Accelerating Bioeconomy Project Finance:
Key Initiatives to De-Risk Capital and Drive Investment

The Biomass Supply Chain Risk Standards and Ratings

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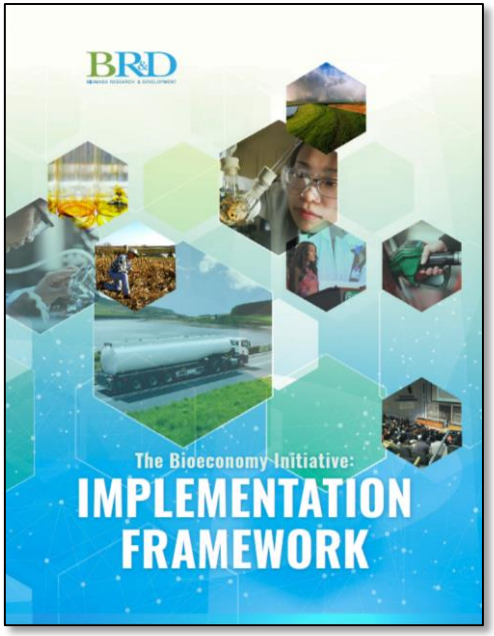
Overview of Discussion

1. **What we have done** to develop US *Standards and Ratings for Biomass Supply Chain Risk*. What they are. The project financing barriers they address. Why we believe they are effective in driving investment.

2. **What we see as the path forward.**
   - ✓ Development and validation Biomass Risk Ratings
   - ✓ Widespread adoption of BSCR Standards and Biomass Risk Ratings by the capital markets.
   - ✓ Supporting other market-based initiatives that de-risk investment into biomass-based projects

3. **How this supports delivery of government priorities.** The Bioeconomy Initiative: Implementation Framework

Alignment with Bioeconomy Initiative: Implementation Framework

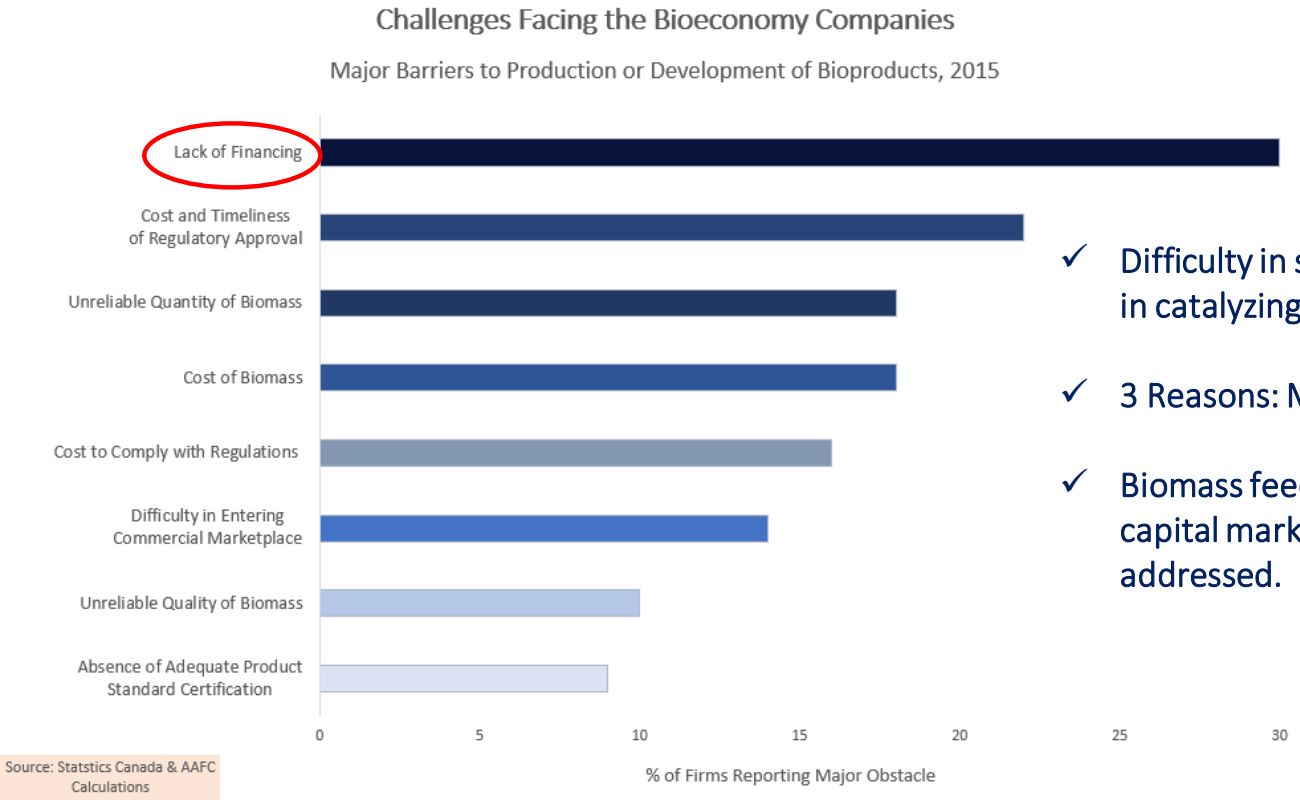


"The expansion of the bioeconomy has been limited in part because of perceived and actual … investment risks for biorefineries".

- ✓ "Better understand funding barriers, key risks, and options with the finance community".
- ✓ "Develop strategies for … risk reduction, especially for feedstock supply".
- ✓ "Identify innovative business and financing models that are working in other sectors and could be adopted for the bioeconomy".
- ✓ "Use success stories from across the value chain to educate the industry, investors, and the general public about how key federal technology development research is reducing … overall risk to private industry and financiers of the bioeconomy".

The Bioeconomy Initiative: Implementation Framework p.57

Feedstock Risk is a major barrier to investment in the bio-economy. Why do technology and market risk get 90% of the attention?



Source: Statstics Canada & AAFC Calculations

- ✓ Difficulty in securing capital is the major obstacle in catalyzing the bio-economy.
- ✓ 3 Reasons: Markets, Technology, and Feedstock
- ✓ Biomass feedstock risk is a key concern for the capital markets which has not been adequately addressed.

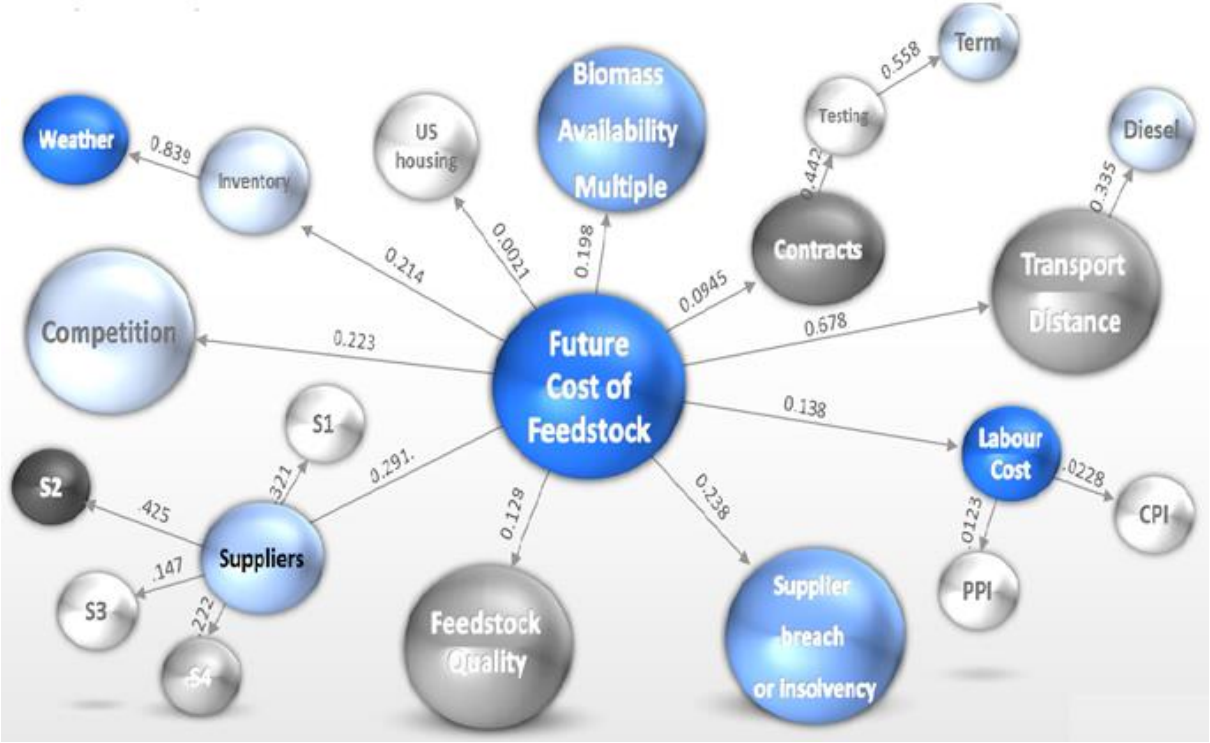
Risk Rating Systems Move over $9.5 Trillion

	S&P	Moody's	Fitch	Others NRSROs	Total
Financial instructions	54,000	61,581	61,550	32,207	209,338
Insurance companies	8,200	4,540	1,657	5,391	19,788
Corporate issuers	44,500	30,285	13,385	11,116	99,286
Asset backed securities	117,900	101,546	64,535	18,480	302,461
Government issuers	965,9000	841,235	363,897	14,694	2,185,726
Total	1,190,500	505,024	505,024	81,888	2,816,599

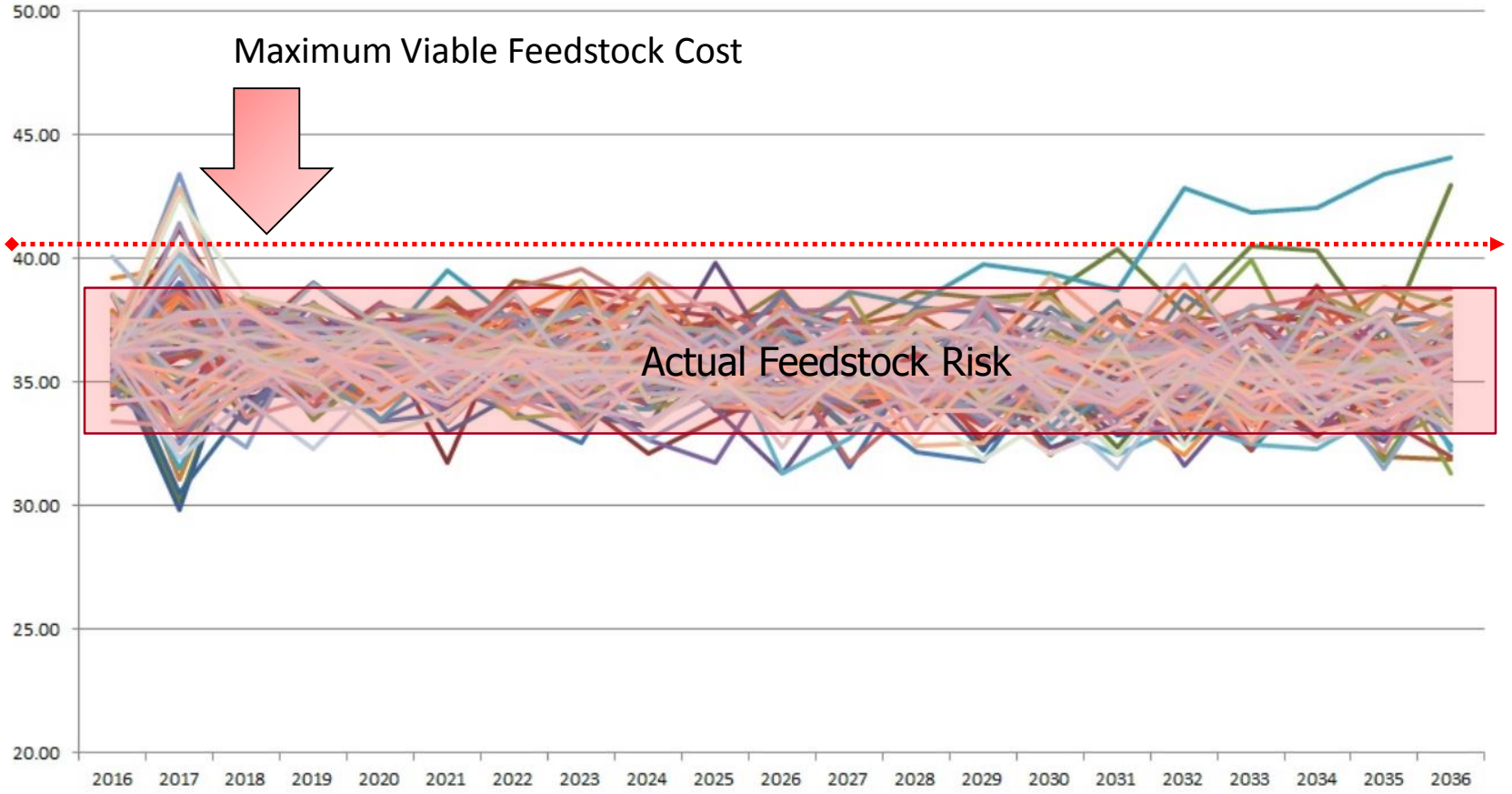
- Application of a **rules-based, standardized approach** to quantifying risk is a proven way of reducing capital market perceptions of risk.
- **Transparent evaluation protocol** allows capital markets to compare "apples to apples"
- Ratings enables massive efficiencies in the capital markets. A "proven financing model".

Funding Barrier:
No Standard Tools for Capital Markets to Measure Feedstock Risk

- Biomass Supply Chain Risk can be complex.
- Investor capacity to assess biomass supply chain risk is limited.
- Balance sheet financing doesn't work.
- Capital does not have a way to properly structure around feedstock risk.



Key Financing Challenge: Real vs Perceived Feedstock Risk



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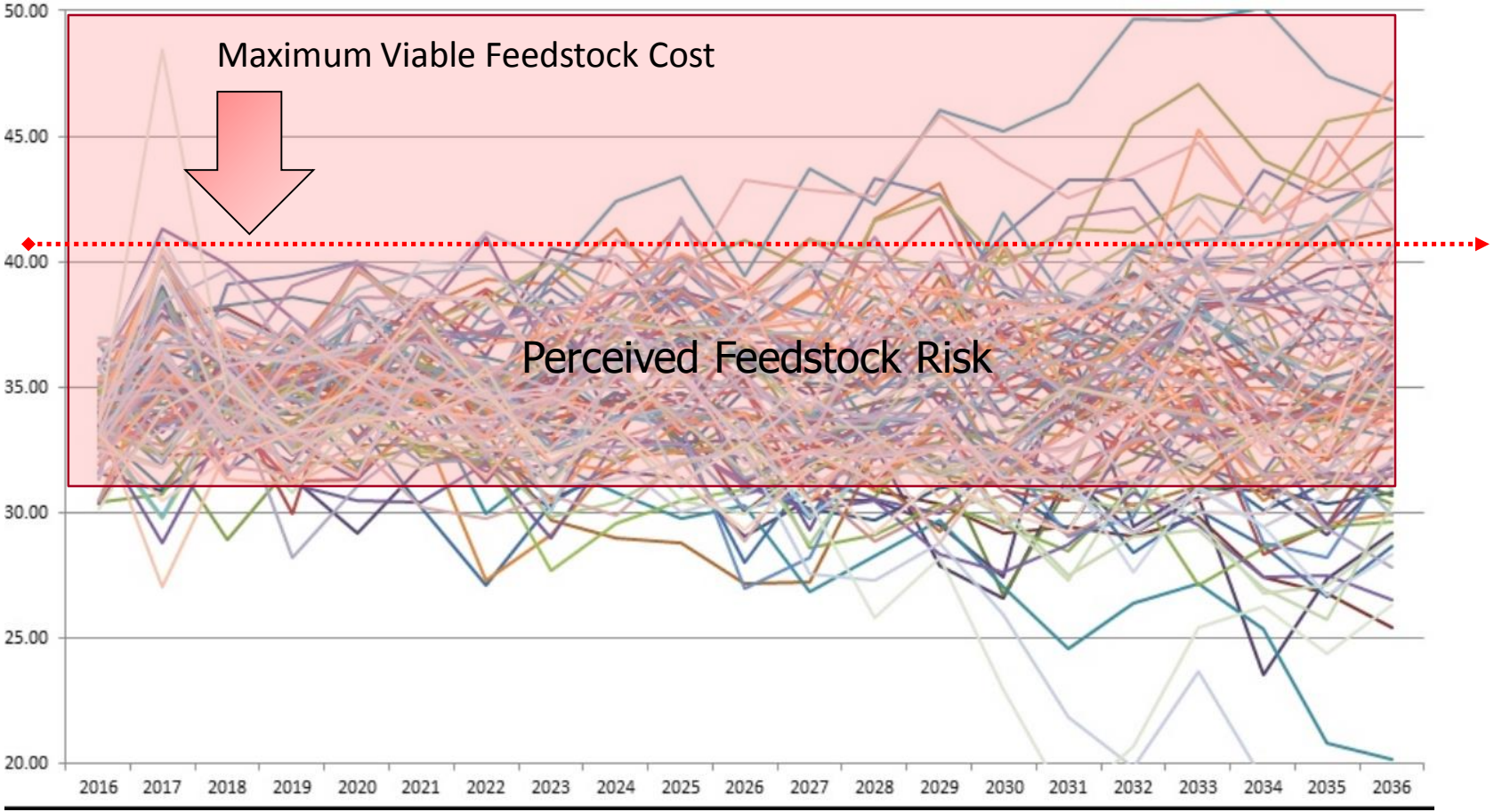
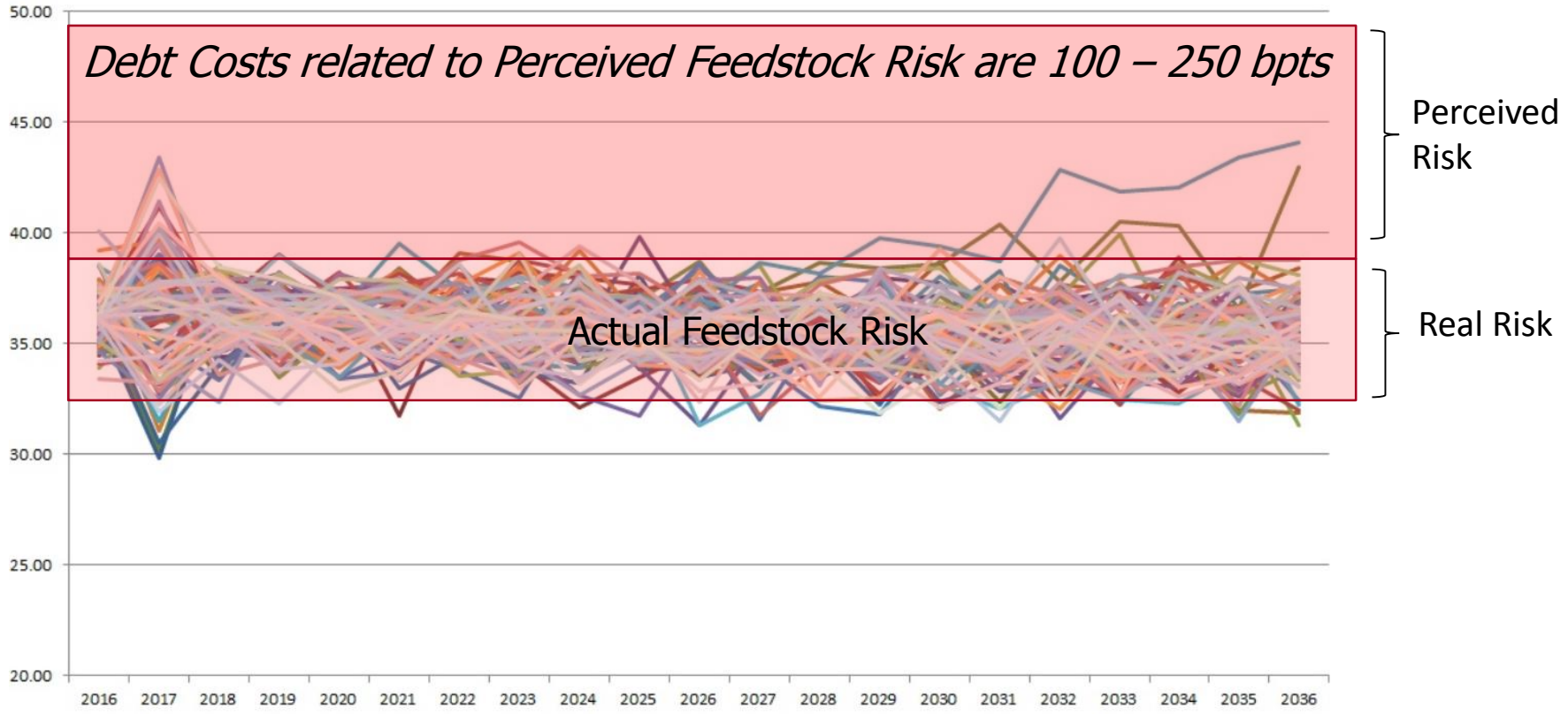
What Happens When Capital Markets are Confused



Lack of Clarity on Feedstock Risk is a Key Barrier to Financing Bio-Projects



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"Better understanding and pricing of risk will lead to easier capital flow to bioenergy projects and accelerate growth of the bio industry" FitchRatings

BSCR Standards are the framework for a risk rating system designed to signal feedstock risk to investors into biomass based projects

It is designed to do for the bio-economy exactly what the credit rating agencies do for the capital markets:

- ✓ **Create** efficiencies for investors and accelerate capital flow
- ✓ **Decrease** investment risk
- ✓ **Lower** the cost of capital
- ✓ **Increase** the pool of available capital

US Stakeholder Group
Standards for Biomass Supply Chain Risk

Biomass Supply Chain Risk Standard development funded in 2016 – ongoing

Impact on bio-project finance recognized by the ratings agencies and the capital markets

100+ Industry Stakeholders

Overview: Biomass Supply Chain Risk Standards

New State-of-the-Science for capital markets

6 RISK CATEGORIES

1. Supplier Risk
2. Competitor Risk
3. Supply Chain Risk
4. Feedstock Quality Risk
5. Feedstock Scale-Up Risk
6. Internal Management Risk

28 RISK FACTORS

126 INDICATORS

REPORTING REQUIRMENTS

GUIDANCE / BEST PRACTICES

Category 4.0: Feedstock Quality

4.1 Risk Factor: Feedstock Quality

4.1.1 CONSISTENCY OF FEEDSTOCK QUALITY REQUIREMENTS WITH LOCAL AVAILABILITY

Rationale	If specifications of biomass feedstock do not reflect what is currently or historically produced in the supply basin, supply chain resiliency decreases and risk increases.
Reporting	**Reporting Requirements** 1. Proponent feedstock specifications shall be consistent with feedstock quality widely available in the supply basin. **Reporting Recommendations** 1. Where feedstock specifications are not typical, mitigating factors shall be demonstrated.
Guidance	**Guidance for Reporting Requirements 1** Suppliers often supply more than one market and, despite contracting for a stricter specification, may deliver traditional feedstock specifications (i.e., sub-standard) that are acceptable for existing markets. That is, some suppliers may believe that the Proponent will in fact tolerate the typical regional specification despite written contract specifications to the contrary. Thermochemical and biochemical refineries have different requirements for the quality of feedstock used for producing fuels or energy. Quality parameters include ash, moisture and hydrocarbon contents (e.g., sugar, lignin, etc.). Current fast-pyrolysis and hydrotreating biofuel facilities require feedstock with low ash content (~0.9%, on a dry basis), 30% moisture content and ~50% hydrocarbons (Jones et al. 2013). For biochemical conversion of feedstocks to biofuels, current designs require 5% ash content on a dry basis, 20% moisture content, and total structural carbohydrates at 59% (Davis et al. 2013). As technologies develop, these requirements will get more specific and optimal quality range parameters will become clearer. It is important for a Proponent to be aware of changing requirements and compare them to the available feedstock quality parameters.
Guidance Source	Abt (2018, interview); Davis et al. (2013); Jones et al. (2013); Muth (2017, interview); Spikes (2017, interview); Smith (2017, interview); Tumuluru (2016)

Case Study: Wood to electricity plant in Florida

- Facility was converted from coal-fired to a 71 MW (net) biomass-fired power plant. Due Diligence was undertaken for sale of project 2018. Feedstock risk was key.
- Capital market perception of feedstock risk was assessed ***before*** and ***after*** application of the BSCR Standards
- Based on three feedstock reports in 2010, 2011, and 2017 commissioned by the developer and on established industry methodology common prior to the development of the BSCR Standards.

KEY RESULTS

1. Over 41% of Risk Factors and 34% of the Risk Indicators in the BSCR Standards *were not addressed* by previous reports.
2. Overall project risk as perceived by capital markets was shown to decrease by 29% after application of the BSCR Standards.

What's Next?

Phase 2: Integrate Ratings with BSCR Standards, Calibrate, Validate and Roll-out

The BSCR Ratings Review Committee

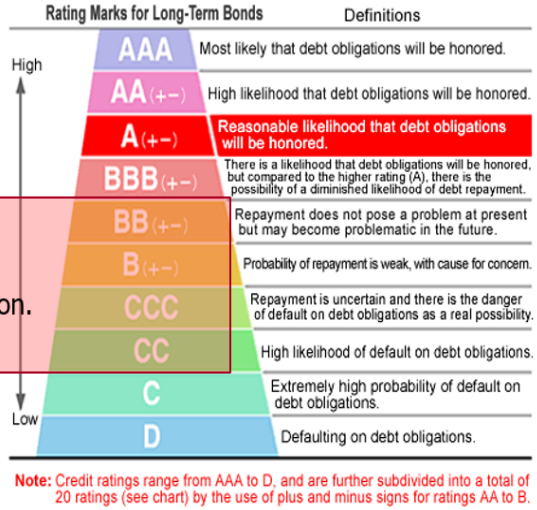
- Over 40 Review Committee members.
- >$50 billion in deployable "bio-targeted" capital from investors deploying capital in sector.
- Clear call for Biomass Risk Ratings by capital market players

Phase 2: Biomass Risk Ratings Protocols and Scoring

		Sub-Factor Rating					
Risk Factor 3.1	**Factor Weight**	**Aaa**	**A**	**Baa**	**Ba**	**B**	**C**
Feedstock Availability	xx%	The Biomass Availability Multiple (BAM) is equal or larger than the minimum required BAM. **AND** Increased feedstock utilization models indicate high BAM under all realistic scenarios. **AND** Redundant feedstock is potentially available at prices close to the primary feedstock. **AND** Model indicates long-term sustainable availability of feedstock **AND** Models indicate low likelihood of significant year-to-year variation in feedstock supply. **AND** Models indicate long-term low likelihood significant seasonal variation in feedstock supply.	The Biomass Availability Multiple (BAM) is equal or larger than the minimum required BAM. **AND** Increased feedstock utilization models indicate high BAM under most realistic scenarios. **AND** Redundant feedstock is potentially available at tolerable prices. **AND** Models indicate long-term sustainable availability of feedstock. **AND** Models indicate low likelihood of significant year-to-year variation in feedstock supply. **AND** Models indicate low-to-medium likelihood of significant seasonal variation in feedstock supply.	The Biomass Availability Multiple (BAM) is equal or larger than the minimum required BAM. **AND** Increased feedstock utilization models indicate high BAM under most realistic scenarios. **AND** Redundant feedstock is potentially available at tolerable prices. **AND** Models indicate long-term sustainable availability of feedstock. **OR** Models indicate low likelihood of significant year-to-year variation in feedstock supply. **AND** Models indicate low-to-medium likelihood of significant seasonal variation in feedstock supply.	The Biomass Availability Multiple (BAM) is equal or larger than the minimum required BAM. **AND** Increased feedstock utilization models indicate medium-to-high BAM under most realistic scenarios. **OR** Redundant feedstock is potentially available at tolerable prices. **AND** Models indicate long-term sustainable availability of feedstock, however, significant year-to-year feedstock supply variation is likely to happen. **AND** Models indicate low-to-medium likelihood of significant seasonal variation in feedstock supply.	The Biomass Availability Multiple (BAM) is equal or larger than the minimum required BAM. **AND** Increased feedstock utilization models indicate high-to-medium BAM under most realistic scenarios, however redundant feedstock is potentially available at relatively high prices, **AND** Models indicate long-term sustainable availability of feedstock; however, significant year-to-year feedstock supply variation is likely to happen. **AND** Models indicate medium-to-high likelihood of significant seasonal variation in feedstock supply.	The Biomass Availability Multiple (BAM) is lower than minimum required BAM. **AND** Increased feedstock utilization models indicate lower than required BAM under the most realistic scenarios. **AND** Redundant feedstock is not available at tolerable prices. **AND** Model indicates a medium-to-high risk of lack of sustainable availability of feedstock over long-term. **AND** Models indicate medium-to-high likelihood of significant year-to-year variation in feedstock supply. **AND** Models indicate medium-to-high likelihood of significant seasonal variation in feedstock supply.

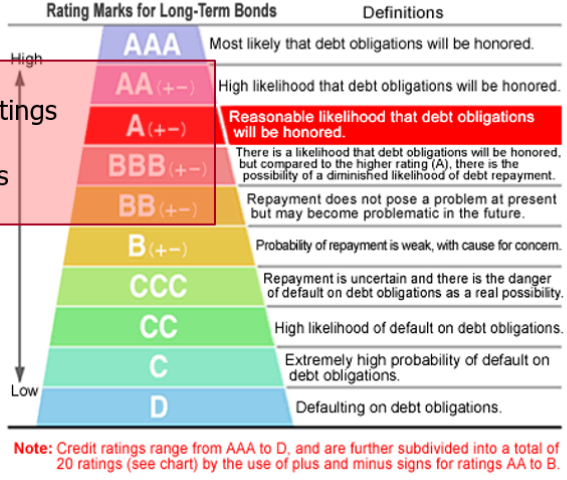
Risk Ratings Impact on Bio-project Financing

Without Rating



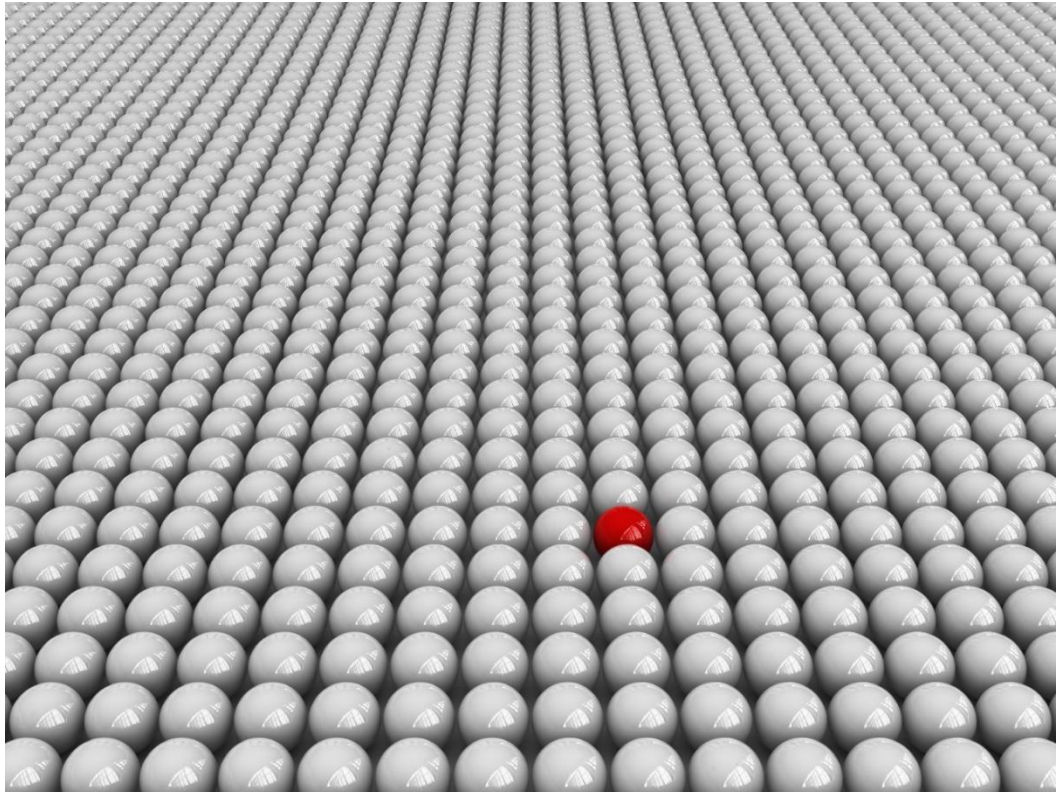
Typical bioenergy project ratings are in the junk region.

With Rating (1-3 notch increase)



Biomass Supply Chain Risk Ratings can result in a ratings bump For bio-projects of 1-3 notches

BSCR Standards Prevent Biomass Project Failure



- Project failure due to improper or inadequate assessment of feedstock risk is a significant threat to development of the bio-economy.
- The “knock-on” effects of project failure on future investment are well documented.
- Project failure makes future investment less likely and more expensive.

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Benefits: Biomass Standards and Ratings

By addressing a key barrier for the capital markets, BSCR Standards and Risk Ratings will:

- ✓ ***Enable the financial markets*** more accurately and more rapidly quantify and structure around long-term biomass feedstock risk.
- ✓ ***Help project developers*** mitigate feedstock risk for the capital markets.
- ✓ ***Allow*** capital to flow more easily to projects.
- ✓ ***Fast-track existing and future bio-project development*** for 2nd generation biofuels including aviation biofuels as well as biochemicals, bioenergy, and bioproducts.
- ✓ ***Support*** development of other market-based tools (i.e. feedstock insurance, hedging).

Key Government Action: Support Initiatives that De-Risk Biomass Feedstock for the Capital Markets

Recommendation 1: Support Development of Ratings Mechanisms and Validation Metrics

- ✓ Integrate risk ratings systems and scoring with BSCR Standards (*in progress*). Calibrate using multiple case studies. Expand scope to food waste, urban wood waste, MSW. Provide real-world proof of efficacy: track risk rated projects against actual performance metrics over time: FY20 and FY21

Recommendation 2: Support Initiatives that Drive Industry Uptake of Standards and Ratings

- ✓ Support ANSI accreditation of BSCR Standards as a US National Standard.
- ✓ Integrate BSCR Standards and Ratings with current government programs. Incorporate BSCR Standards into risk assessment protocols for USDA / OSDOE Loan Guarantee applicants. What other programs could benefit?
- ✓ Support development of an independent, *non-governmental* administrative body that will issue certified risk ratings (AA, A-, BB, etc.) to qualified biomass projects: Biomass Ratings Agency (BRA)
    - USDA Agricultural Research Service (ARS) to provide scientific support and personnel.

Key Government Action: Support Initiatives that De-Risk Biomass Feedstock for the Capital Markets

Recommendation 3: Support Development of other "Structural" Project Finance Initiatives

Example: The Biomass Finance Initiative (BFI): To address barriers to biomass project finance and unlock the full capacity of the capital markets in accelerating the bioeconomy.

- ✓ Accelerator for development of new instruments to de-risk biomass finance: feedstock insurance TC, risk hedging TC, indexing TC, supplier credit wraps.
- ✓ Seeded by members of the $50 B Risk Ratings Review Committee, other capital market players, developers, insurance companies, national labs, and government.
- ✓ Training and certification of biomass professionals
- ✓ The "Directory of Biomass Finance": a comprehensive list of American capital markets investing in different stages of biomass project development.
- ✓ Forum for exchange of the latest ideas, data, models, industry issues and success stories.

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