The Role of Third-Party Institutions in Biomass Contracting: A Comparative Perspective

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Abstract

Bioenergy is a prominent form of renewable energy that encompasses different types of energy produced from biomass feedstock (i.e., organic-based plant materials). Market innovations and feedstock improvements have allowed cost-effective bioenergy production and increased acceptance by end-users. Recent regulations, such as the Obama Administration's Clean Power Plan, encourage the energy sector to reduce carbon emissions by shifting to renewable energy.

As technology improves, however, new challenges emerge as how to organize the biomass supply chain for efficient bioenergy production. In the case of biofuels, one of these challenges is how to address contracting issues that may cause conflicts among biomass feedstock producers and biofuel producers. Biofuel production requires large initial investments, and uncertainty exists in the supply of feedstock; thus, it is necessary to reduce transaction costs and organize the industry in the most efficient manner.

One market we may look to for ideas and answers is the biofuels market in Brazil. Brazil is the world's largest producer of sugarcane and one of the most important players in the ethanol market. Sugarcane is processed into ethanol, which is a clean, affordable, and low-carbon biofuel that has emerged as a leading renewable fuel. The success of the sugarcane market in Brazil is strongly related to the continuous development and improvement of Brazil's sugarcane supply chain. Further, the Brazilian government maintained tight control over the sugarcane industry until the deregulation of the sector in the 1990s. After deregulation, sugarcane growers and sugar and ethanol processing facilities joined together to create the São Paulo State Council of Sugarcane, Sugar and Ethanol Producers, "Consecana." Consecana is an association comprised of representatives of both segments of the supply chain, independent farmers and the sugar and ethanol industry. The Consecana model is an example of a

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voluntary market-based arrangement entered into by the industry, which utilizes a transparent mechanism of payment for sugarcane. When viewed through the lens of transaction cost economics, Consecana reduces uncertainties in the transaction between buyers and sellers of sugarcane by defining its terms ex ante *through a series of rules created and enforced by both sides of the industry.*

In this article, we suggest that different sectors within the U.S. bioenergy industry adopt a model predicated on cooperation and self-regulation, as well as third-party intervention, accomplished in a formal manner. We argue that as different sectors in the bioenergy industry become more established and create demand for specific inputs, such as distinct energy crops and wood wastes, these sectors will benefit from industry self-regulation. Our focus is on voluntary self-regulation, which encompasses both the making and implementation of norms and rules by the private industry itself, independent of the government. We discuss some of the current biomass associations and biomass groups in the United States, how they are structured, and what kinds of contracting issues these associations address. We conclude by proposing that as the biomass market evolves, biomass associations in the United States should specialize according to the type of feedstock their members produce and utilize, encourage cooperation among their members, and increase cooperation among themselves by employing more self-regulatory mechanisms.

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I. INTRODUCTION

Renewable energy is generated from resources that are replenished naturally in a short period of time.[1] This includes energy produced from wind, solar, hydropower, biomass, and waste.[2] Broadly speaking, "biomass" means organic material—such as forest debris, certain crops, and waste residues—used to produce renewable energy, called "bioenergy."[3] Biomass can be combusted directly or converted into "biogas" that can, in turn, be combusted to generate electricity or thermal energy.[4] More often, however, biomass is converted into "biofuels"—liquid fuels that can be used as alternatives to petroleum-based fuels in the transportation sector.[5] Currently, the most common types of biofuels are ethanol and biodiesel. Ethanol is a biofuel made from the fermentation of starches and sugars through a process similar to that used to produce beverage alcohol.[6]

New U.S. regulations are expected to incentivize a significant increase in the demand for biomass over the next twenty-five years.[7] In particular, on August 3, 2015, the U.S. Environmental Protection Agency ("EPA") released its final Clean Power Plan that may further promote the use of renewable energy in the country. The Clean Power Plan modifies the country's energy policy by setting state-by-state greenhouse gas emissions targets that each state must meet by 2030.[8] EPA

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1. *Glossary*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/tools/glossary/index.cfm (last visited Aug. 23, 2015); *see What Is Renewable Energy?*, ENVTL. CTR., http://www.colorado.edu/ecenter/energyclimate/general-energy-climate-info/energy-us/renewable-energy (last visited Jan. 27, 2016).

2. *What Is Renewable Energy*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/energyexplained/index.cfm?page=renewable_home (last visited Aug. 23, 2015).

3. *What Is Biomass?*, REENERGY, http://www.reenergyholdings.com/renewable-energy/what-is-biomass/html (last visited Aug. 23, 2015).

4. *Biomass Energy Basics*, NAT'L RENEWABLE ENERGY LAB, http://www.nrel.gov/learning/re_biomass.html html (last visited Aug. 23, 2015).

5. *Biofuels Basics*, NAT'L RENEWABLE ENERGY LAB, http://www.nrel.gov/learning/re_biofuels.html (last visited Aug. 23, 2015).

6. *Id.*

7. U.S. ENERGY INFO. ADMIN., *supra* note 2.

8. Daniel Kelly-Stallings et al., *EPA's Clean Power Plan: Structure, Implications for the Grid, and Next Steps,* K&L GATES (Aug. 14, 2015), http://www.jdsupra.com/legalnews/epa-s-clean-power-plan-structure-72294/. However, the EPA's Clean Power Plan was recently stayed by the U.S. Supreme Court, pending review by the D.C. Circuit and possibly the Supreme Court. Jonathan Adler, *Supreme Court Puts the Breaks on the EPA's Clean Power Plan*, WASH. POST, https://www.washingtonpost.com/news/volokh-conspiracy/wp/2016/02/09/supreme-court-puts-the-brakes-on-the-epas-clean-power-plan/ (last visited Feb. 16, 2016).

acknowledges, in the Clean Power Plan that "the use of some biomass-derived fuels can help control increases of CO_2 levels in the atmosphere."[9] Each state is free to decide how to meet its emissions target: for example, a state may choose to shift away from coal-fired electricity generation or shift towards renewable energy.[10] This means that states may choose to comply with the new rules by employing technologies to produce electricity from biomass. Accordingly, each state's plan must describe the types of biomass that are being proposed for use under the plan and how those proposed feedstocks or feedstock categories should be considered as "qualified biomass."[11] For this reason, it becomes extremely important to address the supply chain issues that impact efficient production and processing of biomass feedstock. The question we address is how to better organize the biomass industry's supply chain in order to guarantee an adequate and sustainable industry.

In order to accommodate this potentially significant increase in demand, U.S. biomass producers will have to address the contracting issues inherent in their industry.[12] In particular, most biomass feedstocks present high levels of "asset specificity." Asset specificity will be discussed in greater detail below, but, for now, it is sufficient to note that the term means that investments needed to produce a particular biomass feedstock have a higher value inside a given transaction than they otherwise would if used for any other purpose.[13] This makes it difficult for parties to walk away from a biomass transaction once an investment has been made, which, in turn, encourages opportunistic behavior such as holding up a deal to demand more money or shirking contractual duties.

In this article, we build a case for more self-regulatory mechanisms as a solution to these contracting issues. In particular, we look to another biofuel market, Brazil, which is at a more advanced stage of development and therefore provides insight into how to address the contracting challenges in the U.S. biomass market. Part of Brazil's success is due to the interesting case of the São Paulo State Council of Sugarcane, Sugar and Ethanol Producers ("Consecana"), a voluntary program regulating sugarcane market transactions in Brazil that may serve as a model for self-regulatory mechanisms in the United States.

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9. Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,662, 64,885 (Oct. 23, 2015) (to be codified at 40 C.F.R. pt. 60) [hereinafter Carbon Guidelines].

10. Scott Detrow & Elizabeth Harball, *Final Clean Power Plan Shifts Toward Renewables and Away From Natural Gas*, E&E PUB., LLC (Aug. 4, 2015), http://www.eenews.net/stories/1060022944.

11. Carbon Guidelines, 80 Fed. Reg. at 64,885 (the meaning of "qualified biomass" will be determined by EPA when reviewing a state plan).

12. *See generally* JURGEN WEISS & MARK SARRO, THE IMPORTANCE OF LONG-TERM CONTRACTING FOR FACILITATING RENEWABLE ENERGY PROJECT DEVELOPMENT (2013), http://www.brattle.com/system/publications/pdfs/000/004/927/original/The_Importance_of_Long-Term_Contracting_for_Facilitating_Renewable_Energy_Project_Development_Weiss_Sarro_May_7_2013.pdf?1380317003.

13. *See* Oliver E. Williamson, *The Economics of Organization: The Transaction Cost Approach*, 87 AM. J. SOC. 548, 555 (1981) [hereinafter *The Economics of Organization*] (discussing how parties may get "locked into" a transaction when specialized items for a specific transaction limits its use in a different transaction).

Brazil is a good model for the United States because it is one of the most successful biofuel markets in the world.[14] Brazil is the largest sugarcane producer in the world, producing more than 500 million tons of sugarcane each year.[15] This large sugarcane crop also means that Brazil is a leading producer of sugarcane ethanol—a clean, affordable, and low-carbon biofuel produced by the fermentation of sugarcane juice.[16] Currently, Brazil produces about twenty-four billion liters of ethanol each year[17] and derives about 4.1 percent of its total installed energy capacity from biofuel, mostly bagasse made from sugarcane waste that remains after juice extraction.[18] Furthermore, Brazil's experience with ethanol fuel dates back to the 1940s, and the organization of its sugarcane industry and supply chain choices have been influenced by a complex set of factors, including many decades of strong government intervention.[19] Thus, Brazil's solutions to biofuels' contracting issues during these decades of development can provide important lessons for the developing U.S. biomass market. In particular, the successful example of how the Brazilian ethanol and sugar industries allocated responsibilities across their sugarcane supply chains can provide valuable insight for developing the most efficient supply chain strategy for biomass in the United States.

One of the most innovative mechanisms in the Brazilian biofuel industry is the Consecana, a voluntary pricing model that facilitates transactions in the sugarcane and ethanol industries by setting quality standards and minimum contractual rules for the industry. The Consecana model, explained in more detail in subsection III.B., among other things, seeks to reduce the contracting costs of the market by establishing more effective commercial conditions for both sugarcane growers and sugar mills, which generally produce both sugar and ethanol. In Brazil, most sugar mills include integrated distilleries, allowing sugarcane to be processed into either sugar or ethanol. Interactions between independent sugarcane growers and mills have long been adversarial.[20] The Consecana model, as a multi-stakeholder initiative, has been considered a benchmark for sugarcane

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14. ANDRES DUQUE MARQUEZ, THE BRAZILIAN ENERGY REVOLUTION: LESSONS FROM THE BIOFUEL INDUSTRY BOOM 2 (2007), http://iipi.org/wp-content/uploads/2010/07/Biofuels_RD_and_Economic_Development_in_Brazil.pdf.

15. *Brazilian Sugarcane Harvest*, SUGARCANE.ORG, http://sugarcane.org/media-center/sugarcane-statistics (last visited Aug. 23, 2015) [hereinafter *Brazilian Sugarcane Harvest*].

16. *Ethanol*, SUGARCANE.ORG, http://sugarcane.org/sugarcane-products/ethanol (last visited Aug. 23, 2015).

17. *Brazilian Sugarcane Harvest*, *supra* note 15.

18. Anna Austin, *Sugarcane Bagasse Could Benefit Brazil Energy Matrix*, BIOMASS MAG., http://biomassmagazine.com/articles/2299/sugarcane-bagasse-could-benefit-brazil-energy-matrix (last visited Feb. 16, 2016); *What Is Bagasse?*, ECOKLOUD, http://www.ecokloud.com/what-is-bagasse.html (last visited Aug. 23, 2015).

19. Vanessa M. Cordonnier, *Ethanol's Roots: How Brazilian Legislation Created the International Ethanol Boom*, 33 WM. & MARY ENVTL. L. & POL'Y REV. 287, 289–94 (2008).

20. *See* THOMAS FRONZAGLIA & RENATA MARTINS, BRAZILIAN ETHANOL'S GOVERNANCE: IMPLICATIONS FOR SUSTAINABILITY 227 (Edgard Blucher ed. 2014) (noting that while today these categories may not be as defined, several papers have addressed the "specificities and necessities" of these categories).

supply contracts in São Paulo since its creation.[21]

Nevertheless, while Brazil provides valuable insight for the United States, it is important to note that Brazil and the United States differ in the diversity of feedstocks used to produce biofuel. The Consecana model was designed for sugarcane, a homogeneous input with a defined end-use. However, biomass in the United States encompasses a much broader variety of inputs, such as organic waste, energy crops, and agricultural residues. Each of these inputs has different characteristics and unique asset specificity concerns. To address this issue, we propose our model for each specific feedstock material or for each developing sectors of the bioenergy industry, as opposed to an all-encompassing model that will likely not adequately address the unique specificity issues of each type of biomass input.

Further, this article serves as an outgrowth of our recent article, "The Case for Vertical Integration in the Developing Bioenergy Industry," where we analyzed the supply chain organization in the nascent biomass industry, and argued for vertical integration in light of contractual issues and asset specificity concerns in the biomass supply chain.[22] That article argued that the nascent biomass industry in the United States would benefit from a vertically integrated structure because of asset specificity, logistical concerns, and the uncertainties involved in biomass transactions.[23] We employed transaction cost economics ("TCE"), which emphasizes that transaction costs (i.e., the costs associated with making a product and offering a service as well as administering business relationships) are one of the primary determinants of an industry's organization and operations,[24] in discussing the emerging biomass industry in the United States. We examined model biomass contracts and agricultural contract arbitration cases, concluding that the most common disputes in agricultural contracts will also likely occur in biomass supply contracts.[25] However, because of asset specificity concerns and the unique characteristics of biomass supply contracts, failure to meet quality standards and deliver the feedstock as agreed jeopardizes the nascent bioenergy industry.[26]

Therefore, we employ a TCE approach to explore options for increasing efficiency in situations where individual sectors of the bioenergy industry develop to a point where market transactions are the efficient choice. While our prior article addressed initial stages of the biomass industry, the concepts of this

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21. BIOENERGY & FOOD SEC. CRITERIA & INDICATORS, UNICA 2, http://www.fao.org/bioenergy/31534-05a069a7ca48d4b20bbd9b5e9ca6548a8.pdf (last visited Feb. 17, 2016) [hereinafter UNICA].

22. Isabel F. Peres et al., *The Case for Vertical Integration in the Developing Bioenergy Industry*, 39 WM. & MARY ENVTL. L. & POL'Y REV. 575, 575–76 (2015).

23. *Id.* at 635–43.

24. *The Economics of Organization*, *supra* note 13, at 556–58; Paul L. Joskow, *Vertical Integration and Long-Term Contracts: The Case of Coal-Burning Electric Generating Plants*, 1 J. L. ECON. & ORG. 33, 36 (1985).

25. Peres et al., *supra* note 22, at 642.

26. *Id.*

article become applicable when the industry reaches a stage where vertical integration is no longer the optimal organizational choice. In other words, once the individual sectors of the biomass industry mature and become more established, independent market transactions and their costs and benefits draw critical attention.

This article proceeds as follows: First, we establish the analytical framework relevant for examining the role of self-regulatory mechanisms like Consecana for the biomass industry in the United States. We discuss the theory of transaction cost economics as well as its implications for analyzing third-party institutions. We explore the economic role of industry associations and third-party institutions, and the benefits and costs for private parties to implement such self-regulatory mechanisms. The theory of transaction cost economics will provide the undergirding concepts for understanding how the Consecana model may assist market parties to reduce transaction costs.

Second, we introduce the Brazilian sugarcane and ethanol industries and provide a general background of the biofuel supply chain. We emphasize the condition of asset specificity and how it affects sugarcane market transactions and, consequently, the ethanol industry in Brazil. We then discuss the main characteristics of Consecana, a self-regulatory mechanism created by the industry after the deregulation of the sector. Consecana is employed today by buyers and sellers of sugarcane to regulate many aspects of their transactions.

Third, we discuss and contrast important aspects of industry associations in the biomass industry in the United States, as well as their role in promoting cooperation and enforcing contractual guarantees. We contrast the role the Consecana model has in Brazil with the activities and the work performed by biomass associations in the United States, while articulating the viability of implementing self-regulatory arrangements to improve the biomass supply chain in the United States. We offer conclusions on how self-regulatory models like Consecana have the potential to assist market players to increase the efficiency of biomass transactions and promote steady industry growth. Furthermore, we articulate antitrust concerns for industry associations relevant to addressing contractual issues in the supply chain. In short, the main purpose of this article is to introduce self-regulatory mechanisms as well as to examine the viability of industry arrangements in the biomass industry. The upshot of these efforts is to provide mechanisms for the improvement of biomass feedstock supply chains in the United States.

II. TRANSACTION COST ECONOMICS

This section introduces transaction cost economics ("TCE"), an analytical framework that will help explain the transaction costs that determine whether an industry may choose to self-regulate and the particular rules it is likely to choose,

if it does so.[27] First, this section discusses the market failures due to transaction costs that may motivate an industry to govern itself as specific transaction costs prompt different regulatory arrangements in an industry. Then, this section discusses two mechanisms an industry may use to govern itself—self-regulation and third-party institutions.

Before we delve into this discussion, however, let us clarify a few terms: "associations," as defined here, will refer to the role of intermediaries among buyers and sellers that assist and regulate their transactions. Efficient industry-level regulation, as we analyze here, suggests *ex ante* industry cooperation.[28] It is important to note that private firms in an industry can act strategically to reach a solution for an industry problem when cooperation and a sustainable system are present.[29] While the term "cooperation" may have different meanings,[30] we define "cooperation" here as the case when market players reach an explicit agreement to cooperate and coordinate their actions while aiming to establish a sustainable regulatory system.[31] Cooperation, in this sense, refers to explicit industry behavior towards creating self-regulatory mechanisms and guidelines.

A. THE PROBLEM OF TRANSACTION COSTS

Transaction cost economics analyzes the role transaction costs play in determining an industry's organization and operations. Transaction costs include both ordinary production costs, such as the costs of materials, as well as costs related to administering business relationships, including the costs of negotiating, writing, monitoring, and enforcing contracts.[32] Simply put, transaction costs are the costs associated with participating in a particular market.[33] Transaction costs may be affected by different factors, such as technology, self-regulation, and

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27. *See generally* DANIEL CASTRO, BENEFITS AND LIMITATIONS OF INDUSTRY SELF-REGULATION FOR ONLINE BEHAVIORAL ADVERTISING (2011), http://www.itif.org/files/2011-self-regulation-online-behavioral-advertising.pdf (generally a regulatory process is comprised of creating regulations, monitoring parties for compliance, and enforcing the rules.).

28. Anil K. Gupta & Lawrence J. Lad, *Industry Self-Regulation: An Economic, Organizational, and Political Analysis*, 8 ACAD. MGMT. REV. 416, 419 (1983) (noting that "understanding industry self-regulation, therefore, is tantamount to understanding how industry operated as a cooperative formal organization").

29. Jay P. Kesan & Andres A. Gallo, *Optimizing Regulation of Electronic Commerce*, 72 U. CIN. L. REV. 1497, 1547 (2004).

30. DAVID M. KREPS, A COURSE IN MICROECONOMIC THEORY 508 (1990) (no formal definition of cooperation is employed in his book). *See* Kesan & Gallo, *supra* note 29, at 1546–47 (discussing the different levels of cooperation in the internet market).

31. Kesan & Gallo, *supra* note 29, at 1546–47.

32. Joskow, *supra* note 24, at 36. *See The Economics of Organization*, *supra* note 13, at 552 (exemplifying the idea of transaction costs as "[t]he economic counterpart of friction," where relevant questions are whether "the parties to the exchange operate harmoniously, or are there frequent misunderstandings and conflicts that lead to delays, breakdowns, and other malfunction?").

33. RONALD H. COASE, THE FIRM, THE MARKET AND THE LAW 38–40 (Univ. of Chicago Press 1988).

government intervention through taxes and regulation.[34]

Furthermore, proponents of a TCE approach maintain that any contracting problem can be examined under the TCE framework.[35] In fact, TCE suggests that the very existence of firms can be explained by an effort to minimize transaction costs.[36] Consequently, TCE can help explain many transactions between buyers and sellers in the absence of vertical integration.[37]

For example, the theory of economically incomplete contracts—an important theory within TCE—helps inform our understanding of the relationship between the seller of feedstock and the producer of bioenergy.[38] Specifically, the buyer-seller relationship in the bioenergy industry can be described as a two-stage bargain.[39] In the first stage of the buyer-seller relationship, if the buyer is not certain about the quality of the feedstock, he will reserve the right to inspect and reject it when the feedstock is delivered.[40] While the biomass buyer reduces his risk of having low quality feedstock, the seller will be cautious about meeting the technical specifications for a buyer that can reject the biomass if it does not meet exact specifications.[41] The seller of the feedstock will have lower incentives to invest in meeting the buyer's specifications and higher incentives to make a more "generic-quality" biomass feedstock that can be sold to other buyers or redeployed for other uses rather than the contracted one with the specific buyer.[42]

Therefore, to improve the positions of both the buyer and seller of feedstock in the second stage of the transaction, the contract must clearly specify the technical requirements for the seller, and the buyer must renounce his right to reject the biomass if it is delivered in accordance with the contract specifications.[43] In this case, while the buyer of feedstock is in a better position because he will receive a quality product, the seller will have incentives to invest in meeting specifications

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34. *See* DOUGLASS C. NORTH, INSTITUTIONS, INSTITUTIONAL CHANGE AND ECONOMIC PERFORMANCE 125 (Cambridge Univ. Press 1990) (finding that innovations may decrease transaction costs through organizational innovations, instruments, and specific innovation on enforcement techniques). *See also* ENCYC. OF DEMOCRATIC THOUGHT 703 (Paul Barry Clarke & Joe Foweraker eds., 2001) (discussing how information costs for private actors may increase because of regulation and subsidies by the government).

35. Oliver E. Williamson*, The Transaction Cost Economics Project,* 10 MONTENEGRIN J. ECON. 7, 10 (2014).

36. *The Economics of Organization*, *supra* note 13, at 556–58.

37. *See, e.g.*, Oliver E. Williamson, *The Vertical Integration of Production: Market Failure Considerations*, 61 AM. ECON. R. 112, 115–17 (1971) (discussing the problem of contractual incompleteness when contracting is required).

38. *See* Stanford J. Grossman & Oliver D. Hart, *The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration*, 94 J. POL. ECON. 691, 716 (1986) (concluding that "[t]he literature on transactions costs has emphasized that incomplete contracts can cause a nonintegrated relationship to yield outcomes that are inferior to those that would be achieved with complete contracts").

39. *See* Jay P. Kesan, *Carrots and Sticks to Create a Better Patent System,* 17 BERKELEY TECH. L.J. 763, 772–74 (2002) (illustrating the two-stage bargain example involving the order and delivery of car doors by a supplier who contracts with an auto manufacturer).

40. *Id.*

41. *Id.*

42. *Id.*

43. *Id.*

and quality requirements without fearing rejection of the feedstock.[44] Both parties are better off in the transaction and have improved the trade by modifying the contract's terms in both the first and second stages of the contract.[45]

Two other important elements pertaining to the study of contract transactions are the condition of asset specificity and the level of uncertainty to which the transaction is exposed.[46] Asset specificity relates to the level of investment needed to support a particular transaction and the condition where an asset has a higher value within the transaction than if it were diverted and used for another purpose.[47] Asset specificity concerns matter, especially in the case of the sugarcane and biomass industries, because, while a long-term contract may offer parties adequate compensation and contractual terms for investments in specific assets, such contracts are subject to contingencies and parties may not cooperate.[48] The level of "uncertainty" refers to the possibility of changes in the market that affect the relationship between a buyer and a seller. These changes were not provided for nor anticipated in the parties' contracts. As noted above, a seller of biomass feedstock will be reluctant to meet specific technical requirements without further incentives from the buyer.

Furthermore, TCE is built upon the assumption that firms, like individuals, are of bounded rationality, which means that they seek to maximize their own utility but are limited in their ability to do so due to limited information and capacity to provide for all future outcomes.[49] This assumption has three corollaries: First, firms choose strategies that maximize the likelihood of increasing private profit.[50] Second, however, information and capacity mean that exchanges in the market often involve a degree of uncertainty.[51] This desire to maximize profit coupled with this uncertainty sometimes means that firms benefit from opportunistic behavior, defined as "an effort to realize individual gains through a lack of

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44. *See id.* (noting that this illustration demonstrates how the terms of a contract in a two-stage bargain can be modified to improve the position of both parties involved).

45. *Id.* (explaining that a situation is Pareto efficient when "there is no change from that situation that can make someone better off without making someone else worse off").

46. Michael Riordan & Oliver E. Williamson, *Asset Specificity and Economic Organization*, 3 INT'L J. OF INDUS. ORG. 365, 367 (1985); *The Economics of Organization*, *supra* note 13, at 556–58.

47. Riordan & Williamson, *supra* note 46, at 367 (explaining that as specificity becomes more important in an asset the transactions takes on a stronger "bilateral trading character").

48. STEVEN TADELIS & OLIVER E. WILLIAMSON, TRANSACTION COST ECONOMICS 11 (2012), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2020176 (the authors note that contractual hazards will arise when long-term contracts are incomplete and are subject to contingencies "during the implementation of the contract for which it is prohibitively costly to prescribe appropriate responses in advance, requiring ex post adaptation of the original plan . . . defection from the spirit of cooperation to insist on the letter of the contract can be projected for some extreme disturbances . . . .").

49. Bryan D. Jones, *Bounded Rationality*, 2 ANN. REV. POL. SCI. 297, 308 (1999).

50. *Economic Objectives of Firms*, ECONOMICHELPS, http://www.economicshelp.org/microessays/costs/objectives-firms/ (last visited Aug. 26, 2015).

51. *See Jones*, *supra* note 49, at 308 (noting that "in limited-rationality models, uncertainty also involves lack of knowledge of the attributes that characterize the problem . . . ").

candor or honesty in transactions."[52] All this means that a firm may deviate from a contract if the firm may benefit from doing so.[53]

Hence, the TCE approach sets the stage for understanding how industry self-regulation and third-parties can implement efficient mechanisms to reduce costs and improve the biomass industry's supply chain: If the transaction costs from economically incomplete contracts, asset specificity problems, uncertainty, and opportunistic behavior are high enough, self-regulation and a third-party institution may be worthwhile in order to mitigate such costs.[54]

B. SOLUTIONS TO TRANSACTION COSTS: SELF-REGULATION AND INDUSTRY ASSOCIATIONS

Firms have several mechanisms to mitigate the costs discussed above. For instance, a buyer and a supplier, such as a producer of biofuel or bioenergy and a seller of feedstock, can address asset specificity and market uncertainties through contracts.[55] Sometimes, however, negotiating contracts that address all concerns is prohibitively costly, especially when there is great uncertainty, as buyers have quite specific requirements with regard to delivery, quality, etc., and sellers must raise costs to comply with these requirements.[56] Similarly, sometimes firms can address asset specificity and market uncertainty through vertical integration, taking control of different levels of production to render contracts unnecessary.[57] Sometimes, however, vertical integration is not an option because it precludes efficient or necessary market transactions.

In such cases, the best choice for reducing transaction costs may be "institutions" that lower uncertainty and risks in contracts.[58] The term "institutions" here refers to sets of rules that serve to generate predictability and regularity of a certain behavior.[59] Many industries use such institutions to lower transaction

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52. *See* JAN SAMMECK, A NEW INSTITUTIONAL ECONOMICS PERSPECTIVE ON INDUSTRY SELF-REGULATION 18 (2012).

53. *See id.*

54. Timothy A. Slating & Jay P. Kesan, *Making Regulatory Innovation Keep Pace with Technological Innovation*, 2011 WIS. L. REV. 1109, 1114 (noting that "compliance-related burdens associated with a given regulatory scheme should not outweigh the harms that scheme is intended to prevent . . . "). *See also* SAMMECK, *supra* note 52, at 18 (noting that "on the assumption of maximizing individuals there must be a perceived net benefit derived from such a commitment, and these costs have to be outweighed by perceived gains in order to motivate internalization").

55. Gordon Walker & David Weber, *Supplier Competition, Uncertainty, and Make-or-Buy Decisions,* 30 ACAD. MGMT J. 589, 590 (1987) (citing OLIVER E. WILLIAMSON, MARKETS AND HIERARCHIES: ANALYSIS AND ANTITRUST IMPLICATIONS 28 (New York Free Press 1975)).

56. *See id.* at 590 (discussing the rising costs of contracts associated with uncertainty).

57. *Diversification Strategy*, REFERENCE FOR BUS., http://www.referenceforbusiness.com/management/De-Ele/Diversification-Strategy.html (last visited Aug. 25, 2015).

58. *See* SAMMECK, *supra* note 52, at 38.

59. *See id*. at 18 (noting that regularity of a behavior exists when "the institution creates incentives that make deviation from the prescribed behavior (sufficiently) less attractive").

costs, encourage cooperation within the industry, and increase flexibility to respond to changes in a developing industry.[60] However, institutional arrangements, such as industry associations, may raise antitrust concerns, which will be discussed in subsection IV.D.

There are many kinds of institutions, and so it is often prudent to address a specific transaction cost with a specific institution.[61] Two institutions seem specifically well tailored for the U.S. biofuel industry: industry self-regulation and governance by a third-party institution.

1. An Economic Analysis of Industry Self-Regulation

Self-regulation may be defined as "voluntary association of [economic agents] to control their collective behavior."[62] Another definition may be "the normative orders of professional communities and business networks."[63] The important characteristic of both definitions is that economic agents themselves are responsible for developing the rules and enforcing compliance within the industry.[64]

Self-regulation can help firms increase cooperation and reduce the transaction costs discussed above.[65] In particular, self-regulation can help reduce costs due to information asymmetry, a major cause of market inefficiency under the incomplete contract theory discussed above.[66] For example, self-regulatory standards and certifications may provide an efficient option for addressing information asymmetries.[67]

Self-regulation differs from direct regulation by the government when the government sets and enforces the rules, sometimes with input from individuals with a stake in organizational decisions.[68] In a self-regulatory process, the industry, and not the government, manages the responsibility of setting and

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60. CASTRO, *supra* note 27, at 1 (example of such industries include health care, higher education, fashion, advertising, mining, marine fishing, professional sports, and nuclear power).

61. Barak D. Richman & Christopher Boerner, *A Transaction Cost Economizing Approach to Regulation: Understanding the NIMBY Problem and Improving Regulatory Responses,* 23 YALE J. ON REG. 29, 49 (2006).

62. Michael J. Lenox & Jennifer Nash*, Industry Self-Regulation and Adverse Selection: A Comparison Across Four Trade Association Programs*, 12 BUS. STRATEGY & THE ENV'T 343, 343 (2003).

63. Luc Huyse & Stephen Parmentied, *Decoding Codes: The Dialogue between Consumers and Suppliers Through Code of Conduct in the European Community*, 13 J. CONSUMER POL'Y 253, 259 (1990).

64. GLEN HEPBURN, ALTERNATIVES TO TRADITIONAL REGULATION 34, http://www.oecd.org/gov/regulatory-policy/42245468.pdf (last visited Feb. 17, 2016).

65. *See, e.g.*, ANTHONY D. WILLIAMS, AN ECONOMIC THEORY OF SELF-REGULATION 9 (2014) (arguing that "product standards that specify physical qualities required for the sale and use of commercial products facilitate international exchange, increase demand, and lower transaction costs . . . ").

66. *See* George A. Akerlof, *The Market for "Lemons": Quality Uncertainty and the Market Mechanism*, 84 Q. J. ECON. 488, 490–92 (1970) (discussing information asymmetry when the seller knows more about the product than the buyer).

67. Andrew King & Michael J. Lenox, *Industry Self-Regulation Without Sanctions: The Chemical Industry's Responsible Care Program*, 43 ACAD. MGMT. J. 698, 702 (2000) (discussing the role of industry standards in providing a form of "insurance against future mishaps").

68. Gupta & Lad, *supra* note 28, at 416; CASTRO, *supra* note 27, at 2.

enforcing its rules and standards.[69] Self-regulation also differs from co-regulation, when government and industry work together to develop or enforce the rules.[70] An example of co-regulation is when a government sets standards and the industry oversees their enforcement.[71] In general, co-regulation involves explicit participation of the government in the industry regulatory arrangement.[72]

Self-regulation has several advantages over direct government regulation. First, self-regulation may eliminate unnecessary "top-down" regulation that increases production and transaction costs for businesses without providing benefits.[73] This is because, among other things, industry participants understand the limitations and issues in their own industry better than outside regulators.[74] Second, self-regulation may require firms to cooperate and commit to ethical standards of conduct, which in turn may improve individual firms' behavioral standards.[75] A firm's reputation for "good" behavior is relevant in transactions with other firms.[76] Third, self-regulation is more flexible, allowing firms to better respond to changes in the market. For example, a self-regulating industry association is able to review its activities, identify best practices, and implement them into guidelines for an industry that will evolve and change.[77] Such iterative rule making and enforcement is likely faster than government regulatory and remediation processes.[78] This is especially important for the biomass industry because the institutional design of self-regulation may help the industry to resolve conflicts of interest by allowing the participation of parties with different interests in the process.[79]

However, self-regulation may not work in every situation. First, self-regulation works best when power is evenly distributed within an industry.[80] If one or two firms hold excessive power, smaller firms may prefer direct government regulation or co-regulation in order to have a greater voice in the process.[81]

Second, while self-regulation can help reduce some transaction costs, it also imposes transaction costs of its own, for example the fees necessary for creating rules, the costs of implementing these rules, and the costs of monitoring and

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69. Gupta & Lad, *supra* note 28, at 418.
70. CASTRO, *supra* note 27, at 2.
71. *Id.*
72. HEPBURN, *supra* note 64, at 35.
73. CASTRO, *supra* note 27, at 6.
74. *Id.*
75. Neil Gunningham & Joseph Rees, *Industry Self-Regulation: An Institutional Perspective*, 19 L. & POL'Y 363, 366 (1997).
76. SAMMECK, *supra* note 52, at 21.
77. *Id.* at 6.
78. *Id.* at 5.
79. *Id.* at 7.
80. Gupta & Lad, *supra* note 28, at 422.
81. *Id.*

sanctioning behavior in the industry.[82] However, so long as such costs are lower than the benefits of self-regulation, self-regulation will likely be efficient and cost-effective.[83]

Third, critics of self-regulation see it as "weaker" than government regulation because it cannot be enforced through traditional government channels.[84] This means that the outcome of self-regulatory arrangements will depend on a self-regulatory body that has power over the firms in the industry.[85] If this self-regulatory body is weak or ineffective, it is less likely that firms would accept and comply with the industry self-regulatory arrangements.[86]

Finally, self-regulation may not be effective when the answers to the industry's problems are known and will not likely change in the future.[87] Self-regulation is not effective when there is no uncertainty in relations among economic actors, because there is nothing to regulate. Thus, because there are costs associated with the self-regulatory process, the benefits of imposing self-regulatory mechanisms must be higher than the costs of government regulation or no regulation at all.

2. An Economic Analysis of Industry Associations

Self-regulation must be designed and enforced, and the best bodies to do so are often industry associations. Such associations are made up of industry representatives that define and manage rules from a private perspective.[88] As noted above, an industry association is an example of a third-party institution: a private organization formed by market actors for different purposes, including the purpose of defining rules for its members.[89] In this article we focus on associations that are formed by representatives in a particular industry.

According to TCE, profit-maximizing firms will only join an industry association when doing so "may eliminate some of the external costs that the private actions of other individuals impose upon the individual in question."[90] In other words, the costs of an industry association must be lower than the benefits.[91]

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82. SAMMECK, *supra* note 52, at 68.

83. *See id.* (arguing that the "higher the value of time and resources associated with [the self-regulatory activity] the less likely the provision of a particular self-regulation regime will be").

84. CASTRO, *supra* note 27, at 6.

85. Gupta & Lad, *supra* note 28, at 422.

86. *Id*.

87. CASTRO, *supra* note 27, at 9.

88. Kesan & Gallo, *supra* note 29, at 1624.

89. *See* Tazeeb Rajwani et al., *The "Voice of Industry": Why Management Researchers Should Pay More Attention to Trade Associations,* 13 STRATEGIC ORG. 224, 225–56 (2015) (discussing the role of industry associations in making policy and regulation).

90. Kesan & Gallo, *supra* note 29, at 1624 (citing JAMES M. BUCHANAN & GORDON C. TYLLOCK, THE CALCULUS OF CONSENT (1962), http://files.libertyfund.org/files/1063/Buchanan_0102-03_EBk_v6.0.pdf).

91. *See generally* Jan B. Heide & George John, *Alliances in Industrial Purchasing: The Determinants of Joint Action in Buyer-Supplier Relationship*, 27 J. MKTG. RES. 24, 34 (1990) (discussing different governances

Industry associations can often formulate and implement rules at a lower cost than the government. They are composed of members who have greater expertise and technical knowledge and they are usually less formalized than government regimes, allowing them to better respond to industry needs.[92]

Furthermore, industry associations benefit their members by creating conditions for credible commitments, which reduce transaction costs and uncertainty.[93] Industry associations do this by increasing firms' incentives for honoring their commitments and reducing their incentives for acting opportunistically.[94] Industry associations have two important mechanisms for achieving these goals: First, industry associations facilitate trust between firms,[95] which plays an important role in reducing transaction costs between buyers and sellers.[96] One of the reasons that trust reduces costs is because confidence in the relationship is associated with greater information sharing.[97] For example, Jeffrey E. Dyer found that trust reduced *ex post* transaction costs and was associated with increased information sharing between buyers and suppliers in the automotive industry.[98] A related benefit is that an industry association may help members better communicate through a "single point of contact" for the industry,[99] lowering transaction costs.

Second, industry associations can help improve the industry's reputation—which is seen as an increasingly important economic asset because it is a sign of an industry's good intention[100]—both inside and outside the industry. This occurs for at least three reasons. First, firms have an incentive to improve their industry's reputation because they find that their individual performance depends on and is

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in the buyer-supplier relationships, and concluding that "bilateral governance is not universally desirable. It is useful only when specific assets and uncertainty evoke a need to protect and to adapt.").

92. *See* Anthony Ogus, *Rethinking Self-Regulation*, 15 OXFORD J. LEGAL STUD. 97, 98 (1995).

93. *See id.*

94. SAMMECK, *supra* note 52, at 38.

95. Martyn F. L. Rademakers, *Agents of Trust: Business Associations in Agrifood Supply Systems*, 3 INT'L FOOD & AGRIBUSSINESS MGMT. R. 139, 139–42 (2000).

96. Ranjay Gulati, *Familiarity Breeds Trust? The Implications of Repeated Ties for Contractual Choice in Alliances*, 38 ACAD. MGMT. J. 85, 93 (1995). *See also* Jeffrey H. Dyer, *Effective Interfirm Collaboration: How Firms Minimize Transaction Costs and Maximize Transaction Value*, 18 STRATEGIC MGMT. J. 535, 537 (1997) (noting the role of governance mechanisms to provide the "trust" necessary for parties engaging in an exchange).

97. Jeffrey H. Dyer & Wujin Chu, *The Role of Trustworthiness in Reducing Transaction Costs and Improving Performance: Empirical Evidence from the United States, Japan, and Korea*, 14 ORG. SCI. 57, 67 (2003).

98. *Id.*

99. INV. CO. INST., NAVIGATING INTERMEDIARY RELATIONSHIPS 2 (2009), http://www.ici.org/pdf/ppr_09_nav_relationships.pdf (the author discusses investors that use intermediaries, noting that one of the benefits of intermediation is that investors obtain the convenience of a "single point" of contact for their planning expertise for all of their investments).

100. Williams, *supra* note 65, at 12 (citing ANN C. SVENDSEN ET AL., MEASURING THE BUSINESS VALUE OF STAKEHOLDER RELATIONSHIPS: PART ONE (2001), http://www.cim.sfu.ca/folders/research/1%20-%20Measuring%20social%20capital%20-%201.pdf).

affected by the reputation of their industry.[101] Second, practices that improve the industry's reputation may spread from firm to firm, as firms within the same industry adopt similar good management practices.[102] Third, firms in an industry may "team up"[103] in order to police each other's behavior and improve the reputation of the industry as a whole.[104] This is especially important for a firm's reputation to outsiders, because outsiders may not be able to perceive differences between firms within an industry.[105]

Finally, it is important to note that for an industry association to be effective, it must establish formal structures that conform to its prescribed values, so that it can demonstrate that it achieves its purposes adequately and properly.[106] In other words, an industry association must enjoy "legitimacy," which can be defined as "the generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions."[107] This legitimacy must be earned through compliance with expectations and it can be denied in the case of noncompliance.[108] Furthermore, an industry association can help member firms enjoy greater legitimacy, by requiring them to conform their acts to accepted norms and the interests of involved stakeholders.[109]

III. A TRANSACTION COST ECONOMICS APPROACH TO BRAZIL'S BIOFUEL INDUSTRY

Brazil has successfully produced ethanol from sugarcane since at least the 1940s.[110] Brazil's successful ethanol industry developed for complex historical and economic reasons. Brazil has a long history of growing and using sugarcane for the production of other alcohols, including the sugarcane distilled spirit "cachaça."[111] Many decades of strong government intervention have further

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101. LORI QINGYUAN YUE & PAUL INGRAM, INDUSTRY SELF-REGULATION AS A SOLUTION TO THE REPUTATION COMMONS: A CASE OF THE NEW YORK CLEARING HOUSE ASSOCIATION 11 (2010), https://www.sbs.ox.ac.uk/sites/default/files/CCR/Docs/2010Symposia-WP-YueIngram.pdf.

102. *Id.* at 3. *See also* SAMMECK, *supra* note 52, at 26 (discussing how companies do not only belong to an industry, but are recognized as such); YUE & INGRAM, *supra* note 101, at 5.

103. *See* YUE & INGRAM, *supra* note 101, at 9; Michael L. Barnett & Andrew J. Hoffman, *Beyond Corporate Reputation: Managing Reputational Interdependence*, 11 CORP. REPUTATION R. 1, 6–7 (2008).

104. *Id.*

105. *Id.* at 6.

106. SAMMECK, *supra* note 52, at 13.

107. Mark C. Suchman, *Managing Legitimacy: Strategic and Institutional Approaches*, 20 ACAD. MGMT. R. 571, 574 (1995).

108. SAMMECK, *supra* note 52, at 14.

109. *Id.* at 13. *But see* Alan C. Page, *Self-Regulation: The Constitutional Dimension*, 49 MOD. L.R. 141, 142 (1986) (arguing that an association's activities may themselves constitute an abuse when the rules for governing are established without legitimacy in relation to the members of the association).

110. Cordonnier, *supra* note 19, at 289–94 (2008).

111. LUIS CARLOS BASSO ET AL., BIOFUEL PRODUCTION-RECENT DEVELOPMENTS AND PROSPECTS 85 (Marco Aurélio dos Santos Bernardes ed., 2011) (the country's experience in ethanol production from sugarcane dates

influenced the sector's development. Moreover, particular attributes of sugarcane feedstock played a role in the organizational choice of the industry.[112]

This section discusses the growth of Brazilian ethanol into a mature, efficient industry that has addressed many of the transaction cost issues prevalent for biofuel. Subsection III.A discusses the economic challenges in Brazil's ethanol supply chain, including several authors' opinions on how these challenges have shaped its organization. Subsection III.B discusses Consecana, an organization that corrects transaction cost issues in the ethanol supply chain and ensures a steady supply of sugarcane for ethanol production. In particular, subsections III.B.1, III.B.2, and III.B.3 discuss three effective Consecana mechanisms: quality specifications, the pricing system, and minimum contractual clauses. Finally, subsection III.B.4 discusses the effects of these mechanisms: flexibility and reduction of uncertainty.

A. CHALLENGES IN BRAZIL'S BIOFUEL SUPPLY CHAIN

Ethanol production requires the flow of sugarcane and other biomasses from farms to their end-uses.[113] This is called the "ethanol supply chain," which typically consists of five stages: sugarcane production, sugarcane logistics, ethanol production, ethanol distribution, and end-use.[114] In Brazil the ethanol supply chain is usually integrated with the sugar supply chain.[115] Each stage of the ethanol supply chain presents challenges.

At the sugarcane production and logistics stages, one of the main challenges is the harvesting of the sugarcane, which can affect the sugar content and cane quality.[116] Specifically, highly perishable sugarcane must be cut into small pieces[117] and processed in a mill as soon as possible to avoid losing its sugar

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back to the colonial period, and since the beginning of the twentieth century, Brazil has been producing ethanol for energy purposes).

112. Erin Voegele, *Sugarcane Economics*, ETHANOL PRODUCER MAG. (Feb. 4, 2009), http://www.ethanolproducer.com/articles/5345/sugarcane-economics (noting that "sugarcane efficiently turns sunlight and chemical inputs into energy and requires a minimal quantity of fertilizer, compared with other ethanol feedstocks").

113. Carol Williams, *The Biomass Supply Chain*, WIS. GRASSLAND BIOENERGY NETWORK, http://www.wgbn.wisc.edu/biomass-supply-chain (last visited Aug. 23, 2015).

114. JESS CHEN, RENEWABLE ENERGY SUPPLY CHAINS 38 (2011), http://www.myedd.org/files/Renewable%20Energy_Supply_Chain_Issues.pdf.

115. SERGIO VALDIR BAJAY ET AL., ETHANOL IN THE BRAZILIAN ENERGY MATRIX 268, http://sugarcane.org/resource-library/books/Ethanol%20in%20the%20Brazilian%20Energy%20Matrix.pdf (last visited Feb. 17, 2016).

116. *Sugarcane Planting and Harvesting*, RITCHIEWIKI, http://www.ritchiewiki.com/wiki/index.php/Sugarcane_Planting_and_Harvesting (last visited Aug. 24, 2015).

117. *Virtual Tour of a Sugarcane Mill (Transcript)*, SUGARCANE.ORG, http://sugarcane.org/about-sugarcane/virtual-mill-tour/virtual-tour-of-a-sugarcane-mill-transcript#arrival (last visited Jan. 3, 2016) [hereinafter *Transcript*].

content.[118] Thus, most sugarcane is delivered to a mill within twenty-four hours after harvesting.[119] Brazil primarily uses sugarcane as an ethanol feedstock, but greater diversity of feedstocks only complicates the problem: for example, different feedstocks are generally harvested at different times of the year,[120] and total production of each feedstock can vary due to crop rotation, weather, and other factors.[121] The choice of feedstock also has a great impact on production costs.[122]

At the ethanol production stage, sugarcane is crushed to extract its juice, which must then undergo a fermentation process.[123] There are three types of facilities that can process sugar or ethanol in Brazil: First, there are sugar mills that produce only sugar, although the byproduct from such mills, called bagasse,[124] can sometimes also be burned in boilers to produce electricity.[125] Second, there are mills with facilities for both sugar and ethanol production,[126] which can switch between producing larger quantities of sugar or ethanol. These are the most common types of mills in Brazil,[127] and they have the advantage of allowing mill managers to decide the product to produce depending on demand.[128] Third, there are production facilities that only produce ethanol, which are usually called "independent distilleries."[129] All three types of facilities must secure a stable supply of feedstock from farmers, which gives rise to many different kinds of institutional arrangements and purchasing strategies.

At the ethanol distribution stage, the product must be kept in large storage tanks at the production units until it is sold.[130] More than ninety percent of the

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118. *Turning Sugar Cane into Ethanol (Accessible)*, SHELL GLOBAL, http://www.shell.com/global/environment-society/environment/climate-change/biofuels-alternative-energies-transport/biofuels/raizen/sugar-cane-to-ethanol-animation/accessible.html (last visited Aug. 24, 2015) [hereinafter SHELL GLOBAL].

119. *Transcript*, *supra* note 117.

120. *See, e.g.*, *Ethanol Feedstocks*, U.S. DEP'T OF ENERGY, http://www.afdc.energy.gov/fuels/ethanol_feedstocks.htm (last visited Jan. 3, 2016) (discussing the different feedstocks that may be used for ethanol production).

121. CHEN, *supra* note 114, at 38 (discussing the logistics process of feedstocks).

122. BASSO ET AL., *supra* note 111, at 86 (the authors comment on the three main groups of feedstocks: "(1) those containing considerable amounts of readily fermentable sugars (sugar cane, sugar beets, sweet sorghum), (2) starches and fructosans (corn, potatoes, rice, wheat, agave) and (3) cellulosics (stover, grasses, corn cobs, wood, sugar cane bagasse).").

123. Don Hofstrand, *Brazil's Ethanol Industry*, IOWA STATE UNIV. (2009), https://www.extension.iastate.edu/agdm/articles/hof/HofJan09.html.

124. *Id.*

125. *Brazil vs. United States Ethanol Industries*, SOYBEAN & CORN ADVISOR, http://www.soybeansandcorn.com/Brazil-US-Ethanol-Production (last visited Aug. 24, 2015).

126. Hofstrand, *supra* note 123.

127. Ryan Villarreal, *How Brazil Turned Ethanol into a Unique Success*, INT'L BUS. TIMES (Feb. 8, 2013, 7:46 AM), http://www.ibtimes.com/how-brazil-turned-ethanol-unique-success-1064308.

128. SHELL GLOBAL, *supra* note 118.

129. Hofstrand, *supra* note 123.

130. *Transcript*, *supra* note 117.

country's storage capacity belongs to sugarcane processing mills.[131] Several transportation methods are used to distribute ethanol within Brazil, and the most common way to transport ethanol is by truck.[132] There are more than 500 ethanol distribution terminals throughout the country, and currently all gasoline-powered vehicles in Brazil use ethanol in some way.[133]

Many authors have written about the challenges sugarcane asset specificity causes and how the ethanol supply chain can address these challenges.[134] As noted above, asset specificity is an important issue that can be addressed through self-regulation. Perhaps most helpfully for our purposes, Carlos Alfredo Barreto Guedes and others note the conflict common in transactions between sugarcane buyers and sellers at the ethanol production stage:

> [S]ugarcane sales transactions between producers and plants [in Brazil] are one of the most important and conflicting points in the sugarcane agro-industrial system, where notably the parties do not behave as partners, seeking long-term stable relationship, with division of risks and margins. In most cases an extremely short-term view is apparent for immediate results.[135]

Guedes et al. argue that that these conflicts occur because sugarcane is a specific asset.[136] In particular, the need to transport sugarcane quickly from farm to sugar mill before it loses sugar content, as well as the need to crush sugarcane quickly after it is burnt,[137] mean that sugarcane is both location specific and time specific,[138] which are some of the dimensions of asset specificity. Two other factors of sugarcane economics exacerbate asset specificity: Sugarcane sellers must plant their crop long before it can be harvested, making it difficult to plan for demand.[139] At the same time, sugarcane buyers face significant consequences for their production processes if sugarcane is not delivered on time.[140] Both of these factors mean that the value of investments to grow or process sugarcane can fall dramatically outside of a particular transaction, the very definition of asset

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131. *Id.*

132. *Id.*

133. *Id.* (vehicles provided with flex-fuel engines use pure hydrated ethanol, and gasoline-powered vehicles use anhydrous ethanol, which is blended with all gasoline sold in Brazil).

134. *See, e.g.*, CARLOS ALFREDO BARRETO GUEDES ET AL., COMPLEX AGRICULTURAL ESTABLISHMENT SURVEY: THE CASE OF THE SUGAR-ETHANOL SECTOR IN BRAZIL 7 (2011), https://www.farmfoundation.org/news/articlefiles/1749-Bolliger%20Survey%20Brasil%20IBGE.pdf; MARCOS FAVA NEVES ET AL., FOOD AND FUEL: THE EXAMPLE OF BRAZIL 43–45 (2011) (discussing the sugar-energy value chain in Brazil).

135. GUEDES ET AL., *supra* note 134, at 6.

136. *Id.* at 7.

137. *Id.* at 6.

138. *Id.* at 7.

139. NEVES ET AL., *supra* note 134, at 43.

140. ANDRE BASTOS & MARCIA MORAES, VERTICAL INTEGRATION AND SUGARCANE PRODUCTION COSTS IN BRAZILIAN REGIONS (2013) (noting that sugarcane participation in the industrial cost of end products is approximately sixty-one percent for ethanol and fifty-seven percent for sugar).

specificity. These market failures are so great that they may exacerbate contractual incompleteness.

Furthermore, Marcia A.F.D. de Moraes notes that sugarcane presents high asset specificity and must be cultivated for a long time, which makes it difficult for this commodity to be easily traded on the market.[141] Similarly, Marcos Fava Neves and others discuss the known specificities of sugarcane and how this is an important factor when discussing improvements to the sugarcane supply chain.[142] For instance, they note that sugarcane has high temporal specificity because it must be available for processing at mills for eight months of the year.[143]

Finally, M.A. Consoli proposes a solution to these problems in the sugarcane industry based on transaction cost economics: transparency and clear rules when defining the criteria for quality and other variables.[144] As we explain in the next section, the Consecana model appears to be the instrument of choice to address these transaction cost challenges, including asset specificity in sugarcane market transactions.

B. THE CONSECANA MODEL: A CASE STUDY OF INDUSTRY SELF-REGULATION IN BRAZIL

Consecana is a voluntary industry association[145] that seeks to address the transaction cost issues—particularly asset specificity—discussed above. Consecana is made up of representatives from two groups: the Brazilian Sugarcane Industry Association ("Unica"),[146] which represents sugar and ethanol processors from the state of São Paulo, and the Organization of the Sugarcane Growers of the Centre-South Region ("Orplana"),[147] which represents sugarcane growers from the same state. Unica and Orplana share equal representation on Conseca-

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141. *See* MARCIA A.F.D. DE MORAES A DESREGULAMENTACAO DO SETOR SUCROALCOOLEIRO DO BRASIL (Caminho ed. 2000).

142. NEVES ET AL., *supra* note 134, at 42–43.

143. *Id.* at 43.

144. M.A. CONSOLI, COMPLEX CONTRACTUAL ARRANGEMENTS IN THE TRANSACTION OF SUGARCANE TO THE INDUSTRY: A CASE STUDY IN A SUGAR AND ETHANOL MILL IN BRAZIL 16 (2008), http://cdn2.hubspot.net/hub/402341/file-2141006803-pdf/id-markestrat/publicacoes/pub_20101119112131_complexcontractualarrangementsinthetransactionofsugarcanetoteheindustry.pdf?t=1417118348340.

145. UNICA, *supra* note 21, at 2.

146. Currently, Unica is the largest organization representing sugar, ethanol, and bioelectricity producers in Brazil. *History and Mission*, UNICA, http://www.unica.com.br/mission/ (last visited Aug. 24, 2015). The mission of Unica is to support the Brazilian sugarcane industry and to further it as a modern agro-industrial complex. *Id.*

147. Orplana was created in 1976 to represent sugarcane growers and other smaller organizations, such as cooperatives and supplier associations. Orplana seeks to organize the sugarcane supply side of the industry and increase their representation in Brazil. *Quem Somos*, ORPLANA, http://www.orplana.com.br/novosite/quem_somos.php (last visited Aug. 24, 2015) [hereinafter *Quem Somos*]. Orplana represents approximately 17,000 sugarcane farmers that are responsible for around twenty-five to thirty percent of the sugarcane production in São Paulo. BRUMATTI ZORZO, C.R. ET AL., PORTRAIT OF SUGARCANE SUPPLIERS OF MICROREGION NHANDEARA, SP 236 (2014), http://www.alice.cnptia.embrapa.br/alice/bitstream/doc/1009884/1/2014RA056.pdf. The association safeguards the interests of sugarcane farmers and offers several benefits to its members, including legal and technical assistance and promoting educational events. *Quem Somos*, *supra* note 147.

na's Board of Directors,[148] such that all parties enjoy equal participation in the industry association. Unica and Orplana established Consecana as an organized payment system in 1997[149] in anticipation of the end of more than forty years of heavy government regulation, including price setting.[150] Consecana's rules and regulations now serve as a model in other states in the country.[151]

Today, Consecana's purpose is to help buyers and sellers of sugarcane share risks equitably.[152] Specifically, the Consecana Bylaws[153] define the association's main functions as follows: to ensure good relationships among all parties involved in the ethanol and sugar supply chain in the state of São Paulo; and to ensure the continuous development of quality evaluations for sugarcane, as well as the continuous development of the sugarcane industry, particularly in areas related to contracting and negotiation.[154] Consecana also implements its own rules governing organization, meeting, voting, quorums for meetings, and funding.[155]

Most importantly for our purposes are Consecana's rules for determining the quality and price of sugarcane, as set forth in the Consecana Operating Manual and updated every five years.[156] The Consecana Operating Manual contains three appendices: Appendix I establishes the methods for determining the quality of the sugarcane.[157] Appendix II defines how sugarcane prices are determined for sales between Consecana members.[158] Appendix III provides mandatory contractual rules for parties operating under the Consecana model.[159] These appendices are important mechanisms for reducing transaction costs and are discussed below.

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148. MARCIA A.F.D. DE MORAES & DAVID ZILBERMAN, PRODUCTION OF ETHANOL FROM SUGARCANE IN BRAZIL: FROM STATE INTERVENTION TO A FREE MARKET 151, 191 (David Zilberman et al. eds., 2014).

149. *Id.* at 108.

150. Joao Martines-Filho et al., *Bioenergy and the Rise of Sugarcane-Based Ethanol in Brazil*, CHOICES (2006), http://www.choicesmagazine.org/2006-2/tilling/2006-2-10.htm ("In 1997, the Cane, Sugar, and Ethanol Official Harvest Plan was published for the last time by the Brazilian government (Portaria no. 46, May 1997). The 40% tariff quotas for sugar exports were eliminated and market-based prices for anhydrous ethanol became effective May 1, 1997. By 1999, price deregulation for cane and hydrated ethanol was also in place.").

151. *Fair Pricing*, SUGARCANE.ORG, http://sugarcane.org/the-brazilian-experience/fair-pricing (last visited Aug. 24, 2015) (noting that many other states in Brazil "have either adopted a similar system or . . . rely on information from Consecana") [hereinafter *Fair Pricing*].

152. *Id.*

153. We analyze the Bylaws of Consecana ("Consecana Bylaws") and the Consecana Operating Manual, which are publicly available. Access to a more recent version of the Consecana Operating Manual and Bylaws is restricted to Consecana's current paying members and some terms in the most recent version may be different than presented in this article. BYLAWS OF CONSECANA AND CONSECANA OPERATING MANUAL, ORPLANA (2006) http://www.orplana.com.br/manual_2006.pdf [hereinafter BYLAWS OF CONSECANA or CONSECANA OPERATING MANUAL].

154. BYLAWS OF CONSECANA, *supra* note 153, art. 3.

155. *Id.*, arts. 8-29.

156. CONSECANA OPERATING MANUAL, *supra* note 153, art. 23.

157. MORAES & ZILBERMAN, *supra* note 148, at 151.

158. *Id.*

159. *Id.*

1. Consecana's Quality Specifications

Appendix I of the Consecana Operating Manual establishes transparent and accessible methodology for determining the quality of sugarcane at the time and place of the sugarcane's delivery,[160] as measured by the quantity of total recoverable sugar ("TRS"), a test that precisely defines the capacity of a unit of sugarcane to produce sugar or ethanol.[161] Thus, these quality specifications and control parameters provide crucial information that sugar and ethanol producers rely on for assessing the value of sugarcane.[162] This methodology is developed by "Canatec," a technical committee established by the Consecana bylaws.[163] Like Consecana's Board of Directors, Canatec is fairly split between buyers' and sellers' interests, with eight professional representatives appointed by the sugarcane farmers and eight representatives appointed by the sugar and ethanol industries.[164]

First, Appendix I of the Consecana Operating Manual sets forth this methodology in great detail. Appendix I strictly regulates the age of freshly harvested sugarcane, which is important given sugarcane's rapid deterioration in quality over time. Specifically, the appendix dictates that sugarcane must be delivered no more than seventy-two hours after it is burned,[165] and that sugarcane buyers must record any delays in their receipt of sugarcane,[166] all of which is relevant to calculating price.

Second, Appendix I determines the proper procedures and formulas for handling sugarcane and calculating TRS. Specifically, the appendix sets forth the acceptable equipment for testing the sugarcane (with specific images), how laboratories for testing should be equipped, how and from what part of the truck a sample should be taken for testing, how the sugarcane should be otherwise examined, the proper equations and factors for calculating quality, the necessary equipment for receiving the sugarcane at the sugar mill, and so on.[167] Finally, Appendix I also establishes a dispute resolution mechanism: If a dispute arises regarding quality results of the sugarcane, sugarcane producers may submit a written complaint to Consecana, which will examine and devise possible solutions.[168]

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160. CONSECANA OPERATING MANUAL, *supra* note 153, art. 13.

161. MORAES & ZILBERMAN, *supra* note 148, at 151; CONSOLI, *supra* note 144, at 12.

162. F. L. Melquiades et al., *Direct Determination of Sugar Cane Quality Parameters by X-ray Spectrometry and Multivariate Analysis*, 60 J. AGRIC. & FOOD CHEMISTRY 10755, 10755 (2012).

163. CONSECANA OPERATING MANUAL, *supra* note 153, art. 21.

164. *Id.*

165. *Id.* app. I.

166. CONSECANA OPERATING MANUAL, *supra* note 153, app. II.

167. CONSECANA OPERATING MANUAL, *supra* note 153, app. I (in its latest version (2015), the Operating Manual does not specify in as great detail in the document how the lab is to be equipped and how personnel are to be hired).

168. *Id.* app. I.

2. Consecana's Pricing System

Appendix II of the Consecana Operating Manual sets forth a fair pricing methodology for determining the price of sugarcane that member farmers receive for selling to member sugar mills.[169] The pricing methodology is designed to reduce transaction costs between buyers and sellers.

Specifically, the methodology is based on four factors: The first is the quality of the sugarcane in terms of TRS, as determined per Appendix I.[170] The second is the average prices for sugar and ethanol, free on board at the mill, within the state of São Paulo.[171] The third is the mix of products—sugar, anhydrous, and hydrous alcohol—produced at the relevant mill.[172] And the fourth is the proportion of total revenue from sugar and alcohol sales that should be provided to sugarcane farmers.[173] The latter three of these factors are discussed below.

The average prices for sugar and ethanol within the state of São Paulo are a crucial factor.[174] Appendix II delegates the determinations of these prices to a neutral body: the Center for Advanced Studies in Applied Economics at the Agricultural School of the University of São Paulo ("CEPEA").[175] CEPEA monitors prices within the state of São Paulo and updates average prices each month.[176] CEPEA is an impartial body and its mechanisms for determining prices are transparent, ensuring that prices fairly split risks between buyers and sellers of sugarcane. At the same time, reliance on CEPEA's averages ensures that the price mechanism operates within the ethanol supply chain, indirectly taking into account the prices for sugar and ethanol sold in domestic and foreign markets.[177]

Furthermore, the proportion of total revenue that should be provided to sugarcane farmers is also very important. This proportion is based on the actual cost of the raw sugarcane, which takes into account production costs, the production mix, and the total production from that year's harvest.[178] Combined with the quality and average price factors, this proportion factor preserves producers' incentive to combine high agricultural productivity and high sucrose content.[179] At the same time, the proportion factor provides stability in the market

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169. MORAES & ZILBERMAN, *supra* note 148, at 151–52.

170. Troy G. Schmitz et al., *Brazil's Ethanol Program: The Case of Hidden Sugar Subsidies*, 105 INT'L SUGAR J. 254, 258 (2003).

171. *Id.*

172. *Id.*

173. *Id.*

174. *Fair Pricing*, *supra* note 151.

175. *Id.*; MORAES & ZILBERMAN, *supra* note 148, at 152 (CEPEA researches and publishes nine different price indicators for sugar and ethanol and it also calculates the average price of the harvest year for each indicator).

176. UNICA, *supra* note 21, at 2.

177. UNICA, *supra* note 21, at 2; MORAES & ZILBERMAN, *supra* note 148, at 151.

178. CONSOLI, *supra* note 144, at 10.

179. F. L. Melquiades et al., *supra* note 162, at 10755.

and allows the sector to develop in other areas, such as the use of new agricultural and industrial forms, worker remuneration, and the land prices for sugarcane.[180]

3. Consecana's Minimum Contractual Clauses

Appendix III of the Consecana Operating Manual sets up mandatory contractual clauses that must be included in contracts between buyers and sellers using the Consecana model.[181] Of course, membership in Consecana is voluntary; but contracts that fall within the agreement must include the mandatory terms.[182] The justification for these mandatory terms is set forth in the "Whereas" clauses at the beginning of Appendix III.[183] These clauses state Consecana's purpose as ensuring good relationships within the sugar and ethanol supply chain, the need to assist parties due to the "technical peculiarities of the sugarcane industry," and the need to keep parties informed of the latest developments regarding the quality and price of sugarcane.[184] In other words, Appendix III's mandatory contractual clauses exist to remedy the problems of transaction costs and incomplete contracts discussed above.[185]

With this purpose in mind, Appendix III sets forth several mandatory contractual clauses:

First, the Appendix establishes that the quality and price of sugarcane shall be assessed according to Appendices I and II.[186]

Second, the Appendix sets out several provisions governing timing and delivery. The timing of delivery shall be according to the sugarcane's grinding period, and the seller shall deliver the sugarcane to the buyer at the specified location.[187] This reduces the transaction costs of negotiating time and place of delivery and makes clear which party assumes the costs involved.

Third, the Appendix specifies the timing of payment. In particular, a certain percentage of the final payment is to be decided by the parties in the month after the delivery of the sugarcane.[188]

Fourth, there is a provision empowering the Consecana Board of Directors to resolve any issues or conflicts under the contract.[189] Under this provision, an aggrieved party may demand that Consecana take a formal position or provide an

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180. Walter Belik et al., *A Emergencia Dos Conselhos Setoriais Na Agroindustria Brasileria: Genese de uma Governca Mais Ampla?* 50 REV. ECON. SOCIOL. RURAL 9, 21 (2012), http://www.scielo.br/pdf/resr/v50n1/a01v50n1.pdf.

181. CONSECANA OPERATING MANUAL, *supra* note 153, art. 1 of app. III.

182. *Id*. art. 1(I–XI) of app. III.

183. *Id.* art. 1(II) of app. III.

184. *Id.* art. 1(II) of app. III.

185. CONSOLI, *supra* note 144, at 10.

186. CONSECANA OPERATING MANUAL, *supra* note 153, art. 1(V) of app. III.

187. *Id.* art. 1(III, V, VI) of app. III.

188. *Id.* art. 1(VII) of app. III.

189. *Id.* art. 1(IX) of app. III.

explanation or a clarification regarding its rules in a certain situation.[190] However, Appendix III does not provide for specific penalties for parties that violate its rules.[191]

Finally, Appendix III allows for additional provisions in the contract, as long as they do not conflict with any of the provisions discussed above.[192] Thus, parties retain significant freedom of contract.

The Consecana model has been amended several times, such that the provisions above are the results of a flexible, iterative process.[193] These provisions have also brought stability to the sugar and ethanol supply chain in São Paulo, in particular by reducing the issues with regard to guaranteeing supply and demand from the mill.[194]

4. The Effects of Consecana: Flexibility and Reduction of Transaction Costs

All of the above provisions bring significant benefits. Consecana sets forth "clearly defined rules and procedures [that are] needed to have an equitable system for the buying and selling of sugarcane in a free market environment where the establishment of individual contracts is optional."[195] Through a TCE lens, this means that Consecana is a successful self-regulating industry association that saves mills and farmers money and time that otherwise would be spent on negotiating and enforcing contracts, which would ordinarily be established by a "middle man."[196]

Furthermore, Consecana's benefits must outweigh its costs, because sugarcane farmers and mills continue to adopt its system despite the freedom to do otherwise. This same phenomenon of efficient self-regulation has been observed in other industries, such as the food industry.[197] Sometimes, however, self-regulation brings too few benefits at too high a cost, as in the forestry industry.[198] So how does Consecana's brand of self-regulation provide significant benefits at relatively low cost? Different scholars have credited different aspects of the Consecana system.

First, many scholars have credited Consecana's quality specifications, which make transactions more transparent and therefore reduce asset specificity and information asymmetry. For example, Consoli argues that Consecana's methodol-

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190. MORAES & ZILBERMAN, *supra* note 148, at 156.

191. *Id.* at 151 (the authors argue that improvements should be made to the enforcement mechanisms of Consecana, given the "prolonged process" of seeking relief in the courts).

192. CONSECANA OPERATING MANUAL, *supra* note 153, art. 2 of app. III.

193. Fronzaglia & Martins, *supra* note 20, at 226–29.

194. *Id*.

195. MORAES & ZILBERMAN, *supra* note 148, at 151.

196. Fronzaglia & Martins, *supra* note 20, at 228.

197. Lisa L. Sharma et al., *The Food Industry and Self-Regulation: Standards to Promote Success and to Avoid Public Health Failures*, 100 AM. J. PUB. HEALTH 240, 242 (2010).

198. *Id*.

ogy for measuring TRS in sugarcane allows the parties to precisely define the value in the transaction.[199] This precise value for homogeneous input sugarcane means it has the same value regardless of whether it is part of a sugar transaction or an ethanol transaction, eliminating asset specificity.[200] Furthermore, Marcia A.F.D. de Moraes and David Zilberman find that the Consecana model reduces information asymmetries in setting technical parameters for the quality and price of sugarcane.[201] Similarly, Thomas Fronzaglia and Renata Martins argue that Consecana brings transparency and stability to the relationship between farmers and mills.[202] Walter Belik and others note that Consecana's emphasis on the quality of sugarcane incentivizes farmers to develop and improve their product, a beneficial result of greater transparency.[203] Likewise, Moraes and Zilberman argue that the Consecana model has incentivized greater sugarcane production, which has increased by one hundred percent between 2003 and 2012, compared to a thirty-six percent increase in mill production during the same period.[204]

Second, many scholars have also praised Consecana's pricing system, which prevents opportunistic behavior and provides better remuneration to small farmers. Fronzaglia and Martins suggest that one of the reasons why the pricing system prevents opportunistic behavior by parties and provides better remuneration may be because sugarcane prices fluctuate significantly as farmers respond in "an uncoordinated form."[205] Similarly, Belik and others suggest that Consecana's price system counteracts these issues: by using an average price for the entire region, it reduces both farmers' and mills' incentives to opportunistically take advantage of these price fluctuations.[206] Furthermore, Moraes and Zilberman argue that Consecana provides better remuneration and contractual guarantees to small farmers.[207]

Third, scholars have argued that Consecana's mandatory contractual clauses not only prevent opportunistic behavior as discussed above, but also reduce conflict. Belik and others argue that the mandatory contractual clauses protect farmers from opportunistic behavior by mills and oversupply of feedstock in the market.[208] One factor that affects the effectiveness of an industry's self-regulatory arrangement is the intended objective to be achieved.[209] As a homoge-

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199. CONSOLI, *supra* note 144, at 10.

200. *Id.*

201. MORAES & ZILBERMAN, *supra* note 148, at 155.

202. Fronzaglia & Martins, *supra* note 20, at 228–29.

203. *See generally* Belik et al., *supra* note 180.

204. MORAES & ZILBERMAN, *supra* note 148, at 155.

205. Fronzaglia & Martins, *supra* note 20, at 219.

206. *See generally* Belik et al., *supra* note 180.

207. André da Cunha Bastos, FORNECIMENTO DE CANA-DE-AÇĆAR E INTEGRAÇŌ VERTICAL NO SETOR SUCROENERGTICO DO BRAIS 103 (2013) (unpublished Ph.D. dissertation, University of São Paulo) (on file with University of São Paulo).

208. Belik et al., *supra* note 180, at 10.

209. HEPBURN, *supra* note 64, at 42.

neous input for producing sugar and ethanol, a technical objective that can be quantitatively measured and evaluated will likely be more effective than a non-technical objective.[210] The same clauses provide mills with a secure quality and quantity of the feedstock, as well as the possibility of funding based on the existence of the feedstock.[211] Furthermore, Moraes and Zilberman find that Consecana reduces conflict between farmers and buyers of sugarcane.[212] Similarly, Consoli argues that Consecana helps prevent conflict over delivery terms by establishing in advance that suppliers assume all costs for delivery.[213]

Moreover, Consecana seems to provide all these benefits at relatively low cost. This is likely due to the association's impartiality, expertise, and flexibility. Consecana is impartial because the Board of Directors and technical committee, Canatec, are both made up of an equal number of sugarcane farmers and sugar and ethanol producers.[214] Consecana has expertise because its members likely are more familiar with their industry than government regulators.[215] They can write an operating manual that is comprehensive and highly technical,[216] providing desired expertise in the industry. Consecana is designed to be flexible by updating its rules if need be: The Board and Canatec meet every month to discuss the relationship between farmers and mills[217] with the ability to modify rules if necessary to respond to changes in the market. Furthermore, a separate industry committee comprised of both buyers and sellers updates the Consecana Operating Manual's terms and pricing system every five years.[218] All of this means that Consecana can provide fair, technical rules with relative ease and speed, reducing the costs that the association imposes on its members.

True, Consecana is not without its critics. Moraes and Zilberman conducted a survey of sugarcane farmers and mills and found that both groups expressed concern with the efficiency of the supply chain and issues of partnership.[219] Some farmers claimed that the final price for sugarcane based on the Consecana model did not adequately remunerate them, and that the model should be regulated and

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210. *Id.* (arguing that more easily specified and measurable objectives are more efficient in the case of self and co-regulation).

211. Belik et al., *supra* note 180, at 19.

212. MORAES & ZILBERMAN, *supra* note 148, at 155.

213. CONSOLI, *supra* note 144, at 10.

214. GUEDES ET AL., *supra* note 134, at 6.

215. *See, e.g.*, Margaret Dalziel, *The Impact of Industry Associations: Evidence from Statistics Canada Data*, 8 INNOVATION: MGMT, POL'Y & PRAC. 296 (2006) (discussing the role of industry associations in promoting innovation in Canada and one of the reasons for this role is that Canadian firms have "specialized knowledge of the context in which technology is applied and new products developed").

216. *See, e.g.*, the role of Canatec in the Consecana model.

217. MORAES & ZILBERMAN, *supra* note 148, at 155.

218. CONSECANA OPERATING MANUAL, *supra* note 153, art. 23.

219. MORAES & ZILBERMAN, *supra* note 148, at 101 (the survey interviewed suppliers and processing facilities and identified problems occurring in the 1998-1999 harvest season, the first years of the Consecana model).

supervised by the government to ensure that contracts are honored.[220] Farmers also claimed to desire government supervision because they feared that the arbitration procedure in the Consecana model could not resolve disputes, and they would need to turn to slow court systems for reparation.[221] This appears to be a legitimate concern for farmers, especially because they are the contracting party with less bargaining power.[222] Another problem identified by farmers was that mills sometimes did not provide them with a contract and failed to make payments.[223]

For that reason, it is important that the distribution of power in the association remain even and that representatives of farmers be part of the conflict resolution process, so that they do not regard the system as working against their interests. On the other hand, the majority of mills claimed that Consecana's arbitration system was efficient and that government regulation is unnecessary.[224] Even the minority of mills in favor of government regulation believed that the government should implement the Consecana model across the entire country.[225] Mills also noted that farmers should organize themselves in associations that would emphasize the importance of contracts beyond Consecana's mandatory provisions as a guarantee for their transactions.[226] In fact, mills generally recommended using such contracts for trade with farmers, given the "technical particularities of the sugarcane cultivation," which creates mutual dependency between parties.[227] Moraes and Zilberman agreed that contracts beyond Consecana's mandatory provisions were necessary because of inadequate legislative and institutional environments and lack of credible commitments.[228]

In summary, although improvements can be made, Consecana seems to reduce transaction costs between mills and farmers. After years of government regulation, industry members were able to coordinate and work together, achieving a more regulated and trustworthy market environment.

IV. THE CASE FOR SELF-REGULATION IN THE U.S. BIOFUEL INDUSTRY

TCE and the Consecana model may have important lessons for the emerging U.S. biofuel industry. In Section II of this article, we introduced TCE, which helps identify options for the efficient growth of the industry in which cost-effective arrangements are still being developed. In Section III, we explored

220. *Id.* at 101.
221. *Id.*
222. *Id.*
223. *Id.* at 102.
224. *Id.* at 102.
225. *Id.* at 104.
226. *Id.*
227. *Id*.
228. MORAES & ZILBERMAN, *supra* note 148, at 105.

Consecana, an organization whose quality standards, pricing methodology, and mandatory contractual provisions seem to have reduced transaction costs between sugarcane buyers and sellers in Brazil.

In this section, we argue that the U.S. biomass industry should adopt self-regulating industry associations similar to Consecana. Such industry associations would be voluntary and would develop and enforce rules themselves.[229] It is our conclusion that such industry associations would encourage cooperation among members and increase the efficiency of market transactions.

This section proceeds as follows: First, we analyze the current U.S. biofuel supply chain, which seems to present many of the same issues as the Brazilian ethanol supply chain. Second, we consider some of the biofuel industry associations in the United States but note that none seem to provide the same level of self-regulation as Consecana. Third, we provide specific recommendations, based on TCE and the Consecana model, for biofuel industrial associations in the United States. These include: establishing industry associations for each feedstock, fair governance for each industry association, uniform quality standards, and mandatory contractual terms. Finally, we analyze U.S. antitrust law for industry associations to demonstrate that such laws do not preclude self-regulation in the United States.

A. CHALLENGES IN THE U.S. BIOFUEL INDUSTRY

The U.S. biofuel industry differs from its Brazilian counterpart in important ways. The primary ethanol feedstock in Brazil is sugarcane, due to that country's long history of sugarcane production. In contrast, the primary ethanol feedstock in the United States is starch from corn.[230] Furthermore, while Brazil focuses almost exclusively on sugarcane ethanol, biofuel in the United States are much more diverse, including forestry, agricultural, and urban wood waste, all of which present different transaction cost issues.[231]

Despite these differences, the U.S. and Brazilian biofuel supply chains are similar in the challenges they face: any biomass must be produced and then transported to an industrial facility, often presenting logistical challenges; the biomass must then be processed into biofuel, which often presents contractual and asset specificity challenges.[232] Thus, the current U.S. corn-ethanol and other

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229. Gunningham & Rees, *supra* note 75, at 365 (in addition to voluntary self-regulation, the authors discuss other different forms of self-regulation: mandated full self-regulation, where the government officially sanctions the private regulatory program, and mandated partial self-regulation, which limits privatization of the process to either the regulatory or the enforcement function, but not to both).

230. *Ethanol Production and Distribution*, U.S. DEP'T OF ENERGY, http://www.afdc.energy.gov/fuels/ethanol_production.html (last visited Aug. 24, 2015).

231. *Member Directory*, BIOMASS POWER ASS'N, http://www.biomasspowerassociation.com/pages/about_profiles.php (last visited Aug. 25, 2015) [hereinafter *Member Directory*].

232. Don Hofstrand, *Corn-Ethanol Supply Chain Profitability,* AGMRC (June 2013), http://www.agmrc.org/

biomass feedstock supply chains[233] mirror the Brazilian sugar-ethanol supply chain in many aspects. The wood pellet supply chain involves numerous players from the field to facility, which increases the potential for inefficiencies to arise.[234] If we conceptualize the corn-ethanol supply chain in the same way as the Brazilian sugarcane-ethanol supply chain, then the U.S. corn-ethanol supply chain consists of five stages: corn production, corn logistics, ethanol production, ethanol distribution, and end-use.

In the case of corn grain feedstock, at the corn production and logistics stages, feedstock producers must incur significant costs, including seed, fertilizer, fuel, and other production inputs.[235] Furthermore, once the corn is harvested it must be transported to an ethanol production facility.[236] Like Brazilian sugarcane, the cost of transporting corn seems to be an important constraint on the industry: the majority of the 215 ethanol plants in the United States are located in the Midwest, a major corn growing region.[237] This suggests that U.S. corn shares some of the Brazilian sugarcane's time- and location-specificity issues, increasing transaction costs in the industry.

At the ethanol production stage, corn starch is extracted from corn and then broken down into simple sugar glucose.[238] This process has two variants: "wet milling" and "dry milling,"[239] the main difference between the two being the treatment of the grain in the beginning of the process.[240] Like TRS in Brazilian sugarcane, glucose is the primary determinant of value for corn that is to be made into ethanol.[241] Thus, measuring and agreeing on glucose levels likely presents many of the same transparency, information asymmetry, and uncertainty concerns as TRS, further increasing transaction costs in the industry. Glucose is then fermented to produce ethanol, as well as byproducts that can be used for animal feed.[242] Some important consolidated players in this industry are Archer Daniels Midland, POET, Valero, and Green Plains Renewable Energy, which constitute

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renewable_energy/ethanol/corn-ethanol-supply-chain-profitability/.

233. *See id.*

234. *See generally* Joel Tallaksen, *Chapter 6: Guidelines for Developing a Sustainable Biomass Supply Chain 12–15, in* BIOMASS GASIFICATION: A COMPREHENSIVE DEMONSTRATION OF A COMMUNITY-SCALE BIOMASS ENERGY SYSTEM, http://renewables.morris.umn.edu/biomass/documents/USDA_Report/SII_SupplyChain.pdf (last visited Feb. 16, 2016).

235. Hofstrand, *supra* note 232.

236. *Id.*

237. *Biorefinery Locations*, RENEWABLE FUEL ASS'N, http://www.ethanolrfa.org/bio-refinery-locations/ (last visited Aug. 24, 2015).

238. NATHAN S. MOSIER & KLEIN ILELEJI, HOW FUEL ETHANOL IS MADE FROM CORN 2 (2006), https://www.extension.purdue.edu/extmedia/id/id-328.pdf.

239. *How Ethanol is Made*, RENEWABLE FUEL ASS'N, http://www.ethanolrfa.org/pages/how-ethanol-is-made (last visited Aug. 24, 2015).

240. *Id.*

241. *See* MOSIER & ILELEJI, *supra* note 238, at 3.

242. *Id.*

about sixty percent of total ethanol production in the country.[243] Finally, at the ethanol distribution stage, the ethanol must be transported to a blended or fuel supplier, where it is mixed with gasoline to be distributed to fueling stations.[244]

B. U.S. BIOFUEL INDUSTRY ASSOCIATIONS

Given the development of the U.S. biofuel industry, it is not surprising that several relevant industry associations have been established. Generally, U.S. industry associations advertise themselves as forums where members can network[245] and exchange information and ideas.[246] Furthermore, most associations are active in legislative efforts.[247] Nevertheless, based on publicly available information, these biomass associations do not appear to have Consecana-like programs to provide members with solutions for contracting and supply chain issues.

Perhaps the most Consecana-like program in the United States is the Pellet Fuels Institute ("PFI").[248] PFI focuses on wood pellets—a type of biomass fuel made from wood waste recycled into pellets of uniform size, shape, moisture, and density to be combusted for heat and energy.[249] PFI members include pellet producers and retailers, as well as companies that manufacture biomass equipment.[250] PFI articulates a mission to "coordinate and integrate" the needs of

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243. George Wan, *The Ethanol Industry: An In-Depth Primer*, SEEKING ALPHA (Aug. 29, 2014, 1:53 PM), http://seekingalpha.com/article/2460305-the-ethanol-industry-an-in-depth-primer.

244. *Ethanol Fuel Basics,* U.S. DEP'T OF ENERGY, http://www.afdc.energy.gov/fuels/ethanol_fuel_basics.html (last visited Aug. 24, 2015).

245. *See, e.g.*, *Objectives*, N.Y. BIOENERGY ASS'N, http://www.newyorkbioenergy.org/objectives.aspx (last visited Jan, 5, 2016) (the New York Bioenergy Association notes that the field has "a tendency for industry leaders to work in isolation," and, in light of that statement, the association aims to provide a network for the industry to understand the "common concerns in such areas as rules governing access to feedstocks, imbalances in incentives for different technologies and energy end-uses, and [research and development] funding.").

246. *See, e.g.*, *Mission*, FLA. BIOFUELS & BIOENERGY ASS'N, INC., http://floridabiofuelsassociation.com/ (last visited Jan. 5, 2016) (one of the stated missions of Florida Biofuels and Bioenergy Association ("FBBA") is to provide a place for the public and private sectors to exchange ideas and strategies). *See also About Biomass Power Association*, BIOMASS POWER ASS'N, http://www.biomasspowerassociation.com/pages/about.php (last visited Jan. 5, 2016) (the Biomass Power Association promotes several activities with the objective of encouraging networking among its diverse members).

247. *See, e.g.*, *About Us*, MINN. BIOFUELS ASS'N, https://www.mnbiofuels.org/about-us/about-the-mba (last visited Jan. 5, 2016) (the Minnesota Biofuels Association supports legislative action that advances Minnesota's biofuel industry, research initiatives to enhance products and processes, and actions that promote the benefits of biofuels). *See also Why Join the Florida Biofuel & Bioenergy Association*, FLA. BIOFUELS & BIOENERGY ASS'N, INC., http://floridabiofuelsassociation.com/become-a-member/why-join/ (last visited Jan. 5, 2016) (FBBA keeps members updated on federal and state legislation, and any member can petition the FBBA board of directors to support legislative proposals).

248. *Who is PFI?,* PELLET FUELS INST., http://www.pelletheat.org/who-is-pfi- (last visited Jan. 3, 2015) [hereinafter *Who is PFI?*].

249. *What Are Pellets?,* PELLET FUELS INST., http://www.pelletheat.org/what-are-pellets- (last visited Jan. 4, 2016) [hereinafter *What are Pellets?*].

250. *Membership*, PELLET FUELS INST., http://www.pelletheat.org/membership (last visited Jan. 3, 2016).

different segments of the wood pellet industry.[251] Its centerpiece is the PFI Standards Program:[252] producers who wish to participate must receive accreditation from PFI,[253] adhere to particular specifications for their wood pellets,[254] and submit their facilities to regular inspection and lab testing.[255] Producers that satisfy this program can use a quality mark, which provides a registration number that identifies a manufacturing facility.[256] Consumers can then rely on this mark to know that the wood pellets meet PFI standards.[257] Thus, PFI is similar to Consecana in that it regulates the quality of a homogenous input for its members. Because wood pellets consist of somewhat uniform wood material, the program can establish rules and parameters that address specific quality issues.[258] Industry members have embraced the standard, which demonstrates that the program represents a signal of quality to industry participants.[259] However, PFI exists only for one biofuel, wood pellets, and is not as comprehensive as Consecana, in that it does not provide a price mechanism or mandatory contractual provisions.

Besides PFI, no other U.S. biomass association appears to approach Consecana in terms of comprehensiveness. This failure to establish Consecana-style comprehensive self-regulation is not due to a lack of institutional capacity. True self-regulation requires well designed arrangements and infrastructure that allow companies to meet, exchange information, negotiate, and define the rules that will govern their relationships. There are many biomass industry groups in the United States that appear to have this required structure. For instance, the Biomass Power Association ("BPA") operates in the forestry, agricultural, and urban wood waste sectors and represents about eighty biomass power plants, numerous biomass suppliers, and other players in over twenty U.S. states.[260] However, BPA does not implement Consecana-like self-regulation, despite having a large network that represents parties at all stages of the supply chain. Similarly, the Biomass Thermal Energy Council ("BTEC") has 141 members, including biomass fuel producers, appliance manufacturers and distributors, supply chain companies, and nonprofit organizations.[261] However, BTEC also

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251. *Who is PFI?*, *supra* note 248.

252. *Membership Benefits*, PELLET FUELS INST., http://www.pelletheat.org/membership-benefits (last visited Jan. 4, 2016) (the PFI Standards Program is a third-party accredited program that enables consumers to identify PFI Graded Fuel).

253. *Joining the PFI Standards Program*, PELLET FUELS INST., http://www.pelletheat.org/joining-the-pfi-standards-program (last visited Jan. 4, 2016) [hereinafter *Joining the PFI Standards Program*].

254. *Id.*

255. *PFI Standards Program*, PELLET FUELS INST., http://www.pelletheat.org/pfi-standards (last visited Jan. 4, 2016) [hereinafter *PFI Standards Program*].

256. *What are Pellets?*, *supra* note 249.

257. *Id.*

258. *PFI Standards Program*, *supra* note 255 (the program currently has twelve production facilities, whose wood pellets are identifiable with the Quality Mark on the bags).

259. *Id.*

260. *Member Directory*, *supra* note 231.

261. *Member/Associate Directory*, BIOMASS THERMAL ENERGY COUNCIL, https://www.biomassthermal.org/

refrains from Consecana-like self-regulation, instead focusing on information sharing and "[o]nline and in-person events throughout the year [to help] build relationships with suppliers, vendors, and forge new partnerships in . . . regional and national markets."[262] Most biomass associations represent companies from different stages of the biomass supply chain, as well as numerous individuals, such as university professors, biomass supporters, and government officials.[263]

C. LESSONS FROM TRANSACTION COST ECONOMICS AND CONSECANA FOR THE U.S. BIOFUEL INDUSTRY

In this section, we argue that the U.S. biofuel sectors would benefit from Consecana-like self-regulatory industry associations. In theory, TCE shows that self-regulation industry associations can provide rules and contract terms that reduce transaction costs, often with greater expertise and flexibility than governments. In practice, Consecana in Brazil is thriving, with many farmers and mills remaining members and speaking highly of the organization. Furthermore, U.S. biofuel supply chains seem to face many of the same transaction cost challenges as their Brazilian counterparts, and yet there is no U.S. organization with rules as comprehensive as those of Consecana. What, then, is necessary for a U.S.-like Consecana?

In order to answer this question, we should return to the test articulated above for whether a voluntary self-regulating industry association like Consecana is worthwhile: Are the costs of creating and enforcing the rules and maintaining the association less than the benefits the association brings-in in terms of lower transaction costs? In order to ensure that any U.S. self-regulatory industry association provides greater benefits than cost, we have four specific recommendations: First, at this stage of development of the biomass industry, each feedstock sector should be served by an industry association that represents the interests of each stage of the supply chain. Second, each feedstock sector should establish its own quality specifications. Finally, each feedstock sector should develop fair quantity standards and mandatory contractual provisions. Each of these recommendations is discussed in turn below.

1. An Industry Association for Each Type of Feedstock

First, each feedstock sector needs its own specialized industry association. Currently, most biomass associations have members from various actors along

about/memberDirectory.asp (last visited Aug. 26, 2015).

262. BIOMASS THERMAL ENERGY COUNCIL, 2015 PROSPECTUS 4 (2015), http://www.biomassthermal.org/pdf/BTECMembershipBrochureSeparatePages.pdf.

263. *See, e.g.*, *Join Us*, PA BIOMASS ENERGY ASS'N, http://www.supportpabiomass.org/join-us/ (last visited Feb. 16, 2016) (the Pennsylvania Biomass Energy Association includes "anyone [who deals] with biomass in Pennsylvania").

the supply chain or even different feedstock sectors—such as organic waste, energy crops, and agricultural residues[264]— and even parties that do not have a role in the supply chain. Even if such associations have other useful purposes, they would likely be ill-suited for developing rules for different feedstocks, which have different characteristics and unique asset specificity concerns. Part of Consecana's success seems to be that it focuses on sugarcane, a homogeneous input with a defined end-use. The U.S. biofuel industry is more diverse, and so a single, all-encompassing industry association would likely not succeed.

Associations focused on a single feedstock are also likely to attract more members. A real-world example of this model is PFI, discussed above, which addresses a specific product, wood chips, and provides good rules for that sector and attracts members. A hypothetical example could be a switchgrass-focused industry association, which would better represent the needs of the farmers of this high-yield native grass, attracting many to join an association. This, in turn, would attract mills that process switchgrass into ethanol, so that the two groups could form a voluntary switchgrass-focused association. Similarly, a Consecana-like industry association that focuses on corn stover—the leaves and stalks of corn left in a field after harvest—would attract growers and biorefineries that convert stover into cellulosic ethanol.

2. Input from All Stages of the Supply Chain

Second, each feedstock industry association should represent the interests of players at each stage of the supply chain. Industry associations that represent only one stage of a supply chain—for example, only biomass producers—may serve the legitimate purposes of channeling its members' voices and advancing their interests. If an industry association is formed exclusively from one segment of an industry, the association serves as a channel to voice and advance the interests of only that particular industry segment. However, if an industry association aims to address supply chain issues, it will need input from all stages—for example, biomass producers, biofuel producers, distributors, etc. It should be a whole-industry association.

Whole-industry associations must give different parties fair representation, so as to ensure legitimacy. For example, Unica and Orplana established the Board of Directors of Consecana with an equal number of representatives of the growers of sugarcane and producers of sugar and ethanol. Fair representation serves several purposes: First, it prevents one party from using its greater power to gain an opportunistic advantage over other parties, undermining cooperative efforts. Second, it helps establish legitimacy in members' eyes, because all groups have equal input for establishing rules, such as Consecana's price and quality rules.

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264. *Member Directory*, *supra* note 231.

Finally, this legitimacy allows the association to be flexible and change the rules when the market changes. For example, Consecana's legitimacy allows it to formally revise its Operating Manual every five years.

Whole-industry associations should also establish technical committees that are neutral, so as to ensure impartiality. For example, Consecana established a neutral technical committee, Canatec, which develops the organization's rigorous quality standards. Like the Consecana board, Canatec is formed by an equal number of representatives from both Unica and Orplana. A technical committee that represents both sides of the industry brings fairness to the arrangement, encouraging parties to voluntarily participate.

3. Uniform Quality Standards

Third, each specialized, fair industry association should develop uniform quality standards for its particular feedstock. Like Consecana's focus on TRS—measured and tested according to exacting procedures—uniform quality standards have tremendous benefits: First, by focusing on quality, they incentivize better products. Second, they encourage interoperability among participants in the relevant sector.

However, perhaps the greatest benefit of uniform quality standards is that they reduce the costs of defining and negotiating these provisions in every contract entered into between a farmer and an industrial plant. Biofuel producers' business success depends on receiving biomass that meets quality specifications upon delivery, so that it can be efficiently converted and bought at a reasonable price.[265] Thus, biomass purchasers currently spend significant energy negotiating and monitoring contracts to guarantee biomass quality.[266] In fact, a large share of biomass contracts in the United States employ provisions that seek to address quality concerns as well as the different degrees of asset specificity present in the transactions they govern.[267] There can be problems even when there is a contract: discrepancies and misunderstandings can occur regarding size or moisture content specifications,[268] for example, and conversion technologies of biomass users differ,[269] leading to disagreement. All of these difficulties would be eliminated if quality standards were defined *ex ante* and easily accessible to all parties involved, such that the resources and time spent in negotiating terms and

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265. *See* Carol Williams, *supra* note 113 (discussing the biomass supply chain and logistics).

266. Peres et al., *supra* note 22, at 618–35. *See also* GEORGIA FORESTRY COMM'N, DEVELOPING FOREST RESOURCES AND BIOMASS MARKETS IN THE SOUTH 9–11 (2012), http://www.gfc.state.ga.us/resources/publications/VolumeII-MechanismsforSecuringLongtermForestBiomassSupply.pdf (discussing biomass contracting issues and noting that "in the event that a dealer fails to perform, the facility may find itself in a compromised position in which it needs to replace the quantity under the dealer's contract").

267. Peres et al., *supra* note 22, at 619.

268. GEORGIA FORESTRY COMM'N, *supra* note 266, at 3.

269. *Id.* at 3–4.

disputing quality could be allocated to other needs.

One of the best examples of uniform quality standards in the United States, and which also appears to be the closest example of a self-regulatory mechanism, is the PFI Standards Program.[270] With the help of PFI's well designed standards, producers know exactly what grading parameters and requirements they have to meet,[271] and consumers can be assured that pellets with the quality mark meet certain quality standards, reducing information asymmetries.[272] Therefore, as for quality terms, no further resources need to be spent on negotiations and contracts.

4. Suggested Contractual Provisions

Finally, specialized industry associations should develop suggested provisions that members may include in their contracts. For reasons discussed below, Consecana's mandatory contractual provisions may raise antitrust concerns under U.S. law, and so they would likely not be a good import from Brazil. However suggested contractual provisions may be widely adopted if they make economic sense to the players involved, which makes it especially important that the industry association be fair and flexible and possess expertise.

Furthermore, if implemented successfully, suggested contractual provisions could mirror the benefits of Consecana's mandatory provisions in reducing negotiation costs and increasing transparency. For example, Consecana establishes mandatory contractual clauses for sensitive issues such as delivery time, delivery costs, payment terms, price, and dispute resolution before a neutral body, the Consecana Board of Directors. Well drafted suggested contractual provisions could have the same effect: saving parties time and money negotiating some terms, while preserving their freedom to reach beneficial agreements on other terms.

D. ANTITRUST ISSUES FOR INDUSTRY ASSOCIATIONS

Finally, U.S. biofuel industry associations must consider antitrust law. Obviously, industry associations do not exist to fix prices or restrict competition and so are not per se illegal. However, several activities that industry associations engage in—information sharing, standardized contracts, and certification schemes—may raise antitrust issues if they seem to have the purpose or effect of fixing prices or restricting competition.[273] To help clarify this rule as applied to

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270. *PFI Standards Program*, *supra* note 255.

271. *Joining the PFI Standards Program*, *supra* note 253 (providing information for wood pellet producers about the requirements to join the program).

272. *PFI Standards Program*, *supra* note 255.

273. Geoffrey Green, *Antitrust by Association(s)*, FED. TRADE COMM'N (May 1, 2014, 8:34 AM), https://www.ftc.gov/news-events/blogs/competition-matters/2014/05/antitrust-associations (noting that "trade association rules, codes, or bylaws can cross the line into forbidden antitrust territory. When such conduct or rules regulate

industry associations, we provide a doctrine and three cases: first the Noerr-Pennington doctrine, which protects political activism; second, the Professional Lighting and Sign Management Companies of America ("PLASMA") case, which provides an example of illegal information sharing, contractual provisions, and trading rules; third, the American Peanut Shellers Association ("APSA") case, which provides an example of legal contractual provisions and trading rules; and finally, the American Trucking Associations ("ATA"), Inc. case, which provides an example of legal contractual provisions.

First, the Noerr-Pennington doctrine holds that joint actions by competitors to influence government action are exempt from antitrust liability.[274] Thus, biofuel industry associations may represent their members in legislatures and before regulators, which is the main focus of most biofuel industry associations today.[275]

Second, the PLASMA case demonstrates that even generally benign activities—such as information sharing and standardized contracts—can be illegal under antitrust law when they restrict competition.[276] PLASMA is a trade association of about twenty-five firms operating in thirty-nine states.[277] The Federal Trade Commission ("FTC") brought an action against PLASMA that was persuasive enough to force the association to submit to a settlement order.[278] Specifically, the FTC alleged that PLASMA's rules designated territories for its members, imposed a price schedule for work outside the territory, and barred former members from soliciting clients of current members for a period of one year after leaving the group.[279] Therefore, industry associations risk investigation or prosecution if they use information-sharing programs, standardized contracts, etc. as a disguised means of fixing prices.[280]

Third, however, the APSA case demonstrates that voluntary trading rules and contractual terms—similar to Consecana's quality standards—are generally

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or restrict the activities of members, it pays to remember that they will be viewed by antitrust enforcers and courts as joint decision-making by otherwise independent competitors.").

274. *See* Mark Truesdell, *Does Lobbying Violate Antitrust Laws?*, CTR. FOR ASS'N LEADERSHIP (2009), http://m.asaecenter.org/ANowDetail.cfm?ItemNumber=38648 (the Noerr-Pennington doctrine "protects associations from Sherman Act liability as they lobby governments for their industries or professions, even to the detriment of others").

275. *Id.*

276. *To Settle FTC Charges, Two Trade Associations Agree to Eliminate Rules that Restrict Competition*, FED. TRADE COMM'N, (Dec. 23, 2014), https://www.ftc.gov/news-events/press-releases/2014/12/settle-ftc-charges-two-trade-associations-agree-eliminate-rules.

277. Christopher Grigorian & Benjamin Dryden, *5 Antitrust Lessons for Trade Associations From 2 Recent FTC Challenges*, 23 WESTLAW J. ANTITRUST (2015), https://www.foley.com/files/Publication/c5e102c9-a51f-41f6-bce6-8e4599d6d979/Presentation/PublicationAttachment/c85aac8a-aec4-4f60-9848-8e56ce8ac00f/WLJ_ATR_2302_Commentary_Dryden.pdf.

278. *Id.*

279. *Id.*

280. *See Antitrust Laws & Trade Associations*, 25 ELEC. TRANSACTIONS ASS'N, http://www.electran.org/about/antitrust/ (last visited Aug. 25, 2015).

legal.[281] APSA is a trade association composed of commercial peanut shellers and crushers that accounts for approximately ninety percent of U.S. peanut shellers.[282] APSA proposed voluntary trading rules for its members and nonmembers that established standards for farmer-stock peanut grades, as well as standard non-price contractual terms and provisions as to weight, delivery, sampling, inspection, and arbitration.[283] APSA also proposed standard non-price contractual terms and provisions as to shipment instructions and times, weights, inspections, arbitrations, and delayed or excused deliveries.[284]

In order to ensure compliance with antitrust law, APSA submitted these proposed rules and terms to the Department of Justice ("DOJ") for review.[285] In its submission, APSA argued that the proposed rules and terms provide a common language for buyers and sellers and therefore help parties "avoid misunderstandings, make more definite the terms of contracts of purchase and sale, avoid the necessity of drafting in each instance a lengthy and cumbersome document, and otherwise increase the efficiency of transactions"[286]—justifications that seem to echo the benefits Consecana provides its members. Based on the information provided by APSA, DOJ concluded that the proposed trading rules were not likely to reduce competition. Specifically, DOJ agreed that the trading rules use general commercial language that would improve the ability of parties to enter into contracts. In addition, DOJ emphasized that, because the trading rules were voluntary, buyers and sellers would continue to freely compete by using their own contract terms and standards for the peanuts.

Fourth, the ATA case reinforces that model agreements—similar to Consecana's mandatory contractual terms—are also generally legal.[287] ATA is a national trade association that represents the interests of motor carriers, state trucking

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281. LETTER FROM U.S. DEP'T OF JUSTICE TO AMERICAN PEANUT SHELLERS ASS'N, REQUEST FOR BUS. REV. LETTER (Feb. 2, 2006), http://www.justice.gov/archive/atr/public/busreview/214772.htm [hereinafter PEANUT SHELLERS].

282. *Id.*

283. *Id.*

284. *Id.*

285. *Id.* Trade associations may request a statement from DOJ pursuant to its business review procedure about its enforcement intentions regarding their activities. *Business Review Letters and Request Letters*, U.S. DEP'T OF JUSTICE, http://www.justice.gov/atr/public/busreview/letters.html#page=page-0 (last visited Aug. 25, 2015). The business review procedure allows businesses to make inquiries to the agency and to learn how DOJ may respond to the legality of a proposed business conduct. U.S. DEP'T OF JUSTICE, INTRODUCTION TO ANTITRUST DIVISION BUSINESS REVIEWS 1, http://www.justice.gov/atr/public/busreview/276833.pdf (last visited Aug. 25, 2015). The APSA and ATA cases are both results of this procedure. PEANUT SHELLERS, *supra* note 281; LETTER FROM U.S. DEP'T OF JUSTICE TO SOUTHEASTERN PEANUT ASSOCIATION'S REQUEST FOR BUS. REV. LETTER (Dec. 31, 1992), http://www.justice.gov/atr/public/busreview/211329.htm.

286. PEANUT SHELLERS, *supra* note 281.

287. LETTER FROM U.S. DEP'T OF JUSTICE TO AMERICAN TRUCKING ASSOCIATIONS, INC., REQUEST FOR BUS. REV. LETTER (Aug. 10, 2006), http://www.justice.gov/atr/public/busreview/217742.htm#N_1_ (the American Trucking Associations had already requested a business review letter for a similar proposal to develop and circulate a model contract for use by motor carriers and shippers in 2002 where it received a favorable review from DOJ).

associations, and national trucking conferences. ATA aimed to publicize two voluntary model agreements between motor carriers and freight transportation brokers. The model agreements would leave blank clauses that address rates and charges to be negotiated individually with brokers. Similarly, non-rate terms that address geographic scope, commodities covered, invoicing and payment, insurance, and dispute resolution would also be left blank for each carrier to negotiate separately with brokers.

ATA also submitted its proposed model agreements to DOJ for review. In its submission, ATA argued that the model agreements would help to increase efficiency in contract negotiations and reduce transactional costs for all parties.[288] ATA claimed that the model agreements would make "alternative contract terms easily available to smaller brokers who may regularly deal with only a few carriers, and may enhance all brokers' ability to negotiate for different terms when dealing with carriers using their own forms or offering variations from the [terms of the model agreements]."[289] ATA also claimed that the adoption of model contracts would lower barriers to entry into the industry by allowing new freight brokers to concentrate their resources on tasks other than developing and negotiating contracts. ATA noted that the relevant parties, both motor carriers and brokers, would be free to choose whether to use the agreements in their entirety or any of the agreements' individual provisions. DOJ found that the model agreements would not likely have an adverse impact on competition because the agreements did not contain any provisions specifying rates to be charged or other significant terms that could have adverse effects on competition. Moreover, DOJ noted that the parties are free to adopt or reject the model agreements.

These cases give considerable guidance to associations when developing Consecana-like model contracts or trading rules. The PLASMA case illustrates that no practices are acceptable if they limit competition, for example by dividing up territories. However, the APSA and ATA cases illustrate that Consecana-like biomass associations could promulgate rules and contractual terms that benefit their members without raising antitrust concerns. Furthermore, both cases demonstrate that DOJ is aware of the benefits of such self-regulation and is not likely to forbid rules that are carefully drafted to avoid anticompetitive effects. In addition, in both cases DOJ emphasized that the trading rules and contractual terms are voluntary, which made space for competition. This seems to imply that mandatory rules and terms would be more closely scrutinized by DOJ, which has some implications for importing Consecana-like rules into the United States, as discussed above. Finally, both cases provide insight into certification schemes such as those maintained by PFI: such certifications should be granted or denied based upon legitimate criteria and the certification program cannot have the

288. *Id.*
289. *Id.*

purpose or effect of restraining competition.[290]

Given the importance of antitrust law, biofuel industry associations should also consider compliance programs for day-to-day operations. From an antitrust standpoint, there is no checklist for trade associations to follow, but, in general, in order to avoid antitrust scrutiny, the FTC recommends that industry associations implement and consider the following: (1) providing the association's members with guidance concerning antitrust issues; (2) promulgating rules that do not limit members' activities or constrain competition; (3) avoiding discussions of competitively sensitive areas; (4) starting the member association meetings with supervision on antitrust compliance issues; and (5) discouraging members from coordinating anticompetitive behavior and having "off the record" discussions.[291]

One biofuel association already seems to be following such a compliance program: the Advanced Biofuels Association ("ABFA"), an association with approximately forty member companies representing a wide range of technologies and feedstocks within the advanced biofuels industry.[292] ABFA is unique among other biofuel and biomass associations in that it has an "Antitrust Compliance Policy" ("Compliance Policy") available online to its members, officers, directors, and staff.[293] The Compliance Policy has information on antitrust issues for trade associations. For instance, the Compliance Policy provides that there are many benefits associated with providing industry members with an environment where they can share information and allow industry members to better respond to the marketplace.[294] However, it also notes that "information-sharing programs must be structured in ways that do not disclose a member's current pricing, pricing strategies, marketing plans or other competitively sensitive information that could facilitate a price fixing agreement or otherwise be used to restrain competition."[295] As to standards setting, the Compliance Policy defines it as "the process of identifying and agreeing upon a specific set of criteria to which a product should conform." While standard setting can promote competition in the market and improve products if done for a proper purpose, it can invite antitrust scrutiny if it is used as a means of excluding competitors and products from the marketplace.[296]

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290. ADVANCED BIOFUELS ASS'N, ADVANCED BIOFUELS ASSOCIATION ANTITRUST COMPLIANCE POLICY 4 http://www.advancedbiofuelsassociation.com/uploads/files/Advanced%20Biofuels%20Association%20Antitrust%20Compliance%20Policy(1).pdf (last visited Aug. 25, 2015) [hereinafter ANTITRUST COMPLIANCE POLICY].

291. Bruce Colbath, *FTC Targeting Trade Associations?*, SHEPPARDMULLIN (May 7, 2014), http://www.antitrustlawblog.com/2014/05/articles/articles/ftc-targeting-trade-associations/.

292. *About*, ADVANCED BIOFUELS ASS'N, http://www.advancedbiofuelsassociation.com/section.php?sid=6 (last visited Aug. 25, 2015).

293. *See* ANTITRUST COMPLIANCE POLICY, *supra* note 290, at 5.

294. *Id.*

295. *Id.*

296. *Id.*

While the biofuel industry associations must consider antitrust law, the cases and compliance policy above show that such law is not an insurmountable barrier to Consecana-like arrangements in the United States. Thus, antitrust law does not preclude the possibility of efficiency-increasing and cost-saving measures, such as creating and disseminating standards, model contracts, and rules.

VII. CONCLUSION

This article began with an introduction to transaction cost economics ("TCE"): Problems like incomplete contracts and asset specificity can increase the costs of doing business, but self-regulation and industry associations are efficient options to address these problems. This article then applied the lessons from TCE to the Brazilian sugarcane-ethanol industry, one of the most developed sugarcane-ethanol industries in the world: Although the Brazilian supply chain faces transaction cost problems, the self-regulatory industry association Consecana has successfully mitigated these transaction costs. Consecana is an expert, flexible, and neutral private organization governed jointly by sugarcane farmers and ethanol or sugar producers. Consecana provides and enforces rules that help lower members' transaction costs, including well-designed quality specifications, pricing mechanisms, and mandatory contractual terms.

This article then made the case that as the U.S. bioenergy industry evolves and its individual sectors—such as the thermal energy and biofuel sectors—become more established and produce regular demand for specific biomass inputs, the industry could benefit from arrangements like the Consecana model in Brazil. Like Brazilian sugarcane, U.S. biomass producers face significant transaction costs, including asset specificities, uncertainties, etc. These transaction costs may be so large as to make contract negotiations difficult. A Consecana-like cooperative effort between the different sectors of the industry could develop and implement rules that efficiently address these problems.

Furthermore, we provided four specific recommendations to ensure that a Consecana-like association would be efficient in the United States: individual industry associations for each feedstock; political input from all stages of the supply chain in each industry association; uniform quality standards for each association; and suggested contractual terms. All of these could help lower transaction costs for U.S. biofuel, as Consecana has done in Brazil. Finally, we reviewed antitrust issues to demonstrate that Consecana-like organizations would not violate competition law.

In conclusion, as the biomass market evolves and demand for different types of biomass feedstocks strengthens, more parties will have incentives to enter the market. The number of players in the market may grow, but transaction costs remain. As individual sectors become more established, those individual sectors could benefit from voluntary, self-regulatory mechanisms like Consecana to promote stable contractual relationships and reduce the transaction costs associated with the logistics of the biomass supply chain.