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Economic Considerations Associated with Destroying Large Acreages of Sugarcane and Converting Land into Alternative Uses

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Executive Summary

The Louisiana sugar industry is one of the most economically important agricultural industries in the state annually generating more than $1.2 billion in revenue from the production of sugarcane that is processed into raw sugar and molasses. When indirect and induced contributions associated with the industry are considered, it has a total economic impact of more than $2.3 billion. A continuing concern of the industry is the conversion of land in sugarcane production into residential and industrial uses and, more recently, solar panel installations. While most situations have involved relatively small acreages with impacts primarily limited to the producer level, the much larger acreages being discussed with solar panel installations creates concern of both industry wide impacts as well as impact to associated economies and communities.

The LSU AgCenter has long had a methodology and set of procedures to quantify the impacts of land removal from sugarcane production and to suggest appropriate levels of compensation for the different industry segments. Given the small acreages in most situations, however, previous analysis has mostly focused on impacts at the producer level with other impacts believed to be so insignificant that their inclusion had limited to no value. However, given the potential for the involvement of much larger acreages, there is a need to expand the methodology and procedures to now include those impacts that previously were considered insignificant. In situations in which sugarcane crops are destroyed and the land placed into alternative uses, LSU AgCenter methodology would suggest that the appropriate estimate for crop value (the suggested level of compensation) is equal to the estimated unrealized revenue associated with the crop and any unrecovered costs. This report outlines a set of suggested procedures to develop these estimates and establishes a case example to help illustrate those procedures. And while it is impossible to establish a set of estimates that would adequately reflect all situations, the case example can provide a point of reference for reasonable crop value estimates for the "average" situation.

Sugarcane is a perennial crop with a typical production crop cycle consisting of plant cane (year 1), first stubble, year 2), third stubble (year 3), and third stubble (year 4). Based on established LSU AgCenter methodology and procedures, calculations for the case example showed that the net present value of the estimated crop value for the mill ranged from $760.75 per acre for third stubble acres to $3,387.55 per acre for plant cane. The net present value of the estimated crop value for the producer/landowner ranged from $1,252.04 per acre for 3rd stubble acres to $5,237.75 for plant cane.

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Introduction

The Louisiana sugarcane industry is one of the most economically impactful agricultural industries in the state of Louisiana. Over the last 5 years, the direct economic contribution of sugarcane and raw sugar production has averaged more than $1.2 billion annually. Of that value, roughly 60% of the direct economic contribution (or over $735 million) is attributed to the sugarcane producer and the remaining 40% is attributed to the raw sugar factory (or over $500 million). In addition to this direct economic impact, when indirect and induced contributions are considered, the total economic contribution of raw sugar and molasses production from sugarcane has averaged more than $2.3 million annually. So, as illustrated, the economic well-being of the sugarcane industry not only is important for the direct participants in the industry (producers and mills) but also the economies and communities where production takes place.

Given the importance of the industry, large acreage losses which reduce the productivity of sugarcane operations can have a ripple effect and create significant negative economic implications not only for the industry itself but the associated and surrounding economies and communities. Adverse weather conditions, like the drought experienced in 2023 and the severe freeze in December 2022, can cause significant reductions in sugarcane and raw sugar production and create negative impacts on the economic contributions made by the sugarcane industry. These events, fortunately, have short term impacts and a return to favorable growing conditions can quickly result in a return to normal production levels. Other events, however, like selling land and/or placing land into alternative uses, are not short term as they permanently eliminate sugarcane production. The LSU AgCenter is routinely requested to analyze the economic impacts of taking sugarcane acreage out of production and placing the land in alternative uses. For most of these requests, the number of acres impacted is relatively small. And while the removal of sugarcane land from a producer's operation will have revenue and other implications to the producer, they are typically small enough acreages to have limited implications for the sustainability of the operation and even less implications for the overall sugarcane industry.

However, the potential of having much larger acreages and a much larger portion of a producer's operation removed for industrial uses, such as solar panel installations, creates both more significant as well as a wider array of implications for the producer. Having a large percentage of the sugarcane farming operation removed at one time can have significant implications on the revenue and cost structures of the operation and significantly impact the long-term sustainability and survivability of the operation. While the implications for the individual producer can be significant, removing land from an individual operation still likely has limited implications for the industry, even if a substantial amount of land was removed from the producer's operation. However, if this trend continues and more and more land throughout the sugarcane production region becomes subject to being converted to industrial uses, the cumulative loss of sugarcane acreage would certainly create implications for the industry and the associated economies and communities.

While there are certainly potential implications for the sugarcane industry if large acreages are diverted from sugarcane production into alternative uses, it is difficult to accurately predict the total number of acres loss across the industry. And while there can be more certainty when analyzing the implications of a producer losing a specific number of acres, each situation will differ, making it impossible to establish one set of estimates of the economic impacts that will fit each situation. Issues such as productivity of the land being removed, the age and condition of the crop being destroyed, management intensity, and the portion of the producer's operation being removed all can lead to drastically different implications. As such, rather than establishing a set of crop value estimates, this report

focuses on establishing a methodology and set of procedures for analyzing the removal of large acreages of sugarcane production and developing appropriate estimates of crop value. A case example will be used to illustrate the discussion of procedures. This case example is based on state average production levels and LSU AgCenter estimates of variable and fixed sugarcane production costs. And while this example is only meant to be an illustration and not a recommendation for crop value estimates for any specific situation, it can be used to provide some insight as to the magnitude of the economic impacts for a typical situation.

Potential Economic Impacts

Before adopting a methodology and establishing a set of procedures, the nature of the potential impacts of converting sugarcane land into industrial uses such as solar panel installations must be defined. A helpful way to view this situation is to compare what the revenue and cost streams would be at the producer and raw sugar factory levels if the land is kept in sugarcane production versus what they would be if the land is converted to other uses. Revenue and costs streams from this perennial crop would be impacted for all segments of the Louisiana sugar industry – the sugarcane producer, the raw sugar factory, and the landowner. If the land is kept in sugarcane production, the producer would continue to experience variable and fixed costs associated with sugarcane production and would continue to generate revenue through the sale of sugarcane to the raw sugar factory. If the land is converted out of sugarcane production, the producer would lose the ability to generate any future revenue expected from those acres but would also not experience the variable costs associated with generating that future revenue.

If the land is kept in sugarcane production, the raw sugar factory would continue to process sugarcane and experience variable and fixed costs but would also generate revenue by retaining a portion of the raw sugar and molasses produced as payment for processing costs. If the land is converted to industrial uses such as solar panel installations, the raw sugar factory would lose the ability to process the sugarcane that would have been produced as well as the ability to generate any future revenue expected. As with the sugarcane producer, the raw sugar factory would not experience the variable processing costs associated with processing that level of sugarcane.

The sugarcane producer and the raw sugar factory would have very similar impacts from land being converted to industrial uses such as solar panel installations. The biggest difference would be the magnitude of the impacts with the producer losing a larger portion of the total farming operation and the mill losing a much smaller portion of its normal processing levels. The landowner, if different from the producer, however, would have strikingly different impacts. In fact, it can be argued that the landowner would not have any impact. The landowner would be voluntarily deciding to replace the revenue received from leasing the land for sugarcane production for revenue received through selling/leasing the land for industrial uses such as solar panel installations. And, regardless of whether the revenue generated from leasing the land ended up being less than the revenue that would have been generated from leasing the land for sugarcane, there would be no assumed impact to the landowner because that decision was made voluntarily. Furthermore, the landowner would experience no costs associated with sugarcane production or converting the land to industrial uses, so there would be no difference in his/her cost structure under either scenario.

Economic Methodology

With the potential impacts defined, the next step is to adopt a methodology that defines a set of estimates that would equitably establish crop values suitable for serving as the basis for negotiations regarding compensation. The methodology should also equitably identify which parties are entitled to compensation for what impacts. Using economic theory, the LSU AgCenter has established a methodology that serves as the foundation for the numerous crop value analyses it is requested to conduct each year. The estimate of crop value developed attempts to consider all potential economic impacts in establishing a suggested level of compensation. The final estimated crop value considers unrecovered costs and/or unrealized revenue. The exact nature of the crop value estimate depends on

whether the intention is to destroy the sugarcane crop and put the land into an alternative use or if it is to simply transfer the land and sugarcane crop from one sugarcane producer to another sugarcane producer.

If the situation is one in which the sugarcane crop will remain in production but will be transferred from one producer to another producer, the adopted LSU AgCenter methodology sets the estimate of crop value equal to unrecovered planting costs plus any unrecovered production costs. Each year, a producer experiences variable and fixed costs associated with managing the sugarcane operation. The revenue generated by the harvest and sale of the sugarcane crop in that year is then used to recover those costs. If the sugarcane is removed from the producer's operation prior to the harvest of the sugarcane, there is no revenue generated and those costs remain unrecovered. Given the high costs of planting and the need to plant only every 5 or 6 years depending on the established crop cycle length, it is commonly assumed that the planting costs would be prorated across those years with an equal portion of the costs recovered each year. So, if sugarcane crop is removed from the producer prior to the end of the crop cycle, then a portion of those planting costs would be considered unrecovered. Likewise, the costs associated with routine management practices (i.e. tillage, fertilization, herbicide application, etc.) conducted on a sugarcane crop, without the ability to harvest that crop, would be considered unrecovered. At a minimum, the producer should be compensated at a level that would allow for the recovery of those costs that have been experienced.

The costs are considered unrecovered because the producer would not have the ability to generate revenue to recover those costs. As such, many may contend that the estimate of crop value for a situation in which one producer is losing a sugarcane crop to another producer should also include some estimate for loss revenue. But the question here is one of which party, the original producer or the new producer, is entitled to the revenue that the sugarcane crop will generate in the future. Since the new producer is the one that will manage the sugarcane crop going forward and will incur the associated expenses and risks, the adopted LSU AgCenter methodology suggests that the new producer is entitled to that future revenue stream. The original producer is entitled to have all unrecovered planting costs recovered but would not be entitled to capture the future revenue that will be generated by future sugarcane crops.

If the situation is one in which the sugarcane crop is to be destroyed and the land put into an alternative use, as is the case with solar panel installations, the adopted LSU AgCenter methodology sets the estimate of crop value equal to unrealized future net revenue plus any unrecovered costs, not including unrecovered planting costs. In this situation, the revenue that the sugarcane crop would have generated over the remainder of its normal crop cycle will never be realized. And since the producer is the only party that would have been able to generate that revenue, it is assumed that the producer is entitled to be compensated at a level to equal that future unrealized net revenue.

In addition to being entitled to the unrealized revenue, the producer would also be entitled to capture any unrecovered costs. The exception to this is planting costs. Normally, the producer would generate revenue through the sale of the sugarcane crop and use that revenue to recover those planting costs. Since it is suggested that the producer be compensated at a level equal to the net revenue that would have been generated, there is access to the same level of funds normally available for recovering planting costs. As such, if the producer is compensated at a level equal to expected future net revenue, plant costs will not be unrecovered. Other costs, however, could remain unrecovered. The value of future unrealized revenue is set at unrealized net revenue and not unrealized gross revenue. Net revenue is calculated rather than gross revenue because, while it is true the producer will not be able generate that gross revenue moving forward, it is also true that the producer will also not experience the variable production costs associated with generating that revenue. Since the producer will not experience those costs, he/she should not be compensated for those costs, which would be the case if the producer is compensated based on gross revenue.

Unrealized net revenue for this purpose is defined as net revenue above variable production costs and is simply calculated as the estimated future gross revenue minus projected future variable production costs. Projected future fixed costs are not considered when defining unrealized net revenue because those costs, by definition, will continue to be experienced by the producer even with the sugarcane crop removed from the operation. Again, the

estimate of unrealized net revenue considers only those projected costs that will never actually be experienced by the producer. Subtracting the projected future variable production costs from the projected future gross revenue reduces the estimate for crop value and the suggested compensation level. If any of those future variable production costs are experienced by the producer, they must be added back to the estimate for crop value. Given the definition of unrealized future net revenue, those variable production costs experienced by the producer would be considered unrecovered. And as mentioned before, producers should be compensated for any unrecovered costs.

The methodology described here is the same as the one that has been utilized by the LSU AgCenter in its previous crop value analyses. To this point, the analysis conducted by the LSU AgCenter has primarily been focused on impacts at the producer level given that most requests have come from producers. As such, the impacts to other segments of the sugarcane industry have not traditionally been included in the analysis. That does not mean that those impacts do not exist. However, the number of acres impacted in the analysis is typically small enough to assume that impacts to other industry segments would be so small and insignificant that including them into the analysis would have limited value. In the case of converting large sugarcane acreages into industrial uses such as solar panel installations, the impacts to other industry segments, not normally included in the analysis, could be significant and should be added to the analysis. Fortunately, the methodology adopted by the LSU AgCenter provides a framework that is applicable to all segments of the Louisiana sugar industry.

Estimation Procedures

With the adopted methodology providing guidance, a set of estimation procedures have been developed to generate estimates of unrecovered costs and unrealized revenue streams. Since the case of converting sugarcane land into industrial uses is one in which the sugarcane crop will be destroyed, the suggested estimate for crop value would be equal to the unrealized future net revenue plus any unrecovered costs. As such, this report will focus only on estimation procedures for those items and not discuss estimation procedures for unrecovered planting costs.

As mentioned earlier, there are several factors that can influence the estimates of crop value. Because those factors will vary significantly from farm to farm, it is impossible to develop a set of estimates that would accurately and uniformly represent crop value for all potential situations. And while there will always be a degree of uncertainty and error when developing estimates of future revenue and costs, the amount of uncertainty can be greatly reduced by tailoring estimates to the specific situation.

Despite the justification for situation specific analysis, a case example has been developed. This case example is only used to illustrate the estimation procedures and is not meant to be suggested estimates of stubble value for any specific situation. The case example involves a 2,500-acre sugarcane operation losing 400 acres to a solar panel installation. The normal crop cycle is assumed to be through third stubble meaning that, under normal conditions, the producer would continue to manage the sugarcane crop until it was harvested as third stubble. After harvest, the producer would plow out the stubble and replant the acreage in the subsequent year to start the crop cycle over again. A normal crop cycle through third stubble is the default assumption used by the LSU AgCenter in crop value analysis. This is due to current industry statistics that show roughly 80 percent of all sugarcane acres in production are third stubble or younger. Deviating from this assumption is only done if the condition of the sugarcane stubble is such that maintaining to older stubble ages is deemed economically feasible and the producer has a consistent history of keeping sugarcane stubble to older ages. In general, assuming a normal crop cycle through fourth stubble would be the longest cycle considered.

Data and Information Needs

The first step in estimating crop value is gathering the data and information needed about the specific situation. Information relating to several parameters that will be used in the estimation process needs to be collected. Ideally, this information would come directly from the producer and would be specific to the land and sugarcane crop in

question. Table 1 provides the estimates of these parameters for the case example. The parameters needed and a description of each is as follows:

- Mill Shares for Sugar and Molasses - this provides the amount of raw sugar and molasses produced that is retained by the mill for processing the sugarcane. Since producers utilize different mills and since each mill may have different established share percentages, these need to be specific to the situation to provide the highest level of accuracy.

- Sugar to Molasses Conversion – this is an estimate of the amount of molasses produced for every 100 pounds of raw sugar produced. This is typically set at an industry average. Alternatively, this value can be set at the conversion factor of the specific mill used by the producer if drastically different than the industry average.

- Prices for Sugar and Molasses – the estimated selling price of raw sugar and molasses is typically set at the industry average during the most recently completed marketing year. Alternatively, these values can be set at the reported prices of the specific mill used by the producer if drastically different than the industry average.

- Discount Rate – since the analysis involves estimating a stream of future revenue and costs and because expectation is for compensation in the current year, it is common economic practice to calculate the Net Present Value of that future stream of revenue and costs. The Net Present Value provides an estimate of what that future revenue stream is worth today. A critical component of Net Present Value calculations is the establishment of a discount rate. Typically, the discount rate is set based on the return of a low-risk investment (10-Year Treasury Bond). For LSU AgCenter analysis, the discount rate is set at the current rate for a 10-year Treasury Bond and adjusted upward to reflect the associated uncertainty and risk of the revenue and cost projections.

- Operation Size and Acres Impacted – estimates of the producer's total sugarcane acres and the acres being impacted. For typical crop value analysis, only estimates of the acres impacted are obtained. Because these acres are typically small, it is assumed that it would have insignificant impacts on the operation's overall cost structure. However, given the potential of large acreage losses taking larger percentages of the producer's total operation, there could be significant impacts. As such, estimates of total operational acres are needed to identify the portion being removed. Included in this information is the crop age. Producers typically provide USDA-FSA form 578 which includes field acreages and planting dates so that crop age can be determined.

Table 1. Parameter Assumptions

Item	Unit	Value
Mill Share - Sugar	percent	39.00%
Mill Share - Molasses	percent	50.00%
Sugar to Molasses Conversion	gallons per 100 lbs of sugar	2.205
Sugar Price	dollars per pound	$0.40
Molasses Price	dollars per ton	$179.00
Molasses Price	dollars per gallon	$1.05
Discount rate for NPV calculations	percent	5.00%
Operation Size	acre	2,500.0
Acres Removed from Operation	acre	400.0
Percent Acres Removed	percent	16.00%

Another parameter not included in Table 1 but often included in crop value analysis is the land rental arrangement. When sugarcane is removed from production, the revenue that the sugarcane would have generated would be lost by the landowner in addition to the raw sugar factory and the producer. In many situations, the landowner may not have another revenue stream to replace that lost sugarcane revenue and it should be considered in the analysis. For the case example developed in this report, however, the landowner is replacing revenue from sugarcane for revenue generated from the alternative land use. As such, the landowner is not losing a revenue stream as the producer and the raw sugar factory are, and, therefore, the rental arrangement is not considered in this report.

In addition to these parameters, information is needed regarding typical sugarcane production levels. It is recommended that projections of sugarcane production are based on 3 to 5 years of actual production history. Again, ideally, this information would be specific to the land and sugarcane crop in question. Table 2 provides five years of state level production history which is used for our case example. These estimates were obtained from the LSU AgCenter's Agricultural Summary publication and represent average production levels across all stubble ages. The 5-year average sugar production per acre is estimated at 7,747 pounds while the average sugarcane production is 33.3 tons per acre. The average sugar recovery (pounds of raw sugar produced per ton of sugarcane) is estimated at 232.60 pounds. Finally, molasses production is estimated at 182.3 gallons per acre.

Table 2. Louisiana Sugarcane Production History

Year	Sugar Yield (lbs./ac)	Sugar Recovery (lbs./ton)	Sugarcane Yield (tons/ac)	Molasses Yield (gals/ac)
2019	6,863.16	222.00	30.92	172.47
2020	8,264.88	233.00	35.47	181.08
2021	7,718.63	242.00	31.90	166.41
2022	8,336.24	233.00	35.78	225.00
2023	7,551.00	233.00	32.41	166.47
5 Year Average	7,746.78	232.60	33.29	182.29

Estimating Projected Production Levels

The first step in being able to estimate the unrealized future net revenue is developing projections of sugarcane and raw sugar yields. The 5-year production history can serve as the basis for making those projections. But the 5-year production is typically an estimate of productivity across different crop ages. To more accurately project production

levels, projections must be specific to the different crop ages rather than just a single production projection. Historic LSU AgCenter research data from the LSU AgCenter's Sugar Research Station shows that there are relationships between the sugar yield of the different crop ages. In general, and assuming equal growing conditions, the sugar yield from plant cane would be expected to be higher than production from first stubble sugarcane. Likewise, sugar yield from first stubble sugarcane would be expected to be higher than second stubble sugarcane and so on. Using these historic relationships, the single 5-year average production history value can be transformed into estimates of sugar yield for the different crop ages. Sugar yield (pounds of sugar produced per acre of production) is the product of sugarcane yield (tons per acre of sugarcane) and sugar recovery (pounds of sugar produced per ton of sugarcane).

Table 3 provides the estimated production levels for different crop averages using the 5-year state average yields as the basis of the estimates. The relationships shown are those historical relationships that have been developed based on LSU AgCenter research data and are based on production of each crop age as compared to plant cane. Obviously, plant cane production is 100% of plant cane production. Production as first stubble is projected as 93 percent the value of plant cane production while second stubble is projected at 77 percent the value of plant cane production. Finally, production as third stubble is projected at 72 percent the value of plant cane production.

Table 3. Projected Production Levels of Different Crop Ages (Assumes Normal Crop Cycle Through 3rd Stubble)

Crop Age	Relationship - Yield as a % of Plant Cane Yield	Sugar Yield (lbs./ac)	Sugar Recovery (lbs./ton)	Sugarcane Yield (tons/ac)
Plant Cane	100%	9,060.56	232.60	38.95
1st Stubble	93%	8,426.32	232.60	36.23
2nd Stubble	77%	6,976.63	232.60	29.99
3rd Stubble	72%	6,523.61	232.60	28.05
Complete Cycle Average		7,746.78	232.60	33.31

Assuming a normal crop cycle through 3rd stubble, Table 3 estimates sugar and sugarcane yields for each crop age with the constraint that the average across all stubble ages equals the 5-year average found in Table 2. It does this by first estimating the plant cane yield using the historic relationships and the following equation:

(1) PC Yield = 5 Year Avg Yield * (Years in Crop Cycle / Sum of Relationship Percentages)

Where:

PC Sugar Yield is the estimated yield value for Plant Cane

5 Year Avg Sugar Yield is the historic average yield across all stubble ages.

Years in Crop Cycle is the number of years of harvest expected in a normal crop cycle. Assuming a crop cycle through 3rd stubble, this would be 4 years (Plant Cane, 1st Stubble, 2nd Stubble, and 3rd Stubble)

Sum of Relationship Percentages is the sum of the percentages associated with all stubble ages in the normal crop cycle. So, in the example, we would sum 100% plus 93% plus 77% plus 72%.

Using the equation defined above, the 5-year average state sugar yield of 7,747 pounds of sugar per acre is transformed into an estimate of 9,061 pounds of sugar per acre for plant cane. With that estimate for plant cane, estimates for the other crop ages can be developed by simply multiplying the plant cane estimate by the relevant

relationship percentage. For example, the estimate for first stubble sugar yield is simply the 9,061 pounds estimated for plant cane by the 93 percent to get the estimate of 8,426 pounds per acre. Estimates for sugar recovery are set at the 5-year state average for each of the stubble ages and estimates of sugarcane yield is determined by simply dividing the sugar yield estimate by the sugar recovery estimate.

Estimating Unrealized Revenue

With estimates of production levels for each crop age, estimates of gross revenue can be developed using the information on prices and mill percentages found in Table 1. When sugarcane is harvested and brought to the mill for processing, the typical arrangement is for the mill to retain a portion of the raw sugar and molasses produced as payment for processing costs. The remaining portion of the raw sugar and molasses produced is then shared between the producer and the landowner based on the share rental arrangement. In the case in which the producer is also the landowner or the producer has a cash rental arrangement with the landowner, the remaining raw sugar and molasses produced would be totally captured by the producer.

Table 4 provides estimates of the level of gross revenue that each crop age would be projected to generate. As shown, gross revenue values are estimated for both the mill and the producer/landowner. As mentioned above, the gross revenue attributed to the mill is the value of that portion of the raw sugar and molasses produced that is kept by the mill as payment for processing sugarcane. The gross revenue attributed to the producer/landowner is the value of the remaining portion of raw sugar and molasses produced after the mill's share has been removed. As shown, this estimate of gross revenue is not separated into a portion available to the producer and a portion available to the landowner for a few reasons. First, in some cases, the landowner and the producer may be the same person and would have access to both portions. Second, in the case in which the landowner and producer are not the same person, but the rental arrangement is a cash rental arrangement, the producer would also have access to both portions. The third reason is that these estimates of gross revenue are really estimates of the future revenue stream being lost by removing the land from sugarcane production. This represents a loss in revenue for the entire industry and, as such, should be recaptured by those in the industry. The producer and raw sugar factory should recapture their normal share of revenue because there is no mechanism for them to recapture this lost revenue. However, the landowner, in the case of a solar panel installation, has the ability to replace the sugarcane revenue lost with revenue from leasing the land for this alternative use. So, the landowner would not experience reduced revenue as would the producer and the raw sugar factory. But the landowner's share of the sugarcane revenue loss still needs to be recaptured by the industry. And for that reason, the producer and landowner shares of revenue are combined.

Table 4. Estimated Annual Gross Revenue Levels for Different Crop Ages (Through 3rd Stubble)

Crop Age	Mill Share ($/ac)	Producer/Landowner Share ($/ac)	Total ($/ac)
Plant Cane	$1,518.44	$2,315.77	$3,834.21
1st Stubble	$1,412.15	$2,153.67	$3,565.82
2nd Stubble	$1,169.20	$1,783.14	$2,952.34
3rd Stubble	$1,093.28	$1,667.35	$2,760.63

The equations used to develop estimates for gross revenue for the raw sugar factory and the producer/landowner are as follows:

(2) GR – Mill = (Sugar Yield * S Price * MS Share) + ((Yield / 100) * Conversion * M Price * MM Share)

(3) GR – PL = (Sugar Yield * S Price * (1 – MS Share)) + ((Yield / 100) * Conversion * M Price * (1 – MM Share))

Where:

GR-MILL is the estimate of gross revenue for the mill for a specific crop age.

GR-PL is the estimate of gross revenue for the producer and landowner for a specific crop age.

Sugar Yield is the estimate for sugar yield per acre for the specific crop age (found in Table 3).

S Price is the estimate for sugar price (found in Table 1).

M Price is the estimate for molasses price (found in Table 1).

MS Share is the estimate for the mill's share of sugar (found in Table 1).

MM Share is the estimate for the mill's share of molasses (found in Table 1).

Conversion is the estimate for molasses produced for every 100 pounds of sugar produced (found in Table 1).

There is certainly a strong case that can be made for suggesting that the revenue loss from removing sugarcane from production should be recaptured by the industry. There is also strong justification for claiming that landowners are not entitled to their normal share of sugarcane revenue as they are voluntarily replacing sugarcane revenue with revenue generated through the alternative land use. But that amount of sugarcane revenue normally associated with the landowner still needs to be recaptured by one of the other entities in the industry. Since the producer is believed to be at the most risk and is subject to have a significant portion of their operation loss when sugarcane land is converted into the alternative use, it is suggested that the producer is entitled to that portion of sugarcane revenue normally associated with the landowner.

The values in Table 4 represent the amount of gross revenue each crop age would be projected to generate if the sugarcane crop was allowed to remain in production for the remainder of its normal crop cycle. Since the sugarcane crop will be destroyed and the land placed into a venture other than sugarcane production, the estimates are estimates of unrealized gross revenue. But because the crop will be destroyed, the costs that the producer would have experienced in future years will also not be realized. The gross revenue generated by the sugarcane producer would be those funds that would normally be used to cover variable and fixed costs of the sugarcane operation. If the estimate of crop value (the suggested level of compensation to the producer) is set equal to the gross revenue that would have been generated (unrealized gross revenue), then the producer would be compensated for expenses that were never experienced. As such, the estimate of crop value should not be based on unrealized gross revenue but on unrealized net revenue, where unrealized net revenue is gross revenue minus variable production costs. Fixed costs are not subtracted from gross revenue estimates because, by definition, producers will continue to experience fixed costs regardless of whether the sugarcane stubble remains in production or is destroyed, and the land put into an alternative use.

To calculate unrealized net revenue, estimates of variable production costs must be developed. As with all information and data used in the analysis, the most accurate source would be historical information specific to the producer and the sugarcane crop in question. In most cases, producers are reluctant or unable to easily provide the level of detailed information needed to develop those variable cost estimates. As such, for the majority of crop value analyses conducted, estimates of variable costs are based on LSU AgCenter Sugarcane Enterprise Budgets.

Table 5 provides the estimates of variable and fixed production costs associated with all operations or management activities that would typically be expected to be conducted each year on a sugarcane farm. All information provided

in Table 5 comes directly from the LSU AgCenter 2024 Sugarcane Enterprise Budgets. The operation weights provided in the table are an estimate of the percentage each individual operation makes up of the total farm operations. For example, fallow operations are estimated to make up roughly 20 percent of the total effort or costs of the farming operation. The total fixed costs per acre for the sugarcane farm is the estimate of the level of fixed costs associated with every acre in the farm. It is calculated by summing the products of the fixed costs of each operation by its appropriate weight. As such, the total fixed costs per acre is simply a weighted average of the fixed costs associated with each operation, weighted by the estimated operation weight. For the case example, the estimate of $251.84 per acre is the level of fixed cost for each of the 2,500 acres of the operation. If the operation is reduced to 2,100 acres, fixed costs per acre would be estimated at $299.81 per acre. So, the producer would experience a $47.97 per acre increase in fixed costs. Again, while not used in the calculation of unrealized net revenue, fixed costs may be considered unrecovered and will be discussed later in this report.

Table 5. Variable and Fixed Production and Harvest Costs, 2024 (Through 3rd Stubble)

Operation	Variable Costs ($/ac)	Fixed Costs ($/ac)	Total Costs ($/ac)	Operation Weight (Percent)
Fallow Operations	$179.57	$138.99	$318.56	20.00%
Cultured Seed Cane	$753.07	$16.98	$770.05	0.33%
Hand Planting	$262.45	$137.58	$400.03	0.33%
Harvesting Seedcane	$110.47	$81.30	$191.77	3.94%
Mechanical Planting	$227.73	$104.83	$332.56	19.67%
Plant Cane Operations	$324.62	$58.74	$383.36	20.00%
1st Stubble Operations	$388.28	$59.75	$448.03	20.00%
2nd Stubble Operations	$364.78	$58.24	$423.02	20.00%
3rd Stubble Operations	$364.78	$58.24	$423.02	20.00%
Harvest for Sugar	$247.53	$200.78	$448.31	76.06%

Total Fixed Costs Per Acre for Farm (Original Farm Size)	$251.84
Total Fixed Costs Per Acre for Farm (After Land Removal)	$299.81
Change in Total Fixed Costs Per Acre (Unrecovered Fixed Costs)	$47.97

The estimate for net revenue generated for each stubble age is provided in Table 6. As with the gross revenue estimates, the estimates of net revenue are separated into that attributable to the raw sugar factory and that attributable to the producer/landowner. The estimate of net revenue attributable to the mill is simply the mill's gross revenue found in Table 4 minus an estimate of the mill's variable production costs. An estimate of the mill's variable processing costs was determined based on communications with mills. Due to confidentiality considerations, this estimate is not provided in this report. The estimate of net revenue attributable to the producer/landowner is simply the producer/landowner's gross revenue found in Table 4 minus the relevant variable costs found in Table 5. Landowners are assumed to not have any variable production costs and, as such, the variable costs for the producer/landowner are simply the producer's variable production costs.

Table 6. Estimated Annual Net Revenue Above Variable Costs for Different Crop Ages (Through 3rd Stubble)

Crop Age	Mill Share ($/ac)	Producer/Landowner Share ($/ac)	Total ($/ac)
Plant Cane	$1,109.43	$1,743.62	$2,853.05
1st Stubble	$1,031.77	$1,517.86	$2,549.63
2nd Stubble	$854.26	$1,170.83	$2,025.09
3rd Stubble	$798.79	$1,055.04	$1,853.83

The equations used to generate estimates of net revenue are as follows:

(4) NRAVC–Mill = Mill Gross Revenue – Mill Variable Production Costs

(5) NRAVC–PL = PL Gross Revenue – PL Variable Production Costs

Where:

NRAVC-Mill is the estimate of net revenue above variable costs for the mill for a specific crop age.

NRAVC-PL is the estimate of net revenue above variable costs for the producer/landowner for a specific crop age.

Mill Gross Revenue is the estimate of gross revenue for the mill for a specific crop age (found in Table 4).

PL Gross Revenue is the estimate of gross revenue for the producer/landowner for a specific crop age (found in Table 4).

Mill Variable Production Costs is the estimate for the mill's variable production costs for processing sugarcane. Due to confidentiality considerations, the estimate of variable production costs is not reported.

PL Variable Production Costs is the estimate for the producer/landowner's variable production costs for producing sugarcane of a specific crop age. This estimate includes stubble maintenance (operations) costs for the specific crop age plus variable harvest costs (found in Table 5).

To illustrate the calculation of net revenue for the producer/landowner, assume the stubble being removed is first stubble. The gross revenue generated by first stubble is estimated at $2,153.67 per acre (Table 4). The variable production costs associated with first stubble would be first stubble operations plus harvest costs. From Table 5, variable production costs for first stubble operations are estimated at $388.28 per acre while variable harvest costs are estimated at $247.53 per acre. So, collectively, the variable production costs associated with first stubble sugarcane is $635.81 per acre ($388.28 + $247.53). When the variable production costs are subtracted from the gross revenue, the net revenue for first stubble is estimated at $1,517.86 per acre ($2,153.67 - $635.81).

One thing to remember is that the estimates found in Table 6 are just for the current year. For example, the estimate of net revenue above variable production costs for plant cane is just the estimate in the year that the crop is harvested as plant cane. However, if the sugarcane crop was allowed to remain in production for the remainder of its crop cycle, it would have also generated net revenue as first stubble, second stubble, and third stubble. So, the

true nature of the impact is the cumulative value of net revenue over the remaining life of its normal crop cycle. Tables 7 and 8 provide estimates of unrealized net revenue for each year of the crop's remaining crop cycle along with the cumulative estimate over the entire cycle. Table 7 provides these estimates attributable to the raw sugar factory while Table 8 provides the estimates attributable to the producer/landowner.

Table 7. Estimated Unrealized Net Revenue Over Life of Crop Cycle - Mill Share

Age At Removal	Year 1 ($/ac)	Year 2 ($/ac)	Year 3 ($/ac)	Year 4 ($/ac)	Total Unrealized Net Revenue ($/ac)
Plant Cane	$1,109.43	$1,031.77	$854.26	$798.79	$3,794.25
1st Stubble	$1,031.77	$854.26	$798.79	$0.00	$2,684.82
2nd Stubble	$854.26	$798.79	$0.00	$0.00	$1,653.05
3rd Stubble	$798.79	$0.00	$0.00	$0.00	$798.79

Table 8. Estimated Unrealized Net Revenue Over Life of Crop Cycle – Producer / Landowner Share

Age At Removal	Year 1 ($/ac)	Year 2 ($/ac)	Year 3 ($/ac)	Year 4 ($/ac)	Total Unrealized Net Revenue ($/ac)
Plant Cane	$1,743.62	$1,517.86	$1,170.83	$1,055.04	$5,487.35
1st Stubble	$1,517.86	$1,170.83	$1,055.04	$0.00	$3,743.73
2nd Stubble	$1,170.83	$1,055.04	$0.00	$0.00	$2,225.88
3rd Stubble	$1,055.04	$0.00	$0.00	$0.00	$1,055.04

The estimates for total unrealized net revenue are the estimate of the total amount of net revenue that is being foregone with the sugarcane crop being destroyed and the land put into alternative uses. For example, if plant cane is destroyed, the unrealized net revenue value would be the sum of the net revenue that would have been generated as plant cane, first stubble, second stubble, and third stubble. For the raw sugar factory, the unrealized net revenue for plant cane is estimated at $3,794.25 per acre while it is $5,487.35 per acre for the producer/landowner. So, for every acre of plant cane being taken out of sugarcane production, the raw sugar factory would have $3,794.25 of unrealized net revenue and the producer/landowner would have $5,487.35 of unrealized net revenue.

Another potential area of unrealized revenue are payments to producers and raw sugar mills via established affiliations with raw sugar refineries. In return for shipping raw sugar to a specific refinery, the raw sugar mill and producer participate in refinery revenues which are paid in the form of patronage or included in the price of raw sugar. These refinery payments are an existing additional revenue stream tied to sugarcane production and processing which would be lost if agricultural land currently in sugarcane production were diverted to another, non-agricultural use.

Table 9 provides one example of a revenue estimate of unrealized patronage payments for each crop age and each year of the normal crop cycle. These revenue estimates are conservative in nature and are presented primarily to illustrate the relative magnitude of these payments. It should be noted that these revenue estimates are only estimated for the producer and landlord. Losing a single tract of land currently in sugarcane production to a nonagricultural use could represent a significant portion of a single producer's farm operation, the loss of a single tract of land for sugarcane production would represent a significantly smaller portion of a raw sugar mill's total processing volume. Hence, the loss in refinery revenue via patronage or raw sugar price would be much greater for a producer/landowner than for a mill, on a case-by-case basis. For these reasons, no effort was made to estimate

payments associated with the mill. Since there are several scenarios to consider when evaluating refinery revenue streams back to producers and mills, it is important to confer with both the producer and the mill in evaluating and estimating a refinery revenue stream for a specific tract of sugarcane land.

Table 9. Estimated Unrealized Patronage Revenue - Producer / Landowner Share

Age At Removal	Year 1 ($/ac)	Year 2 ($/ac)	Year 3 ($/ac)	Year 4 ($/ac)	Total Unrealized Revenue ($/ac)
Plant Cane	$31.16	$28.98	$24.00	$22.44	$106.58
1st Stubble	$28.98	$24.00	$22.44	$0.00	$75.41
2nd Stubble	$24.00	$22.44	$0.00	$0.00	$46.43
3rd Stubble	$22.44	$0.00	$0.00	$0.00	$22.44

Estimating Unrecovered Costs

The other component to the estimated crop value (and suggested compensation level) is any unrecovered costs. In a typical crop value analysis, unrecovered costs are generally confined to any variable production costs (i.e. tillage, fertilization, herbicide applications, etc.) experienced by the producer in the management of a sugarcane crop that the producer was unable to harvest. Again, the best source of information for these unrecovered production costs would be from the producer. In the absence of producer information, LSU AgCenter Sugarcane Enterprise Budgets are often used to provide an estimate of the activities conducted and the costs experienced. For case example, it is assumed that there are no unrecovered production costs. This assumption implies that the producer was allowed to harvest the sugarcane crop to recover the variable production costs experienced with that crop.

Given the small number of acres involved in the typical crop value analysis, unrecovered fixed costs are not considered. The rationale is that the small number of acres involved does not affect the total size of the operation enough to have a significant impact on per acre fixed costs. However, in the case of removing large acreages, such as in the case of solar panel installations, a large component of the producer's operation would be lost, and the impacts on per acre fixed costs could be significant. As such, the impact on fixed costs should be considered.

Fixed costs associated with a producer's operation are prorated across all acres in the operation to determine per acre values. Fixed costs include items like depreciation and interest expense on equipment and buildings along with farm insurance and others. These costs, by definition, do not change as the number of acres in the operation changes. Certainly, if an operation increases the size of the operation from 1,000 to 2,000 acres, there is likely a need to purchase additional equipment and add additional infrastructure to maintain production efficiency that would add to the operation's total fixed costs. But in this context, if a producer loses 16 percent of the operation's acreage, the total fixed costs would not be expected to change. The ability to divest the operation of the excess capacity created from losing those acres is limited in the short term. So, the only thing that would change for the producer would be the fact that total fixed costs would have to be spread across fewer acres, therefore, increasing the per acre fixed costs. This increase in per acre fixed costs would be considered an unrecovered cost.

To estimate the amount of unrecovered fixed costs, the following equation would be used:

(6) UFC = (TFC / Adjusted Farm Acreage) – (TFC / Initial Farm Acreage)

Where:

UFC is the estimate of unrecovered fixed costs.

TFC is the estimate for total fixed costs associated with the farming operation.

Adjusted Farm Acreage is the estimate of the number of acres remaining in the farming operation AFTER acres are removed to be put into solar farms.

Initial Farm Acreage is the estimate of the number of acres in the farming operation BEFORE acres are removed to put into solar farms.

Again, the best estimates for total fixed costs are from the producer and specific to the farming operation. If this is unavailable, LSU AgCenter Sugarcane Enterprise Budgets can be used to provide estimates. Looking back at Table 5 shows that the estimated total fixed costs per acre are estimated at $251.84. The example assumes that the initial farm acreage is 2,500 acres for this operation resulting in total fixed costs of roughly $629,596 (2,500 * $251.84). If that total fixed cost value is now divided on the adjusted farm acreage of 2,100 acres (assuming 400 acres are loss), then the per acre fixed costs increase to $299.81 per acre ($629,596 / 2,100). The difference in fixed costs is $47.97 per acre ($299.81 - $251.84) and represents the unrecovered costs.

For consistency, unrecovered fixed costs associated with the raw sugar factory would also need to be considered. However, these were not included in this analysis for a couple of reasons. First, information about the cost structure of sugarcane mills is highly proprietary and, as such, the ability to accurately estimate fixed costs is extremely limited. Beyond that, and probably more important, is that the amount of sugarcane being removed from a producer's operation for industrial uses like solar panel installations, no matter how large a component of that producer's operation, is still likely relatively small relative to the total amount of sugarcane processed by the raw sugar factory. As such, removing that land and the associated sugarcane production is not likely to have a significant impact on the per unit fixed costs for the mill. So, given the likelihood of only minimal impacts and given the difficulty in accurately depicting the cost structure of raw sugar factories, unrecovered fixed costs associated with the factory are not included.

The final area of potential unrecovered costs is infrastructure improvements made by the producer. Infrastructure improvements can include things like precision leveling land, development of sugarcane loading sites, and major drainage improvements, among others. While these infrastructure improvements are done by the producer to increase the efficiency and profitability of the operation either by increasing productivity and/or reducing costs, the landowner may also benefit from an increase in the value of the property. In general, producers invest in these infrastructure projects with an assumption that they will be able to retain the land for a certain period that would allow them to capture the benefits of the improvements and recover their initial investment costs.

A couple of issues should be considered when developing estimates for unrecovered infrastructure costs. First, annual maintenance activities or routine management activities should not be considered as infrastructure. For example, the initial precision grading done on a field in which a large amount of dirt will be moved to improve drainage and crop performance can be considered an infrastructure investment. Doing touch up precision leveling after that initial leveling should be considered routine management. Similarly, the land preparation and limestone costs associated with initially establishing a loading site would be considered an infrastructure improvement. However, adding additional limestone after that initial investment or certainly adding limestone annually should probably be considered routine management.

The other consideration is the period the producer should realistically expect to capture the benefits of the infrastructure improvements and recover the initial investment costs. Should the costs of establishing a loading site 15 years ago still be considered unrecovered? Or has that 15-year period been sufficient to assume that the producer has captured the benefits and recovered those investment costs. In general, economic theory would suggest that there is a set period for these types of investments to be recaptured and after that time, no unrecovered costs would remain.

Certainly, given the variability in infrastructure improvements made from producer to producer would suggest that any information developed would need to be situation specific. Also, if the lease agreement specified how

producers would or would not be compensated for infrastructure improvements, those procedures would need to be followed. However, to illustrate how infrastructure improvements could be included in the analysis in the absence of procedures specified by a lease agreement, Table 10 provides two infrastructure improvements for the case example.

Table 10. Example Infrastructure Improvements

Item	Cost Per Acre	Recovery Period in Years	Annual Prorated Cost Per Acre	Number of Years Since Conducted	Remaining Recovery Years
Precision Leveling	$407.00	10	$40.70	7	3
Loading Site (1 per 200 ac)	$93.00	10	$9.30	7	3

In the case of precision leveling, an estimated per acre cost was obtained from the LSU AgCenter publication entitled, "Estimated Costs of Precision Grading Sugarcane Fields,2024". In the case of the loading site, estimates of the costs associated with constructing a 600 ft by 100 ft loading site with a ½ mile of road were developed using LSU AgCenter Enterprise Budgets and online resources for the amount of limestone needed and the current cost of limestone. The estimated cost was converted to a per acre cost assuming that a loading site would service 200 acres of sugarcane.

A recovery period for both the precision leveling and loading site was assumed at 10 years. This simply means that the producer would be expected to be able to capture the benefits of the improvements and recover the initial costs within 10 years. That assumption implies that the producer would be recovering roughly 1/10th of those initial investment costs per year. So, if the land was removed from the producer 7 years after the infrastructure improvements were made, the remaining 3 years would represent the amount of unrecovered infrastructure costs. The amount of unrecovered infrastructure costs would be equal to the annual prorated costs times the remaining recovery years. The unrecovered infrastructure costs associated with precision leveling in our case example would be $122.10 per acre ($40.70 * 3). Similarly, the unrecovered infrastructure costs associated with the loading site are estimated at $27.90 per acre ($9.30 * 3). But this per acre value is only relevant for the 200 acres that the loading site is assumed to support. In the case example, the assumption is that 400 acres are being removed from operation. As such, this would imply an additional loading site would be impacted. If it assumed that this second loading site had the same initial investment cost and was developed in the same year as the first loading site, then the unrecovered infrastructure costs associated with both loading sites would simply be $55.80 per acre ($27.90 * 2) for the 400 acres being removed. Combining the unrecovered infrastructure costs associated with both precision leveling and the loading sites results in a total unrecovered infrastructure cost of $177.90 per acre ($122.10 per acre for precision leveling plus $55.80 per acre for the loading sites).

Again, this example is provided to illustrate a method by which infrastructure improvements could be included. Information on infrastructure improvements and costs specific to the situation would be needed and agreement would need to be made related to the suggested recovery period. Finally, there are no assumed unrealized infrastructure costs associated with the raw sugar factory. The mill does not lose any of the infrastructure improvements made as the producer can when land is removed from the farming operation.

Final Crop Value Estimates

Given estimates of unrealized net revenue and unrecovered costs, an estimate of crop value (and suggested compensation level) can be developed. As mentioned earlier, when a sugarcane crop is destroyed and the land put in an alternative use, LSU AgCenter methodology would suggest the appropriate value for crop value is the total unrealized revenue plus the total unrecovered costs. Tables 11 and 12 provide estimates of stubble value for the case example for both the raw sugar factory and the producer/landowner.

Table 11. Estimated Crop Value of Sugarcane over Entire Crop Cycle for Different Crop Ages - Mill Share (Through 3rd Stubble)

Age At Removal	Total Unrealized Future Net Revenue ($/ac)	Unrealized Patronage Revenue ($/ac)	Unrecovered Fixed Costs ($/ac)	Unrecovered Infrastructure Costs ($/ac)	Estimated Stubble Value ($/ac)	NPV @ 5% ($/ac)
Plant Cane	$3,794.25	$0.00	$0.00	$0.00	$3,794.25	$3,387.55
1st Stubble	$2,684.82	$0.00	$0.00	$0.00	$2,684.82	$2,447.50
2nd Stubble	$1,653.05	$0.00	$0.00	$0.00	$1,653.05	$1,538.11
3rd Stubble	$798.79	$0.00	$0.00	$0.00	$798.79	$760.75

Table 12. Estimated Crop Value of Sugarcane over Entire Crop Cycle for Different Crop Ages - Producer / Landowner Share (Through 3rd Stubble)

Age At Removal	Total Unrealized Future Net Revenue ($/ac)	Unrealized Patronage Revenue ($/ac)	Unrecovered Fixed Costs ($/ac)	Unrecovered Infrastructure Costs ($/ac)	Estimated Stubble Value ($/ac)	NPV @ 5% ($/ac)
Plant Cane	$5,487.35	$106.58	$47.97	$177.90	$5,819.80	$5,237.75
1st Stubble	$3,743.73	$75.41	$47.97	$177.90	$4,045.02	$3,713.56
2nd Stubble	$2,225.88	$46.43	$47.97	$177.90	$2,498.18	$2,341.11
3rd Stubble	$1,055.04	$22.44	$47.97	$177.90	$1,303.35	$1,252.04

In both cases, the estimated crop value (and suggested compensation level) is simply the sum of the total unrealized net revenue, the unrealized patronage revenue, the unrecovered fixed costs, and the unrecovered infrastructure costs. The estimate for crop value for plant cane, for example, is $3,794.25 per acre for the mill and $5,819.80 per acre for the producer/landowner. Since the estimate of crop value is the suggested level of compensation to be made and since that compensation is expected to be paid in the current year, a Net Present Value of the crop value is calculated. The Net Present Value of the crop value of plant cane is $3,387.55 per acre for the mill and $5,237.75 for the producer/landowner. These values represent the amount of unrecovered costs and the amount of revenue that would have been generated over the remainder of the entire crop cycle.

Conclusions

This report provides a methodology and set of procedures for analyzing the crop value of sugarcane being taken out of production and the land put into alternative uses such as industrial uses like solar panel installations. Given the potential large number of acres potentially lost to alternative uses, this report expands the analysis beyond that done in typical analysis as impacts generally are considered minimal and left out of the analysis. It is impossible to develop a set of crop values that would accurately reflect all situations. This report provides a case example based on state averages and typical sugarcane production costs. The case example is provided to illustrate the methodology and procedures described and should not be thought of as estimates of crop value for a specific situation. However, the case example can provide insight as to what crop values could be for an average situation.

For a sugarcane crop destroyed and the land put into alternative uses, LSU AgCenter methods suggest that the crop value is equal to unrealized revenue plus any unrecovered costs. A potential source of unrealized revenue is the unrealized net revenue that would have been generated by the production and harvest of the sugarcane crop and unrealized patronage revenue certain producers would have received. Potential sources of unrecovered costs are those routine production costs experienced on a sugarcane crop without the ability to harvest the crop, increases

to per acre fixed costs due to having to spread total fixed costs over fewer acres, and infrastructure improvement costs that have not been fully recaptured by the producer.

For the case example presented, the net present value of the estimated crop value for the mill ranged from $760.75 per acre for third stubble acres to $3,387.55 per acre for plant cane. The net present value of the estimated crop value for the producer/landowner ranged from $1,252.04 per acre for third stubble acres to $5,237.75 for plant cane. These estimates assume that the normal crop cycle of the sugarcane stubble is through third stubble. This implies that after the sugarcane stubble is harvested as third stubble, the producer would terminate the crop and prepare the land to be replanted in the subsequent year. Once the crop has been harvested for the last time, it is assumed that it no longer has value. However, as varieties continue to improve, their ability to maintain production and remain economically viable at older crop ages has increased. This has allowed producers to hold onto the crop longer than they have in the past. So, depending on the situation, it is conceivable that assuming a crop cycle length through fourth stubble is more appropriate. To show how assuming the longer crop cycle would impact estimates of crop value, the appendix provides duplicate tables of those presented earlier under the assumption of a normal crop cycle length through fourth stubble.

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APPENDIX

Estimates of Unrealized Revenue and Unrecovered Cost Estimates Assuming a Normal Crop Cycle Through Fourth Stubble – Case Example

Table 13b. Projected Production Levels of Different Crop Ages (Assumes Normal Crop Cycle Through 4th Stubble)

Crop Age	Relationship - Yield as a % of Plant Cane Yield	Sugar Yield (lbs./ac)	Sugar Recovery (lbs./ton)	Sugarcane Yield (tons/ac)
Plant Cane	100%	9,516.93	232.60	40.92
1st Stubble	93%	8,850.75	232.60	38.05
2nd Stubble	77%	7,328.04	232.60	31.50
3rd Stubble	72%	6,852.19	232.60	29.46
4th Stubble	65%	6,186.01	232.60	26.60
Complete Cycle Average		7,746.78	232.60	33.31

Table 14b. Estimated Annual Gross Revenue Levels for Different Crop Ages (Through 4th Stubble)

Crop Age	Mill Share ($/ac)	Producer/Landowner Share ($/ac)	Total ($/ac)
Plant Cane	$1,594.92	$2,432.41	$4,027.33
1st Stubble	$1,483.28	$2,262.14	$3,735.42
2nd Stubble	$1,228.09	$1,872.96	$3,092.77
3rd Stubble	$1,148.34	$1,751.34	$2,891.94
4th Stubble	$1,036.70	$1,581.07	$2,610.78

Table 15b. Variable and Fixed Production and Harvest Costs, 2024 (Through 4th Stubble)

Operation	Variable Costs ($/ac)	Fixed Costs ($/ac)	Total Costs ($/ac)	Operation Weight (Percent)
Fallow Operations	$179.57	$138.99	$318.56	16.67%
Cultured Seed Cane	$753.07	$16.98	$770.05	0.27%
Hand Planting	$262.45	$137.58	$400.03	0.27%
Harvesting Seedcane	$110.47	$81.30	$191.77	3.28%
Mechanical Planting	$227.73	$104.83	$332.56	16.40%
Plant Cane Operations	$324.62	$58.74	$383.36	16.67%
1st Stubble Operations	$388.28	$59.75	$448.03	16.67%
2nd Stubble Operations	$364.78	$58.24	$423.02	16.67%
3rd Stubble Operations	$364.78	$58.24	$423.02	16.67%
4th Stubble Operations	$364.78	$58.24	$423.02	16.67%
Harvest for Sugar	$247.53	$200.78	$448.31	80.07%

Total Fixed Costs Per Acre for Farm (Original Farm Size)	$253.09
Total Fixed Costs Per Acre for Farm (After Land Removal)	$301.30
Change in Total Fixed Costs Per Acre (Unrecovered Fixed Costs)	$48.21

Table 16b. Estimated Annual Net Revenue Above Variable Costs for Different Crop Ages (Through 4th Stubble)

Crop Age	Mill Share ($/ac)	Producer/Landowner Share ($/ac)	Total ($/ac)
Plant Cane	$1,165.31	$1,860.26	$3,025.57
1st Stubble	$1,083.74	$1,626.33	$2,710.07
2nd Stubble	$897.29	$1,260.65	$2,157.94
3rd Stubble	$839.02	$1,139.03	$1,978.05
4th Stubble	$757.45	$968.76	$1,726.21

Table 17b. Estimated Unrealized Net Revenue Over Life of Crop Cycle - Mill Share

Age At Removal	Year 1 ($/ac)	Year 2 ($/ac)	Year 3 ($/ac)	Year 4 ($/ac)	Total Unrealized Net Revenue ($/ac)
Plant Cane	$1,165.31	$1,083.74	$897.29	$839.02	$3,985.36
1st Stubble	$1,083.74	$897.29	$839.02	$757.45	$3,577.50
2nd Stubble	$897.29	$839.02	$757.45	$0.00	$2,493.76
3rd Stubble	$839.02	$757.45	$0.00	$0.00	$1,596.47
4th Stubble	$757.45	$0.00	$0.00	$0.00	$757.45

Table 18b. Estimated Unrealized Net Revenue Over Life of Crop Cycle – Producer / Landowner Share

Age At Removal	Year 1 ($/ac)	Year 2 ($/ac)	Year 3 ($/ac)	Year 4 ($/ac)	Total Unrealized Net Revenue ($/ac)
Plant Cane	$1,860.26	$1,626.33	$1,260.65	$1,139.03	$5,886.27
1st Stubble	$1,626.33	$1,260.65	$1,139.03	$968.76	$4,994.77
2nd Stubble	$1,260.65	$1,139.03	$968.76	$0.00	$3,368.43
3rd Stubble	$1,139.03	$968.76	$0.00	$0.00	$2,107.78
4th Stubble	$968.76	$0.00	$0.00	$0.00	$968.76

Table 19b. Estimated Unrealized Patronage Revenue - Producer / Landowner Share

Age At Removal	Year 1 ($/ac)	Year 2 ($/ac)	Year 3 ($/ac)	Year 4 ($/ac)	Total Unrealized Revenue ($/ac)
Plant Cane	$32.73	$30.44	$25.20	$23.57	$111.94
1st Stubble	$30.44	$25.20	$23.57	$21.28	$100.49
2nd Stubble	$25.20	$23.57	$21.28	$0.00	$70.05
3rd Stubble	$23.57	$21.28	$0.00	$0.00	$44.84
4th Stubble	$21.28	$0.00	$0.00	$0.00	$21.28

Table 20b. Estimated Crop Value of Sugarcane over Entire Crop Cycle for Different Crop Ages - Mill Share (Through 4th Stubble)

Age At Removal	Total Unrealized Future Net Revenue ($/ac)	Unrealized Patronage Revenue ($/ac)	Unrecovered Fixed Costs ($/ac)	Unrecovered Infrastructure Costs ($/ac)	Estimated Stubble Value ($/ac)	NPV @ 5% ($/ac)
Plant Cane	$3,985.36	$0.00	$0.00	$0.00	$3,985.36	$3,558.18
1st Stubble	$3,577.50	$0.00	$0.00	$0.00	$3,577.50	$3,193.94
2nd Stubble	$2,493.76	$0.00	$0.00	$0.00	$2,493.76	$2,269.89
3rd Stubble	$1,596.47	$0.00	$0.00	$0.00	$1,596.47	$1,486.10
4th Stubble	$757.45	$0.00	$0.00	$0.00	$757.45	$721.38

Table 21b. Estimated Crop Value of Sugarcane over Entire Crop Cycle for Different Crop Ages - Producer / Landowner Share (Through 4th Stubble)

Age At Removal	Total Unrealized Future Net Revenue ($/ac)	Unrealized Patronage Revenue ($/ac)	Unrecovered Fixed Costs ($/ac)	Unrecovered Infrastructure Costs ($/ac)	Estimated Stubble Value ($/ac)	NPV @ 5% ($/ac)
Plant Cane	$6,855.03	$133.22	$48.21	$177.90	$7,214.36	$6,374.66
1st Stubble	$4,994.77	$100.49	$48.21	$177.90	$5,321.36	$4,789.09
2nd Stubble	$3,368.43	$70.05	$48.21	$177.90	$3,664.59	$3,360.46
3rd Stubble	$2,107.78	$44.84	$48.21	$177.90	$2,378.74	$2,231.33
4th Stubble	$968.76	$21.28	$48.21	$177.90	$1,216.14	$1,169.00