



**MOODY'S**  
INVESTORS SERVICE

# New Developments in US ABS

**William Black**, Managing Director, Structured Finance

December 2017

# Agenda

1. Marketplace Lending: Creative Disruption
2. Solar ABS: Financing Green Tech
3. Blockchain: A Glimpse of the Future

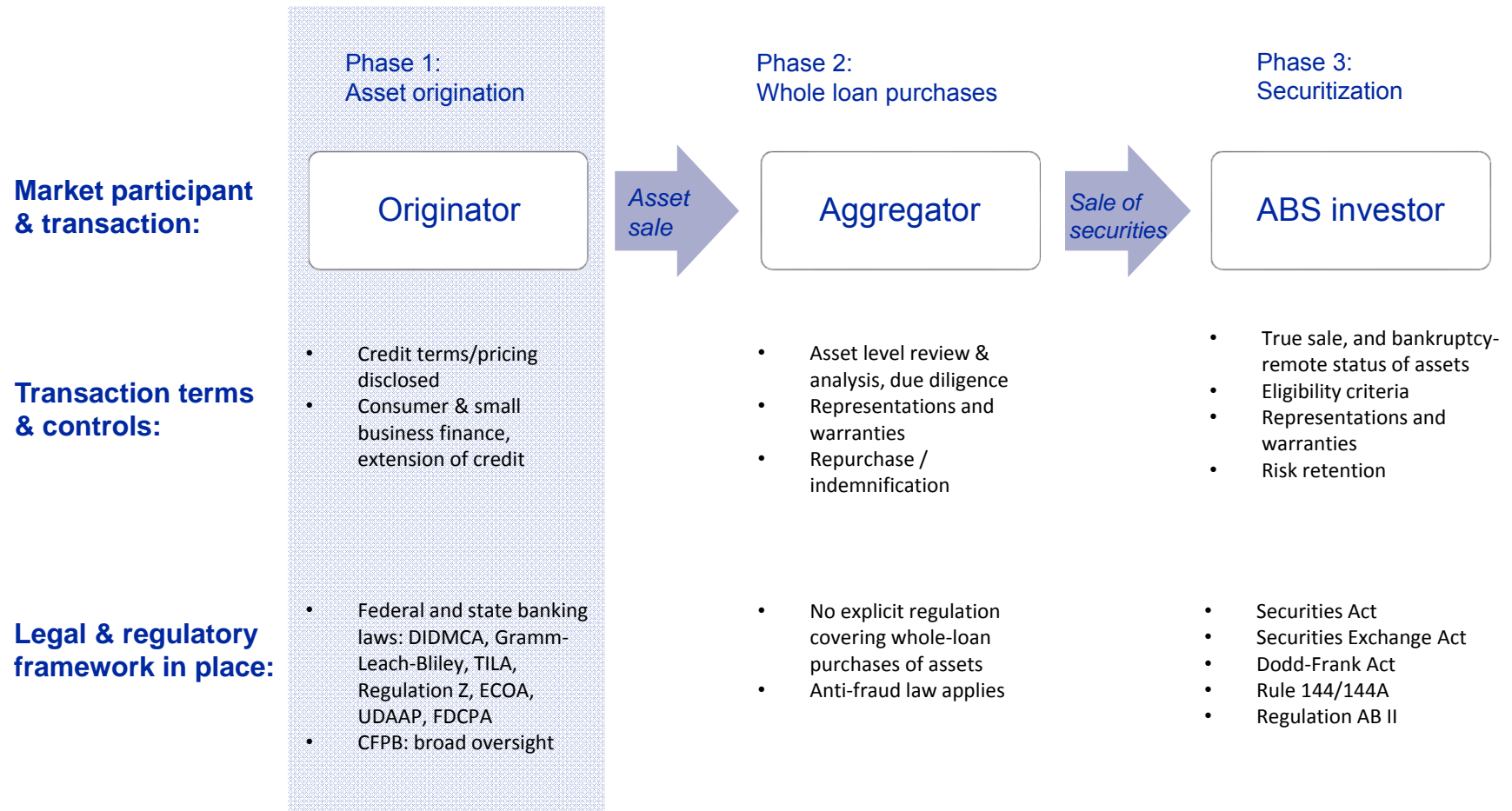
1

Marketplace Lending:  
Creative Disruption

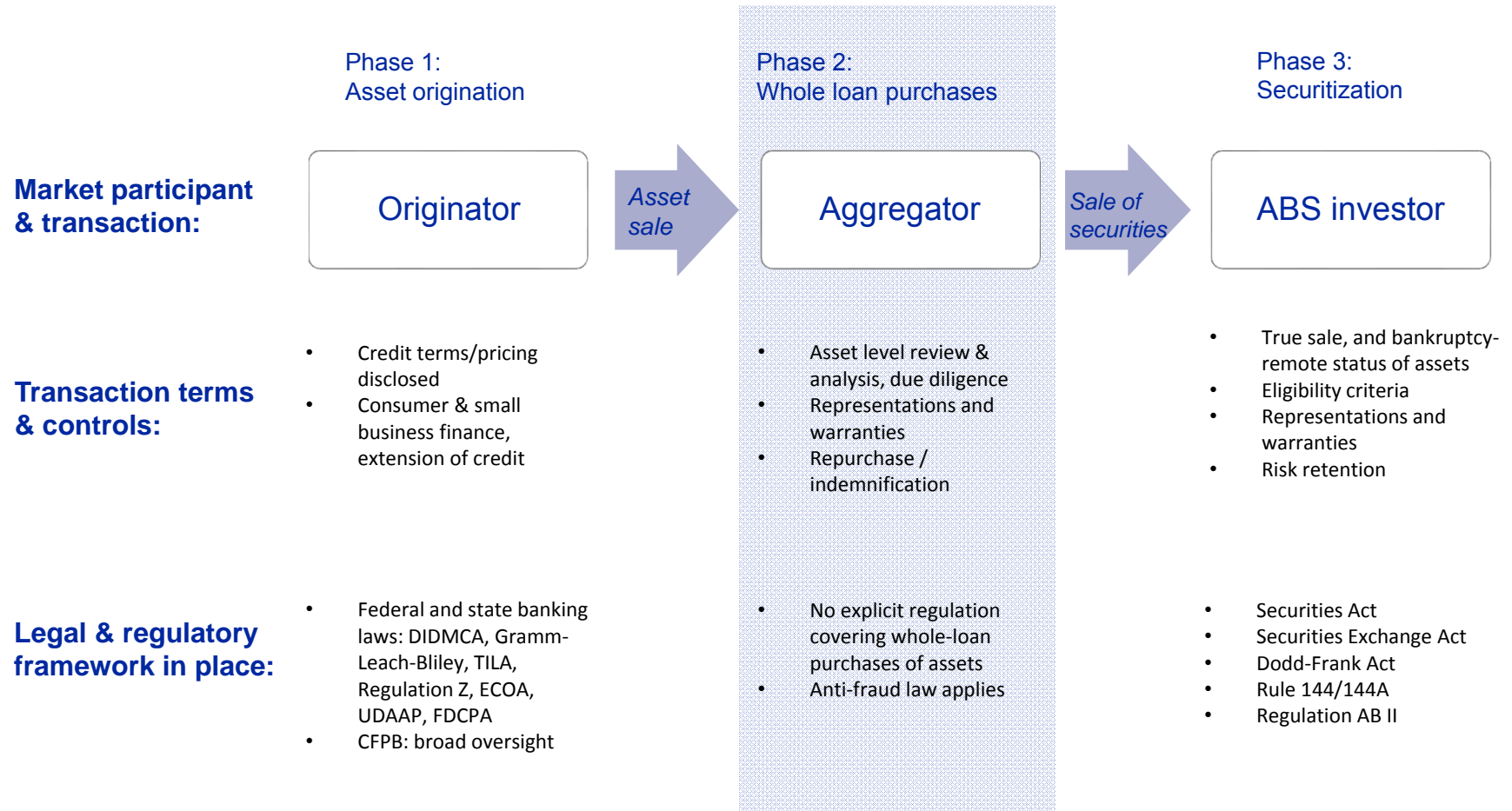
# Marketplace loan financing chain



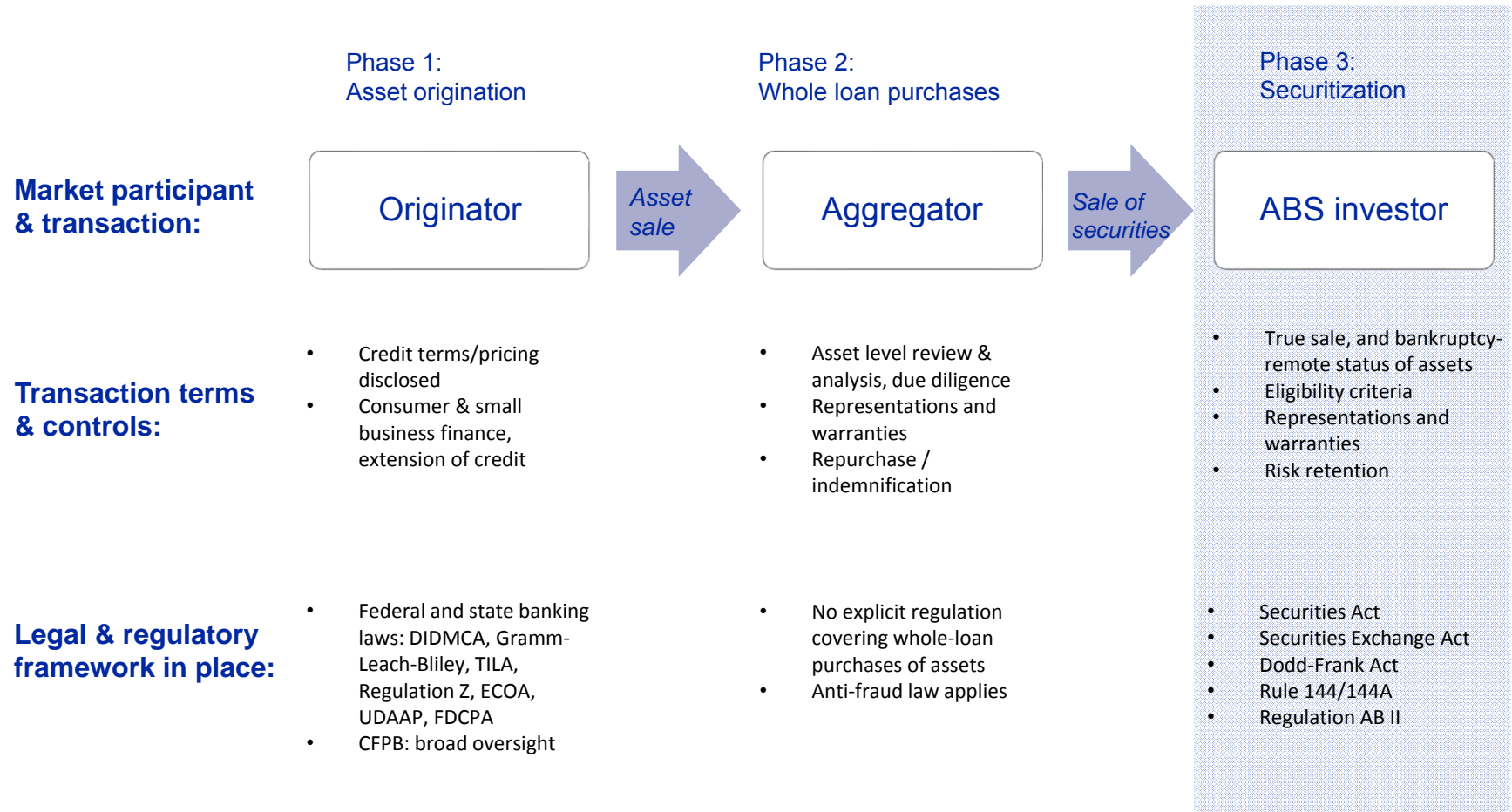
# Marketplace loan financing chain



# Marketplace loan financing chain



# Marketplace loan financing chain



# Number of US marketplace lenders is growing

- » More than 100 companies in the US now fit the description of marketplace lender
- » Some of the more established players are expanding into additional loan types

## Leading marketplace lenders and loan types they offer

Originator	Student loans*	Personal consumer loans*	Residential mortgage	Medical procedure loans	Education loans**	Small business loans*	Subprime consumer loans
Lending Club		X		X	X	X	
Prosper		X					
SoFi	X	X	X				
CommonBond	X						
Avant		X					X
OnDeck						X	

\* Assets included in rated securitizations

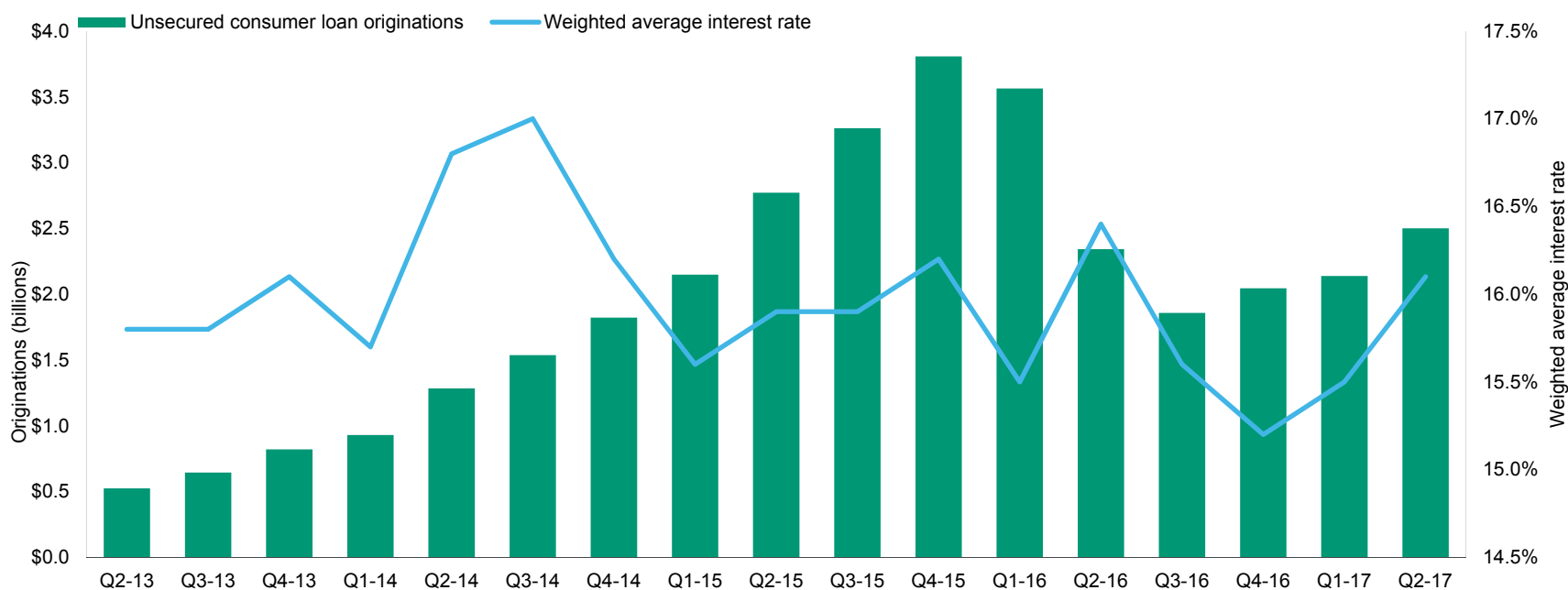
\*\* Includes loans for private secondary and elementary tuition or tutoring; these loans are distinct from college student loans

Source: Platform websites, Moody's Investors Service



# MPL origination growth, hampered by negative headlines, resumes at moderate rate

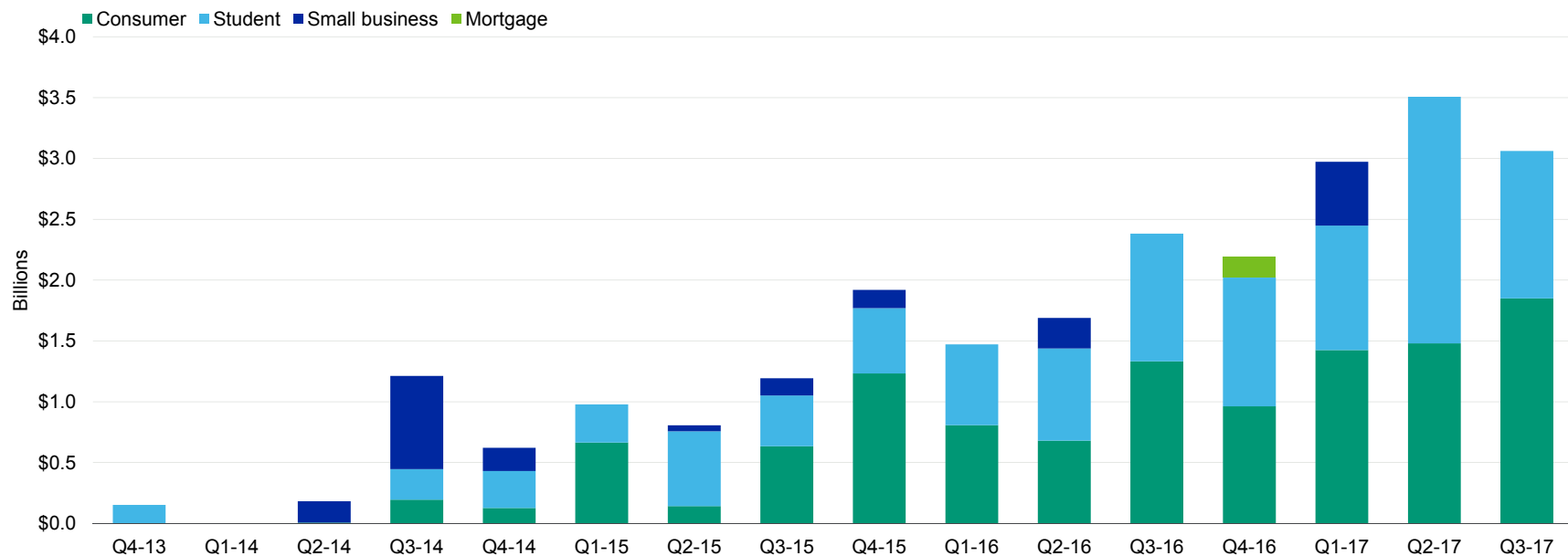
- » Investors in MPL loans showed wariness in 2016 as a result of negative developments
  - Lending Club’s CEO resigning amid questions about data manipulation and conflicts of interest
  - The weaker than expected performance of some marketplace lending platforms, including performance trigger breaches in some transactions
- » Investor interest in direct loan purchase or ABS is renewed after a period of scrutiny on platform efforts to strengthen governance and internal processes



Source: Orchard Platform, Moody's Investors Service

# MPL ABS issuance picks up despite market challenges

- » Although lending volumes in 2016 decreased for some major lenders, MPL ABS issuance increased to \$7.8 billion from \$4.9 billion in 2015
- » Growth continues in 2017, with Q2 and Q3 2017 issuing the largest amount of issuance yet
- » Short term growth will depend on market and economic conditions, however large funding agreements signed in the last months should support 2017 origination volumes



Source: PeerIQ, Moody's Investors Service

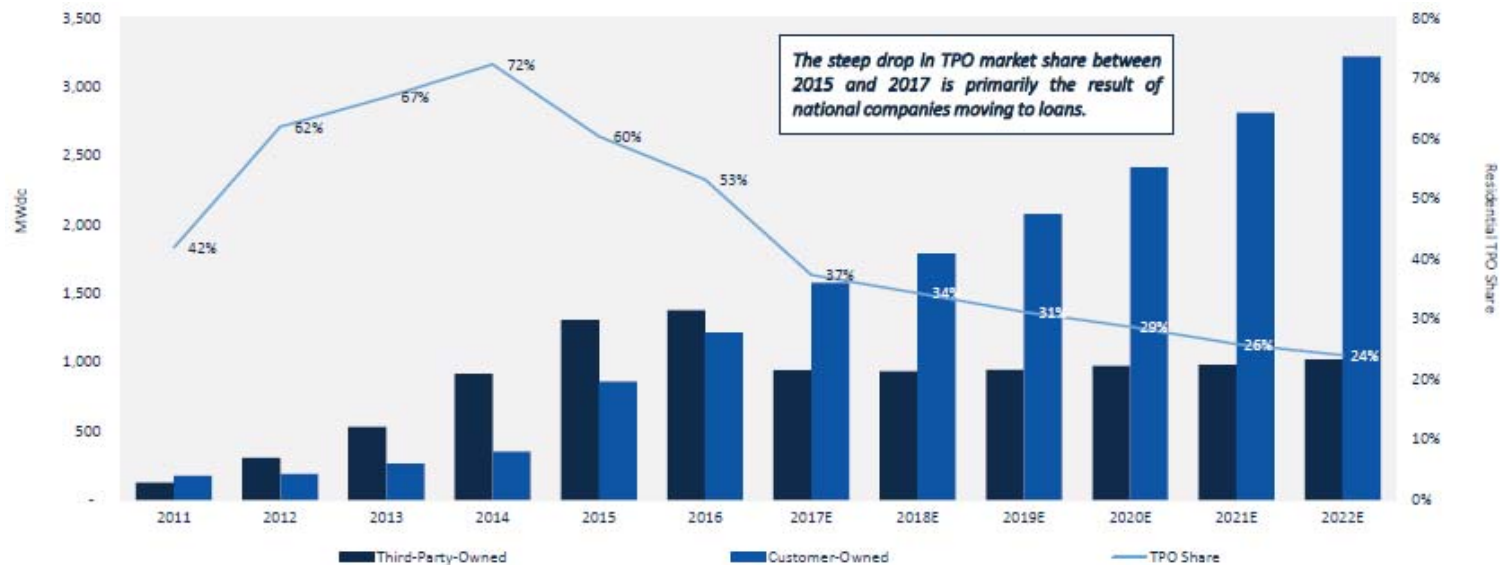
# 2

## Solar ABS: Financing Green Tech

# Solar loans have become a larger share

- » Growing originations of solar loans to homeowners are likely to result in more residential solar ABS backed by loans than backed by leases and power purchase agreements (PPA)
  - Some loans might offer more savings than leases and PPAs, and the fixed monthly payments of solar loans are likely to be more appealing to consumers as compared with solar leases and PPAs with annual escalators
  - Three solar loan ABS were issued in 2017 to date
- » Solar leases and PPAs will still play an important role in financing solar installations
  - Leases and PPAs provide solar companies with the federal ITC as well as a tax benefit from depreciation of the solar PV systems. Therefore the solar developer's cost of funding for loans may be less favorable than for leases
- » Tesla Energy, among others, issued securitizations backed by leases and PPAs

**Customer-owned systems will exceed third-party owned for new residential originations in 2017**



Source: GTM Research [U.S. Residential Solar Finance Update: H2 2017](#)

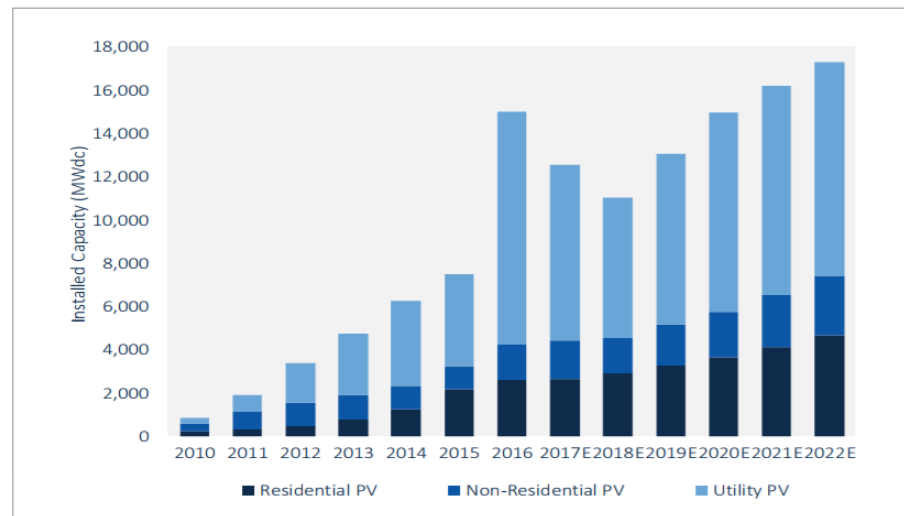
# Pace of growth in residential solar installations may slow further

- » After rapid growth, US residential installations have fallen in the last year
  - Tax incentives created an anomaly in 2016
  - National residential solar companies continue to slow operations and pursue profitable sales channels at the expense of growth
  - Presence of top national installers in unprofitable geographies reduced
  - Customer acquisition challenges are constraining growth in major states, including California

- » Headwinds:

- » In September, the US International Trade Commission ruled that imported solar panels caused “injury” to the domestic panel manufacturers. PV system costs may increase considerably.
- » Adverse changes in net metering rules for new solar customers in several states will slow installations because the economic savings that new solar customers receive from PV systems will decline

**U.S. PV Installation Forecast, 2010-2022E**



Source: [GTM Research / SEIA U.S. Solar Market Insight](#)

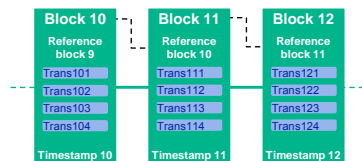
# 3

---

## Blockchain: A Glimpse of the Future

# Overview of blockchain technology

## 1. What is a blockchain?



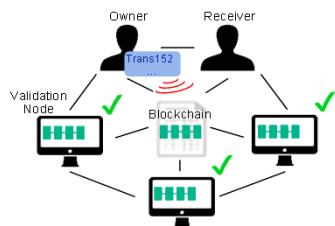
- A blockchain is a continuously growing list of data records that is organized into a series of blocks, each containing a batch of records or transactions
- Each block also has a timestamp and a reference to the previous block, allowing all blocks to be linked together to form a 'chain' that includes a history of all transactions executed in the network, thereby increasing the transparency and auditability of transactions → **immutable ledger**
- A blockchain can transfer any digital assets, such as financial instruments, contracts, ownership rights

## 2. How is a blockchain transaction originated?

Transaction ID: Trans152  
 Receiver's public key: 00f1d5...  
 Value of asset: property deed  
 Sender's private key: 004rl9...

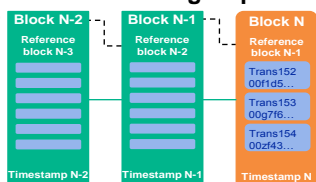
- The transaction 'sender' transmits a message to the network indicating a transaction ID; the address, or 'public key', of the receiver; the transaction value; a timestamp; and the sender's digital signature, or 'private key'
- E.g., two network members have agreed to an exchange of a property deed. The owner of the property sets up a transaction including the network address of the receiver to clarify to whom the property deed should be sent. The sender approves the transaction by signing it off with his private key

## 3. What ensures a transaction's authenticity?



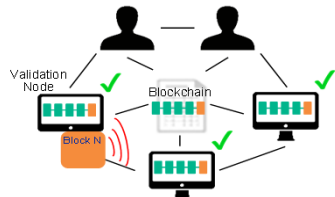
- Once the property owner has sent the transaction to the network, all network nodes receive the transaction message. They then verify the authenticity of the transaction with the network rules by decrypting the transaction using the sender's public key. Once the transaction is verified it is added to a queue of pending transactions
- The blockchain is spread across all participants, or 'nodes', of the peer-to-peer network. Nodes can create and/or validate new data. Each node's copy of the ledger is synchronized with all others to ensure that each member has real-time access to the most current data → **shared ledger**
  - One ledger shared among a network is robust against a failure of a node, increasing resilience to outages or attacks. Transaction completion time is shorter as no reconciliation is required

## 4. How are transactions grouped into blocks?



- All validation nodes group recent verified transactions of property deeds into a new block that they try to add to the blockchain. Blocks with corrupt transactions will not be accepted by the network
- A new block also includes a header with the name of the new block, a timestamp to indicate when the new block was created and a reference to the previous block of property deed transactions to ensure that the blocks are linked to each other and form a chain with the entire history of property deed transactions

## 5. How is a block added to the blockchain?



- Before the new block with the property deed transfer can be added to the chain, it is validated through an iterative process that requires consensus from a majority of the members or validation nodes (e.g. real estate agents, financing banks and the land registry authority) → **distributed consensus**
- Validation nodes will verify the work of the node that added the new block to ensure that the network rules were followed and checking the accuracy of the ownership history of the property deed
- Once the block is validated it is added to the blockchain and the updated state of the blockchain is broadcasted to the network. Fraudulent blocks are declined

Source: Bitcoin.org, Deloitte University, Evry, Moody's Investors Service

# How does a smart contract work?

- » A powerful concept that blockchain technology could leverage is ‘**smart contract**’ computer protocols; i.e., contracts among several parties that are self-executing and/or self-enforcing by automatically verifying, executing, and/or enforcing contractual clauses once predetermined conditions are triggered. These protocols could considerably reduce admin costs as they can be executed bilaterally, while also eliminating uncertainty around the exact terms or the execution process
  - Securities that automatically execute some corporate actions, such as principal repayments to bondholders at maturity, coupon payments to bondholders on contractually agreed coupon payment dates, and dividend payments to stockholders on the dividend payment date
  - Derivatives that automatically post margin on the occurrence of a margin call or automatically pay out when a counterparty defaults, syndicated loans with automated cashflows among lenders, and loans with collateral being locked when borrower misses payment

## 1 Set-up contract



All counterparties within the contract agree on common contract terms. The contractual clauses are stored as programming script on the blockchain.

## 2 Event triggers contract



A particular event occurs and triggers a transaction on the blockchain to the address that stores the contractual clauses.

## 3 Execution contract



The programming script is automatically executed based on the inputs that the contractual clauses receive.

## 4 Value transfer



Value of the underlying assets are transferred to the new owner, as described by the contract

## 5a Settlement digital assets



Digital assets on the blockchain would get automatically settled.

## 5b Settlement off-chain assets



Off-chain assets (e.g., securities) will be settled through settlement instructions to the respective ledgers

Source: R3, Moody's Investors Service



# Blockchain's benefits vs. outstanding hurdles

» Given the limited track record of large-scale blockchain applications, many hurdles are ahead. Those hurdles should be overcome for broader blockchain adoption

Key potential benefits
• Increased transaction <b><u>speed</u></b>
• Increased <b><u>accuracy</u></b> & reduced <b><u>human error</u></b>
• Reduced opportunity for <b><u>fraud</u></b> and data manipulation
• Improved <b><u>efficiency</u></b> and reduced infrastructure costs by eliminating the need for manual reconciliation
• Increased <b><u>transparency</u></b> over and <b><u>auditability</u></b> of transactions
• Increased <b><u>resilience</u></b> to outages/attacks as the ledger is shared among participants
• Increased <b><u>security</u></b> through cryptography
• <b><u>Broad application</u></b> of the blockchain is possible

Key outstanding hurdles
• Select optimal blockchain <b><u>configuration</u></b> per application
• <b><u>Scalability</u></b> of the blockchain and its ability to compete with current solutions remains uncertain
• Need for development of <b><u>industry standards</u></b> and <b><u>technical skills</u></b> for blockchain
• <b><u>Compatibility</u></b> of new blockchain infrastructure with existing non-blockchain solutions as well as different blockchain solutions with each other
• <b><u>Regulatory</u></b> backing needed in some industries before firms will fully explore the technology
• <b><u>Legal</u></b> uncertainty around data ownership, settlement finality, cross-border transaction legislation and smart contracts
• <b><u>Security</u></b> to hackers and network domination & <b><u>privacy</u></b> of confidential information
• <b><u>Cost-efficiency</u></b> of the benefits of an effective blockchain versus required investments and implementation risks

# Fully implemented blockchain is still some time away

- » Although market participants are mapping a large and growing landscape for blockchain applications, the tangible territory for fully implemented blockchain solutions beyond bitcoin is limited and is likely to remain so for up to a decade or longer
- » Only when blockchain applications **solve significant real-world problems** – providing user-friendly applications with a high level of stability and governance – will substantial ground be gained, paving the way for further investment and progress
- » Blockchain development will need to allow for **deliberate, in-depth analysis and testing**, as well as the incorporation of the new technology with existing technology. Many ‘proofs of concept’ of blockchain use cases have been put forward, but the next step will focus on how to operationalize and integrate the technology into current processes and systems
- » **Collaboration across companies and industries** would benefit blockchain’s development since its highest value will likely be derived from interconnected networks among institutions, rather than from closed networks within an institution
- » Blockchain will only embed itself in a given industry once solutions have been found for its hurdles and its benefits are proven to outweigh the additional investment cost required to develop and employ it as a replacement technology. A **deep cost-benefit analysis of each blockchain use case** will reveal if blockchain technology makes sense or if alternatives provide similar benefits in a more cost-efficient manner

# Moody's related research

[Marketplace Loan ABS - Court Ruling in Lending Club Case Is Positive for Marketplace Lending ABS](#), 6 February 2017

[Marketplace Lending ABS - An Overview of Marketplace Lending Securitizations](#), 13 February 2017

[Marketplace Lending ABS - Prosper's Funding Agreement Is Credit Positive for Its Marketplace Lending ABS](#), 6 March 2017

[Marketplace Lending ABS – China and US: Different Lending Models Present Unique Credit Challenges and Strengths](#), 16 March 2017

[Fintech: An Overview of the Fintech Regulatory Environment](#), 28 February 2017

[New Issue Report: Marketplace Originated Consumer Assets 2017-1 PLC](#), 8 November 2017

# Moody's related research

[Marketplace Loan ABS Would Benefit from a Bank Charter for US Financial Technology Companies](#), 13 December 2016

[Marketplace Lending ABS - US 2017 Outlook - Credit Quality Will Be Generally Steady as Lenders Look to Reestablish Confidence](#), 5 August 2016

[Marketplace Lending ABS - US: FDIC Proposal Would Improve Credit Quality of Marketplace Loans Originated Through Partner Banks](#), 28 October 2016

[Fintech - US Online Lenders: Competitive Advantages in Underserved Niche Market Rest on Unsteady Foundation](#), 19 October 2016

[Marketplace Originated Consumer Assets 2016-1: New Issue - The 1st Marketplace Originated Consumer Loan Transaction in the U.K.](#), 5 October 2016

[Marketplace Lending ABS - US: Key Risks in US Small Business Marketplace Lending Securitizations](#), 12 September 2016

[Marketplace Lending ABS - US: CFPB Win in Lending Lawsuit Is Credit Negative for Sector](#), 9 September 2016

[Marketplace Lending ABS – US Efforts to Strengthen Lender Protections Will Not Remove Legal Risks for Sector](#), 30 August 2016

[Marketplace Lending ABS – US Uncertainty Lingers as Supreme Court Declines to Hear Madden Case](#), 29 June 2016

[New Issue Report: Small Business Origination Loan Trust 2016-1 DAC](#), 23 May 2016

[Marketplace Lending ABS - US Proposed Class Action Lawsuit Against Lending Club is Credit Negative for Sector](#), 5 May 2016

[Marketplace Lending ABS - US Lending Club's Updated Model Likely Reduces But Doesn't Eliminate Legal Risks](#), 28 February 2016



**MOODY'S**  
INVESTORS SERVICE

William Black  
[william.black@moodys.com](mailto:william.black@moodys.com)  
Tel: 212-553-4563

moodys.com

This publication does not announce a credit rating action. For any credit ratings referenced in this publication, please see the ratings tab on the issuer/entity page on [www.moodys.com](http://www.moodys.com) for the most updated credit rating action information and rating history.

© 2017 Moody's Corporation, Moody's Investors Service, Inc., Moody's Analytics, Inc. and/or their licensors and affiliates (collectively, "MOODY'S"). All rights reserved.

CREDIT RATINGS ISSUED BY MOODY'S INVESTORS SERVICE, INC. AND ITS RATINGS AFFILIATES ("MIS") ARE MOODY'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES, AND MOODY'S PUBLICATIONS MAY INCLUDE MOODY'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES. MOODY'S DEFINES CREDIT RISK AS THE RISK THAT AN ENTITY MAY NOT MEET ITS CONTRACTUAL, FINANCIAL OBLIGATIONS AS THEY COME DUE AND ANY ESTIMATED FINANCIAL LOSS IN THE EVENT OF DEFAULT. CREDIT RATINGS DO NOT ADDRESS ANY OTHER RISK, INCLUDING BUT NOT LIMITED TO: LIQUIDITY RISK, MARKET VALUE RISK, OR PRICE VOLATILITY. CREDIT RATINGS AND MOODY'S OPINIONS INCLUDED IN MOODY'S PUBLICATIONS ARE NOT STATEMENTS OF CURRENT OR HISTORICAL FACT. MOODY'S PUBLICATIONS MAY ALSO INCLUDE QUANTITATIVE MODEL-BASED ESTIMATES OF CREDIT RISK AND RELATED OPINIONS OR COMMENTARY PUBLISHED BY MOODY'S ANALYTICS, INC. CREDIT RATINGS AND MOODY'S PUBLICATIONS DO NOT CONSTITUTE OR PROVIDE INVESTMENT OR FINANCIAL ADVICE, AND CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT AND DO NOT PROVIDE RECOMMENDATIONS TO PURCHASE, SELL, OR HOLD PARTICULAR SECURITIES. NEITHER CREDIT RATINGS NOR MOODY'S PUBLICATIONS COMMENT ON THE SUITABILITY OF AN INVESTMENT FOR ANY PARTICULAR INVESTOR. MOODY'S ISSUES ITS CREDIT RATINGS AND PUBLISHES MOODY'S PUBLICATIONS WITH THE EXPECTATION AND UNDERSTANDING THAT EACH INVESTOR WILL, WITH DUE CARE, MAKE ITS OWN STUDY AND EVALUATION OF EACH SECURITY THAT IS UNDER CONSIDERATION FOR PURCHASE, HOLDING, OR SALE.

MOODY'S CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT INTENDED FOR USE BY RETAIL INVESTORS AND IT WOULD BE RECKLESS AND INAPPROPRIATE FOR RETAIL INVESTORS TO USE MOODY'S CREDIT RATINGS OR MOODY'S PUBLICATIONS WHEN MAKING AN INVESTMENT DECISION. IF IN DOUBT YOU SHOULD CONTACT YOUR FINANCIAL OR OTHER PROFESSIONAL ADVISER.

ALL INFORMATION CONTAINED HEREIN IS PROTECTED BY LAW, INCLUDING BUT NOT LIMITED TO, COPYRIGHT LAW, AND NONE OF SUCH INFORMATION MAY BE COPIED OR OTHERWISE REPRODUCED, REPACKAGED, FURTHER TRANSMITTED, TRANSFERRED, DISSEMINATED, REDISTRIBUTED OR RESOLD, OR STORED FOR SUBSEQUENT USE FOR ANY SUCH PURPOSE, IN WHOLE OR IN PART, IN ANY FORM OR MANNER OR BY ANY MEANS WHATSOEVER, BY ANY PERSON WITHOUT MOODY'S PRIOR WRITTEN CONSENT.

All information contained herein is obtained by MOODY'S from sources believed by it to be accurate and reliable. Because of the possibility of human or mechanical error as well as other factors, however, all information contained herein is provided "AS IS" without warranty of any kind. MOODY'S adopts all necessary measures so that the information it uses in assigning a credit rating is of sufficient quality and from sources MOODY'S considers to be reliable including, when appropriate, independent third-party sources. However, MOODY'S is not an auditor and cannot in every instance independently verify or validate information received in the rating process or in preparing the Moody's publications.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability to any person or entity for any indirect, special, consequential, or incidental losses or damages whatsoever arising from or in connection with the information contained herein or the use of or inability to use any such information, even if MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers is advised in advance of the possibility of such losses or damages, including but not limited to: (a) any loss of present or prospective profits or (b) any loss or damage arising where the relevant financial instrument is not the subject of a particular credit rating assigned by MOODY'S.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability for any direct or compensatory losses or damages caused to any person or entity, including but not limited to by any negligence (but excluding fraud, willful misconduct or any other type of liability that, for the avoidance of doubt, by law cannot be excluded) on the part of, or any contingency within or beyond the control of, MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers, arising from or in connection with the information contained herein or the use of or inability to use any such information.

NO WARRANTY, EXPRESS OR IMPLIED, AS TO THE ACCURACY, TIMELINESS, COMPLETENESS, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OF ANY SUCH RATING OR OTHER OPINION OR INFORMATION IS GIVEN OR MADE BY MOODY'S IN ANY FORM OR MANNER WHATSOEVER.

Moody's Investors Service, Inc., a wholly-owned credit rating agency subsidiary of Moody's Corporation ("MCO"), hereby discloses that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by Moody's Investors Service, Inc. have, prior to assignment of any rating, agreed to pay to Moody's Investors Service, Inc. for appraisal and rating services rendered by it fees ranging from \$1,500 to approximately \$2,500,000. MCO and MIS also maintain policies and procedures to address the independence of MIS's ratings and rating processes. Information regarding certain affiliations that may exist between directors of MCO and rated entities, and between entities who hold ratings from MIS and have also publicly reported to the SEC an ownership interest in MCO of more than 5%, is posted annually at [www.moodys.com](http://www.moodys.com) under the heading "Investor Relations — Corporate Governance — Director and Shareholder Affiliation Policy."

Additional terms for Australia only: Any publication into Australia of this document is pursuant to the Australian Financial Services License of MOODY'S affiliate, Moody's Investors Service Pty Limited ABN 61 003 399 657AFSL 336969 and/or Moody's Analytics Australia Pty Ltd ABN 94 105 136 972 AFSL 383569 (as applicable). This document is intended to be provided only to "wholesale clients" within the meaning of section 761G of the Corporations Act 2001. By continuing to access this document from within Australia, you represent to MOODY'S that you are, or are accessing the document as a representative of, a "wholesale client" and that neither you nor the entity you represent will directly or indirectly disseminate this document or its contents to "retail clients" within the meaning of section 761G of the Corporations Act 2001. MOODY'S credit rating is an opinion as to the creditworthiness of a debt obligation of the issuer, not on the equity securities of the issuer or any form of security that is available to retail investors. It would be reckless and inappropriate for retail investors to use MOODY'S credit ratings or publications when making an investment decision. If in doubt you should contact your financial or other professional adviser.

Additional terms for Japan only: Moody's Japan K.K. ("MJKK") is a wholly-owned credit rating agency subsidiary of Moody's Group Japan G.K., which is wholly-owned by Moody's Overseas Holdings Inc., a wholly-owned subsidiary of MCO. Moody's SF Japan K.K. ("MSFJ") is a wholly-owned credit rating agency subsidiary of MJKK. MSFJ is not a Nationally Recognized Statistical Rating Organization ("NRSRO"). Therefore, credit ratings assigned by MSFJ are Non-NRSRO Credit Ratings. Non-NRSRO Credit Ratings are assigned by an entity that is not a NRSRO and, consequently, the rated obligation will not qualify for certain types of treatment under U.S. laws. MJKK and MSFJ are credit rating agencies registered with the Japan Financial Services Agency and their registration numbers are FSA Commissioner (Ratings) No. 2 and 3 respectively.

MJKK or MSFJ (as applicable) hereby disclose that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by MJKK or MSFJ (as applicable) have, prior to assignment of any rating, agreed to pay to MJKK or MSFJ (as applicable) for appraisal and rating services rendered by it fees ranging from JPY200,000 to approximately JPY350,000,000.

MJKK and MSFJ also maintain policies and procedures to address Japanese regulatory requirements.