DEMANDING SUPPLY: RE-ENVISIONING THE LANDLORD-TENANT RELATIONSHIP FOR OPTIMIZED PERENNIAL ENERGY CROP PRODUCTION

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ABSTRACT

As the bioenergy industry in the U.S. expands to meet increased demands for transportation fuel under the Renewable Fuel Standard and electrical power under state Renewable Portfolio Standards and the proposed Clean Power Plan, producers of biomass will seek the ability to grow dedicated, high-yielding energy crops of a perennial nature on leased property. Given the large amount of leased farmland in the U.S., the contributions of tenant-farmers will represent a significant, though currently not well understood, segment of the biomass supply chain. Through the use of contracts as governance schemes, landowners and tenants can navigate three key challenges of the bioeconomy: the necessity of long-term access to land coupled with the development of equitable termination clauses; assuaging landowner concerns regarding the potential invasiveness associated with some novel bioenergy crops; and the reclamation of rhizomes as an additional revenue stream associated with perennial biomass production.

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I. INTRODUCTION

A variety of state and federal renewable energy mandates and incentives,[1] along with numerous sustainability and low-carbon standards,[2] are driving interest in perennial energy crop production. Significant amounts of biomass will be necessary to achieve these standards. For instance, research indicates that by 2030 the United States will consume 329 million dry tons of forest and agricultural feedstocks for energy production, primarily for co-firing electricity generation facilities.[3] Producers' ability to supply biomass through bioenergy crops is critical to the commercialization process and to ensuring the viability of the biofuel industry.[4]

Two such agricultural crops are *Miscanthus*[5] and switchgrass,[6]

1. *E.g.*, Clean Power Plan, 79 Fed. Reg. 34,829 (June 2, 2014) (to be codified at 40 C.F.R. § 60); Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594 (2005) (originally codified at 42 U.S.C. § 7545(o)); *Renewables Portfolio Standards for Renewable Energy*, DATABASE OF STATE INCENTIVES FOR RENEWABLES AND EFFICIENCY (2010), http://www.dsireusa.org/.

2. *E.g.*, Jody M. Endres, *Legitimacy, Innovation, and Harmonization: Precursors to Operationalizing Biofuels Sustainability Standards*, 37 S. ILL. U. L.J. 1 (2012); Jody M. Endres, *Agriculture at a Crossroads: Energy Biomass Standards and a New Sustainability Paradigm?*, 2011 U. ILL. L. REV. 503 (2011).

3. U.S. DEP'T OF ENERGY, U.S. BILLION-TON UPDATE: BIOMASS SUPPLY FOR A BIOENERGY AND BIOPRODUCTS INDUSTRY 15 (2011).

4. Ira Altman et al., Producer Willingness to Supply Biomass: the Effects of Price and Producer Characteristics 2 (Feb. 2011) (Southern Agricultural Economics Association, Annual Meetings 2007) *available at* http://ageconsearch.umn.edu/bitstream/98804/2/SAEA_2011_ Producer_Willingness_ to_Supply_Biomass.pdf.

5. *Miscanthus* × *giganteus* is a second-generation bioenergy crop grown primarily for heat and electricity generation which can also be used to produce transportation fuels. It is already

perennial energy grasses included under the Biomass Crop Assistance Program (BCAP) and considered by scientists and policy makers to have significant environmental and economic benefits.[7] Economically, perennial energy crops require fewer mechanical and chemical inputs than traditional grain or oil seed production, creating a potentially lucrative industry for those who grow them.[8]

These crops also tout both large-scale and small-scale environmental benefits. Requiring few inputs and creating few emissions, these crops present the opportunity to create energy more sustainably. Additionally, extensive root systems allow the grasses to grow on highly erodible land.[9] These qualities reduce soil erosion and improve water quality.[10] Along with a high yield potential, these features have propelled *Miscanthus* and switchgrass to the center of bioenergy discourse.[11] The success of the bioenergy industry will therefore improve sustainability, both through soil health and a lower ecological footprint resulting from the production of energy.

While the technologies for processing perennial feedstocks into renewable energy are nearing financial viability, the transaction costs[12] associated with biomass production and exchange remain a decisive barrier to commercial development.[13] Agricultural production typically takes place on rented land; in 2012, 86% of grain

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grown commercially in the UK and several other countries for biomass production. The plant is a naturally occurring, sterile, hybrid between *Miscanthus sinensis* and *M. sacchariflous*. Dudley G. Christian, Nicola E. Yates & Andrew B. Riche, *Estimation of Ramet Production from* Miscanthus × giganteus *Rhizome of Different Ages*, 30 INDUS. CROPS & PRODUCTS 176, 176 (2009).

6. Switchgrass is a warm-season perennial grass native to most of North America and commonly grown for forage and grazing. Kimberly Jensen et al., *Farmer Willingness to Grow Switchgrass for Energy Production*, 31 BIOMASS & BIOENERGY 773, 773 (2007); James P. Muir et al., *Biomass Production of 'Alamo' Switchgrass in Response to Nitrogen*, *Phosphorus, and Row Spacing*, 93 AGRONOMY J. 896, 896 (2001).

7. Miriam A. Cope, Sara McLafferty & Bruce L. Rhoads, *Farmer Attitudes Toward Production of Perennial Energy Grasses in East Central Illinois: Implications for Community-Based Decision Making*, 101 ANNALS OF THE ASS'N OF AM. GEOGRAPHERS 852, 853 (2011).

8. Jensen et al., *supra* note 6, at 773.

9. *Id.*

10. *Id.*

11. Cope et al., *supra* note 7, at 853–54.

12. These transaction costs include a lack of coordination between contracting parties, holdup costs, and economic barriers to market opportunities. Jody M. Endres, A. Bryan Endres & Jeremy J. Stoller, *Building Bio-Based Supply Chains: Theoretical Perspectives on Innovative Contract Design*, 31 UCLA J. ENVTL. L. & POL'Y 72, 98 (2013).

13. Ira J. Altman, Dwight R. Sanders & Chris R. Boessen, *Applying Transaction Cost Economics: A Note on Biomass Supply Chains*, 25 J. AGRIBUSINESS 107, 107 [hereinafter Altman et al., *Applying TCE*] (2007).

production in central Illinois took place on rented land,[14] outside of the Midwest, about 40% of agricultural land is rented.[15] High rental rates and the vagaries of oral contracts lead to leases which do not properly incentivize farmers and landowners to participate in growing bioenergy crops. Nonetheless, the contractual decisions underlying the industry's current state remain underrepresented in the literature.[16]

Biomass production can only succeed to the extent that tenant-farmers and landowners are willing to engage in this new industry.[17] The perennial nature of many leading bioenergy crop candidates will present unique contracting challenges because the existing farmland rental market is based on an annual lease term. Furthermore, economic circumstances of the bioenergy sector will likely be highly variable and dependent on factors such as the price of fossil fuels, agronomic factors, and technological considerations.[18] This emerging economic environment creates potential for incomplete contracts and opportunism throughout the supply chain, particularly with regards to land rental markets.[19] These additional risks further compound the risk inherent to all farm operations.[20]

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14. Gary Schnitkey, *Farmland Ownership and Rental Percentages in Illinois: A 2007 to 2012 Perspective*, FARMDOC DAILY (July 2013), *available at* http://farmdocdaily.illinois.edu/2013/07/farmland-ownership-rental-illinois-2007-2012.html.

15. Edward Cox, *A Lease-Based Approach to Sustainable Farming, Part I: Farm Tenancy Trends and the Outlook for Sustainability on Rented Land*, 15 DRAKE J. AGRIC. L. 369, 372 (2010) (citing NAT'L AGRIC. STAT. SERVICE, USDA, PERCENT OF LAND IN FARMS RENTED OR LEASED: 2007 (2007)).

16. Ira J. Altman, Chris R. Boessen & Dwight R. Sanders, Contracting for Biomass: Supply Chain Strategies for Renewable Energy (Southern Agricultural Economics Association, Annual Meetings 2007), *available at* http://ageconsearch.umn.edu/bitstream/34907/1/sp07al01.pdf.

17. For the purposes of this paper, we explore cash rental agreements, as opposed to share rental agreements. This decision reflects the modern trend regarding farmland ownership and rental percentages.

18. Altman et al., *Applying TCE*, *supra* note 13, at 109.

19. *Id.*

20. *See* Endres et al., *supra* note 12, at 88 ("Risk is inherent in all farming operations, and successful producers expend considerable effort to manage negative risk exposure. . . . The main categories of producer risk traditionally include yield/production, price, institutional, human/personal, and financial. Weather and technology are the primary components of yield risk. Price risk refers to uncertainty in input and output prices, and institutional risk arises from changes in agricultural policies (e.g., price supports, ethanol mandates) and regulations (e.g., watershed protection, odor or dust minimization). Personal risks include the risk of producer injury or death. Farmers also face asset risk, the chance of loss of equipment, and contracting risk, which includes the threat of opportunistic behavior of contracting parties. Financial risk includes the business risks of obtaining and financing capital.") (citing JOY HARWOOD ET AL., U.S. DEP'T OF AGRIC., MANAGING RISK IN FARMING: CONCEPTS, RESEARCH, AND ANALYSIS 7 (1999)).

This article will focus on three key differences between perennial energy crop production and traditional farming. First, perennial energy crops require a larger up front cost than traditional crops. Second, perennial energy crops present a greater risk of invasiveness. Third, perennial energy crops produce rhizomes, which might be either a nuisance or an asset to tenant-farmers and landowners. We suggest that tenant-farmers and landowners engage in more complex lease agreements, with specific clauses to account for these differences.[21] Improving these three areas will improve the initial segment of the bioenergy supply chain, and encourage both tenant-farmers and landowners to participate in this new industry.

II. TRANSACTION COST ECONOMICS PROVIDES ESSENTIAL INSIGHT INTO THE LEASING PROBLEMS POSED BY PERENNIAL ENERGY CROPS

Contracts theory provides two paradigms for approaching agreements such as the leases which tenant-farmers engage in with landowners. Transaction Cost Economics (TCE) dictates that, in some cases, contracts should be more complex, with clauses to appropriately incentivize the parties and distribute risk. Classical Contract Theory (CCT) suggests the opposite. Under CCT, simple, short-term contracts are preferable to complex, long-term contracts. With regard to bioenergy crop production, the insights of TCE are essential to ensuring that this nascent industry succeeds.

A. Transaction Cost Economics

TCE theory provides a lens for navigating such contractual uncertainty.[22] TCE focuses on coordination problems among

21. This article assumes that the negotiating parties will commit their agreement to writing. There are a number of reasons why agricultural leases should be in writing; reducing the agreement between the land owner and the land operator to a written document brings discipline to the negotiation process, helps the parties focus on key leasing issues to be resolved, helps the parties realize when they are in agreement and when they are not, and preserves the agreement for future reference when memories may have faded. Donald L. Uchtmann, *Should A Farm Lease be Written and Is an Illinois Farm Tenant Protected If the Lease Is Oral?*, AGRIC. L. & TAX'N BRIEFS (2007), *available at* http:// farmdoc.illinois.edu/legal/articles/ALTBs/ALTB_ 07-01/ALTB_07-01.pdf. While this advice is appropriate for traditional row cropping, it is particularly sage for bioenergy farm leases to be reduced to writing. As we discuss at length in this article, the parties to the agreement should agree to a governance scheme specific to the particular bioenergy crop, which would be difficult, if not impossible, to commit to memory.

22. Effective bioenergy farm leases will be grounded in economic theory—specifically, given their uncertainty, in transaction cost economics. Given the specialized nature of the bioenergy farm lease, it is difficult to evaluate the economic virtues of a model contract by using

economic agents.[23] Within an organization or supply chain, individuals' goals come into conflict, causing parties to abandon their responsibilities, renege on understandings, and engage in other non-cooperative behavior.[24] TCE examines individuals' ability to devise mechanisms—referred to as "governance structures"—that alleviate potential conflicts by adjusting incentives, risks, and authority.[25]

Governance structures fit within a spectrum between "market" and "hierarchy."[26] At one end lies the spot market, used mostly in simple transactions such as basic commodity sales.[27] Here, market prices provide incentives for the exploitation of profit opportunities, and market participants are quick to adapt to changing scenarios as prices reveal information over time.[28] On the other end of the spectrum lies the fully integrated firm, where trading parties are under unified ownership and control.[29] TCE suggests that this end of the governance structure spectrum offers greater protection for specific investments and provides relatively efficient mechanisms for

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empirical studies that are based on cross-sectional comparisons of different contracts. Accordingly, the design of an effective bioenergy farm lease will not rely on surveys or case studies alone, but, rather, will be grounded in economic theory. Corinne Alexander et al., *Contract Theory and Implications for Perennial Energy Crop Contracting*, 34 ENERGY ECON. 970, 970 (2012).

23. Peter G. Klein & Howard A. Shelanski, *Transaction Cost Economics in Practice: Applications and Evidence*, 4 J. MARKET FOCUSED MGMT. 281, 282 (1996).

24. *Id.*

25. *Id.* TCE further places particular emphasis on asset specificity, which is defined as the value of assets in alternative uses. Asset specificity can refer to physical asset specificity (when assets are tailored to meet the needs of a particular trading partner), spatial asset specificity (when location creates dependency), dedicated assets (when expansion investments are made to meet the needs of a particular trading partner), human asset specificity (or, learning by doing), and temporal asset specificity (where timing of the assets is specific and critical). Asset specificity is prevalent in the biofuel industry—equipment must be tailored to plant, harvest, store, and transport these novel crops (physical asset specificity); the relationship between the location of processing plants and the supplied biomass is vitally important to the strength of the industry (spatial asset specificity); farmers must learn how to grow perennial energy crops (human asset specificity); and the timing of biomass harvesting and storage is critical to the health of the biomass supply chain (temporal asset specificity). Furthermore, in TCE, the importance of asset specificity is attributed to the creation of bilateral dependence which it creates between two otherwise independent actors. Tenant-farmers and landowners are initially independent agents; however, once they make specialized investments to support the bioenergy farm lease (for instance, if the farmer purchases a harvester made to harvest *Miscanthus*), the farmer and the landowner become bilaterally dependent on one another, as suggested by TCE. Ira Altman & Thomas Johnson, *The Choice of Organizational Form as a Non-Technical Barrier to Agro-Bioenergy Industry Development*, 32 BIOMASS & BIOENERGY 28, 31 (2008).

26. Klein et al., *supra* note 23, at 285.

27. *Id.*

28. *Id.*

29. *Id.*

responding to change when coordinated adaptation is necessary.[30] Between these two poles lie a variety of "hybrid" governance structures, such as partial ownership arrangements and complex contracts.[31] TCE suggests that when contractual hazards are posed, the parties to the exchange have an incentive to craft contract-specific safeguards, thereby realizing mutual gains.[32] In circumstances in which the parties are unable to mitigate a hazard, pricing mechanisms will allocate the risk.[33]

The emerging bioenergy economy provides an opportunity to implement TCE principles within the landlord-tenant relationship. Neither spot markets[34] nor full-scale, fully integrated firms currently exist to frame standard agricultural contracts within the bioenergy sphere.[35] Tenant-farmers of bioenergy crops must use a hybrid governance structure, in the form of the bioenergy farm lease described below, to improve the traditional contract structures developed within the commodity agricultural economy. Traditional agricultural leases contain few terms and rely on the law to provide default rules that both parties find agreeable. The parties to the bioenergy farm lease have an opportunity to create a governance structure that re-envisions the traditional annual agricultural lease and restructures the landlord-tenant relationship to reflect the novelties of perennial energy crop production. Re-conceptualizing the landlord-tenant relationship as a governance structure rather than a mere contract for the lease of land resolves the problems posed to bioenergy crops by the current default rules for annual farmland leases.

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30. *Id*.

31. *Id.*

32. Oliver E. Williamson, *Transaction Cost Economics: An Introduction* 5 (Kiel Institute for the World Economy, Economics Discussion Papers, No. 2007-3) [hereinafter Williamson, *An Introduction*], *available at* http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0CDIQFjAB&url=http%3A%2F%2Fwww.economicsejournal.org%2Feconomics%2Fdiscussionpapers%2F20073%2Fcount&ei=biiJUur1FcWT2gXstoGwCw&usg=AFQjCNH9d3FoAgbfHsvjlEQDr2WKMLVEqQ&sig2=gICaKHNMbrybzAY-DaOtvg&bvm=bv.56643336,d.b2I.

33. *Id.*

34. Endres et al., *supra* note 12, at 80.

35. Furthermore, three quarters of the current bioenergy industry relies on vertical integration for fuel procurement, so "the prediction of spot markets being efficient for future biomass industries is difficult to justify with current data." *See* Ira Altman & Thomas Johnson, *Organization of the Current U.S. Biopower Industry: A Template for Future Bioenergy Industries*, 33 BIOMASS & BIOENERGY 779, 784 (2009) (suggesting that spot markets are unlikely to develop for the biomass industry).

B. Classical Contracting Theory

The novelty of bioenergy farm leasing is evident when analyzing the paradigm established by CCT. For instance, CCT considers the identities of the parties to a transaction irrelevant.[36] CCT demands careful delineation of contract terms and holds that more formal features of the contract control when formal (e.g., written) and informal (e.g., oral) terms are contested.[37] Furthermore, CCT suggests that in ideal contracts, remedies are narrowly arranged and third-party participation is discouraged.[38] CCT concludes that long-term contracts executed under conditions of uncertainty, such as those created in an emerging economic sector, are prohibitively costly and nearly impossible to design.[39]

Bioenergy farm leases fail to align with this framework. The identity of the parties to the transaction is highly relevant due to their specialized roles. Third party participation, as we will elaborate upon later, is likely necessary for the transaction to be successful. And, perhaps most significantly, perennial energy crops require a large initial investment[40] and a long establishment period[41]—characteristics that require multiyear lease agreements in order to provide an adequate return on investment.

Additionally, because farmers and landowners often engage in oral agreements to lease land, the terms of a contract are often

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36. Oliver E. Williamson, *Transaction-Cost Economics: The Governance of Contractual Relations,* 22 J.L. & ECON. 233, 236 (1979) [hereinafter Williamson, *The Governance of Contractual Relations*].

37. *Id.*

38. *Id.*

39. *Id.* at 237.

40. *See* Joseph Dolginow & Ray Massey, *Switchgrass and Miscanthus: Economics of Perennial Grasses Grown for Bioenergy*, U. OF MO. EXTENSION (Oct. 2013), http://extension.missouri.edu/p/G4980#Basic (estimating that income over total cost per acre of a switchgrass or *Miscanthus* plot is not positive until years 3–5). Planting material alone for giant miscanthus can cost $1,000 to $10,000 per acre. Emily A. Heaton et al., *Miscanthus (Miscanthus × giganteus) for Biofuel Production*, U. OF ILL. EXTENSION, http://www.extension. org/pages/26625/miscanthus-miscanthus-x-giganteus-for-biofuel-production#.UokphKWHoYU.

41. *See* Feng Song, Jinhua Zhao & Scott M. Swinton, *Switching to Perennial Energy Crops Under Uncertainty and Costly Reversibility*, 93 AM. J. AGRIC. ECON. 768, 768–69 (2011) ("[A]ll of the major cellulosic energy crop contenders are perennial. They need several years to establish before achieving full yield potential . . . . Devoting land to energy crops represents a long-term commitment by the farmer and incurs sunk costs. Moreover, converting land back to traditional annual crops also incurs (possibly substantial) costs (e.g., costs of killing persistent perennial rootstock).") (citing David S. Powlson, Andrew B. Riche & Ian Shield, *Biofuels and Other Approaches for Decreasing Fossil Fuel Emissions from Agriculture*, 146 ANNALS APPLIED BIOLOGY 193, 193–201 (2005)).

minimal. Instead of relying on written terms, the parties rely on the default rules provided by state law to address their interests. However, the default rules used to ensure fairness in farm leases for traditional crops are insufficient to protect the interests of the tenant-farmer and the landowner in leases for energy crop production.

Bioenergy farm leases are not unique in their failure to align with CCT, and TCE scholars have long noted the benefits of long-term contracts in specific sectors. Keith Crocker and Scott Masten, for instance, found that contracts in the natural gas industry tend to cover longer terms when specific assets are involved.[42] In a study of bulk shipping, Stephen Pirrong argued that long-term contracts can be efficient in the presence of relatively small contracting hazards, even when obvious physical, human, and site asset specificities are absent.[43]

The challenges presented in the natural gas and the bulk shipping industries are no more complex than those in the bioenergy sector; and the successful models implemented in those industries can be adopted to fit within the bioenergy sector. The commonality of these successful long-term contracts is their incompleteness. Significantly, the criticisms levied by CCT against long-term contracts—that they are impossible to fully design and completely enforce—are the same characteristics that TCE touts.[44] TCE holds that all complex contracts are necessarily incomplete;[45] one basic insight of TCE is that it is not feasible for parties to write complete contracts specifying the parties' respective rights and obligations under all possible future contingencies.[46] Rather, parties will often go to considerable lengths to craft contractual provisions—governance schemes—so as to reduce the prospect of future disagreement.[47]

TCE better captures the complex needs of a bioenergy farm lease. It allows the tenant-farmer and the landowner to agree beforehand on how they will approach a variety of situations which they may encounter, through negotiating additional terms into the lease. The remainder of this paper will explain three ways in which

42. Keith J. Crocker & Scott E. Masten, *Mitigating Contractual Hazards: Unilateral Options and Contract Length*, 19 RAND J. ECON. 327, 341 (1988).

43. Stephen Craig Pirrong, *Contracting Practices in Bulk Shipping Markets*, 36 J.L. & ECON. 937, 938 (1993).

44. Howard A. Shelanski & Peter G. Klein, *Empirical Research in Transaction Cost Economics: A Review and Assessment*, 11 J.L. ECON. & ORG. 335, 347 (1995).

45. *Id.*

46. Edward F. Sherry & David J. Teece, *Contactual Hazards and Long-Term Contracting: A TCE View from the Petroleum Industry,* 13 INDUS. & CORP. CHANGE 931, 933 (2004).

47. *Id.*

TCE can improve the traditional lease so that the lease will best satisfy the goals of both the tenant-farmer and the landholder when the land will be used for bioenergy crop production.

III. RE-ENVISIONING THE LANDLORD-TENANT RELATIONSHIP: THREE KEY TERMS

Energy crops differ substantially from traditional crops grown on farms in the United States. The leases between tenant-farmers and landowners should account for these differences. These leases can be improved in three significant ways. First, they can have provisions extending the lease beyond the term of the ordinary farm lease. Second, they can contain clauses which will define the responsibilities of each party with regard to mitigating and responding to the potential invasiveness of the bioenergy crops. Finally, they can define the conditions under which each party is entitled to keep the rhizomes produced by the bioenergy crop and the conditions under which each party will be required to clean these rhizomes from the land.

A. Multiyear Leasing Provisions

Perennial energy crops require a significant initial investment and establishment period.[48] As such, tenant-farmers are likely to grow such crops only under multiyear lease agreements. The Statute of Frauds requires written confirmation of any agreement that cannot be performed in one year.[49] In an industry where oral agreements are the norm, this precludes the formation of multi-year contracts unless the parties put their agreement in writing. The Statute of Frauds therefore allows the landowner to prematurely terminate the tenant-

48. Dolginow et al., *supra* note 40, at 1.

49. *See, e.g.*, U.C.C. § 2-201 (2002); RESTATEMENT (SECOND) OF CONTRACTS § 138 (1981) (discussing unenforceability of contracts); 740 ILL. COMP. STAT. 80 / 2 (1983) ("No action shall be brought to charge any person upon contract for sale of lands, tenements or hereditaments or any interest in or concerning them, for a longer term than one year, unless such contract or some memorandum or note thereof shall be in writing, and signed by the party to be charged therewith, or some other person thereunto by him lawfully authorized in writing, signed by such party."). In order to satisfy the writing requirements of the statute of frauds, all jurisdictions apply the general contract rule that the writing must contain all the material terms of the agreement. NEIL E. HARL, AGRICULTURAL LAW § 121.04[1][a][i] (2010) (citing Bills v. Fruge, 360 So. 2d 661 (La. Ct. App. 1978); Hoke v. Brown, 448 P.2d 483 (N.M. Ct. App. 1968); McClellan v. Britain, 826 P.2d 245 (Wyo. 1992)). Precisely what terms are material to the lease varies among jurisdictions. For instance, in Wisconsin, the essential elements of a lease are set out in statute: a lease must be signed by the parties, identify the premises, specify the duration of the lease, and state the rent to by paid. WIS. STAT. § 704.03 (2012).

farmer's access to the bioenergy crops.

A number of states have rules in place intended to protect tenant-farmers from the harsh dictates of the Statute of Frauds. For example, a tenant-farmer in Illinois must receive at least four months' notice prior to the end of the lease in order to terminate a year-to-year lease.[50] These farm leasing arrangement default interpretations have not yet evolved to protect the interests of the parties to a bioenergy farm lease. While four months' notice is adequate for farmers of annual crops, it would be cold comfort to a farmer who had sunk a substantial financial interest into establishing perennial biomass crops on the land. Thus, multiyear, written lease agreements are an essential element of perennial bioenergy crop production; one that stands in stark contrast to the annual nature of most farmland rental agreements.

A multiyear agreement is not only essential to the production of perennial bioenergy crops, it also benefits both parties involved. Both parties benefit from the low transaction costs that accompany a longer term deal, as opposed to the high transaction costs associated with re-negotiating the lease year after year. Additionally, the parties reap the benefits provided by growing perennial bioenergy crops. Farmers benefit from the opportunity to grow a crop which requires little fertilizer and irrigation without facing a large risk of losing their initial investments. Landowners benefit because perennial bioenergy crops improve soil health.[51]

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50. 735 ILL. COMP. STAT. 5 / 9-206 (2013) ("Subject to the provisions of Section 16 of the Landlord and Tenant Act, in order to terminate tenancies from year to year of farm lands, occupied on a crop share, livestock share, cash rent or other rental basis, the notice to quit shall be given in writing not less than 4 months prior to the end of the year of letting. Such notice may not be waived in a verbal lease."). Other jurisdictions have instituted legislation limiting the ability of parties to cancel contracts which required a substantial financial obligation by one party, thereby creating an expectation of renewal. *See, e.g.*, MINN. STAT. § 17.92 (2013) ("A contractor must not terminate or cancel a contract that requires a producer of agricultural commodities to make a capital investment in buildings or equipment that cost $100,000 or more and have a useful life of five or more years until: (1) the producer has been given written notice of the intention to terminate or cancel the contract at least 180 days before the effective date of the termination or cancellation . . . ; and (2) the producer has been reimbursed for damages incurred by an investment in buildings or equipment that was made for the purpose of meeting minimum requirements of the contract."). Similar legislation could be drafted to protect tenant-farmers who have made large financial investments from having farm leases terminated by landowners.

51. Melissa K. Lynes et al., *Determining Farmers' Willingness To Grow Cellulosic Biofuel Feedstocks on Agricultural Land* 6 (Aug. 2012) (citing Richard J. Hess et al., *Corn Stover Availability for Biomass Conversion: Situation Analysis*, 16 CELLULOSE 559–619 (2009)), *available at* http://ageconsearch.umn.edu/bitstream/124777/2/LynesEtAlRev.pdf.6. Perennial crops can contribute to increased soil carbon and nitrogen stocks. These are factors that

TCE suggests that when a contractual hazard is posed—for instance, the necessity of a long lease term—the parties have an incentive to craft contract-specific safeguards.[52] Under TCE the contract should create a governance scheme that accounts for the risks associated with bioenergy crops through contractual mechanisms such as the termination clauses discussed below. Negotiating this governance structure is necessary to protect both parties' interests. The negotiation also allows the parties to confront further concerns they may have regarding conversion of land from annual commodity crop production to perennial energy crop production.

A recent focus group conducted by researchers at the University of Illinois illustrated some of these underlying trepidations. The researchers utilized survey methods and a Geographic Information System-aided focus group in order to determine farmers' perspectives on growing perennial energy grasses in central Illinois.[53] Two issues raised by several participants related to the contingency of cropping decisions and the necessity of obtaining the landowner's pre-approval to plant energy grasses.[54] The contracting process for multiyear leases partially assuages these concerns because it creates an opportunity for farmers and landowners to discuss the profitability and agronomic practices associated with dedicated energy crops.

Study participants also noted that even when landowners are amenable to planting biofuel crops, taking land out of traditional crop cultivation for this use goes against the grain of established farming practices and might place the owner at risk of being considered overly progressive.[55] The process of developing multiyear lease agreements speaks to this concern. The creation of a multiyear lease demonstrates to the community that the landowner is engaged in a lasting commercial venture, rather than in an experiment.[56]

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improve quality of land in a way that landowners will appreciate (particularly landowners who rent their land—"[s]ociological and economic studies indicate that land tenure security, while not the only factor, is directly related to the adoption of conservation practices on agricultural land. The theory is that tenants do not have as much of a long-term interest in the land, so their motivation for conservation investments is limited"). Cox, *supra* note 15, at 371 (footnotes omitted).

52. Williamson, *An Introduction*, *supra* note 32, at 5.

53. Cope et al., *supra* note 7, at 855–56.

54. *Id.* at 858.

55. *Id*.

56. Furthermore, community expectations could be a powerful mechanism for keeping landowners in such arrangements, as "[p]eer expectations of continued commitment or personal support and encouragement will reinforce commitment and provide a buffer against setbacks."

The long-term nature of the lease also raises economic concerns. For landowners, one of the primary reservations to engaging in multiyear lease arrangements is a perceived inability to adjust the rent on a yearly basis.[57] Changes in the prices of commodities and land values over time may result in rental payments substantially below alternative land production value.[58] In other words, a landowner may reason that the opportunity cost of such a lease is too high. A more nuanced approach can alleviate these market concerns by allowing for yearly adjustments to rental payments over the life of the lease.[59] For instance, the parties could agree to renegotiate some contract terms, including rent, each year, perhaps subject to annual percentage-change limitations. Alternatively, the parties could agree to allow a neutral third party such as a certified appraiser to determine the rent.[60]

The parties could also agree to a "flex lease" arrangement, a cash lease tailored to automatically adjust to changing price scenarios.[61] Many potential measures of price and yield could be used in flex lease arrangements, including the price of a selected crop or multiple crops to create a pricing index to approximate the current fair market value.[62] Landowners using flex lease agreements may feel more comfortable in a long-term arrangement because they can hedge their risk of declining rental payments against the various opportunity costs associated with leasing to farmers of more traditional annual row crops.

Landowners may also be concerned that multiyear lease agreements put farm marketability at risk because a properly

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David J. Pannell et al., *Understanding and Promoting Adoption of Conservation Practices by Rural Landowners*, 46 AUSTL. J. EXPERIMENTAL AGRIC. 1407, 1411 (2006) (citing IRVING L. JANIS & LEON MANN, DECISION MAKING: A PSYCHOLOGICAL ANALYSIS OF CONFLICT, CHOICE AND COMMITMENT 280–83 (1977)).

57. Edward Cox*, A Lease-Based Approach to Sustainable Farming, Part II: Farm Tenancy Trends and the Outlook for Sustainability on Rented Land*, 16 DRAKE J. AGRIC. L. 5, 13 (2011).

58. *Id.*

59. As stated by one researcher, the fundamental issue with long-term contracts is credibility. To achieve credibility, the contract must incorporate foreseeable renegotiation into the initial contract, allowing the parties to acquire new information over time, which will flavor the terms of the renegotiation. Alexander et al., *supra* note 22, at 977. In other words, not only does allowing for renegotiation of the rental payments over the course of a long-term contract make the landlord more likely to enter such a contract in the first place, it adds credibility to the contract, which could encourage the landowner to remain in the contract.

60. Cox, *supra* note 15, at 14.

61. Donald L. Uchtmann & A. Bryan Endres*, Illinois Farm Leases: One Variable Cash Rent Option*, AGRIC. L. & TAX'N BRIEFS 1, 1 (2008).

62. *Id.*

recorded lease subjects any subsequent purchasers of the land to its terms.[63] However, a re-envisioned bioenergy farm lease can contain provisions that address early termination, such as inclusion of a predetermined fee to be paid to the tenant in the event of a sale.

Marketability is particularly illustrative of the tension between a landowner's desire for flexibility in exiting leases and a tenant-farmer's desire for land tenure security when growing perennial energy crops. This tension is understandable. The risk for perennial energy crop farmers is highest during the beginning of the lease, when they have heavily invested in the crop but have not yet harvested biomass.[64] For landowners in a fixed long-term lease, the risk is greater in later stages as potential opportunity costs accumulate.[65] To reduce this tension, farmers and landowners may incorporate formulaic termination clauses into their leases that place pressure on the parties to remain in a lease over the long-term. These clauses can also provide flexiblity in exiting the lease should certain circumstances arise. The termination clause options can be envisioned as fitting into one of two different contracts. The first is a multiyear leasing contract, with the formulaic termination clause functioning as a buy-out provision. The alternative is a yearly lease agreeement, with each party having the option of renewing the lease for the following year, and the decision to renew (or not) determines the parties' rights and obligations under the long-term agreement.[66] The key is to disencentivize lease termination, but not impose measures so draconian as to unnecessarily tie parties to a sub-optimal contract in this novel bioeconomy.

Based on our analysis of agricultural contracts, the critical issues to balance include the cost of establishing the perennial biomass crop,

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63. Cox, *supra* note 15, at 15.

64. While not the focus of this research, it should be noted that, for farmers, bioenergy farm leases are likely only one in a series of contracts that will enable their entry into the bioenergy market. While the biomass industry is in its infancy and no standard contracting procedure has yet been established, scholars suggest that "[w]ith a large investment at stake in a cellulosic ethanol plant, the ethanol producer will want multi-year commitments from farmers to ensure a sufficient supply of biomass to operate the facility." L. Paul Goeringer, Harold L. Goodwin & Michael Popp, *The New Fuel Frontier: Biomass Contracting*, 5 KY. J. EQUINE, AGRIC. & NAT. RESOURCES L. 71, 74 (2012–13) (footnote omitted). Signing a multiyear agreement with an ethanol plant may suggest that tenant-farmers (who do not have complete control over their ability to supply) are less likely to secure such contacts. This is not so—farmers can negotiate excuse of performance clauses into their contracts with the ethanol producer. These clauses can stipulate that termination of a lease constitutes a valid excuse of performance.

65. *Id.* at 75.

66. *Id.*

the profit to date of the biomass farmer,[67] and the cost of restoring the farm to its condition prior to planting the perennial crop[68] (assuming the previous and subsequent production consists of annual row crops). The result is a variable termination fee assessed to the party seeking to exit the agreement.

As a starting point in this analysis, one can envision a scenario in which the biomass farmer seeks to exit the market before the end of the multiyear lease. Perhaps the demand for biomass was lower than expected or he had other unanticipated complications. When the tenant-farmer walks away from a multiyear lease intended for commodity production of annual crops such as corn or soybeans, relatively little cost is imposed on the landowner. The landowner only has to deal with the hassle of finding a new tenant and negotiating new lease terms. On the other hand, the nature of perenial crop production such as *Miscanthus* requires potentially substantial transition costs such as the effort required to remove the *Miscanthus* rhizomes[69] and prepare the field for subsequent planting of annual crops in the next growing season.[70] Thus, the terminating tenant-farmer should pay a fee equivalent to the cost of restoration. Likewise, if the failure to renew is a mutual decision, the landowner and the farmer should share restoration costs.

If the landowner unilaterally fails to renew the lease, the distribution of various costs should adjust to account for the current situation within the larger life-span of the multiyear lease agreement. For example, the governance structure could dictate that if the farmer's accumulated profits are less than the establishment costs of the crop, the landowner will pay the farmer a termination fee equal to the difference between the establishment costs and the farmer's profit

67. In economics, profit represents the firm's total revenue minus all the opportunity costs (both explicit and implicit) of producing the goods and services sold. In accounting, profit represents total revenue minus the firm's explicit costs. N. Gregory Mankiw, PRINCIPLES OF ECONOMICS 270 (Jack W. Calhoun & Michael P. Roche eds., 3d ed. 2004). For the purposes of the bioenergy farm lease, the parties are free to define profit however they wish within their contract—what is important is that theirs is a shared definition.

68. *Id.*

69. A rhizome is an underground stem capable of sending out both shoots and roots and functioning as a reproductive structure. *Rhizome Definition*, BIOLOGY ONLINE, http://www.biology-online.org/dictionary/Rhizome (last modified Oct. 3, 2005).

70. Currently, there are no published experiments investigating *Miscanthus* removal. Eric Anderson et al., *Growth and Agronomy of* Miscanthus × giganteus *for Biomass Production*, 2 BIOFUELS 167, 175 (2011). Accordingly, the cost of restoring a field to agricultural viability after the growth of *Miscanthus* is not well understood. The parties may need to agree, therefore, that they will reimburse the other for the cost of restoration, rather than pay the restoration costs *ex ante*.

at the time of lease nonrenewal. Moreover, the landowner would bear the full cost of restoration. However, if failure to renew the lease occurs when the farmer's profits are equal to or greater than the establishment costs—most likely in the outer years of the multiyear lease—the landowner will only bear responsibility for restoration.

This approach takes into account the agronomic properties of the particular perennial energy crop, and allows the farmer to bear restoration costs should a crop grow for its entire life cycle. Imagine that a landowner and a farmer are drafting a lease for the growth of switchgrass, a crop thought to be capable of harvest for 10 to 12 years.[71] The formulaic termination clause could read:

> If Farmer fails to renew the lease, Farmer agrees to pay restoration costs. If Landowner fails to renew the lease at a time when Farmer's profits are less than Farmer's establishment costs, Landowner agrees to pay Farmer the difference between the establishment costs and Farmer's profit at the time the lease failed to be renewed, and Landowner agrees to pay restoration costs. If Landowner fails to renew the lease and Farmer's profits are equal to or greater than Farmer's establishment costs, Landowner agrees to pay the restoration costs. If the failure to renew is a mutual decision, Landowner and Farmer will share restoration costs. Should the lease tenure last for 10 years or more, Farmer agrees to pay restoration costs.

Shifting the termination fees presents a reinterpretation of the traditionally strict view of contract breach and associated responsibilities. However, this change may represent an adjustment necessary to incentivize the long-term lease provisions required for widespread production of perennial biomass to meet renewable energy mandates. These terms add certainty to the governance scheme of the bioenergy farm lease and have the residual benefit of fostering open and frequent communication between the landowner and the land operator. Lack of communication between landowners and tenant-farmers undermines tenant-farmers' capacity to adopt sustainable farming practices.[72] A contract that encourages, or even requires, open communication between landowners and their tenants will only benefit the health of the farmland.

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71. Kate Withers, *Growing the Future: Switchgrass Management for Ethanol*, EXTENSION BULLETIN E-3078 1, 2 (Mich. State U. Sept. 2009).

72. Cox, *supra* note 15, at 381.

B. Invasiveness Concerns

Another objection landowner may have to renting to perennial energy crop farmers—besides just entering into long-term lease agreements—is the risk of crop invasion by perennial energy crops. The current interest in biofuels has our nation's scientists looking for plant species capable of increased biomass production, which requires "traits such as rapid growth, the ability to outcompete local vegetation, prolific seed production, increased tolerance to a variety of soils and climatic conditions, a strong resistance to plant pests and diseases, and a lack of predators in the recipient ecosystem."[73] These are traits shared by many invasive plant species, a fact that has some concerned about the risk of perennial energy crops becoming invasive within their targeted ecosystems.[74]

These concerns are not unfounded. Many purportedly beneficial introduced species have created long-term economic and environmental costs due to their invasiveness.[75] Kudzu, the so-called "vine that ate the south," was purposefully introduced to the United States for use as a forage crop[76] and has caused enormous economic damage; estimated by some to be as high as $500 million per year.[77] *Sorghum halepense,* an introduced forage grass, is invasive in 16 states.[78] The most conservative estimates of competitive losses for cotton and soybean crops as a result of this invasion exceed $30

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73. James S. Neal McCubbins et al., *Frayed Seams in the "Patchwork Quilt" of American Federalism: An Empirical Analysis of Invasive Plant Species Regulation*, 43 ENVTL. L. 35, 39–40 (2013) (citing Jacob N. Barney & Joseph M. DiTomaso, *Nonnative Species and Bioenergy: Are We Cultivating the Next Invader?*, 58 BIOSCIENCE 64, 64 (2008); Joseph M. DiTomaso et al., *Biofuel vs. Bioinvasion: Seeding Policy Priorities*, 44 ENVTL. SCI. & TECH. 6906, 6907 (2010)).

74. *See* Sathyamurthy Raghu et al., *Adding Biofuels to the Invasive Species Fire?*, 313 SCI. 1742 (2006) ("Balancing costs and benefits of species introductions is a key contemporary challenge. Introducing some plant species as biofuel sources may be safe, but safety must be established by agronomic and ecological analyses . . . . Experts must assess ecological risks before introducing biofuel crops, to ensure that we do not add biofuels to the already raging invasive species fire.").

75. *See* John J. Ewel et al., *Deliberate Introductions of Species: Research Needs*, 49 BIOSCIENCE 619 (1999) ("Introductions of nonindigenous organisms can be both a boon and a bane to society.").

76. Karen Ray, *Are Biofuel Crops the Next Kudzu?*, 17 SAN JOAQUIN AGRIC. L. REV. 247, 247 (2008) (citing Theo Emery, *In Tennessee, Goats Eat the "Vine that Ate The South*," N.Y. TIMES, June 5, 2007; Amanda Allen, *Kudzu in Appalachia*, *in* ASPI TECHNICAL SERIES TP 55 (Al Fritsch ed., 2000)).

77. Richard J. Blaustein, *Kudzu's Invasion into Southern United States Life and Culture*, *in* THE GREAT RESHUFFLING: HUMAN DIMENSIONS OF INVASIVE SPECIES, 55, 60 (J.A. McNeeley ed., 2001) (citing James H. Miller, *Kudzu Management Program: Containing the Spread and Reclaiming Lands* (2000) (paper e-mailed by Dr. Miller to R. Blaustein)).

78. Raghu et al., *supra* note 74, at 1742.

million annually in just three of those states.[79]

How can "the economic benefits of growing nonnative crops for bio-based energy" outweigh the concern of "cultivating the next noxious weed or invasive plant?"[80] Discussions for resolving this quandary typically revolve around large-scale policy reforms.[81] Research suggests, however, that such schemes are ineffectual; despite the enormous cost to the U.S. associated with invasive plants,[82] invasive species affecting nonagricultural landscapes are largely unregulated by states or by the federal government.[83]

Noticeably absent in both scientific and policy literature is a consideration of the landowners' ability to protect their property from the risk of invasive species spread through private contracting and through the creation of governance structures. The bioenergy farm lease can be tailored to minimize a landowner's risk of invasion. Approximately 40% of agricultural land in the United States is farmed by someone other than the owner.[84] Bioenergy farm leases could provide an important tool in the protection of agricultural landscapes because of their root structures which create healthy soil and reduce erosion.[85]

Furthermore, TCE suggests that transaction-specific governance

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79. *Id.* (citing Chester G. McWhorter, *A 16-Yr Survey on Levels of Johnsongrass (*Sorghum halepense*) in Arkansas, Louisiana, and Mississippi*, 41 WEED SCI. 669, 669 (1993)).

80. Jacob N. Barney & Joseph M. DiTomaso, *Nonnative Species and Bioenergy: Are We Cultivating the Next Invader?*, 58 BIOSCIENCE 64, 65 (2008).

81. *See generally* U.S. GEN. ACCOUNTING OFFICE, INVASIVE SPECIES: CLEARER FOCUS AND GREATER COMMITMENT NEEDED TO EFFECTIVELY MANAGE THE PROBLEM (Oct. 2002) (recommending reform efforts to better manage invasive species), *available at* www.gao.gov/assets/240/236162.pdf.

82. *See* David Pimentel, Rodolfo Zuniga & Doug Morrison, *Update on the Environmental and Economic Costs Associated with Alien-Invasive Species in the United States*, 52 ECOLOGICAL ECON. 273, 273 (2005) (citing study reporting $97 billion in damages from 1906 to 1991).

83. *See* Lauren D. Quinn et al., *Navigating the "Noxious" and "Invasive" Regulatory Landscape: Suggestions for Improved Regulation*, 63 BIOSCIENCE 124 (2013) (citing Pimentel et al., *supra* note 82, at 273–88) ("Nonagricultural invasive plants cost the U.S. economy more than $7.7 billion annually in income losses . . . and control expenditures . . . . Although these environmental and economic consequences are substantial, invasive species affecting nonagricultural landscapes are largely unregulated by states or federal agencies.").

84. Cox, *supra* note 15, at 372 (citing NAT'L AGRIC. STAT. SERVICE, USDA, PERCENT OF LAND IN FARMS RENTED OR LEASED: 2007 (2007)).

85. Very small-scale eradication need not require enormous resources. The determination of a single person or small nongovernmental organization may even suffice. Daniel Simberloff, *Eradication—Preventing Invasions at the Outset*, 51 WEED SCI. 247, 248 (2003), *available at* http://www.bioone.org/doi/pdf/10.1614/0043-1745%282003%29051%5B0247%3AEPIATO%5D2.0.CO %3B2.

structures are more likely to be fully developed in transactions executed under greater uncertainty.[86] The potential invasiveness of a number of proposed bioenergy feedstocks creates uncertainty within the bioenergy farm lease in at least two ways. First, legislators may deem the bioenergy feedstock to be noxious or invasive during the lease term, and thus the contract would have to be terminated. Second, the bioenergy feedstock may escape from the proposed plot, thus exposing the tenant-farmer and/or the landowner to liability. Accordingly, this inherent contractual uncertainty should be resolved through transaction-specific governance structures within the contract.

Implementing carefully drafted written agreements can lower the risk of invasion. Such an agreement will assuage the concerns of both the tenant farmer and the landowner before invasiveness becomes a problem and thus incentivize more farmers and more landowners to participate in this nascent industry. The rest of this section will suggest how prudent landowners can negotiate to mediate these risks by (1) establishing ways to determine if an invasion has occurred, (2) specifying agronomic practices to reduce the risk of such an invasion, and (3) articulating the parties' responsibilities once an invasion has been identified.[87]

1. Establishing that an Invasion Has Occurred

Well-crafted bioenergy farm leases will include a term that stipulates when invasive species spread is considered to have occurred. A lease-term that adequately analyzes invasiveness will clearly define three factors: (a) who determines whether an invasion has occurred, (b) when that determination will take place, and (c) what parameters will be used to determine whether or not an invasion

86. Williamson, *The Governance of Contractual Relations*, *supra* note 36, at 254.

87. Many states create an affirmative duty for a landowner, a tenant-farmer, or a state department (this varies by state) to eradicate or take other control measures in the event that noxious weeds be discovered on the property by the appropriate government agency. In Illinois, for instance, if an individual in possession of a property (landowner or tenant) has allowed noxious weeds to grow, the Control Authority is permitted, after notifying the caretaker of the property, to implement proper control and eradication methods on the property. 505 ILL. COMP. STAT. 100 / 10 (1972). Landowners still have an interest in contracting to protect against invasion for a number of reasons: (1) these duties relate to noxious weeds, which are considered by many to be not well regulated, *see* Quinn et al., *supra* note 83, at 125 (discussing problems with state and federal regulations); (2) if the state's regulations require that the landowner re-enter the property to control the invasion, the landowner has an interest in contracting this duty away to the tenant, because the tenant is the least cost avoider.

has occurred.

A neutral third party should ideally determine whether an invasion has occurred because other factors in the lease might incentivize a party to either ignore invasive species spread or be too eager to find an invasion. Consider, for instance, a contract that requires a farmer to eradicate the entirety of his crop or engage in other costly control measures if an invasion was found to have occurred. A farmer in this position would be hesitant to acknowledge such an invasion. The landowner, by contrast, seeking to terminate the lease for other reasons might have an opposite bias. Accordingly, the contract should require that a third party determine whether an invasion has occurred. This third party could be another local farmer or landowner; an extension agent; or, if bioenergy farm leases become widespread, a consulting agency could be created to make these determinations. The contract also should specify who would pay for the evaluation.

In addition to who should determine if an invasion has occurred, leases should define when and how often this determination should be made. Due to the multiyear nature of the agreements, lease terms could require that an invasion inspection be made on the date of renewal each year. The date of the inspection could also relate to the agronomic properties of a specific plant. For instance, if the tenant-farmer is growing *Miscanthus*, which develops shoots each spring,[88] the inspection date could occur at a specified time in late spring.

Ideally, the contract would also identify precisely what constitutes an invasion. Specificity is necessary because of the lack of consensus over terminological concepts within the field of invasion ecology.[89] The parties are unlikely to have a common conception of what constitutes an invasion, as even the scientific community struggles to agree.[90] The contract could define an invasion as an unapproved plant appearing outside of a specified area, or as the bioenergy crop appearing within a defined radius. A temporal

88. Dudley G. Christian, Andrew B. Riche & Nicola E. Yates, *Growth, Yield, and Mineral Content of* Miscanthus × giganteus *Grown as a Biofuel for 14 Successive Harvests*, 28 INDUS. CROPS & PRODUCTS 320, 321 (2008).

89. *See* David M. Richardson et al., *Naturalization and Invasion of Alien Plants: Concepts and Definitions*, 6 DIVERSITY & DISTRIBUTIONS 93 (2000) ("The expanding field of invasion ecology has seen a proliferation of terms to describe various concepts. There has also been considerable confusion and misuse of existing terminology.").

90. *See* Lauren D. Quinn et al., *Resolving Regulatory Uncertainty: Legislative Language for Potentially Invasive Bioenergy Feedstocks*, GLOBAL CHANGE BIOLOGY BIOENERGY (2014) (discussing different states' invasion terminology).

element may be necessary in this analysis—for instance, the farmer's responsibilities under the contract could terminate at the end of the lease term, or the farmer could have duties to the landowner that extend beyond the lease term. The contract should clearly state what constitutes an invasion because the measures taken to avoid an invasion and the responsibilities of the parties once an invasion has occurred are dependent upon that determination.

2. Reducing the Risk of Invasion

Landowners should insist on provisions that reduce *invasion risks*. The two best options are an "improved" good husbandry clause or a variety selection clause, both of which would further strengthen the governance scheme of the bioenergy farm lease.

A good husbandry clause establishes a duty to protect the farm's productivity and to prevent waste. These clauses are often included in form farmland leases, which have language creating a duty for tenants to farm the leased land in a manner consistent with a general standard of good husbandry.[91] The precise words used to establish this standard often vary, as does the context in which the standard is created.[92] Without modification, good husbandry clauses do not sufficiently protect landowners' interests against invasive species, as good husbandry clauses are generally not read to include a duty to engage in practices to prevent species invasion. Landowners can better protect their property by privately contracting for specific expectations regarding invasive species spread rather than relying on a vague good husbandry clause and noxious weed regulations.

An "improved" good husbandry clause would require specific conservation standards or methods *to better protect landowner interests.* An "improved" good husbandry clause that establishes the expectations regarding the possibility of and expected treatment for invasion could read:

> The Tenant will farm in accordance with the highest standards of good husbandry and will take all first-class, farmer-like steps to ensure the conservation of the natural resources and the long-term productivity of the farm. This includes taking measures to protect against the possibility of invasion by the energy crop and pledging to take measures to eradicate the plant should such an invasion take place.

91. Cox, *supra* note 15, at 24.

92. *Id.* at 24–25.

As a starting point, these "improved" clauses should incorporate the regulations and recommendations of relevant federal agencies, such as the U.S. Department of Agriculture's recommendations regarding the prevention of invasion.[93] Surprisingly, federal regulations and recommendations are rarely referenced in the good husbandry clauses currently in use. For example, an "improved" good husbandry clause could contain the Natural Resources Conservation Service's recommendations for preventing the unintentional spread of *Miscanthus*. These recommendations include establishing and maintaining a minimum 25-foot setback or border around a *Miscanthus* stand to allow for monitoring and management of any spread; covering or otherwise containing vegetative planting material during transportation; and a prohibition against disposing excess live planting material at the edges of fields, in field borders, in farm trash piles, or in landfills.[94] A good husbandry clause that incorporates crop-specific recommendations would better protect the property from invasion and the landowner and tenant-farmer from legal liability. Edward Cox observed that good husbandry clauses sometimes focus more on productivity than evolving stewardship standards, ignoring sustainable practices and the risk of invasive species.[95]

Incorporating federal regulations into a bioenergy farm lease—in other words, a more complete governance scheme—could allow independent tenant-farmers growing bioenergy crops without a standing purchasing contract to sell their biomass to fuel producers.

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93. An additional regulatory structure that should be included in "improved good husbandry clauses" is relevant Environmental Protection Agency (EPA) regulations, including Renewable Fuel Standard (RFS2) which relate to giant reed (*Arundo donax*) or Napier grass (*Pennisetum purpureum*). The RSF2 regulations define what qualifies as advanced biofuels. EPA will only approve giant reed or napier grass crop production pathways if producers meet certain registration, recordkeeping, and reporting protocols designed to minimize the potential invasiveness of these crops. Producers can only sell fuel that has been created under an approved pathway. These precautionary steps are in addition to registration requirements unfolded in 40 C.F.R. 80.1450. Requiring that farmers comply with EPA regulations will ensure that they manage the risk of invasion. These requirements are placed on the fuel producer, but must be implemented by the biomass producer. EPA acknowledges that the feedstock grower and the renewable fuel producer may be separate entities, but the comprehensive requirements conflate the parties. At a minimum, the regulations require an intensely cohesive and communicative relationship that significantly predates the sale of biomass to the biofuel producer.

94. Nat. Resources Conservation Service, USDA, *Planting and Managing Giant Miscanthus as a Biomass Energy Crop* (Technical Note No. 4, 2011).

95. Cox, *supra* note 15, at 25.

Such an arrangement would benefit landowners by protecting their property from invasion. The regulatory lease terms would also enable tenant-farmers to enter the bioeconomy by guaranteeing that their biomass follows the regulations to fuel producers seeking compliant sources. Therefore, tenant-farmers growing crops to sell into the biomass supply chain may want to negotiate bioenergy farm leases that incorporate the documentation and registration required by federal regulation to certify that the crops qualify under federal energy regulations.

Another option is the variety selection clause. The lease may include a breed selection clause specifying the species and, if appropriate, the variety of plant permitted to be cultivated on the property. For example, if the famer wishes to grow *Miscanthus*, the contract could stipulate that the farmer is only to grow the so-called Illinois clone on the property due to its sterile characteristics that reduce the potential for invasion.

3. Articulating Responsibilities Once an Invasion Has Occurred

These contracts must also define what constitutes eradication. Eradication is commonly understood to mean complete annihilation of a species within a given area[96] and is used by lawmakers in this way.[97] However, for some bioenergy species—like *Miscanthus*, which develops elaborate, nutrient-rich root systems—complete annihilation may be neither feasible nor advisable. For example, *Miscanthus* did not reduce yields for glyphosate-resistant soybeans even though it was not completely eradicated.[98]

Two additional definitions of eradication could be used in a bioenergy farm lease to absolve tenant-farmers from being burdened with unnecessary eradication responsibilities. The first option is a procedure-based definition, which defines eradication as a series of accepted protocols. The second is a results-based definition, which would hold the farmer liable for further eradication procedures or damages if the field is not returned to a healthy, productive state at the end of the lease tenure. "Healthy and productive" could be

96. Merriam-Webster defines "eradicate" as "to do away with as completely as if by pulling up by the roots." *Eradicate Definition*, MERRIAM-WEBSTER ONLINE DICTIONARY, http://www.merriam-webster.com/dictionary/eradicate (last visited May 9, 2014).

97. *See, e.g.,* COLO. REV. STAT. § 35-5.5-103 (2014) (defining eradication as "reducing the reproductive success of a noxious weed species or specified noxious weed population in largely uninfected regions to zero and permanently eliminating the species or population within a specified period of time").

98. Anderson et al., *supra* note 70, at 175.

defined as distinct from a state of zero residual rhizomes.

Once eradication is defined, bioenergy farm leases should articulate who will be responsible for completing the process. There are a number of options available to landowners and farmers in this regard. The lease could stipulate that the tenant-farmer must return the farm to the same condition as it was in when she took possession. Or, the landowner and farmer could stipulate that the farmer would pay the landowner for the cost of eradication. Other alternatives include: placing the financial and physical responsibilities of eradication on the farmer entirely; an agreement among the parties to share the costs of eradication; or creating either an escrow account into which the farmer pays or a surety bond to cover eradication and restoration costs.

The parties should also determine *ex ante* what is to happen after eradication is complete. One option is for the lease to end at that time. Another is for the terms of the lease to be renegotiated. The options are several, but the take-away is singular: as TCE suggests, the parties to a bioenergy farm lease should include a transaction-specific plan to determine if an invasion has occurred and a series of steps to restore the ecological and productive value of the land if an invasion has in fact occurred.

C. Rhizome Reclamation and the Doctrine of Emblements

A bioenergy farm lease must also navigate the novel area of rhizome reclamation. Rhizomes are the means through which many bioenergy crops can be reproduced, and can thus be very valuable. However, they can be a nuisance if they are not removed. Leases for land that will be used for the production of bioenergy crops that produce rhizomes should contain clauses defining the rights and responsibilities surrounding the rhizomes. Specifically, these clauses should define both when tenant-farmers have the right to remove rhizomes from the farm and when tenant-farmers are required to harvest rhizomes, which would otherwise be a nuisance to the landowner.

Miscanthus is sterile, and, as such, it is propagated vegetatively using micro-propagation of plantlets and macro-propagation of rhizomes.[99] Plants produced from rhizome division have proven more

99. Richard Pyter et al., *Agronomic Experiences with Miscanthus × Giganteus in Illinois, USA*, 581 BIOFUELS: METHODS & PROTOCOLS 41, 45 (Jonathan R. Mielenz ed., 2009).

resistant to winter losses than those produced from plantlets,[100] and rhizome recovery is currently the favored method of propagation in the U.S.[101] Rhizome reclamation for subsequent planting or sale at the end of a lease term is a potentially profitable enterprise. For instance, studies indicate that a three-year-old *Miscanthus* plant can produce 75-80 harvestable rhizomes,[102] a hearty return on a farmer's initial investment. Both the farmer and the landowner will have a strong financial interest in determining the distribution of rhizomes at the end of the lease.[103] As a practical matter, if the lease ends while the *Miscanthus* crop is still producing high yields of biomass, the landowner may wish to stipulate that some or all of the rhizomes remain on the property. If the lease ends and the landowner is not interested in continuing to grow *Miscanthus* on the property, she will have an interest in the *Miscanthus* rhizomes being removed from the property to eradicate the crop. Alternatively, a landowner may be interested in keeping some or all of the rhizomes on the property to sell them to a third party.[104]

Common law conventions are not prepared to address the novel issue of rhizome reclamation. The doctrine of emblements, a long recognized equitable remedy,[105] illustrates the manner in which the common law fails to protect the interests of parties to a bioenergy farm lease. The doctrine permits farmers to enter and leave the land for necessary purposes, not a right of possession, and the right must be exercised within a reasonable time after the tenancy has ended.[106] The doctrine also provides a tenant who holds farmland for an indeterminate period a right to remove from the land, after the

100. *Id.*

101. Christian et al., *supra* note 5, at 176.

102. Pyter et al., *supra* note 99, at 46. *But see* TEAGASC & AGRI-FOOD & BIOSCIENCE INST., MISCANTHUS BEST PRACTICE GUIDELINES (Barry Caslin, Dr. John Finnan & Dr. Lindsay Easson eds. 2010) ("Planted [*Miscanthus*] crop will have a rhizome multiplication factor of 15 after 4 years."), *available at* http://www.afbini.gov.uk/miscanthus-best-practice-guidelines.pdf.

103. *See* TEAGASC et al., *supra* note 102, at 26 (discussing the value of remaining rhizomes). This discussion assumes that the farmer has autonomous ownership over the rhizomes at the beginning of the lease term, but this may not be the case—patented plant varieties may include end use restrictions as a condition of sale similar to contractual restrictions on the saving of patented soybean seeds.

104. Whether or not the rhizomes will be sellable is likely a factor of their age. *See* Christian et al., *supra* note 5, at 176 ("The most successful establishment was achieved with rhizomes from 5-year old plants where 88% of rhizome pieces produced ramets. In comparison, 52% of the 9-year-old and 25% of the 1-year-old rhizome produced ramets.").

105. Leigh v. Lynch, 493 N.E.2d 1040, 1042 (Ill. 1986).

106. *Id.*

termination of the tenancy, the emblements planted prior to the termination of the tenancy.[107]

Traditionally, the doctrine of emblements only applied to *fructus industriales*, plants that must be sown each year in order to produce. In practice, courts limited application of the doctrine to crops such as wheat and corn.[108] This traditional definition was deemed too restrictive in light of modern agricultural practices.[109] Perennial plants may be classified as emblements under the modern construction of the doctrine if they require extensive cultivation each crop year.[110] In 1986, the Illinois Supreme Court specified crops such as hops, sugar cane, and some artificial grasses as potential emblements.[111]

Because *Miscanthus* is a grass, the modern statement of the doctrine seems to include a farmer's right to harvest *Miscanthus* biomass after the lease termination, so long as the other factors are met.[112] But what about the potentially valuable rhizomes—does the doctrine of emblements allow for their harvest?

While a court has yet to decide this question, the answer is most likely no. Even the expanded modern interpretation of the doctrine does not seem to cover rhizomes. The doctrine of emblements under the Restatement (First) of Property defines "annual crops" as both those that have to be placed in the ground each year, as well as those from which the yearly produce is principally the result of attention and care exerted in the same agricultural year.[113] *Miscanthus* does not fit this definition because the biomass growing annually from the rhizome might be emblements, but the rhizome itself continues to grow year after year in a perennial manner. Courts, therefore, are unlikely to grant tenants a right to post-lease rhizome reclamation under the doctrine of emblements.

The lack of common law guidance for the distribution of rhizomes at the end of the lease terms suggests that the bioenergy farm lease is being executed under greater uncertainty than CCT was developed to manage. As such, the parties must follow TCE by re-

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107. *Id.*

108. *Id.*

109. *Id.* at 1043.

110. *Id.*

111. *Id.*

112. HARL, *supra* note 49, § 121.05[1] ("To exercise the doctrine of emblements, lessees must establish (1) an emblement is involved; (2) the lease authorizes the planting of the crop in question; (3) the lease in question is for an uncertain period; and (4) the termination of the lease was not caused by the lessee.").

113. RESTATEMENT (FIRST) OF PROP. § 121 cmt. f (1936).

envisioning the traditional agricultural farm lease and creating a governance scheme internal to the contract. One contractual mechanism that could be a powerful tool in such a governance structure is the good husbandry clause.[114]

The good husbandry clause would not protect the farmer's right to reclaim *Miscanthus* rhizomes, nor would it necessitate the removal of the rhizomes. Good husbandry is often measured against the community's common farming practices. In this case, the growth of bioenergy crops is so new that there are no common farming practices to dictate the terms of such an arrangement. However, landowners and tenant-farmers can craft "improved" good husbandry clauses that delineate the rhizome removal process. These provisions would move beyond legal convention and require specific action. A baseline clause could read:

> The Tenant will farm in accordance with the highest standards of good husbandry and will take all first-class farmer-like steps to ensure the conservation of the natural resources and the long-term productivity of the farm. This includes removing the *Miscanthus* rhizomes from the property before the end of the lease tenure.

Such provisions can be incorporated and expanded upon in farm leases to protect all parties' interests.

The formula for allocating contractual rights and responsibilities, described earlier in the context of early termination/failure to renew, could also determine the rights to rhizomes upon lease termination. For example, a farmer failing to renew the lease would, in addition to bearing the cost of restoration, forfeit the right to claim the rhizomes. If the failure to renew is a mutual decision, the landowner and the farmer would share both restoration costs and the right to harvest and dispose of the rhizomes. If the landowner fails to renew the lease, the famer would have rights to the rhizomes as a contractual extension of the previously discussed common law doctrine of emblements. These arrangements can even account for the particular agronomic properties of perennial energy crops. If the lease were to run for the length of the plant's life, the cost of restoration would be attributed to the tenant-farmer.

A clause accounting for *Miscanthus'* particular agronomic properties could read:

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114. Cox, *supra* note 15, at 24.

> If Farmer fails to renew the lease, Farmer agrees to pay the restoration costs and forfeits the right to claim the rhizomes. If Landowner fails to renew the lease and Farmer's profits are less than his establishment costs, Landowner agrees to pay Farmer the difference between the establishment costs and Farmer's profit at the time the lease failed to be renewed, Landowner agrees to pay the restoration costs, and Farmer has a right to claim the rhizomes. If Landowner fails to renew the lease and Farmer's profits are equal to or greater than Farmer's establishment costs, Landowner agrees to pay the restoration costs and Farmer has a right to claim the rhizomes. If the failure to renew is a mutual decision, Landowner and Farmer agree to share restoration costs and the right to claim the rhizomes.

This clause effectively employs the TCE recommendation to negotiate a transaction-specific governance scheme to overcome a potential contractual hazard. Inserting this formula into a bioenergy farm lease for *Miscanthus* ensures that the rhizomes will be equitably distributed upon termination of the lease.

IV. CONCLUSION

The emerging bioenergy industry will require a tremendous amount of biomass.[115] Because so much of U.S. farmland is leased, the success of the industry will depend predominantly on tenant-farmers' willingness to participate in biomass production. Traditional agricultural leases—based on CCT principles such as short lease terms and minimal specificity—do not adequately protect the parties to bioenergy farm leases. Fortunately, complex contracts can function as governance schemes that allow parties to navigate the intricacies inherent to growing bioenergy crops.

For the parties to a bioenergy farm lease, potential conflicts include: the necessity of long-term leasing provisions; the potential invasiveness of some proposed bioenergy feedstocks; and the distribution of *Miscanthus* rhizomes at the end of a lease term. Using the model provisions proposed in this article, the parties to a bioenergy farm lease can protect themselves from these potential hazards by re-envisioning traditional agricultural leases and restructuring such agreements to reflect the novelties of perennial energy crop production.

While this article only discussed three ways in which TCE can

115. *See, e.g.*, U.S. DEP'T OF ENERGY, *supra* note 3, at 151–52 (discussing expected future needs for biomass).

improve the bioenergy industry, this analytical framework can address additional issues that may arise. Three other ways in which tenant-farmers and landowners could modify the traditional lease are as follows. First, landowners could require that tenant-farmers own or pre-negotiate access to the proper equipment for harvest,[116] to ensure revenue streams and prompt rental payments. Second, bioenergy farm leases could account for issues relating to storage and transport of harvested biomass to avoid post-contractual conflicts.[117] Third, the parties could stipulate how potential access to energy premiums and carbon credits[118]—which could create revenue beyond the sale of biomass—would be divided.[119]

Bioenergy crops have important environmental benefits. Most importantly, these crops provide sustainable, renewable energy. They also improve soil health and reduce the risk of land erosion. Thus, it is important to encourage farmers and landowners to participate in this burgeoning industry. However, many of the properties that differentiate bioenergy crops from traditional crops make these actors wary of committing to grow them. For this reason, the simplistic leases used for traditional crops must be adapted for the bioenergy crop context. The bioenergy parties should modify their leases to account for: (1) the extended timeline required to effectively grow bioenergy crops; (2) the risk of invasiveness presented by these novel crops; and (3) the reclamation of rhizomes and other byproducts of these crops. By doing so, the leases will protect landowners and farmers alike, while allowing the parties to cultivate this nascent but promising renewable fuel source.

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116. Biomass harvesting equipment is similar to the equipment used for harvesting hay. Dolginow, *supra* note 40. *But see* University of Illinois, *Illinois Researchers Modify Equipment to Harvest Biomass*, BIOMASS MAG. (2011), http://biomassmagazine.com/articles/5968/illinois-researchers-modify-equipment-to-harvest-biomass (interviewing an engineer who noted that machines currently used for biomass harvest "are generally set up to harvest crops like hay and forage. There is some degree of uncertainty related to these machines working in miscanthus, which is a much denser, taller crop, or even switchgrass, a shorter grass.").

117. The estimated yield potential for switchgrass is 4–6 tons per acre; the estimated yield potential for *Miscanthus* is 12–15 tons per acre. Dolginow et al., *supra* note 40.

118. *Id.*

119. Credits traded on carbon markets ("carbon credits") are tradable benefits which arise from the reduction or avoidance of GHG emissions. RICARDO BAYON ET AL., VOLUNTARY CARBON MARKETS: AN INTERNATIONAL BUSINESS GUIDE TO WHAT THEY ARE AND HOW THEY WORK 2 (Ricardo Bayon et al. eds., 2d ed. 2009).