-sheet project. Project bonds are an asset-based form of financing.

Revolving debt: A type of debt that typically has a variable interest rate, an open-ended term and payments that are based on a percentage of the balance.

Risk-adjusted return: A measure of valuing return on investment calculated in a way that takes into account the risks associated with the investment. Being able to compare a high-risk, potentially high- return investment with a low-risk, lower-return investment helps to answer a key question that confronts every investor: is it worth the risk? There are several ways to calculate risk- adjusted return. Each has its strengths and shortcomings. All require particular data, such as an investment's rate of return, the risk-free return rate for a given period, and a market's performance and its standard deviation. Risk-adjusted returns can apply to individual securities and investment funds and portfolios.

Securitisation: The process of transforming illiquid financial assets into tradable products.

Special purpose vehicle: Legal entity created to fulfil a specific and well-defined financial or regulatory objectives. For project finance, a SPV may be created to hold the assets associated with a project therefore keeping the investment off the balance sheets of project developers. Within the securitisation framework, an SPV can be a legal entity which may issue securities or other debt instruments, may legally or economically own assets underlying the issue of the securities mentioned above and be financially and legally isolated from the originator.

Solvency II: A directive developed by European Commission for the European insurance industry. It aims to establish a revised set of EU-wide capital requirements and risk management standards that will replace the current solvency requirements. Solvency rules stipulate the minimum amounts of financial resources that insurers and reinsurers must have in order to cover the risks to which they are exposed. The rules also lay down the principles that should guide insurers' overall risk management so that they can better anticipate any adverse events and better handle such situations. The original Solvency I rule was introduced in 1973. According to the Commission, Solvency II will introduce economic risk-based solvency requirements across all EU Member States for the first time and these new solvency requirements will be more risk-sensitive and more sophisticated than in the past, thus enabling a better coverage of the real risks run by any particular insurer. The Commission also states that Solvency II will also be more comprehensive than in the past, in the sense that whereas at the moment the EU solvency requirements concentrate mainly on the liabilities side (i.e. insurance risks), Solvency II takes account of the asset-side risks.

Term loan: Loan payable in a fixed number of equal instalments over the term of the loan. Term loans are generally short-term (between one and five years) and are usually provided as working capital for acquiring income-producing assets (machinery, equipment, inventory, etc.) that generate cash flows to repay the loan.

Underwriting: In the case of loans, underwriting is the process by which a lender decides whether a potential creditor is creditworthy and should receive a loan. For securities issuances, underwriting is the procedure by which an underwriter, such as in investment bank, brings a new security issue to the investing public in an offering. In such a case, the underwriter will guarantee a certain price for a certain number of securities to the party that is issuing the security (in exchange for a fee). Thus, the issuer is secure that they will raise a certain minimum from the issue, while the underwriter bears the risk of the issue.

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