

BONDS AND CLIMATE CHANGE

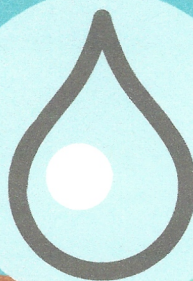
THE STATE OF THE MARKET

2018

LAND USE



WATER



BUILDINGS

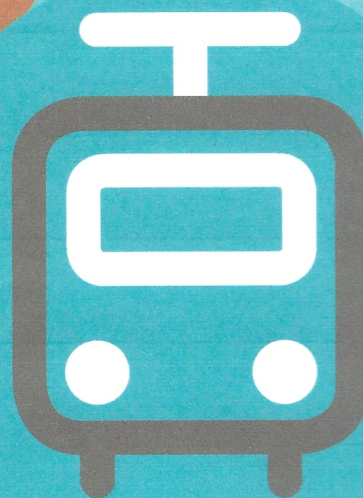


WASTE AND POLLUTION CONTROL

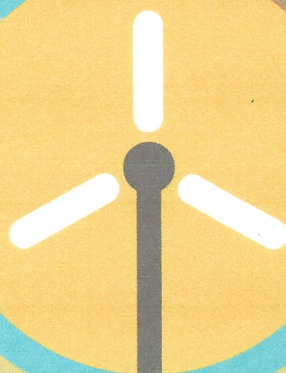


A \$1.45 TRILLION CLIMATE-ALIGNED BONDS UNIVERSE*

TRANSPORT



ENERGY



*Including USD389bn of green bonds

Private placement

What is it? In private placements, the bond issuer places the bond directly with the investor. Certain terms such as the tenor or currency may be chosen to match investor preferences. Private placement (PP) bonds are typically not listed.

While most debt details – particularly pricing – are confidential, green bond issuers are expected to disclose information on the assets/projects to be financed. As with other green bond issuers, best practice is to develop a green bond framework in compliance with the Green Bond Principles and obtain an external review.

Who's issuing? 2017 volumes reached a record high of USD2.6bn, or over half of total PP issuance to date. The spike is largely due to higher issuance from non-financial corporates including rail company Alpha Trains (Luxembourg) and renewable energy companies Neoen (France), Acciona (Spain), Tenaska (USA) and GCL New Energy Investment (China).

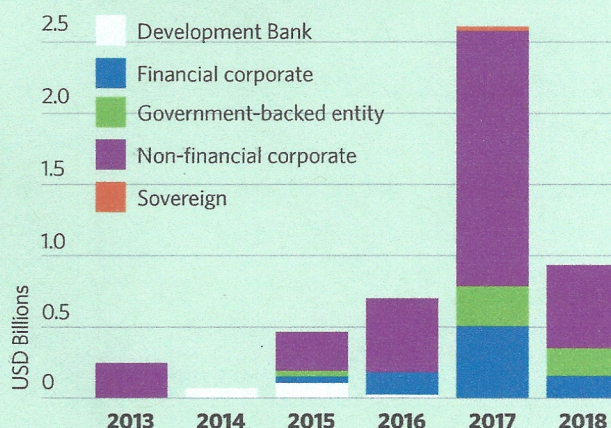
US REIT Hannon Armstrong Sustainable Infrastructure and Argo Infrastructure Partners (Cross-Sound Cable) have raised private bond funding for renewable energy infrastructure, while property companies WDP (Belgium) and Fonciere INEA (France) as well as Monash University (Australia) have raised funds for buildings.

Private placements also feature public sector issuance, including Fiji's sovereign green bond and some of the World Bank's green bonds issued between 2010 and 2016. Government-backed entities that have accessed the private placement market include the Indian Renewable Energy Development Agency (IREDA), water authority Aquafin (Belgium), power company Landsvirkjun (Iceland) and local government funding agency MuniFin (Finland).

Private placement investment can play an important role in supporting the introduction of green bonds in emerging markets. For instance, the first green bond from Lebanon, issued by Fransabank SAL in April 2018, was fully subscribed by the IFC and the EBRD. The IFC has invested in green bonds placed by further emerging market banks, e.g. Bank Zachodni WBK (Poland), Davivienda (Colombia), YES BANK (India).

Green bond private placements from emerging market issuers total USD1.4bn compared to USD3.4bn from developed market issuers, with the remaining USD233m attributable to the World Bank and Asian Development Bank.

US private placements and supranationals investing in EM green bonds support growth



Developed markets issuers such as Australian bank Westpac and New Zealand's Contact Energy have used US private placements to tap US institutional investors who can invest in size and can take long-term positions. Conversely, Canadian Solar used private placement to raise JPY funding for a Japanese solar power plant.

Five issuers have achieved Certification under the Climate Bonds Standard for 8 private placement deals, which account for USD1.3bn, or 28% of total green bond private placements to date. Certification under sector-specific criteria involves independent third party verification that the underlying assets are on a trajectory towards decarbonisation by 2050, and this is reconfirmed annually as part of ongoing impact reporting.

Future prospects: Private placements have been part of the green bond market since 2010, and are likely to be small but complementary to public placement bonds, given rising issuance from emerging markets financial institutions and private sector corporates.

Note: Bonds which do not disclose sufficient information to confirm an asset's green credentials are not included in the Climate Bonds green bond list. While private placements are confidential, greater climate-related disclosure on underlying assets would help improve market credibility and deal visibility.

US Munis

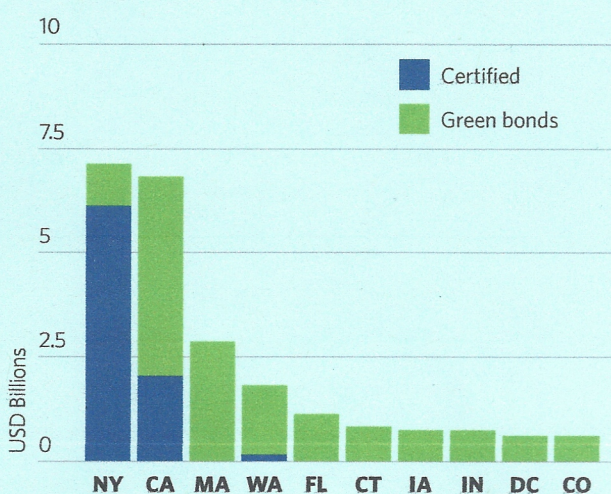
What is it? US Municipal bonds benefit from favourable tax treatment to facilitate access to private funding for public sector spending, including infrastructure investments. They feature long tenors and are often sold as a pension investment.

Who's issuing? Municipal entities from 29 US states have issued green US Munis, contributing USD26.6bn in issuance. New York State tops the rankings with USD7.2bn from 27 deals, followed by California (USD6.9bn, 38 deals). NY Metropolitan Transit Authority is the largest issuer at USD5.5bn, and its deals are Certified under the Low-Carbon Transport Criteria of the Climate Bonds Standard.

Future prospects: Issuance is expected to pick up again as the effect of recent tax changes is incorporated in deal structures.

For more on US Munis, see our US Muni briefing from July 2018.²⁶

Top 10 US states for green bond issuance



→ PACE ABS *WowTech Bonds*

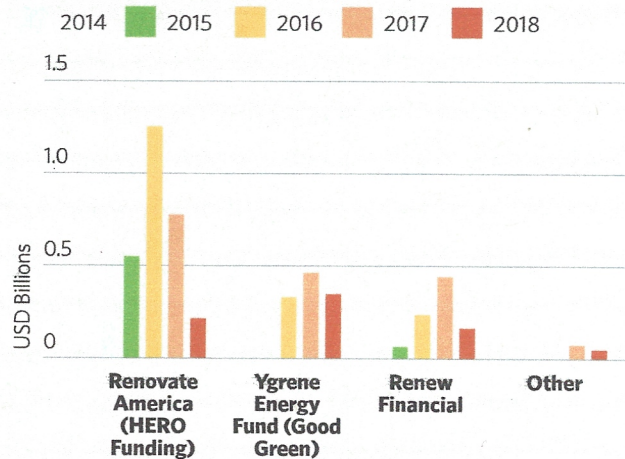
What is it? The US Property Assessed Clean Energy (PACE) model is an innovative mechanism for financing energy efficiency and renewable energy improvements. PACE loans fund the upfront cost of energy improvements on residential and commercial properties, and are paid back over time by property owners through property tax bills. Sponsoring states implement legislation to collect loan repayments through property tax bills and redistribute them to lending agencies. The funding and credit risk are passed onto ABS investors through the securitisation of the loans. Each ABS frees up lending capacity for new loans.

Who's issuing? Four PACE financing providers from California have issued green ABS backed by residential PACE loans. The largest issuer is Renovate America under its HERO funding programme. The most recent issuer is PACE Funding Group.

Greenworks Lending, based in North Carolina, became the first commercial property PACE (or C-PACE) issuer in 2017.

Future prospects: So far there has been limited issuance outside California and most loans are taken out by homeowners. Improved access to C-PACE loans from smaller landlords could help significantly in upgrading existing building stock.

PACE ABS reached USD5.1bn in H1 2018



Similar legislation for local governments to incentivise energy efficiency improvements can be implemented elsewhere. The Climate Bonds Initiative is part of the EuroPACE Project consortium - an H2020 project seeking to implement PACE financing in Europe through a city-wide pilot in Spain.

Solar ABS

What is it? Solar ABS are securitisations secured on cash flows from solar assets. Most deals are backed by lease payments and power purchase agreements. Some are backed by loans extended to fund the acquisition and installation of solar panels. A variation on solar ABS is Hannon Armstrong's ABS secured on ground lease receivables from solar and wind farms - see Other Receivables ABS below for details.

Who's issuing? In total USD4.4bn solar backed ABS have been issued through H1 2018 and 92% by volume, from US issuers. 2018 is shaping up as a record year for solar ABS with the market entry of Vivint Solar. In total, its public and private deals contributed USD932m to issuance figures.

SolarCity (now Tesla Energy) issued the first one in 2013: a USD54m deal backed by cash flows from power purchase agreements for the electricity generated by a bundle of residential rooftop PV installations of around 5,000 customers. In total, the company has placed 9 solar ABS deals.

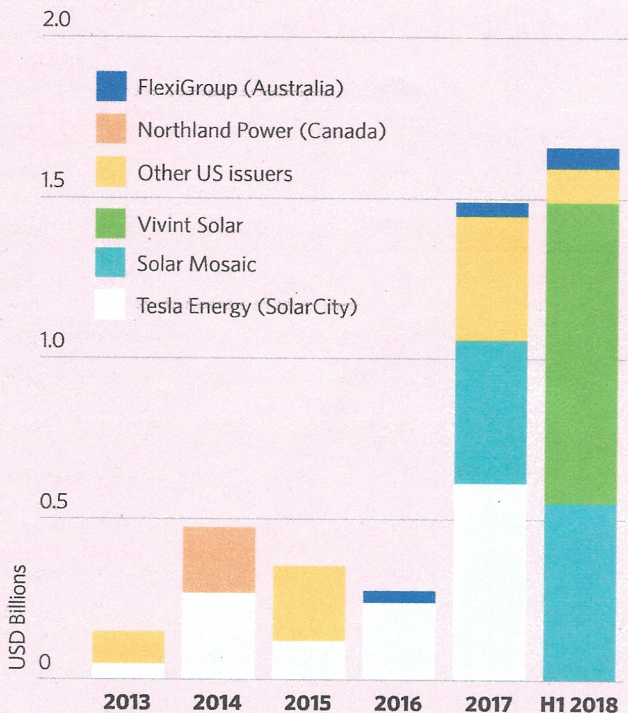
In Canada, Northland Power's 2014 ABS is backed by revenue from the 20-year feed-in tariff contract between the company's solar projects and the Ontario grid.

FlexiGroup issued the first Australian deal with a green ABS tranche in 2016 to refinance a pool of loans extended to customers for residential rooftop solar. The tranche priced 5bps lower than the pari passu non-green tranche issued as part of the same ABS. FlexiGroup's 2018 deal included a subordinated green tranche as well as a AAA-rated one, indicating yield appetite on the demand side.

Future prospects: Solar ABS has been used primarily to refinance residential rooftop solar, but commercial solar has significant scaling potential. Wind and Hydro ABS can also work.

Changes in or uncertainty about the availability of subsidies and the level of feed-in tariffs can impede issuance.

Solar ABS issuance is on the rise



In Europe, the uptake of renewable energy ABS has been hindered by the lack of standardised documentation, uncertainty around feed-in tariffs and insufficient volume of green assets from individual banks or leasing companies. Financial warehousing which aggregates loans and/or leases from multiple sponsors would help scale up the market.

Emerging markets such as India are also considering ABS for solar loans to finance ambitious targets for renewable energy capacity development within the lending capacities of banks.

↓
TESLA?
?

November 16, 2006

Daniel Longworth
Chief Executive Officer
EVCS Technologies, Inc.

Dear Dan:

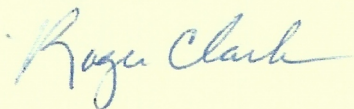
This is a follow-up to my letter of September 17 that thanked you "...for your invaluable insights into the business and politics of causing our transition to a clean energy future. Your contribution of many months of sound advice and service have aided in the success of the Grand Canyon Trust's programs to clean up dirty and dangerous coal-fired generating plants."

I encourage you to keep a record of the time and value of your **pro bono services to Grand Canyon Trust**. We would like to include your contributions with those of other volunteers as part of our annual report to members and donors.

Thank you for your continued service as an advisor to our Air Quality and Clean Energy Program. I wanted to specifically acknowledge your critique of our three-year strategic plan and your comments before the Arizona Corporation Commission before it voted to approve Arizona's ne Renewable Energy Standards.

Grand Canyon Trust volunteer donated 4,000 hours of service in 2005, and this year's contributions are projected to exceed 10,000 hours. Your dedicated service is an enormous contribution to our continued success.

With deep appreciation,



Roger Clark
Air and Energy Program Director



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**Mr. Daniel J. Longworth
Coalplex International, Inc.
4634 South Maryland Parkway, Suite 101
Las Vegas, NV 89119-6311**

July 23, 1994

Ref: Cheung Report Review

Dear Dan,

The attached review of the Cheung Report was conducted to reflect the evolutionary changes in the Coalplex System to that concept reviewed specifically by Dr. Cheung back in 1983. The more detailed technical requirements met by the equipment utilized in the current Coalplex System reflect the current "state of the art" in coal cleaning compared to that available and known in 1983. Instead of dealing with as yet undocumented performances of such equipment as the Browning Attrition Machine, the current system uses OEM equipment from reputable suppliers where performance characteristics are well known and routinely applied in various applications. The Fluid Bed Separator, tested at the Coal Quality Development Center under EPRI contract is now the essential feature of a wet process system which has been demonstrated to be able to remove over 90% of the pyritic sulfur from fine coal slurries. The current Coalplex system is more comprehensive and effective in coal cleaning and can be configured in many ways to produce specific products varying from loose powder supercoal to briquettes, pellets, or nodules.

The economic analysis performed by Dr. Cheung in 1983 (wherein he determined that the economic savings to be realized by utilizing the Trimex process instead of the limestone slurry process at **\$US 114,000,000**) is no longer valid, both because current energy economics are different, and because the detailed system configurations are different. An updated analysis should be performed to reflect the current situation. However, the current energy economics, driven by legislated amendments to the Clean Air Act, have intensified the demands for "Compliance Coal". Also, the Eastern European Market did not even exist back in 1983 which has expanded the markets for clean coal world wide. It is anticipated that a current economic analysis would still favor the implementation of Coalplex technology over the only apparent current solution of FGD Scrubbers.

Very truly yours,

Joseph d. Balsler
Joseph d. Balsler, Ph. D.