Biofuel Development Opportunity Zone Rating: The City of Regina, SK

Biomass Category: Wheat Straw

Date of Issue: 07-22-2022

Rating Score: 'A'

BDO Zone Rating

'A'

The City of Regina, SK BDO Zone for wheat straw is rated "A". Long-term outlook on price and quantity is deemed stable. Key scale-up risks are likely addressable with reasonable mitigation measures.

Rating Parameters

Feedstock Quantity	Feedstock Form	Price Range ($/ADMT)	BDO Zone Radius
350,000 to 500,000 ADMT	Square/round bales	$74-$109 delivered	90-110 km

BDO Zone Assets

- **Stable long-term outlook on feedstock price and quantity: low impact of seasonal variation on feedstock price and quantity.**
- **Marginal increase in transport cost for substantial wheat straw supply basin.**
- **Large Biomass Availability Multiple (BAM) and a good grower participation rate is available within 150 km.**
- **Relatively large average farm size requires the engagement of fewer growers.**
- **No large-scale competition for wheat straw.**
- **Positively rated infrastructure asset profile.**

BDO Zone Liabilities

- **Moderate to high probability of necessity to engage third parties to provide square balers for harvest.**
- **Current high wheat costs may serve to lessen grower interest in supplying wheat straw. Currently 20% of large growers have expressed interest. It is likely there will be greater interest once a biomass plant is commissioned and supply chain gets secured.**

BDO Zone Risk Rating

The City of Regina, SK Bio-economy Development Zone is rated "A", or *low risk*.

Risk Rating Grades are defined as follows: Aa (*very low*), A (*low*), Baa (*low-moderate*), Ba (*moderate*), B (*moderate-high*), or C (*high*).

In assessing the biomass supply chain risk for the City of Regina, SK Bio-economy Development (BDO) Zone, 49 Risk Indicators from the *Canadian National Standards for Biomass Supply Chain Risk* were applied. These BDO Zone Risk Indicators are the subset of BSCR Risk Indicators applicable to gauging feedstock risk within a BDO Zone.

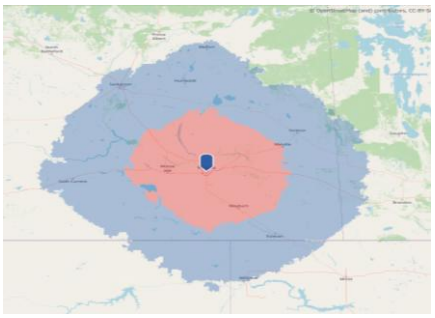
Feedstock quantity is expressed in Air-Dried Metric Tonnes (ADMT). Feedstock Price is expressed in Canadian dollars, and delivered to the plant yard, assuming the plant is located centrally in the BDO Zone. Maximum transport distance is calculated assuming the maximum quantity in this BDO Zone Rating. Delivered feedstock costs for projects with lower volume requirements can be expected to be at the lower end of the BDO Zone's price range.

Scoring and Rating Methodology

The BDO Zone rating is based on an aggregation of the scores assigned to each BDO Zone Risk Indicator (RI) assessed in this report. First, each BDO Zone Risk Indicator is given a **Raw RI** score based on the current, undeveloped state of the supply chain, and the uncertainty drivers within it. Raw RI Scores are scaled between 1 (*low risk*) and 10 (*high risk*).

Next, each Risk Indicator is discounted, or "notched", based on the degree to which the uncertainty drivers are deemed to be addressable, and whether there is a reasonable expectation that mitigation measures could be put into place within the price parameters for this rating. The **Notched Salience score** corresponds to the likelihood of each Risk Indicator's described risk materializing given the implementation of reasonable mitigation measures. To arrive at the Notched Salience score, Raw RI scores are reduced based on the efficacy of the proposed mitigation measures. If applicable, notching occurs at one of four levels: *moderate* (25%), *significant* (50%), *broad* (75%), or *comprehensive* (100%).

Regina, SK BDO Zone



Finally, the potential impact of each Risk Indicator on the supply chain is assessed and scored on a 10-point **Impact Level** scale, as either *low (3.33)*, *moderate (6.66)*, or *high (9.99).* Impact level scores are based on the assumption that key measures were implemented to mitigate uncertainty drivers in the BDO Zone but failed to do so.

The **Loaded RI** score for each Risk Indicator is then calculated as the product of Notched Salience and Impact Level scores. For example, Risk Indicator 3.2.2: *Low Historical Demand for Feedstock in the Supply Basin*; Notched Salience is scored at 4.5, and Impact Level is deemed *low* (i.e., 3.33 out of 10). The final Loaded RI score for RI 3.2.2 is therefore 4.5 x 3.33 = 14.99 (out of 100).

Loaded RI scores of 33.33 or less are deemed *low risk*; scores greater than 33.33 and less than 66.66 are deemed a *moderate risk*, and those that score 66.66 to 100 are deemed *high risk*.

The total risk rating for the BDO Zone is the average of all Loaded RI scores. The BDO Zone score for The City of Regina, SK is ***17.65 out of 100, resulting in an "A" designation.*** All scoring and rationale for each Risk Indicator are provided in Appendix A.

Analyst Notes

The Regina BDO Zone presents several strong assets, including a lack of competition for wheat straw, a large BAM, and stable long-term outlooks on feedstock price and quantity. Risk of supplier breach for quantity is powerfully mitigated by redundancy of supply available at a marginal increase in delivered cost.

Key Low and Moderate Risk Indicators

Most Loaded RI Scores are scored below 33.33 out of 100 and are thus considered *low* risk.

Risks related to competition are all scored as *low*. This primarily resulted from the fact that presently no operational large-scale facilities consuming wheat straw exist within the 280 km competition zone surrounding Regina, SK. Cattle feedlots and Mushroom markets are the only consumers of wheat straw in the region intaking ~5% of generated wheat straw in the BDO Zone.

Risks related to potential feedstock availability are also scored *low*. Based on interviews with growers, three levels of participation rate are derived: 58%, 38%, and 20%. When considering wheat production variation, the 1-in-20 year low, and grower participation rates, there is 299,140 ADMT/yr. of potentially available feedstock within 90-110 km in the *High* participation and expected scenario; and 220,053 ADMT/yr. of potentially available feedstock within 90-110 km in the *Low* participation and expected scenario for the 1-in-10-year low case.

Most farms in the Regina BDO Zone tend to be moderate to large. Large bio-based projects may require aggregations of individual growers. The degree of management complexity for this is significant; however, it is likely manageable. A large pool of suppliers will also bring with it positive supply chain attributes. The presence of many suppliers can function to increase supply chain resilience, as a breach by a few suppliers would not significantly impact the overall supply of feedstock to a project.

We assess the Loaded RI Score of Risk Indicator *1.9.1: Feedstock Production Priority* which scores at 52.45, as *moderate*. The initial feedback indicated 20% interest from the growers. It is reasonable to assume that larger suppliers would eventually indicate interest in supplying once the commissioning of a proposed project is in place. Higher grower participation is expected.

Key High-*Risk* Indicators

The most significant risks in the Regina wheat straw supply chain are classified into two categories: 1) risks related to harvesting /collection equipment, and 2) risks related to natural events.

Harvesting, Collection, and Equipment Risk Indicators

Due to a current lack of markets for wheat straw in the region, suppliers in the Regina BDO Zone are generally inexperienced in harvesting and baling wheat straw. In addition, few growers presently own the square baling equipment ideal for the storage and delivery of wheat straw. Instead, round balers are far more commonly used. Differences in baling equipment and harvest practices among growers may result in significant variance in delivered feedstock quality.

We assume that bio-based projects that locate in the Regina BDO Zone will likely take measures to mitigate key risks. This expectation is indicated by the difference between Raw RI scores and Notched Salience scores for multiple Risk Indicators detailed in Appendix A.

Risks around harvesting/collection equipment can be substantially mitigated by the vertical integration of a bio-project with wheat straw harvest / baling processes, or by the engagement of a credible third-party to carry out harvest / baling activities. This rating assumes that such

measures will be implemented and scoring reflects that assumptions.

We have a Loaded RI Score for RI *5.1.2 Capacity of Supply Chain Components and Equipment which scales at* 75, as high. This indicator presents a salient risk even with mitigation measures, and a high impact if mitigation measures were to fail.

Natural Event Risk Indicators

Natural events can have a significant impact on wheat straw supply in the Regina BDO Zone, and this category of presents the highest risk scores for this BDO Zone rating. The Loaded RI Score of RI *3.7.1 Seasonal Weather Impacts on Feedstock Supply* is 35. However, specific projects may be able to effectively mitigate RI 3.7.1 through the use of indoor storage for large quantities of baled wheat straw.

Other *moderate* Risk Indicators, scoring between 33.33 and 66.66, include *3.7.2 Long-Term Weather and Climate Trends; 3.7.4 Risk of Infestation;* and *3.7.5-9 Risk of Hail, Flood, Drought, Hurricanes, Tornadoes, Strong Winds, and Low Temperatures.* Mitigation measures are limited for natural risk.

Despite this, a large BAM for wheat straw in the Regina BDO Zone, and the relatively low impact of additional transport cost on the landed cost of feedstock, are material mitigating considerations – as can be seen in the large difference between Raw RI Scores and Notched Salience scores for Natural Event-related Risk Indicators.

BDO Rating Parameters

In the interest of avoiding undue market influence and prejudicing a project's ability to negotiate with suppliers, BDO Zone rating reports do not provide information on total feedstock cost breakdowns obtained throughout the assessment. This includes all costs associated with the engagement of a third party, as well as the development of a vertically integrated supply chain.

For this rating, growers' "ask" prices were solicited and baling costs evaluated. Transportation costs were calculated using average distances based on the supply curves and using trucking costs typical for the region.

The rating of the Regina BDO Zone is based on total delivered costs of the feedstock of $74-$109/ADMT at a distance range of 90-110 km and for a total of 350,000 to 500,000 ADMT.

Infrastructure Asset Profile

The City of Regina's infrastructure assets were scored on a scale of 0 - 10, with scores defined as follows: 0 (*insufficient*), 2 (*poor*), 4 (*fair*), 6 (*reasonable*), 8 (*good*), 10 (*very good*). 8.0 of 10 as an average of all assets scored as either *good* or *very good*, and 0 scored as *poor* or *insufficient*. Overall, the City of Regina presents a profile of positively rated infrastructure assets. Among the top-rated assets are the ease of local rail and highway access, and the safe and vibrant local community.

Contact Info:
Jordan Solomon
President & CEO at Ecostrat
Jordan.solomon@ecostrat.com

Figure 1 - Risk Indicators (sorted by risk level)

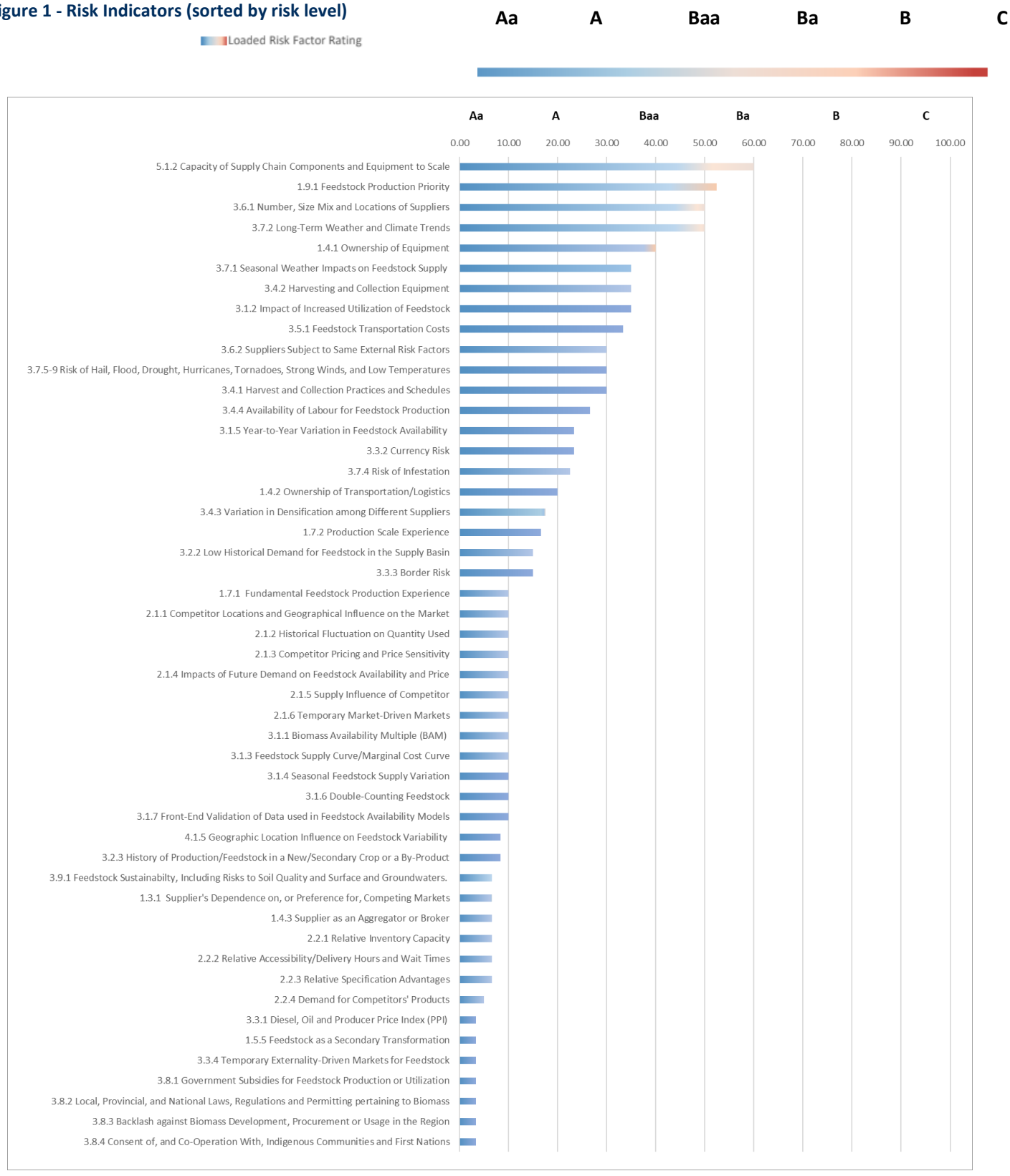


Table 1 - Risk Indicators

Feedstock Supply Chain Risk Indicators	Raw RI Score	Notched Salience	Impact Level	Loaded RI Score
1.3.1 Supplier's Dependence on, or Preference for, Competing Markets	2	2.0	3.33	6.66
1.4.1 Ownership of Equipment	7	5.25	6.66	34.97
1.4.2 Ownership of Transportation/Logistics	6	1.75	9.99	17.48
1.4.3 Supplier as an Aggregator or Broker	1	1.0	6.66	6.66
1.5.5 Feedstock as a Secondary Transformation	3	0.75	6.66	5.00
1.7.1 Fundamental Feedstock Production Experience	7	3.5	9.99	34.97
1.7.2 Production Scale Experience	9	4.5	6.66	29.97
1.9.1 Feedstock Production Priority	7	5.25	9.99	52.45
2.1.1 Competitor Locations and Geographical Influence on the Market	1	1.0	9.99	9.99
2.1.2 Historical Fluctuation on Quantity Used	1	1.0	9.99	9.99
2.1.3 Competitor Pricing and Price Sensitivity	1	1.0	9.99	9.99
2.1.4 Impacts of Future Demand on Feedstock Availability and Price	1	1.0	9.99	9.99
2.1.5 Supply Influence of Competitor	1	1.0	9.99	9.99
2.1.6 Temporary Market-Driven Markets	1	1.0	9.99	9.99
2.2.1 Relative Inventory Capacity	1	1.0	6.66	6.66
2.2.2 Relative Accessibility/Delivery Hours and Wait Times	1	1.0	6.66	6.66
2.2.3 Relative Specification Advantages	1	1.0	6.66	6.66
2.2.4 Demand for Competitors' Products	1	1.0	6.66	6.66
3.1.1 Biomass Availability Multiple (BAM)	1	1.0	9.99	9.99
3.1.2 Impact of Increased Utilization of Feedstock	1	1.0	9.99	9.99
3.1.3 Feedstock Supply Curve/Marginal Cost Curve	1	1.0	9.99	9.99
3.1.4 Seasonal Feedstock Supply Variation	3	1.5	9.99	14.99
3.1.5 Year-to-Year Variation in Feedstock Availability	9	2.25	9.99	22.48
3.1.6 Double-Counting Feedstock	1	1.0	9.99	9.99
3.1.7 Front-End Validation of Data used in Feedstock Availability Models	1	1.0	9.99	9.99
3.2.2 Feedstock Production Priority	9	4.5	3.33	14.99
3.2.3 History of Production/Feedstock in a New/Secondary Crop or a By-Product	10	2.5	3.33	8.33
3.3.1 Diesel, Oil, and Producer Price Index (PPI)	4	4.0	6.66	26.64
3.3.2 Currency Risk	1	1.0	3.33	3.33
3.3.3 Border Risk	1	1.0	3.33	3.33
3.3.4 Temporary Externality-Driven Markets for Feedstock	1	1.0	3.33	3.33
3.4.1 Harvest and Collection Practices and Schedules	7	3.5	6.66	23.31
3.4.2 Harvesting and Collection Equipment	10	5.0	6.66	33.30
3.4.3 Variation in Densification among Different Suppliers	5	2.5	6.66	16.65
3.4.4 Availability of Labour for Feedstock Production	7	3.5	6.66	23.31
3.5.1 Feedstock Transportation Costs	3	3.0	9.99	29.97
3.6.1 Number, Size Mix, and Locations of Suppliers	5	7.5	6.66	49.95
3.6.2 Suppliers Subject to Same External Risk Factors	9	4.5	6.66	29.97
3.7.1 Seasonal Weather Impacts on Feedstock Supply	7	3.5	9.99	34.97
3.7.2 Long-Term Weather and Climate Trends	5	5.0	9.99	49.95
3.7.4 Risk of Infestation	2	2	9.99	19.98
3.7.5-9 Risk of hail, flood, drought, hurricanes, tornadoes, strong winds, and low temperatures	4	4	9.99	39.96
3.8.1 Government Subsidies for Feedstock Production or Utilization	1	1.0	3.33	3.33
3.8.2 Local, Provincial, and National Laws, Regulations, and Pertaining to Biomass	1	1.0	3.33	3.33
3.8.3 Backlash against Biomass Development, Procurement or Usage in the Region	1	1.0	3.33	3.33
3.8.4 Consent of, and Co-Operation With, Indigenous Communities and First Nations	1	1.0	3.33	3.33
3.9.1 Feedstock Sustainability, including risks to soil quality and surface and groundwaters.	5	2.5	3.33	8.33
4.1.5 Geographic Location Influence on Feedstock Variability	1	1.0	9.99	9.99
5.1.2 Capacity of Supply Chain Components and Equipment to Scale	8	6	9.99	59.94
Average				**17.65**

Table 2: Asset Indicators

Infrastructure Assets	Overview	Score	
Category 1: Physical Infrastructure			
1.1 Land Parcel	320-acre greenfield site, purchase offer secured, close on Nov 30, 2022, or sooner.	8	
1.2 City Ownership	The city owns and/or intends to acquire all lands for industrial purposes. No, private ownership.	7	
1.3 Industrial Land Use Zone	Lands to be rezoned by the City to Industrial for medium and heavy uses. Currently rezoning from agricultural to Heavy Industrial use, Concept Development Plan submitted & reviewed	8	
1.4 Natural Gas Line	SaskEnergy and its subsidiary TransGas provides Natural gas services.210 GJ/hr. 210 GJ/hr. Major transmission line and gas storage caverns in close proximity - prelim pricing underway.	8	
1.5 Electrical	25 MVA. Major transmission lines on site	8	
1.6 Fresh Water Supply Line	2400 litres/minute [3456 m3 /day]. New pipeline from Buffalo Pound reservoir - surplus capacity for other industrial projects recently announced.	8	
1.7 Sewage Disposal	Office sewage - City of Regina/GTH/EPCOR WWTP located within 2 miles. Process Effluent – 1400 litres/minute [2016 m3 /day] - deep well injection.	7	
1.8 Drainage	Drainage study completed for general area in Concept Development plan - specific plans to be developed later.	9	
1.9 Stormwater Management	Master Stormwater Drainage Plan (MDP) discusses key aspects of the planning, analysis, design, and construction of future stormwater management systems in SIP	8	
1.10 Natural Gas Power Generation Site	SaskPower continues to add new generation in the southwest, including almost 400 megawatts of renewable	8	
1.11 Available ICT Services	Good	8	
1.12 Available Land	Good - all land is "greenfield" and site plans are flexible. Additional land is available to the west.	8	
1.13 Cost of Land - Initial Cost	Offered by City - with other incentives to be negotiated. $11k/ac	7	
1.14 Cost of Land - Property Tax, Utilities	Located in RM of Sherwood, where property taxes are 1/3 of the City of Regina. Other incentives to be negotiated.	8	
1.15 Infrastructure - Pre-existing Infrastructure	Minimal pre-existing plant infrastructure. "Greenfield" situation will enable a custom-designed site.	8	
1.16 Infrastructure - Landfill/waste disposal	Landfill and waste disposal services are available. GFL is located within 2 miles.	8	
Category 2: Logistics			
2.1 Rail	Located on CN rail, developing link to CP with province & other industrial partners to be dual served by both Class 1 railroads.	9	
2.2 Highway Access and Intersection	Located adjacent to Global Transportation Hub industrial park, within 3 miles of new Regina Bypass highway infrastructure.	9	
2.3 Proximity to Major Markets	Very good rail and road transportation - good "back-haul " rates to the USA via semi-trailer trucks.	8	
2.4 Inbound/Outbound Shipping Costs	Good. Boxcar & container rates determined.	8	
2.5 Accessibility to Airport	Very good. International Airport with all services located within 8 miles.	9	
2.6 Railway Service	3x/week. CN rail with CN and CP branch lines connecting to Regina, Saskatoon etc.	8	
2.7 Logistics - Construction Logistics	Very good. Located just outside of the City of Regina, an, industrial hub that services southern Saskatchewan.	8	
2.8 Logistics - Proximity	Very good. Located just outside of the City of Regina, an, industrial hub that services southern Saskatchewan.	8	
Category 3: Social Infrastructure			
3.1 Quality of Life	Very family-friendly. Good education, sports, and all amenities. Cabin and boating lake 20 minutes away.	8	
3.2 Education - Elementary & High School	Very good. Public, Catholic, and French-Immersion. Childcare approx. $650 per month. Many comprehensive high schools with a wide range of academic trades education.	8	
3.3 Education - Post Secondary	Very good. The University of Regina, small University of Saskatchewan campus, First Nations University of Canada, Sask Polytechnic trade school	7	
3.4 Local Retail	Good. City working on a Downtown Revitalization Plan. Highway Commercial Retail is strong.	8	
3.5 Culture and Recreation	Excellent sports facilities, boating lake 20 minutes away. Several clubs.	10	
3.6 Hospital and Doctors	2 large hospitals with 454 doctors & approx. 9,000 staff. STARS helicopter base.	8	
3.7 Housing Availability	Very good. Many major new residential subdivisions are in the planning stages for 2022 development.	8	
3.8 Crime Rate	Good. RCMP training depot for Canada is located in the city.	10	
Category 4: Workforce			
4.1 Labour Costs	Good.	8	
4.2 Available Skilled Labour	Good.	8	
4.3 Available Unskilled Labour	Good. Agricultural producers will be a good, reliable source.	8	
4.4 Training Programs / Community College	Luther College offers education from grades 9-to 12. Dedicated training courses possible. Sask Polytechnic & community colleges, dedicated training courses possible with all levels of post-secondary education.	7	
4.5 Workforce - Population Support/Size of Workforce	Good. City and residents are interested in new industrial growth. Support for local retail.	8	
4.6 Workforce - Community Impact	Good. City and residents are interested in new industrial growth. Support for local retail.	8	
4.7 Workforce - EA Impact - Public Opinion	Home to Canadian Pacific (CP) Railway's newest intermodal facility, & hails as Saskatchewan's only Foreign Trade Zone	8	
4.8 Workforce - Labour Cost	Good.	7	
Category: 5 Financial			
5.1 Corporate tax rate	Good. There is no corporate capital tax on new capital investments and a 2 percent small business tax rate	9	
5.2 Construction Costs	Good.	8	
5.3 Provincial Incentives	Good, successful with initial provincial and federal government funding, expect additional funding, infrastructure, and tax credit support.	8	
5.4 Municipal Incentives	Yes. Fair and equitable for both Red Leaf and other medium and heavy industrial companies.	8	
5.5 Energy Availability and Costs	Good – acceptable budgetary costs received, specific unit costs pending as commercial agreements are negotiated.	8	
5.6 Environmental Regulations	EA submitted to the provincial Ministry of Environment with minimal concerns received to date. Expect approval and support shortly.	7	
5.7 Expedited Permit Process	Good. RM of Sherwood will expedite. Concept Development plan approved by council; rezoning initiated	7	
		Total	***8.02***

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APPENDIX A: Scoring Protocols, Rationale, and Ratings

Biofuel Development Opportunity (BDO) Zone Assessment for Regina, SK

The objective of this Bio-economy Development Opportunity (BDO) Zone assessment is to assess Wheat Straw biomass supply chain risk for the City of Regina. The **BDO Zone rating for Wheat Straw in Regina, SK is 'A'**.

Category 1: Supplier Risk

1.3.1. Supplier's Dependence On, or Preference For, Competing Markets

Rationale Supplier may have a vested interest or preference to supply to specific competitors for biomass feedstock. Preferences may be due to historical, long-term, or personal relationships, less stringent feedstock quality requirements, more flexible operating hours by competing markets, or supplier's dependence on competing markets to accept or purchase other products/by-products. During periods of feedstock shortage, such suppliers may be more likely to allocate the scarce supply to a competitor resulting in supply disruptions for the Proponent.	**Score**
Raw RI Score **I**n the region, there are no large-scale consumers of wheat straw. The cattle bedding and feed and the Mushroom market for mushroom cultivation in total are estimated to consume approximately 5 % of all generated wheat straw. The cattle bedding and feed market along with the mushroom market together is too small to pose a significant risk. Raw RI Score is considered low.	**2**

Notched Salience. No adjustments.	**Score Unnotched 2**
Impact Level. RI Impact Level is deemed *low*.	**Score 3.33**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 6.66 out of 100.	**Score 6.66**

1.4.1. Ownership of Equipment

Rationale In most cases, supplier which own or lease equipment for harvest, collection and processing feedstock are lower risk than those who are not. For example, third-party harvesting equipment may not be available when required. Short harvest windows may be missed if a farmer and contractor cannot schedule harvest times that are convenient and quantity shortages can result. However, in some circumstances reliance on third-party equipment to harvest or produce feedstock can decrease supply chain risk. For example, when harvesting agricultural residues such as corn stover, the use of a third-party company with standard equipment specializing in harvesting, collection and transportation may decrease quality variations (e.g., ash content) of final feedstock.	**Score** **7**

Raw RI Score
There are commonly two types of balers: round and square. Round balers are more commonly used for wheat harvest, with no square bales in use as there is currently no market for baled wheat straw. Square bales are preferred for wheat straw as they are more manageable while stacking and additional bales can be more easily stored compared to round bales, increasing the number of bales per trailer.

As few producers own this equipment, engagement of a third-party company with suitable baling equipment is likely required. Several third-party baling companies exist in the region creating a large enough pool of service providers to mitigate risk.

We see two major risks associated with engaging third parties to harvest wheat straw in the BDO Zone: First, the use of a third-party baler will drive up feedstock costs, making them higher than originally estimated in this report. Additional costs associated with engaging such a third party (or by vertically integrating a similar service within a project) are estimated at $10- $20/bale. This increase in feedstock cost has been incorporated into the feedstock cost range on which this rating is based. Secondly, not all growers will accept wheat straw harvesting by third parties, meaning grower participation rates could be lower than expected. Raw RI score is high

Notched Salience. This risk could be significantly mitigated by the involvement of an experienced third-party baling company (or companies). The risk posed by a lack of precedent and farmer reticence to allow third-party balers on their land is considered with the assumptions of a low-end participation rate (20 %). This value is based on-the-ground feedback; and the fact that even at this lower participation rate, 350,467 ODMT of feedstock is likely available in the BDO Zone. As a result, the Raw RI Score is notched by 25%: Notched Salience is 5.25	**Score Notched 5**
Impact Level. RI Impact Level is deemed *Medium*.	**Score 6.66**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 34.97 out of 100.	**Score 34.97**

1.4.2. Ownership of Transportation/Logistics

Rationale In most cases, suppliers that own or lease transportation equipment necessary to transport biomass from forests or field are at lower risk than those who do not. However, in some circumstances, reliance on third parties to transport biomass is common practice and does not contribute to risk.	**Score**
Raw RI Score Wheat straw currently sold is transported by the growers themselves (mostly cattle growers). However, the total number of trucks and trailers owned by present growers is insufficient to support a large consumer of straw. Although growers may invest in equipment to respond to increasing demands, and greater market confidence, the lack of widespread ownership of transportation equipment, and need to hire third-party transportation companies poses a distinct risk to the supply chain. This risk is heightened by the fact that the harvesting season is short (a few weeks), and that in response sufficient transport equipment must be moved into the region quickly. Raw RI score is deemed moderate.	**6**

Notched Salience RI 1.5.3 could be greatly reduced as sufficient transport equipment can likely be obtained from other custom haulers, i.e. local companies which offer custom baling and hauling services. Several well-known trucking companies currently transport other products using flatbed and super B bed trailers that could easily transport square bales. Secondary research indicates that the existing trucking infrastructure should be able to support a large-scale project, given that trucks could be brought into the region from other parts of Saskatchewan. As a result, the Raw RI Score is notched by 75%: Notched Salience is 1.75.	**Score notched** **1.75**
Impact Level. RI Impact Level is deemed *high*.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 17.48 out of 100.	**Score 17.48**

1.4.3. Supplier as an Aggregator or Broker

Rationale Mitigation than other intermediaries. An aggregator premium should relate to the degree to which they are able to mitigate feedstock supply risks. Aggregators may effectively provide supply chain redundancy and eliminate the risk and complexity of dealing with multiple sources of supply by combining supplies into a single master contact. Aggregators can add much-needed stability to biomass supply basins by increasing offtake stability for both suppliers and markets. An aggregator can be a more reliable long-term offtake for suppliers by virtue of having multiple markets; and can be a more reliable long-term supplier for markets by virtue of having multiple suppliers. Further, when a single supplier breaches, the aggregator can source from another. Both aggregators and brokers are intermediaries. Aggregators consolidate and manage feedstock procurement from a number of smaller suppliers. Brokers tend to act as intermediaries between a single source of supply but brokers of multiple sources of feedstock are common. Aggregators act as principles in the supply of feedstock and assume the contractual obligations of a direct supplier; brokers do not. Definitional confusion between aggregators and brokers is common. If an aggregator does not assume the supply risk of sub-contractors, then they are more accurately deemed either a “procurement manager” or “broker”. Aggregators add more value in terms of risk	**Score**
Raw RI Score There is no aggregator in the area. A few farmers; have expressed interest in aggregating feedstock for a project in the Regina area. However, the presence of a large number of growers allows for the spread of supply sources and reduces the risk of supply shortages. Some balers have collaborated on a business-to-business (B2B) basis and aggregators may not be necessary. The raw RI Score is considered low.	**1**
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk.	**Score notched** **1**
Impact Level. RI Impact Level is deemed *medium*.	**Score 6.66**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 6.66 out of 100.	**Score 6.66**

1.5.5. Feedstock as a Secondary Transformation

Rationale A secondary transformation is dependent upon the production of primary products; e.g. wheat straw resulting from the production of wheat.

Score

Risks are higher if the feedstock is a secondary transformation of a primary, more valuable product. It may not be economical for suppliers to produce biomass on its own, in the absence of markets for the primary product.

In the case of agricultural feedstocks such as wheat straw, the feedstock is a by-product of a primary crop. Since the primary crop is significantly more lucrative than the residue, it will be a priority for the producer. If the production of the primary crop requires resources to be taken away from the production of the secondary crop (e.g., in case of shorter harvesting windows due to weather), the secondary feedstock supply will suffer. In times of stretched resources, suppliers may also perceive harvesting and collection of the feedstock as a nuisance, potentially decreasing production levels.

Raw RI Score

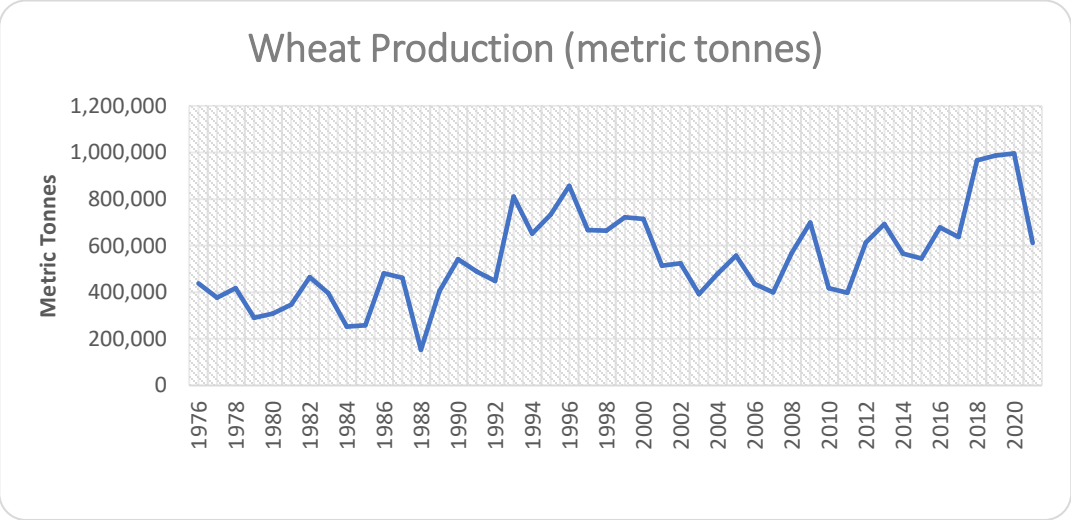
A feedstock is a byproduct of wheat, a primary crop. As a result, producers will always prioritize producing wheat grain first, with straw as a potential secondary by-product. Many farmers use wheat straw as fertilizer.

3

A direct relationship between feedstock and primary product exists; i.e. wheat straw accounts for 60 to 70% of grain yield by weight.

Since 2002, wheat production has been steadily increasing. Therefore, as wheat straw generation is directly connected to wheat production, wheat straw generation has also increased. The raw RI Score is considered relatively low.

Wheat Production - Regina BDO Zone



Notched Salience. RI 1.5.5 risk could be greatly reduced by broadening the supply basin. In the event of a feedstock shortage due to low wheat production, more feedstock can most likely be obtained from areas outside the supply basin. When compared to the total cost of feedstock, the cost of

Score notched

additional transportation is relatively low (e.g., at 50 km from Regina the transportation cost makes up 15 percent of the total cost). On average, the factor used for transportation is 0.34 $/ODMT/km which means $3.4 is added for each additional 10 km distance. To further mitigate wheat harvest shortfalls, an on-site inventory of more than 18 months' worth of feedstock could be kept under cover. As a result, the Raw RI Score is notched by 75%	**0.75**
Impact Level. RI Impact Level is deemed *medium*.	**Score 6.66**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 5.00 out of 100.	**Score 5.00**

1.7.1. Fundamental Feedstock Production Experience

Rationale Risk is higher when a supplier has limited experience with planting/growing/harvesting/processing and/or collecting biomass. Limited experience may be common for stover or forest residue supply chains where farmers or forestry producers may have no previous experience. In cases where experience is lacking, the Proponent should show that steps have been taken to ensure proper training, knowledge dissemination and monitoring.	**Score**
Raw RI Score The supply chain has little experience producing wheat straw, with the only consumers being the cattle bedding and feed market as well as mushroom growers. Many individual growers have never baled wheat straw, although some have done so with straw from other crops. The raw RI Score is considered high.	**7**
Notched Salience. RI 1.7.1 could be significantly reduced by utilizing an experienced third-party baling company (or companies), or by providing similar services through the establishment of a vertically integrated bio-project. As a result, the Raw RI Score is notched by 50%: Notched Salience is 3.5.	**Score notched 3.5**
Impact Level. RI Impact Level is deemed *high*	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 34.96 out of 100.	**Score 34.96**

1.7.2. Production Scale Experience

Rationale Scale-up entails risk. Risk is higher when a supplier has limited experience with the product of the quantity of feedstock required.	**Score**
Raw RI Score A lack of production-scale experience with wheat straw exists within the current supply chain, meaning the transition from current wheat straw production levels to those required for a large-scale facility would be significant. The raw RI Score is considered to be high.	**9**
Notched Salience. RI 1.7.2 could be greatly reduced by outsourcing harvest and collection to a credible third-party baling company or by providing similar services through a vertically integrated bio-project. As a result, the Raw RI Score is notched by 50%: Notched Salience is 4.5.	**Score notched 4.5**
Impact Level. RI Impact Level is deemed *moderate*	**Score**

	6.66
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 29.97 out of 100.	**Score 29.97**

1.9.1. Feedstock Production Priority

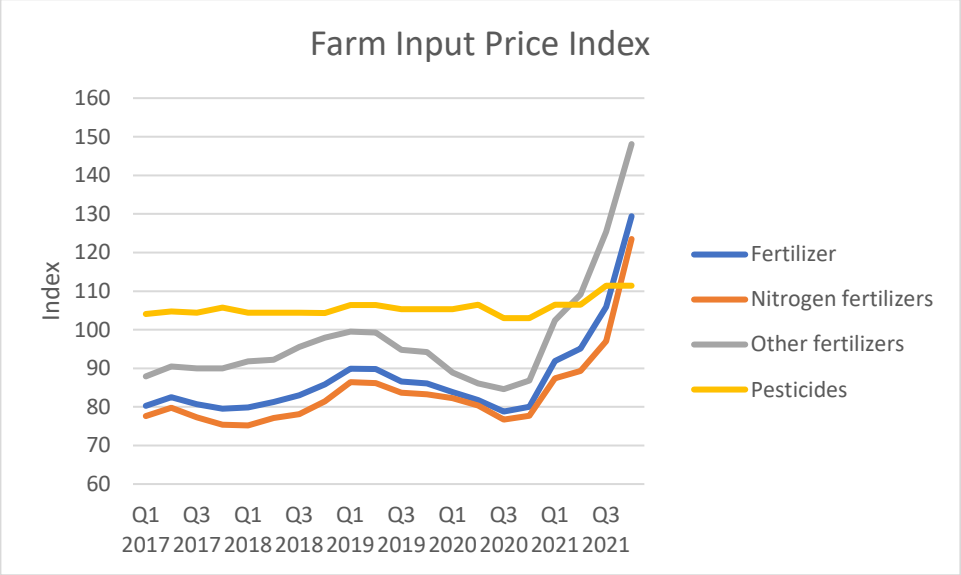
Rationale When biomass feedstock is a secondary or non-core line of business, or when it is a by-product or a residual from a more valuable primary product, then suppliers may not put sufficient effort into consistently producing it. Risk of breach increases when production and/or delivery of feedstock compromises the supplier's ability to make a primary product. **Score**

When biomass feedstock is a by-product of another main higher margin or main product (e.g. wheat straw), supply may not be a top priority for a supplier.

Raw RI Score

According to interviews with a sample of suppliers, growers indicated a willingness to supply wheat straw that could become a significant source of on-farm income. **7**

Growers who are hesitant to supply noted two conditions that needed to be addressed for them to consider supplying wheat straw. First, costs associated with a potential need for fertilizer when the wheat straw is removed from the field must be addressed. And second, wheat straw prices would need to be attractive enough for them to consider becoming a supplier. Wheat straw production is not a top priority for growers in either case.



This risk is exacerbated by a relatively short wheat harvesting window - 4 to 6 weeks. As a result, suppliers will prioritize grain production and will only supply wheat straw if it does not interfere with their ability to harvest grain efficiently. The raw RI Score is considered high.

Notched Salience. Face-to-face meetings with potential suppliers can mitigate favorable feedback from large growers. Outsourcing harvest and collection to a reputable third-party baling company or providing similar services through a vertically integrated bio-project, could mitigate this risk. As a result, the Raw RI Score is notched by 25%: Notched Salience is 5.25.	**Score notched 5.25**
Impact Level. RI Impact Level is deemed *high*.	**Score 9.99**

Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 52.45 out of 100.	**Score 52.45**

Category 2: Competitor Risk

2.1.1. Competitor Locations and Geographical Influence on the Market

Rationale Competitors' locations relative to a Proponent can affect the viability of procuring feedstock and the cost of that feedstock. Accurate and detailed competitor mapping provides an understanding of the geographical influence a competitor may have, including competitive advantages such as short hauling.	**Score**
Raw RI Score In the region, there are no large-scale competitors for wheat straw. Raw RI Score is deemed low.	**1**
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk.	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *high*.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 9.99 out of 100.	**Score 9.99**

2.1.2. *Historical Fluctuation of Quantity Used*

Rationale Clear understanding of key competitors' consumption of each type of feedstock utilized by the Proponent is essential to quantifying the risks associated with each competitor. Understanding historical trends of feedstock utilization can provide valuable information about feedstock price elasticity during shortages, and insight into events that may impact future supply conditions. It can enable more accurate estimates of the sensitivity of feedstock availability to potential future consumption levels or to the impact of external events (e.g., weather events, structural economic changes, seasonality, or policy change).	**Score**
Raw RI Score In the area, there are no major current or historical competitors for wheat straw. The cattle bedding and feed along with the mushroom market are the only current local consumers of wheat straw. Even so, it is estimated that they consume only 5% of all wheat straw generated. As a result, the Raw RI Score is considered low.	**1**
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *high*.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 9.99 out of 100.	**Score 9.99**

2.1.3. **Competitor Pricing and Price Sensitivity**

Rationale Understanding how much competitors pay for different feedstock types is an essential step to determining competitiveness of Proponent. Historical prices paid by competitors provide insight into their procurement behaviors and ability/willingness to pay premiums for feedstock and expert pressure on Proponent's suppliers during times of feedstock shortage. Competitors that have an ability to offer higher prices for feedstock during feedstock shortages can pose significant risks to Proponent. Knowledge of competitor pricing and price sensitivity is also an essential prerequisite to formulating a feedstock cost curve which can enable predictions of feedstock redundancy; i.e., how much feedstock could become available at different pricing levels (see Category 3–Supply Chain Risk 3.1.3).	**Score**
Raw RI Score There are no significant competitors for wheat straw in the region. Raw RI Score is deemed low.	**1**
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *high*.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 9.99 out of 100.	**Score 9.99**

2.1.4. Impacts of Future Demand on Feedstock Availability and Price

Rationale Future competitors for feedstock, or expansion of feedstock demand by current competitors, can cause feedstock market disruption. Even before new competitors become operational, high interest in a supply basin can make suppliers overconfident, leading to a supplier-controlled market where short-term contracting becomes the norm and supply chain reliability is compromised for the Proponent. Once operational, new competitors increase demand for feedstock, potentially lowering availability and increasing cost. Existing competitors may seek to expand operations, increasing the consumption of feedstock.	**Score**
Raw RI Score No large-scale local competitors for wheat straw, have been identified. Wheat straw can be found all over the province, meaning that once a project is located in the BDO Zone, the risk of another project will be located in the same BDO Zone is likely low. Wheat straw's cattle bedding and feed along with the mushroom market is unlikely to grow significantly in the future due to its low quality in comparison to other types of straw (e.g., flax, oat, etc.). The raw RI Score is considered low.	**1**
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk.	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *high*.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 9.99 out of 100.	**Score 9.99**

2.1.5. Supply Influence of Competitor

Rationale In some cases, competitors may be able to exert high degrees of pressure over local suppliers, effectively enabling them to control feedstock, especially during times of shortage. This control can derive from long previous relationships between suppliers and competitors. It can also result from verbal or "understood" agreements, or a competitor being able to assist suppliers in times of surplus by maintaining large inventories which enable suppliers to continue supplying when other markets impose quotas. Understanding and planning around such soft risk factors are important. If such relationships exist in the Proponent's procurement area, they may indicate an increased risk of feedstock shortage or pricing changes.	**Score**
Raw RI Score. Wheat straw currently has no large-scale competitors. Wheat straw is widely available throughout the province, so competitors for wheat straw (i.e., intake requirements of >300,000 ODMT/yr) are unlikely to locate in the same BDO Zone. The raw RI Score is considered low.	**1**
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk.	**Score notched** **1**
Impact Level. RI Impact Level is deemed high.	**Score** **9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 9.99 out of 100.	**Score** **9.99**

2.1.6. Temporary Market-Driven Markets

Rationale Alternative, non-traditional, market-driven competitors for feedstock can drive feedstock demand in unusual circumstances. A Proponent using corn stover as a feedstock, for example, would not typically compete with higher-end animal feed markets due to quality issues. However, in times of significant hay shortage (e.g., during drought), farmers use corn stover in place of hay, driving the price of feedstock and decreasing availability for bio-projects (Bergtold 2018).	**Score** **1**
Raw RI Score. There are no non-traditional or market-driven markets for feedstock. Raw RI Score is deemed low.	
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk.	**Score Unnotched** **1**
Impact Level. RI Impact Level is deemed *high*.	**Score** **9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 9.99 out of 100.	**Score** **9.99**

2.2.1. Relative Inventory Capacity

Rationale The more inventory a biomass facility is able to store, the more competitively it can behave on the market. The ability to store large inventories allows biomass Proponents to purchase inventory when the prices are low, giving it an economic advantage. Additionally, the ability to store inventory during feedstock supply surpluses enables a competitor to continue to intake feedstock when the Proponent (with lesser inventory capacity) may be forced to put suppliers on quota. Larger investor capacity thereby creates supplier loyalty, and this can increase reliability and decrease risk.	**Score**
Raw RI Score Wheat straw has no large-scale suppliers at present and there is relatively little demand for the feedstock so no current need for large-scale inventory. Cattle feedlots typically stockpile up to a year's worth of feedstock and are a relatively small market for wheat straw. Together with the intake from the Mushroom market, they consume only 5% of all locally generated feedstock. The raw RI Score is considered low.	**1**
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *moderate*.	**Score 6.66**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 6.66 out of 100.	**Score 6.66**

2.2.2 Relative Accessibility/Delivery Hours and Wait Times

Rationale The value attributed by suppliers to local markets is often directly related to the degree of flexibility the market provides in terms of delivery hours, and the more efficiently discharge can occur.	**Score**
Raw RI Score There is no existing wheat straw supply chain. Accessibility and delivery time can be developed to ensure maximum supplier participation. Raw RI Score is deemed low	**1**
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk.	**Score unnotched 1**
Impact Level. RI Impact Level is deemed *moderate*.	**Score 6.66**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 6.66 out of 100.	**Score 6.66**

2.2.3 Relative Specification Advantages

Rationale When choosing a market, suppliers not only look at price, but also at relative quality requirements or specifications. It is important to understand a competitor's feedstock quality specifications in order to accurately quantify the risk that a competitor can exert on the Proponent's supply chain.	Score
Raw RI Score. No large-scale suppliers or competitors for feedstock exist in the region. The cattle bedding and feed market is tolerant of poor feedstock quality (especially when used for bedding, which is in the	1

majority of cases). Collectively, the local cattle bedding and mushroom market, on the other hand, are insignificant, consuming only 5% of total wheat straw generated in the region. The raw RI Score is regarded as low.

Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *moderate*.	**Score 6.66**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 6.66 out of 100.	**Score 6.66**

2.2.4 Demand for Competitors' Products

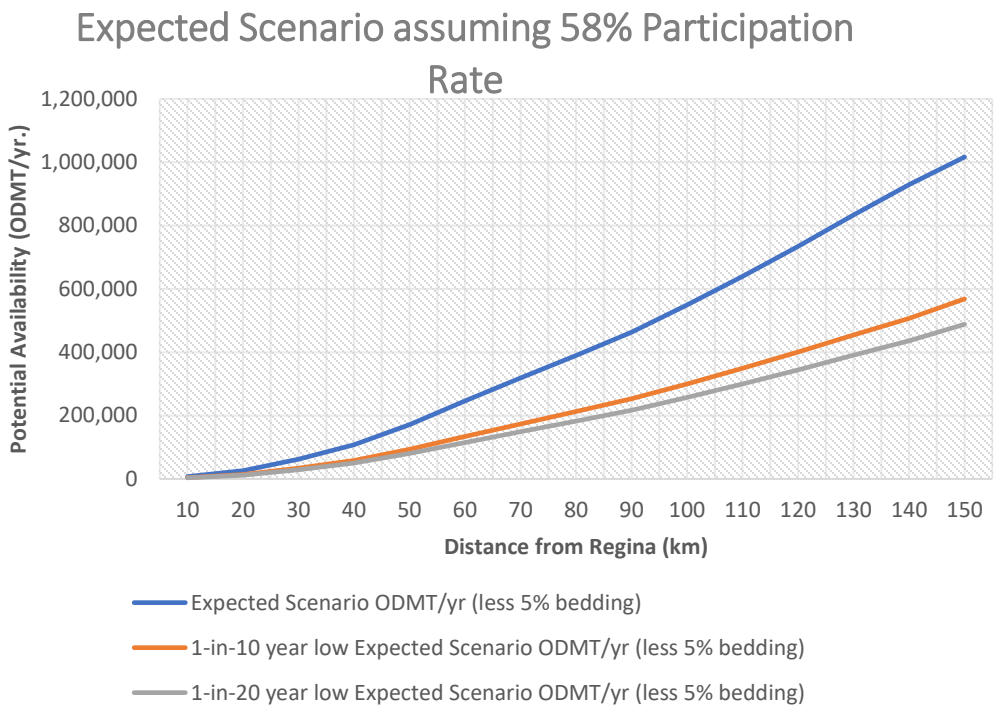
Rationale Increased demand for competitor's product can cause an increased demand for feedstock by the competitor, given the competitor can increase its production capacity easily. For example, an increased demand for biofuels due to a clean fuels policy can cause increased biofuel production by the competitor, thereby increasing demand for feedstock.	Score
Raw RI Score. There are no large-scale competitors for wheat straw in the region. Raw RI Score is deemed low	1

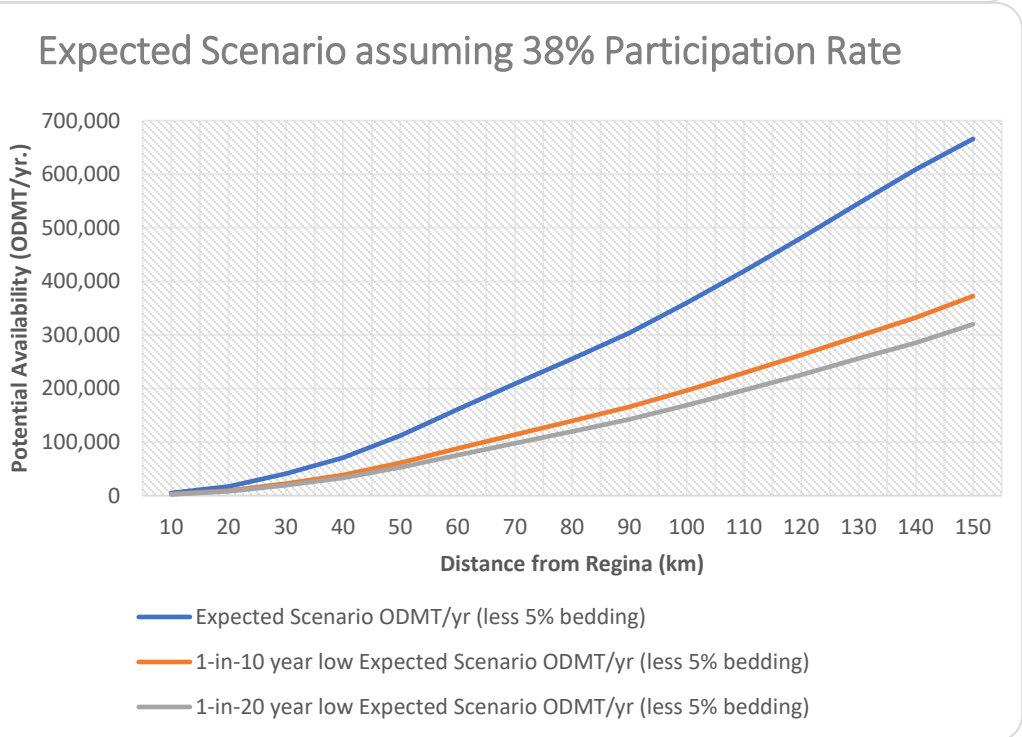
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *moderate*.	**Score 6.66**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 6.66 out of 100.	**Score 6.66**

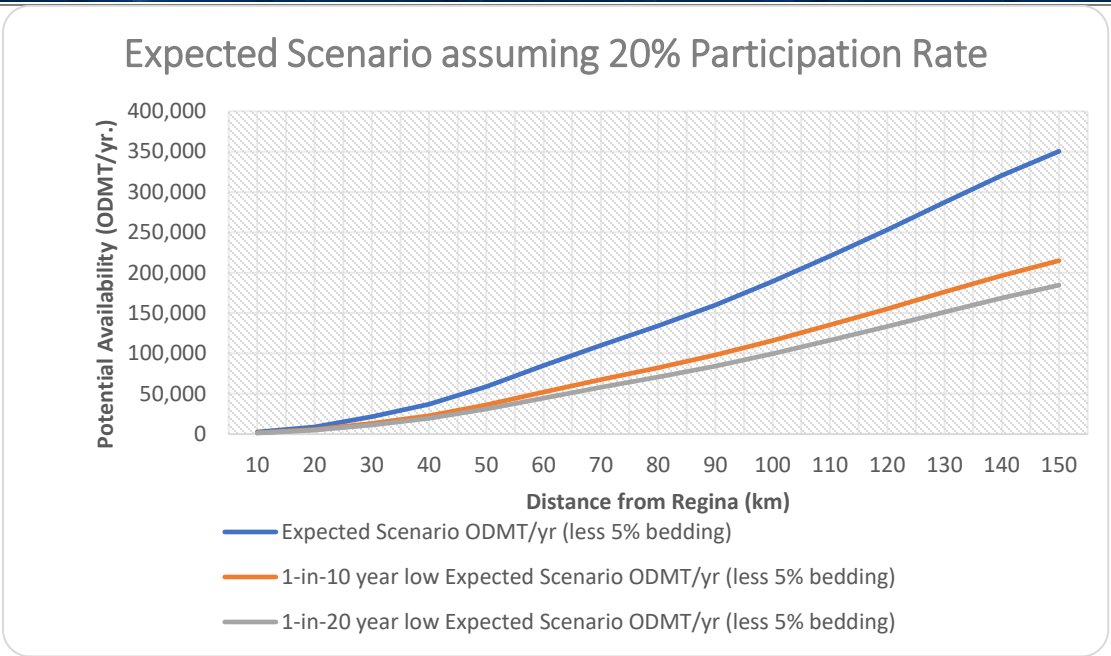
Category 3: Supply Chain Risk

3.1.1 Biomass Availability Multiple (BAM)

Rationale Biomass Availability Multiple (BAM) indicates the degree of redundancy in a Proponent's supply chain. BAM is the ratio of biomass feedstock available to a project, at costs, timing, and in quality feasible for the Proponent, divided by the project's feedstock requirements. BAM is a strong indicator of supply chain resilience when stressed by supply shortage and/or supplier breach.	Score
Raw RI Score The Biomass Availability Multiple (BAM) is represented by availability and cost curves projected in the future. Appendix B of this rating contains detailed information on the potentially available feedstock participation rates, costs, and distance curves. The raw RI Score is considered low.	1


Expected Scenario assuming 58% Participation Rate
Potential Availability (ODMT/yr.)
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
Distance from Regina (km)
Expected Scenario ODMT/yr (less 5% bedding)
1-in-10 year low Expected Scenario ODMT/yr (less 5% bedding)
1-in-20 year low Expected Scenario ODMT/yr (less 5% bedding)


Expected Scenario assuming 38% Participation Rate
Potential Availability (ODMT/yr.)
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
Distance from Regina (km)
Expected Scenario ODMT/yr (less 5% bedding)
1-in-10 year low Expected Scenario ODMT/yr (less 5% bedding)
1-in-20 year low Expected Scenario ODMT/yr (less 5% bedding)



Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed high.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 9.99 out of 100.	**Score 9.99**

3.1.2 Impact of Increased Utilization of Feedstock

Rationale Feedstock utilization in a supply basin can change over time. Existing consumers of feedstock can expand operations or new facilities can enter the market. Increased utilization puts additional pressure on feedstock and can lead to higher prices, feedstock disruptions, shortages or supplier breach.	**Score**
Raw Score Currently there is no existing wheat straw market and there is considerable supply available.	1

Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk.	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed ***high***.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 9.99 out of 100.	**Score 9.99**

3.1.3 Feedstock Supply Curve / Marginal Cost Curve

Rationale The greater the feasible transport distance, the more feedstock is accessible to the Proponent, but at a higher delivered cost. The feedstock supply curve, sometimes referred to as the	**Score**

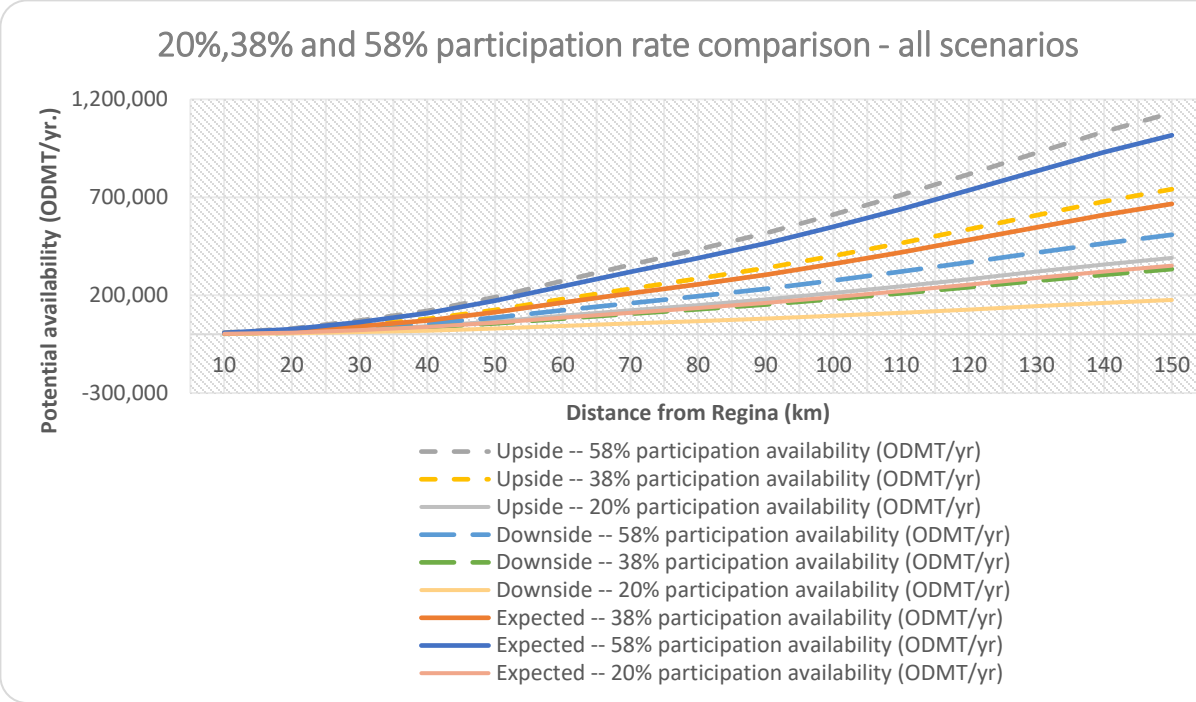
marginal cost curve, is a function of feedstock availability over its cost which is primarily, but not exclusively, a function of distance. The feedstock supply curve is used to determine the availability of redundant feedstock at various price points, and the cost of replacing feedstock with substitutes located at different distances.

Feedstock cost curves are useful in determining supply chain resilience; they provide information about the cost of feedstock availability in times of supply disturbance. Biomass supply chains are prone to supply disturbances over time; suppliers can become insolvent, or weather events can temporarily disrupt feedstock availability. When a disturbance occurs, the Proponent may need to source replacement feedstock from different suppliers at different locations and costs. A biomass supply curve indicates quantities of feedstock available at various price levels from suppliers generally located further away than core suppliers.

Raw RI Score 1

Appendix B of this rating contains supply curves representing feedstock availability based on price and distance of potentially available feedstock. As a result, the supply curves represent high level estimates of feedstock availability based on assumptions derived from a sample of potential suppliers. Having said that, this level of analysis should suffice for a BDO Zone designation.

Appendix B's supply curves assess the economic burden on a project procuring redundant feedstock from greater distances and under various stress scenarios (i.e., participation rates). The raw RI Score is considered low.



Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *high*.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 9.99 out of 100.	**Score 9.99**

3.1.4 Seasonal Feedstock Supply Variation

Rationale Biomass supply can present significant seasonal supply variations. Seasonal supply variations combined with limitations associated with longer-distance transportation and storage can lead to regional biomass supply imbalances (Golecha & Gan 2016) and can manifest in shortages and higher costs for Proponents.	Score
Raw RI Score Wheat straw is only available during wheat harvesting, which occurs between late August and early October. During those months, all wheat straw is harvested. The risk of a short harvest window has been factored into the RI 1.9.1 score above. As a result, this risk indicator's Raw RI Score is considered low.	3
Notched Salience. This risk can be mitigated through careful inventory management. So we notch by 50% and the notched score is 1.5.	**Score notched** **1.5**
Impact Level. RI Impact Level is deemed *high*.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 14.98 out of 100.	**Score 14.98**

3.1.5 Year-to-Year Variation in Feedstock Availability

Rationale Biomass can have significant year-to-year supply variations due to variability in yield from biomass harvesting operations, particularly with agricultural biomass.	**Score**
Raw RI Score There can be year to year supply variations which are increasing with the impacts of climate change.	**9**
Notched Salience. The large BAM in the BDO Zone, which provides significant feedstock redundancy, as well as the planned inclusion of >18 months' worth of on-site inventory capacity, could significantly mitigate RI 3.1.5. Encouraging signs for risk reduction are present, such as the fact that the cost of additional transportation is relatively low in comparison to the total feedstock costs (see supply curves in Appendix B).This relatively minor additional cost due to year-to-year supply variation is shown in Table 12 of Appendix B, in the 1-in-10 and 1-in-20-year low columns. As a result, the Raw RI Score is notched by 75%: Notched Salience is 2.25.	**Score Notched** **2.25**
Impact Level. RI Impact Level is deemed *high*.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 22.48 out of 100.	**Score 22.48**

3.1.6 Double-Counting Feedstock

Rationale Aggregators, intermediaries or brokers organize and distribute feedstock produced by suppliers. If such sources of supply are used in assessing feedstock availability for BAMs or supply curves, Proponent should be sure not to double count feedstock produced by one supplier and traded/supplied by an intermediary.	Score

Raw RI Score	1

All estimates of feedstock availability are based on feedstock that is directly available from growers. While estimates are only estimates, there is no risk of double-counting in our method. The raw RI Score is considered low.

Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *high*.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 9.99 out of 100.	**Score 9.99**

3.1.7 Front-End Validation of Data Used in Feedstock Availability Models

Rationale Feedstock supply models can be complex. Lack of clarity about model assumptions and baseline data can result in confusion on the part of the capital markets and drive financing costs for biomass projects. The adequacy and credibility of assumptions and baseline data is paramount to credible model outputs.	**Score**
Raw RI Score.	**1**

Appendix B of this rating contains a list of all assumptions used in the development of feedstock supply curves. Assumptions are based on verbal feedback from numerous local growers in the BDO Zone. Other theoretical approaches, such as the BIMAT model, were used to validate these assumptions.

Raw RI Score is deemed low.

Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk.	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *high*.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 9.99 out of 100.	**Score 9.99**

3.2.2 Low Historical Demand for Feedstock in the Supply Basin

Rationale If Proponent supply basin does not have history of developed, large-scale feedstock procurement, suppliers may not have sufficient expertise in feedstock production to ensure reliable supply, especially in early years. This can be particularity true for forest residues where typically the infrastructure for collection, processing and delivery is immature.	**Score**

Where supply chains are not well-established, risk can be mitigated when Proponent controls a higher degree of feedstock processing. For example, if a Proponent requires clean wood chips and the historical demand in the woodshed is exclusively for pulpwood, then supply chain risk will be decreased by Proponent's intake of pulpwood and internal log debarking and chipping, rather than requiring inexperienced suppliers to deliver debarked wood chips.

Raw RI Score	

	9
There is no history of developed, large-scale wheat straw consumers in the supply basin. As a result, suppliers lack expertise in feedstock production, posing a significant risk of unreliable supply. The raw RI Score is considered to be high.	
Notched Salience. Outsourcing harvest and collection to a credible third-party baling company or providing similar services through a vertically integrated bio-project could significantly reduce RI 3.2.2.	**Score notched**
As a result, the Raw RI Score is notched by 50%: Notched Salience is 4.5.	**4.5**
Impact Level. RI Impact Level is deemed *low*.	**Score 3.33**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 14.99 out of 100.	**Score 14.99**

3.2.3 History of Production / Feedstock is a Secondary Crop or a By-Product

Rationale If feedstock is a new/secondary crop or a by-product, suppliers may either lack sufficient experience to mitigate risk, or be unable to react to such risk. Secondary crop or by-product producers may be less likely to prioritize production. For new crop types, inexperience in planting, harvest, collection and yield data may pose higher levels of risk. If feedstock is a secondary crop, then production can be subject to variables beyond suppliers' control (e.g., changing primary crop prices).	**Score**
Raw RI Score. There is no history of producing wheat straw on a large scale in the proposed BDO Zone. However, feedstock is a by-product of wheat grain production which has a long history of production in the area. Wheat straw production is proportional to wheat production. The potential availability of wheat straw is determined by the number of wheat acres planted, the type of wheat, and weather. Yearly crop prices will influence the amount of wheat acres planted each year, with growers planting less wheat and greater quantities of other crops if they perceive wheat prices to be low in comparison. These planting decisions are made a few months before seeding and can impact biomass availability. Raw RI Score is deemed high.	**10**
Notched Salience. RI 3.2.3 could be broadly mitigated by the large BAM and relatively flat supply curve. The cost of additional transportation is relatively small compared to the total cost of feedstock. As a result, the Raw RI Score is notched by 75%: Notched Salience is 2.5.	**Score Notched** **2.5**
Impact Level. RI Impact Level is deemed *low*.	**Score 3.33**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 8.33 out of 100.	**Score 8.33**

3.3.1 Diesel, Oil and Producer Price Index (PPI)

Rationale Diesel, oil and PPI can impact feedstock cost of harvest and collection over time. Sensitivities to worst case scenarios should be run.

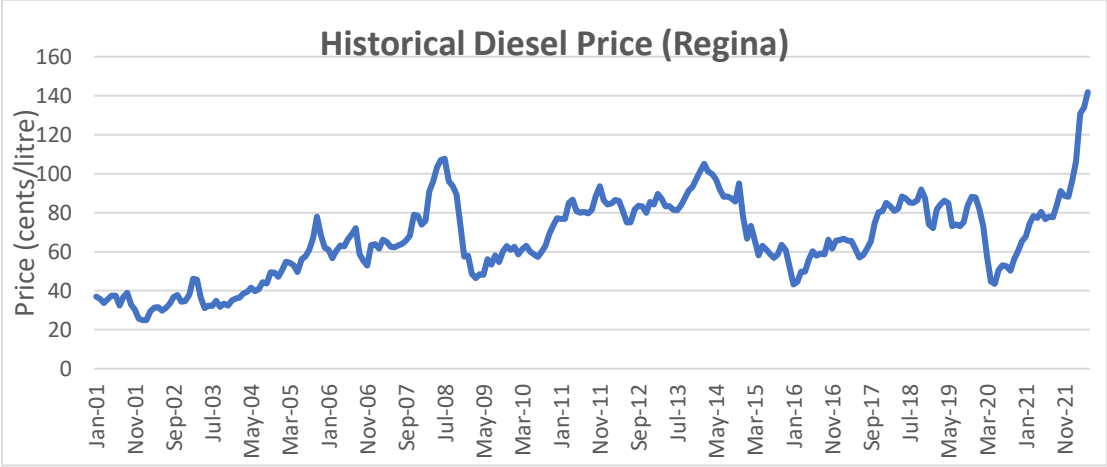
Score

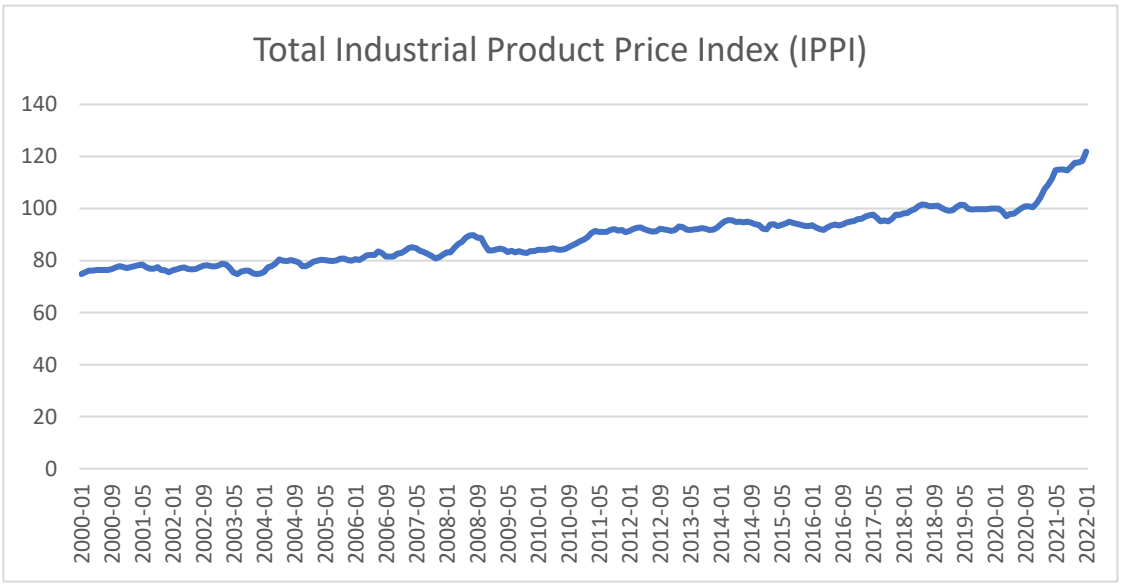
Raw RI Score **4**

The delivered cost of wheat straw is affected by the price of diesel/oil and the Producer Price Index (PPI). The cost of baling and transportation is directly affected by the price of diesel. While the PPI index has an indirect impact on baling and transportation costs via labor costs.

The graph below depicts historical diesel prices in Regina, Saskatchewan, over the last ten years. The price of diesel is volatile.

The industrial product price index (IPPI), on the other hand, shows little year-to-year volatility and continues to rise. The raw RI Score is considered medium .





Notched Salience. No adjustments

Score
Unnotched

	4
Impact Level. RI Impact Level is deemed *medium*.	**Score 6.66**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 26.64 out of 100.	**Score 26.64**

3.3.2 Currency Risk

Rationale Where feedstock is purchased in a currency different than that which the plant and markets use to operate, currency exchange rates and volatility can constitute risk exposure. Plants near the US-Canada border which intake feedstock from both countries are exposed to such currency risk.	**Score**
Raw RI Score. There would be no currency risk because none of the feedstock would be sourced from across the border. The raw RI Score is considered low.	**1**
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk.	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *low*.	**Score 3.33**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 3.33 out of 100.	**Score 3.33**

3.3.3 Border Risk

Rationale Where feedstock is transported cross-border to another country, risk exposure to border closures and crossing delays becomes present. The availability of trucks willing to do cross-border runs is limited which can decrease supply chain flexibility and resilience. Plants near the US-Canada border which intake feedstock from both countries are exposed to these risks.	**Score**
Raw RI Score Because no feedstock would be sourced from the United States, there would be no border risk. The raw RI Score is considered low.	1
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk.	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *low*.	**Score 3.33**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 3.33 out of 100.	**Score 3.33**

3.3.4 Temporary Externality-Driven Markets for Feedstock

Rationale Alternative, non-traditional, externality-driven competitors for feedstock can drive feedstock demand (and cost) in unusual circumstances. For example, a Proponent using corn	**Score**

stover as a feedstock would not typically compete with the higher-end animal feed market. However, in times of significant hay shortage (e.g., during drought), farmers may use corn stover as hay replacement, driving the price of stover feedstock and decreasing its availability for bio-projects (Bergtold 2018).

Raw RI Score.
No non-traditional and externality-driven markets for feedstock were identified. Raw RI Score is deemed low.

1

Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk.	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *low*.	**Score 3.33**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 3.33 out of 100.	**Score 3.33**

3.4.1 Harvest and Collection Practices and Schedules

Rationale Differences in harvest timing and practices used can create risk to both the quantity and quality of feedstock. For example, feedstock harvested by different suppliers in different windows can undergo varying levels of exposure to sun, wind and moisture, leading to variations in delivered feedstock quality.

Score

For example, agricultural feedstocks and energy crops have optimal harvesting windows to ensure minimal moisture content. In certain regions these harvesting windows may coincide with heightened weather risk such as frost or rain.

Raw RI Score **7**

Wheat harvesting season lasts from late August to early October, is highly weather dependent and harvesting time varies by four weeks between the supply basin's southern and northern regions. Dry weather in particular can negatively impact the quality and quantity of feedstock produced, resulting in reduced yields or a difficult to bail product (if the straw becomes too dry).

Because of the weather, the harvesting window may be reduced Wheat straw must be baled and transported as soon as it is harvested. Growers said they would not tolerate wheat straw laying in bales in their fields.

Dry weather can have a negative impact on the quality and quantity of feedstock. For starters, dry weather can reduce wheat yields, resulting in less wheat straw produced. Second, dry weather can cause wheat straw to dry out to the point where it is difficult to bale. This is especially true when rotary combines are used, which increases the impact of dry weather.

There will be no public backlash against feedstock production, collection, or delivery. The raw RI Score is considered moderate/high.

Notched Salience. The involvement of an experienced third-party baling company could significantly reduce RI 3.4.1. (Or by provision of similar services through a vertically integrated bio-project). The preferred company should use square balers, which can	**Score notched**

handle the output of rotary-type combines, this would also reduce the risk of shorter harvesting windows as the company can focus all of its efforts on baling in a timely manner. As a result, the Raw RI Score is notched by 50%: Notched Salience is 3.5.	**3.5**
Impact Level. RI Impact Level is deemed *medium*.	**Score 6.66**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 23.31 out of 100.	**Score 23.31**

3.4.2 Harvesting and Collection Equipment

	Score
Rationale Different types of harvesting and collection equipment used by suppliers can have a significant impact on the quality and availability of feedstock. Use of different types and combinations of harvesting, collection and processing equipment among suppliers can lead to non-homogeneous feedstock. Equipment that is not designed specifically for biomass cultivation, harvesting and collection, can increase feedstock quality risks. Relevant equipment should be specified for the sake of product consistency and risk reduction.	
Raw RI Score The conventional combine is ideal for harvesting wheat straw in terms of yield. Wheat straw produced by conventional combines is relatively long in length, making it easier for balers to collect. These combines are typically only used by growers who also raise cattle and collect straw for bedding and feed. As most regional growers within this BDO zone harvest wheat for grain, they prefer to use rotary combines, which increase wheat yields, but cut the straw into shorter lengths that are more difficult to bale. The rotary combine is a newer machine designed to maximize grain separation at the expense of straw length. The separation process shreds straw to lengths significantly shorter than the conventional combine, making it difficult to collect and store using round balers. Square balers can handle short straw lengths with ease, but they are not commonly used in the Regina area at present. Because the harvesting and collection equipment preferred within the supply basin is not designed for collecting / baling wheat, the raw RI Score is considered high.	**10**
Notched Salience. Given the high capital investment and loss of primary crop yield, growers are unlikely to purchase conventional balers. Similarly, there is a low likelihood of large-scale investment in square balers by local growers to supply a bio-plant in the BDO Zone. RI 3.4.2 could be notably reduced by outsourcing harvest and collection to a reputable third-party baling company capable of supplying square balers, or by providing similar services through a vertically integrated bio-project. As a result, the Raw RI Score is notched by 50%: Notched Salience is 5.	**Score notched 5**
Impact Level. RI Impact Level is deemed *medium*.	**Score 6.66**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 33.30 out of 100.	**Score 33.30**

3.4.3 Variation in Densification Methods among Different Suppliers

Score

Rationale The shape and density of the unit in which feedstock is supplied can impact feedstock cost and quality. Standard feedstock densification modes for biomass consist of round or square bales, pellets, cubes, chips, or grindings. The size of wood fibre processed in a grinder is less homogenous than if a chipper is used.

Bales of different densities can absorb moisture at different rates. In certain cases, round bales have been viewed as problematic due to their uneven moisture content distribution (Huhnke 2018).

Raw RI Score. **5**

Round balers constitute most balers available in the supply basin. Even if growers invest in square balers (which is unlikely due to capital costs), the resulting mix of round and square bales can result in a less homogeneous feedstock supply for a bio-project, resulting in high supply variations in MC (Moisture Content) and downstream issues regarding handling and processing equipment. Adding to this, it's important to note that round bales cost slightly more to transport per tonne than square bales, potentially offsetting margins (however, not by much).

The raw RI Score is considered moderate.

Notched Salience. Outsourcing harvest and collection to a credible third-party baling company that can supply square balers and ensure homogeneous bale density and size or providing similar services through a vertically integrated bio-project, could mitigate RI 3.4.3. As a result, the Raw RI Score is notched by 50%: Notched Salience is 2.5.	**Score notched** **2.5**
Impact Level. RI Impact Level is deemed *moderate*.	**Score** **6.66**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 16.65 out of 100.	**Score** **16.65**

3.4.4 Availability of Labour for Feedstock Production

Score

Rationale Skilled labor shortages can be difficult to remedy in the short-term. Availability of suitable labor in an area can impact the ability to procure sufficient feedstock quantities on required schedules. Labour risks are higher for greenfield facilities where supply chains are not yet active; or for Proponent's for whom large feedstock requirements, or development of new (or expanded) supply chains, demand significant additions to the local labor force.

Raw RI Score. **7**

4-6 weeks of the year, during harvest, additional labor required for wheat straw collection and transportation. Transport companies should be able to handle the temporary increase in demand because as this dynamic is common in agricultural markets. If necessary, trucks could be brought in from other provinces to support excess yields, without minimal net cost-impact.

Due to presently low market demands for wheat straw and an underdeveloped supply chain, the amount of bailer operators trained to (square) bail wheat straw is low. This has generated concerns

about the existing labor force's ability to meet the increased demand for baling, meaning that willing participants would need to be quickly trained during the relatively short harvesting season.

The raw RI Score is considered high.

Notched Salience. RI 3.4.4 can be significantly mitigated by importing temporary labor and trucking equipment from other regions. In addition, all sub-risks in RI 3.4.4 could be significantly mitigated by outsourcing harvest and collection to a credible third-party baling company or by provision of similar services through a vertically integrated bio-project. As a result, the Raw RI Score is notched by 50%: Notched Salience is 3.5.	**Score notched** **3.5**
Impact Level. RI Impact Level is deemed *moderate*.	**Score 6.66**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 23.31 out of 100.	**Score 23.31**

3.5.1 Feedstock Transportation Costs

Rationale Transportation can be one of the most significant cost components of biomas supply chains. The average transport cost and percentage of total feedstock co attributable to transport should be known.	**Score**
Raw RI Score Estimated transportation costs should account for about 10% to 15% of total feedstoc delivered costs. We observed that even a minor increase in average transport distanc results in a significant expansion of the feedstock supply basin (see supply curves Therefore, the risk of rising transportation costs having a significant impact on th delivered price of feedstock was determined to be low. To avoid jeopardizing future negotiations between markets and growers, detaile transportation calculations are not included in this rating. The raw RI Score is considere low/moderate.	**3**
Notched Salience. No adjustments	**Score Unnotched 3**
Impact Level. RI Impact Level is deemed *high*.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 29.97 out of 100.	**Score 29.97**

3.6.1 Feedstock Transportation Costs OR Number, Size Mix and Locations of Suppliers

Rationale In general, a supply portfolio involving multiple suppliers of various sizes (and from multiple regions) is important for ensuring steady and uninterrupted feedstock	**Score**

supply with minimal price fluctuations. If a small number of large suppliers provides a high proportion of total feedstock, a disruption or supplier breach will have greater impact on the supply chain. In such cases the risk of disruption is lower, but the impact of those disruptions is higher. Conversely, a large number of small suppliers are less likely to have the capacity to withstand internal disruptions and thus may be more likely to breach. Here, risk of disruption is higher, but their likely impact is lower. The number of suppliers as well as the ratio of small to large suppliers should be optimized. There is no pre-determined number or optimal ratio of suppliers, although having too many or too few can both pose higher degrees of risk.

5

Raw RI Score
Numerous potential feedstock suppliers have been identified in the area. Six of the 174 growers polled indicated a willingness to supply a total of 30,200 ODMT/yr. of wheat straw. Based on this sample, a large-scale project would require between 150 and 250 growers. Despite the logistical pains of coordinating multiple supply sources, securing a larger number of growers, will reduce the overall feedstock risk, as the unexpected failure of one or two growers would have less significant impacts on the overall supply chain.

Notched Salience. The large number of potential suppliers can make use of the third-party baling company (or provision of baling services by the off-taker) more complicated and potentially more costly. Because RI 3.6.1 dampens the effectiveness of the introduction of a third-party baling company as a mitigant to other RIs, the Raw RI Score is negatively notched by 125%: Notched Salience is 7.5.	**Score Notched** **7.5**
Impact Level. RI Impact Level is deemed *high*.	**Score** **6.66**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 49.95 out of 100.	**Score** **49.95**

3.6.2 Suppliers Subject to Same External Risk Factors (non-weather and equipment based)

Rationale When a single risk event can impact the feedstock production ability of all (or most) suppliers, then feedstock risk is higher and supply chain resiliency is lower. Resilience is maximized when biomass supply chains exhibit diversity in spatial location (i.e., geography), production practices and other elements of supply chain structure such that the impact of single high-risk events have varying impacts on suppliers.	**Score**
Raw RI Score. Wheat straw suppliers are subject to falling wheat prices, which may force growers to switch to other crops. The raw RI Score is considered to be high.	**9**
Notched Salience. The radius of the supply basin could be expanded to significantly reduce RI 3.6.2. Supply curves show widespread availability at a marginally higher cost. Maintaining site bale inventories of more than 18 months' worth of biomass can offset moderate fluctuations in straw supply. Farmers who enter supply contracts with a bio-project would benefit from increased revenue streams from the money they make from straw in addition to the earnings generated from primary wheat production. This additional income may keep wheat planting competitive (in terms of farmer profit), even if other crops become marginally more valuable in certain years.	**Score Notched** **4.5**

As a result, the Raw RI Score is notched by 50%: Notched Salience is 4.5.

Impact Level. RI Impact Level is deemed *medium*.	**Score 6.66**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 29.97 out of 100.	**Score 29.97**

3.7.1 Seasonal Weather Impacts on Feedstock Supply

Rationale Seasonal weather impacts are defined as those deriving from natural weather variations (i.e., spring thaws, rainy seasons or dry seasons – as opposed to from singular weather events like fires, droughts or hurricanes). Seasonal weather changes can be a significant risk factor affecting feedstock availability, quality and price. **Score**

Given the major influence that weather has on multiple aspects of growing, harvesting and transporting biomass, it is difficult to predict the availability of biomass at a specific location at different points in the future with a high degree of certainty. However, it is still possible, using past data and statistical models, to generate reasonable upper/lower bound estimates of biomass production in any given year in a wider supply basin. Such estimates are important in assessing feedstock risk and enable accurate assessment of the efficacy of Proponent's mitigation methods.

Raw RI Score **7**

Wheat production, and thus wheat straw availability, varies yearly, with weather events being a significantly contributing factor. However, variances have been historically well tracked with 1-in-10-year low statistics and 1-in-20-year low statistics being published and publicly accessible (BIMAT). Potential wheat straw availability is 61 percent of an average year's availability within 10 kilometers of Regina in a 1-in-10-year low year, and 53 percent in a 1-in-20-year low year.

The detailed impacts of seasonal weather variations can impact wheat straw in the following ways; hot dry summers reduce wheat yields, directly impacting the amount of straw that can be acquired from a single crop. Additionally, overly dry straw can be difficult to bail with rotary combines, resulting in lower net yields.

Meanwhile early winter, can shorten the harvesting season, leaving less time for wheat straw collection as growers prioritize grain collection over that of wheat straw.

Raw RI Score is deemed high.

Notched Salience. The region's large BAM; marginal cost increases due to longer transport distances; on-site bale inventories of more than 18 months; option agreements with redundant growers; and engagement of a credible third-party (or equivalent vertical integration of such service within a bio-project) to harvest / bale wheat straw from redundant growers could collectively help to mitigate RI 3.7.1.	**Score Notched 3.5**
As a result, the Raw RI Score is notched by 50%: Notched Salience is 3.5.	
Impact Level. RI Impact Level is deemed *high*.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 34.97 out of 100.	**Score 34.97**

3.7.2 Long-Term Weather and Climate Trends

Rationale In certain regions, climatic trends and significant potential changes to future weather patterns can create feedstock risk.	**Score**
Raw RI Score. Although precise forecasting is impossible, regional temperatures are expected to rise due to climate change. The same risks would exist in drier weather as in 3.7.1. The raw RI Score is considered moderate.	**5**
Notched Salience. No adjustments.	**Score Unnotched 5**
Impact Level. RI Impact Level is deemed *high*.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 49.95 out of 100.	**Score 49.95**

3.7.4 Risk of Infestation

Rationale Risk of future infestation, including its estimated consequences on feedstock supply, should be calculated into the overall risk profile. Since forest insect populations are influenced by environmental conditions, future changes in climate can be expected to significantly alter the outbreak dynamics of certain forest insect species. In some cases, larger and more frequent insect outbreaks may occur, but in other cases recurring outbreaks may be disrupted or diminished. As climate continues to change, we can expect more situations, particularly at the margins of tree ranges, where sub-optimal conditions for tree growth and reduced tree vigor can lead to outbreaks of forest insects.	**Score**
Raw RI Score The use of a third-party baler would amplify RI 3.7.4. However historic data has shown that there have been few incidences of crop disease outside the supply basin. Importantly, no confirmed cases of club root disease have been reported in the Regina BDO Zone. With proper management, most diseases can be controlled. For instance, by ensuring proper equipment sanitization between fields, the risk of disease transfer can be minimized. Raw RI Score is deemed low.	**2**
Notched Salience. No adjustments.	**Score Unnotched 2**
Impact Level. RI Impact Level is deemed *high*.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 19.98 out of 100.	**Score 19.98**

3.7.5-9 Risk of Extreme Weather Events-- Risk of hail, flood, drought, hurricanes, tornadoes, and strong winds, and extreme low temperature

Rationale See BSCRS Standards RI 3.7.5 Risk of Hail; 3.7.6 Risk of Flood; 3.7.7 Risk of Drought; 3.7.8 Risk of Hurricanes, Tornadoes, Strong Winds; 3.9.7 Risk of Low Temperatures.	**Score**
Raw RI Score Extreme weather events such has hail, flooding and strong winds pose a limited risk to wheat straw availability in the Regina BDO Zone. Raw RI Score is deemed ***medium.***	**4**
Notched Salience. No adjustments.	**Score Unnotched 4**
Impact Level. RI Impact Level is deemed *high*.	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 39.96 out of 100.	**Score 39.96**

3.8.1 Government Subsidies for Feedstock Production or Utilization

Rationale Feedstock that is directly subsidized though government programs can pose greater long-term risk than feedstock that is not. Subsidies may be subject to amendment or repeal, sometimes with minimal notice. NOTE: This risk indicator refers to direct feedstock subsides only; it does not apply to government subsidies that pertain indirectly to the operations of the Proponent such as Loan Guarantees or to the markets for products produced by the Proponent.	Score
Raw RI Score No government subsidies for feedstock exist at this time, including for wheat production. The raw RI Score is considered low.	1
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk.	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *low.*	**Score 3.33**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 3.33 out of 100.	**Score 3.33**

3.8.2 Local, Provincial, and National Laws, Regulations and Permitting Pertaining to Biomass

Rationale Feedstock whose production is directly dependent on local, provincial/state or national laws or government regulations can pose greater long-term risk than feedstock that is not, since laws and regulations may be subject to amendment or repeal. If utilization of biomass requires specific permits (i.e., percentage removal of forest residues or corn stover, allowable cut limits, air emission, storage permits, rights-of-way, overweight permits for trucks, cross-border permitting for shipment of biomass, chain of custody, or certification of sustainability) then likelihood of obtaining such permits and/or complying with permitting requirements should be examined.	Score

Raw RI Score. Wheat straw supply is not governed by any laws, regulations, or permits issued by the government. Changes to these laws, regulations, or permits pertaining to wheat straw, are unlikely to occur. The raw RI Score is considered low.	1
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *low*	**Score 3.33**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 3.33 out of 100.	**Score 3.33**

3.8.3 Backlash Against Biomass Development, Procurement or Usage in the Region

Rationale Public backlash against biomass development in the Proponent region can directly impact Proponent's ability to procure, transport, trans-load, store, or utilize feedstock by affecting local policies, regulations and Proponent's ability to obtain necessary permitting.	Score
Raw RI Score. There is not expected to be any backlash against biomass development. The raw RI Score is considered low.	1
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk.	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *low*	**Score 3.33**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 3.33 out of 100.	**Score 3.33**

3.8.4 Consent of, and Co-Operation With, Indigenous Communities and First Nations

Rationale Where new project development on or near Indigenous or First Nation land, or where near Indigenous or First Nations exert influence over feedstock producing areas, consent of, and co-operation with, Indigenous communities and First Nations decreases Proponent risk.	**Score**
Raw RI Score No Indigenous communities were immediately identified in the supply basin that would be impacted by wheat straw production or procurement. The raw RI Score is considered low.	**1**
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *low*	**Score 3.33**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 3.33 out of 100.	**Score 3.33**

3.9.1 GHG EMISSIONS FROM PRODUCTION, HARVEST AND TRANSPORT

	Score
Rationale Understanding a project's overall emissions and the carbon intensity throughout the feedstock supply chain is an essential part of reducing risks related to carbon pricing mechanisms and related regulations GHG emissions from production, harvest and transportation can be a significant challenge to Proponent claims of carbon neutrality for biomass projects. Carbon emissions from harvested soils, as well as emissions from harvesting machinery or delivery trucks, can make the achievement of net-zero GHG emissions difficult. If a Proponent's financial model relies on carbon neutrality/GHG regulatory pricing frameworks, then an investigation into the feedstock's carbon emission status is essential.	
Raw RI Score Wheat straw has soil nutrients and is currently used as a fertilizer in the field. Sourcing significant quantities would likely require farmers to seek fertilizer replacement and may impact grower participation. Farmers currently leave wheat straw in the field every three years. The raw RI Score is considered moderate.	**5**
Notched Salience. RI 3.9.1 could be mitigated as the price of wheat straw is expected to be higher than the cost of fertilizer.	**Score Notched**
As a result, the Raw RI Score is notched by 50%: Notched Salience is 2.5.	**2.5**
Impact Level. RI Impact Level is deemed *low*	**Score 3.33**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 8.33 out of 100.	**Score 8.33**

Category 4: Feedstock Quality

4.1.5 Geographic Location Influence on Feedstock Variability.

	Score
Rationale Feedstock from different regions may differ in quality due to variations in soil quality, topography, harvest practices, weather, fertilizer applied, etc.	
Raw RI Score. There should be no significant variation in feedstock quality from feedstock harvested within the BDO Zone. The raw RI Score is considered low.	**1**
Notched Salience. No adjustments. De-risking measures are not necessary for risk indicators with Raw RI Scores of 1, as they are already the lowest risk.	**Score Unnotched 1**
Impact Level. RI Impact Level is deemed *high*	**Score 9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 9.99 out of 100.	**Score 9.99**

Category 5: Feedstock Feedstock Scale-Up Risk

5.1.2 Capacity of Supply Chain Components and Infrastructure to scale.

Rationale Scale-up risk increases if supply chain components, or underlying feedstock infrastructure necessary for these components, cannot scale to handle Proponent feedstock requirements and throughput capacity. Capacity to scale should be demonstrated.	**Score**
Raw RI Score Based on included supply curves (see Appendix), more than enough wheat straw produced to support a large-scale biomass project. However, the supply basin's baling equipment is insufficient to support a large-scale project, especially in the short term. The use of round balers in conjunction with rotary combines poses a high risk as round balers are ineffective for baling straw processed by rotary combines. It is believed that expecting current growers to invest in additional baling or combine equipment is unrealistic, even with the economic incentive of becoming a supplier. As presently the wheat straw is deemed insufficient or lacking in comparison to wheat grain (which their combine systems have been optimized for). This correlates to a high risk that baling equipment would not scale, especially in the short-term. Labor availability may be another issue as well, as discussed above. Raw RI Score is deemed high.	**8**
Notched Salience. RI 5.1.2 could be moderately mitigated by outsourcing harvest and collection to a credible third-party baling company, or by provision of similar services through a vertically integrated bio-project. As a result, the Raw RI Score is notched by 25%: Notched Salience is 7.5.	**Score Notched** **6**
Impact Level. RI Impact Level is deemed *high.*	**Score** **9.99**
Loaded RI Score. The Loaded RI Score (Notched Score x Impact Level) is 59.94 out of 100.	**Score** **59.94**

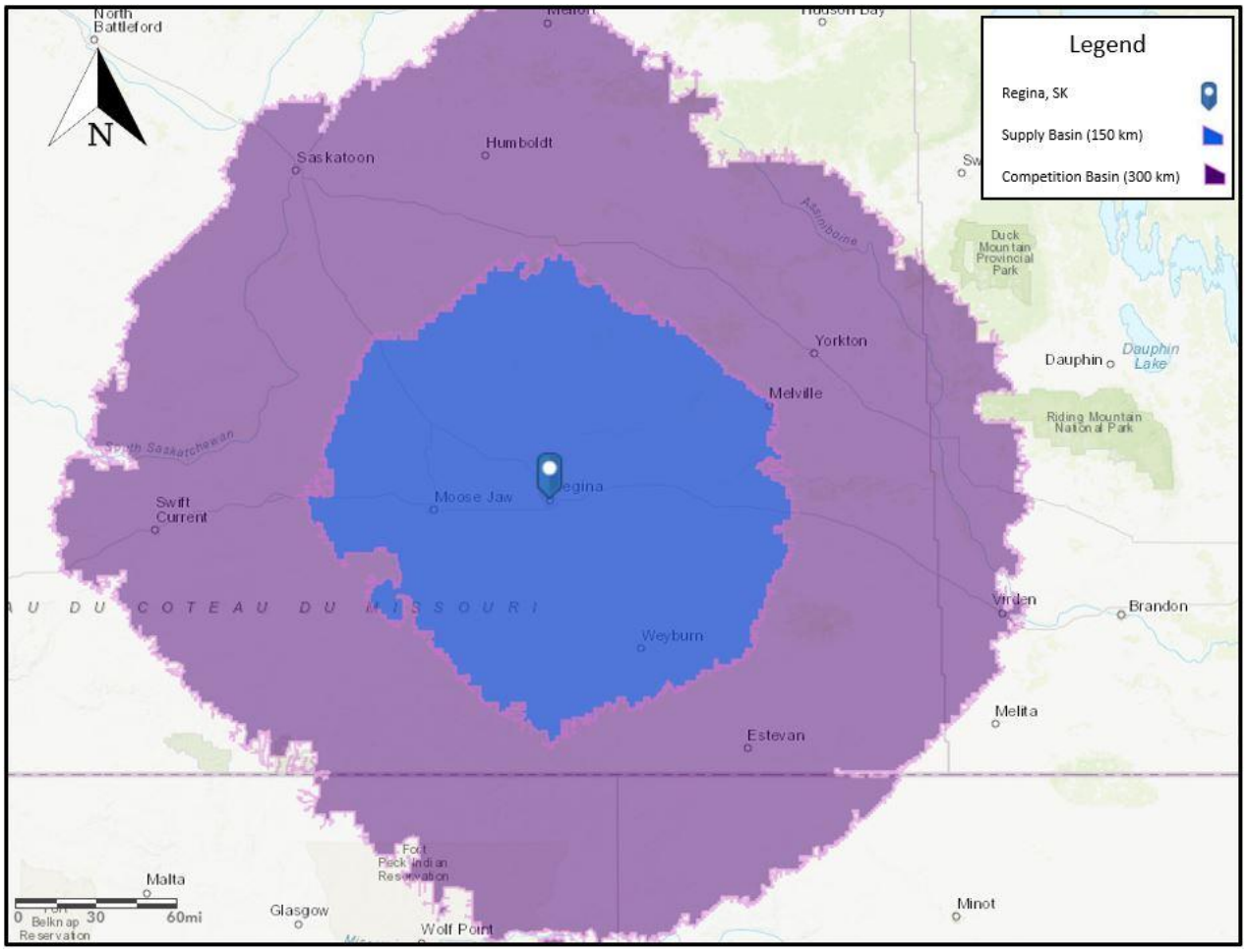
APPENDIX B: BDO Zone Designation

This appendix serves as a wheat straw availability background study to the BDO Zone Risk Rating for the City of Regina, SK.

BACKGROUND RESEARCH AND ASSUMPTIONS

This Study was conducted for City of Regina and IRAP. The objective of this part of the Study is to provide City of Regina with a high-level analysis of wheat straw projected availability and cost, as well as an overview of feedstock supply risk.

Map 1: Feedstock supply basin and Competition Basin



Current demand

Presently, there are no large-scale facilities consuming wheat straw within 300 km surrounding Regina, Saskatchewan (SK). Cattle feedlots and mushroom growers are the only consumers of wheat straw in the region, accounting for an estimated 5% of all generated wheat straw. The remainder of the wheat straw is left in the fields after the grain is harvested.

Outreach and assumptions

To determine farmers' willingness to supply wheat straw to the Project, and to collect data necessary for deriving feedstock availability and cost projections, conversations were held with 174 farmers. Based on this outreach, three sets of assumptions could be derived, which were turned into an Expected, Upside, and Downside scenarios. Analysis confirmed that the Expected scenario is in line with theoretical availability models, such as BIMAT. Additionally, based on outreach we have assumed three levels of famer participation rates: 20%, 38% and 58%. Finally, outreach to transport companies was carried out to estimate the cost of trucking.

Overview of results

The figure below depicts a summary of all feedstock availability projections. The three supply curves indicate the Expected scenarios. Under the 20% participation rate, the Project would likely acquire its required feedstock of 300,000 ODMT/yr (Oven Dried Metric tonnes per year) within 150 km of Regina, at 350,467 ODMT/yr. Under the 38% participation rate, the Project can potentially acquire all of its required feedstock within 90 km of Regina, and 303,657 ODMT/yr. Under the 58% participation rate, the Project can potentially acquire all of its required feedstock within 70 km of Regina, 318,510 ODMT/yr.

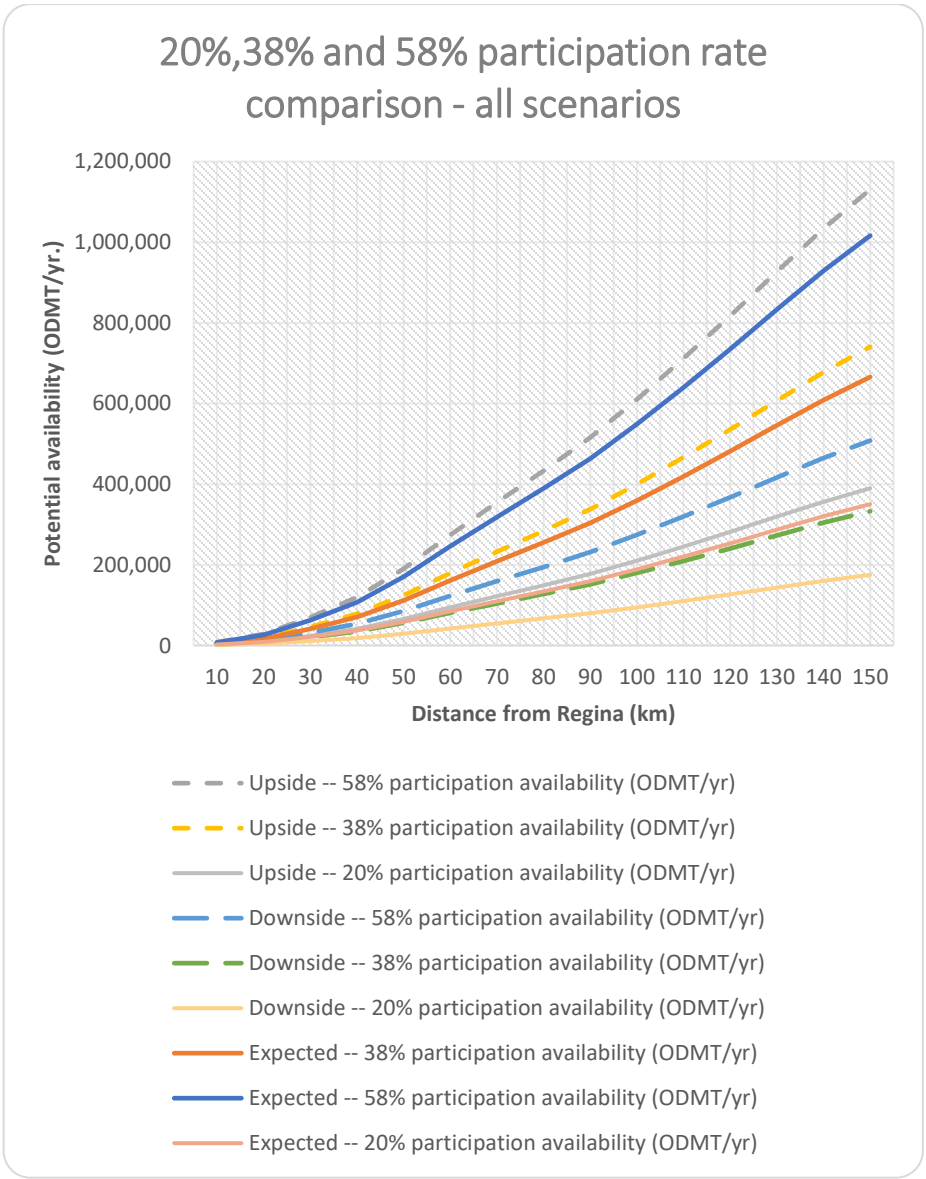


Table 1 below indicates the average projected feedstock cost assuming a facility feedstock intake of 300,000 ODMT/yr. Small differences exist between the average delivered feedstock costs for the participation rates due to incremental transportation costs. These make up a relatively small portion of the total cost.

Table 1: Average feedstock price in $/ODMT

	58% participation rate	38% participation rate	20% participation rate
Expected	$116.63	$123.37	$143.60
Upside	$77.58	$83.13	$94.24
Downside	$171.54	$187.41	-

Overview of risks

We identified five high-level areas of risk:

- **Underestimating wheat straw price**. This risk can likely be mitigated through fixed-price contracts.
- **Lack of interest from large growers during initial outreach**. This risk can likely be mitigated through in-person visits and credibility building.
- **Lack of baling infrastructure and need for a third-party baler**. The lack of baling infrastructure can be mitigated through an engagement of a third-party baling company. Engaging just one company also poses risks, which can be mitigated by engaging more than one custom baler.
- **Widespread use of the rotary combines**. This risk can likely be mitigated using a square baler (for example, through an involvement of a third-party baler or vertical integration by the project developer).
- **Dry weather**. Dry weather is likely to negatively affect the potential availability of wheat straw. This can be mitigated by expanding the procurement radius.

1.0 About the Study

The Study is conducted for City of Regina. The purpose of the Study is twofold:

1. To provide the City of Regina with a high-level analysis of wheat straw projected availability and cost as well as an understanding of feedstock supply risk.
2. To determine the City of Regina's eligibility as a low-feedstock-risk site location and designate the City of Regina as a Biofuel Development Zone ("BDO Zone"), which includes a Feedstock Risk Rating based on the Standards for Biomass Supply Chain Risk.

Project description

The proposed project involves the construction of a pulp manufacturing facility in the City of Regina, with a planned feedstock intake of 300,000 oven-dry metric tons per year (ODMT/yr), herein referred to as “the Project.”

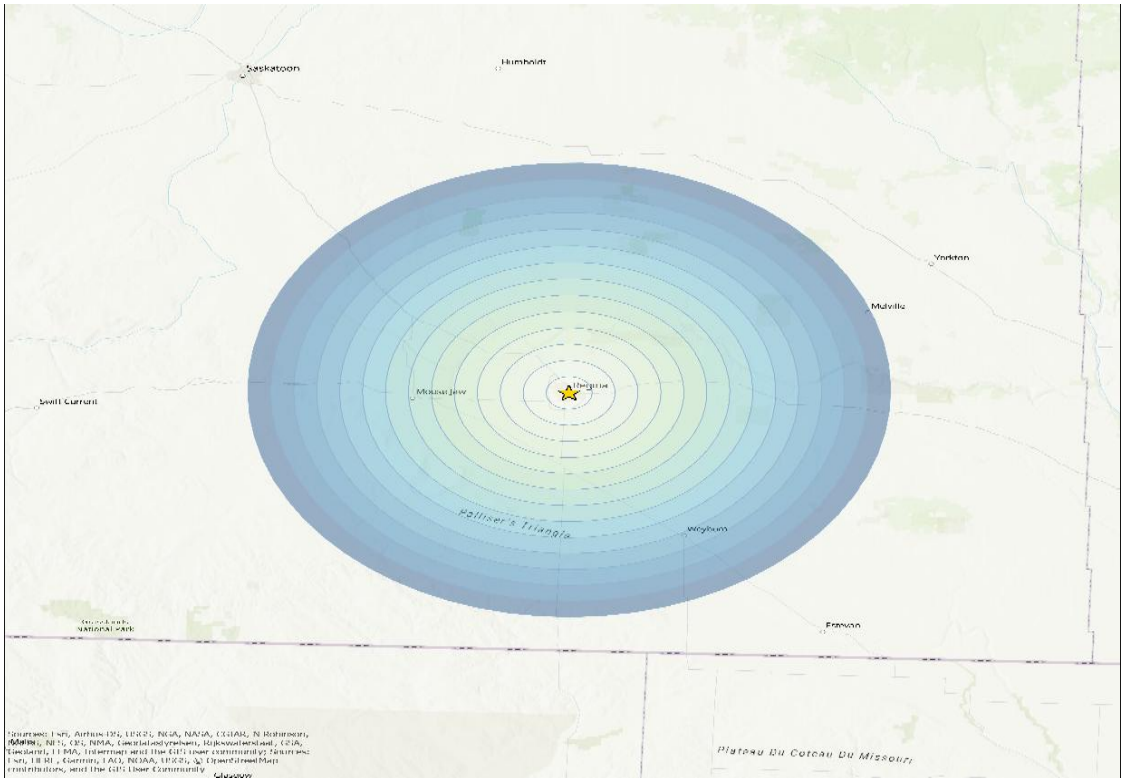
2.0 BACKGROUND RESEARCH AND ASSUMPTIONS

2.1 Supply Basin

The supply basin is defined as an area around Regina from which wheat straw can be economically sourced. As it’s derived from agricultural residue supply chains, the supply basin is not constant, and can fluctuate due to changing feedstock availabilities within the region; for example, dry weather can result in lower than expected yields, requiring the supply basin to expand. The supply basin is merely limited by the maximum cost of feedstock the Project is willing to pay, as the transportation costs to bring in additional feedstock is minor in comparison to the net feedstock cost. For analysis purposes we looked at a region up to 150 km from Regina at 10 km intervals (Map 1).

The competition zone is defined as an area double that of the supply basin, that is, 300 km.

Map 2: Feedstock supply basin of 150 km radius by 10 km intervals



2.2 Current Demand

Presently there are no large-scale facilities consuming wheat straw within the 300 km competition zone.

Cattle feedlots are the primary identified consumers of wheat straw within the region. Wheat straw is often used for bedding, and sometimes for feed. Sokhansanj et al. (2006)[1] estimate that in the Prairies 2.5% of generated wheat straw goes to cattle feedlots. When intake from mushroom growers is included, we *use an estimate of 5% in our calculations*.

Due to the lack of significant markets for wheat straw, an estimated 95% of the total annual generation is left in the fields as a fertilizer.

2.3 Supply research and assumptions

Potential Wheat Straw Availability

Two approaches were applied to determine the potential availability of wheat straw in the region. Potential (as opposed to actual) wheat straw availability refers to the amount of wheat straw that could be acquired from the supply basin. It does not consider the availability of equipment or other variables related to infrastructure that could affect actual availability. These variables are discussed later.

Approach 1: Theoretical Model

To estimate theoretical availability of wheat straw, we first used Agriculture and Agri-Food Canada's Biomass Inventory Mapping and Analysis Tool (BIMAT)[2] to determine the potential wheat straw availability at each 10 km distance interval from Regina. Since BIMAT provides data up to 2016 (based on data collected between 1985 and 2016), additional data from Statistics Canada for 2017 - 2021 was acquired and BIMAT assumptions applied.

In addition to BIMAT, a separate model to verify BIMAT's assumptions was created. The following assumptions are included within our model:

- The total wheat straw that could be potentially acquired makes up between 60- 80% of grain yield (in pounds). This estimate would already include losses due to chaff and stubbles[3].
- The average tillage rate was estimated to be 11%[4] as per current state. However, no tillage was considered for modelling purpose as this is the convention currently followed in the region.

As previously stated, Prairie-wide estimates indicate that 2.5% of generated wheat straw is utilized as cattle bedding and feed; intake from mushroom growers was added to this estimate, bringing it up to 5% in our calculations.

Approach 2: Outreach to farmers and transport companies

To confirm the above assumptions, and gauge farmers willingness and capacity to supply wheat straw to the project, 174 farmers who self-identified as wheat straw growers were contacted. Farmer estimates were generally

[1] Sokhansanj, S., Mani, S., Stumborg, M., Samson, R., and Fenton, J. (2006). Production and distribution of cereal straw on the Canadian prairies. Canadian Biosystems Engineering, Vol. 48.
https://www.researchgate.net/publication/236999871_Production_and_distribution_of_cereal_straw_on_the_Canadian_prairies

[2] Accessible through: http://www.agr.gc.ca/atlas/bimat

[3] Chaff refers to small particles created through the harvesting process. Stubble refers to the part of the wheat plant that is left in the ground following harvesting.

provided based on bale and acre units. For example, the price of wheat straw paid for by cattle feedlots is calculated per bale.

To determine the quantity of wheat straw per acre farmers were asked for verbal estimates. In most cases, farmers provided a rough estimate of 2 bales per acre with approximately 0.5 MT per bale. Estimates as to the number of bales per acre generally varied between wheat straw farmers and cattle farmers. For instance, some wheat straw farmers claimed as much as 3-4 bales per acre could be harvested, while cattle farmers were more conservative and, in a few cases, claimed that less than 2 bales per acre could be available. The following table shows a summary of estimates provided by cattle farmers:

Table 1: Estimates of bales per acre by cattle farmers

Bales/acre Estimate	Farmer
1.25	F1
2.00	F2
1.00	F3
2.00	F4
1.56	**Average**

In terms of estimates as to the quantity of wheat straw in a bale (in MT), most farmers indicated that there are 0.5 MT/bale. In a few cases that estimate was higher, as summarized in the table below:

Table 2: Estimates of the number of MT per bale (in addition to the general 0.5 MT/bale estimate)

MT/bale Estimate	Farmer Last Name
0.65	F1
0.55	F2
0.60	F3
0.55	F4
0.60	F5
0.73	F6
0.61	**Average**

Supply Curve Scenarios

Based on the above assumptions, we developed three potential wheat straw availability scenarios:

Expected scenario assumes the 'rule-of-thumb' assumptions quoted by the majority of farmers correlating to 2 bales/acre with 0.5 MT/bale.

Upside scenario assumes 2 bales/acre with 0.6125 MT/bale. The 0.6125 MT/bale estimate is an average of estimates provided by farmers who did not agree with 0.5 MT/bale estimate.

Downside scenario assumes 1 bale/acre with 0.5 MT/bale. The 1 bale/acre estimate was provided by a custom baler that used to bale for the Dow strawboard processing facility that shut down in 2005. Although this estimate

was the most conservative out of all estimates gathered, it was applied as he was the only baler we spoke with that had previously worked for a large-scale wheat straw processing facility.

Participation rate

The potential availability estimates are based on wheat production data. Another important factor for consideration is farmers' participation rates, which based only on verbal feedback from outreach at this time would be low. It is expected that this would increase once a facility is commissioned.

In total, 174 farmers were surveyed, of which 1 in 5 expressed a willingness to supply wheat straw to the project. Cumulatively, these farmers indicated willingness to supply 30,200 ODMT/yr., meaning that our survey sample represents approximately 10% of the Project's feedstock intake.

Three estimates for participation rate have been derived. The first is based on the proportion of farmers contacted that expressed willingness to supply feedstock, while the subsequent rates are estimates based on increasing grower interest following project commission, as observed in other BDO zones.

i) Out of 174 farmers contacted, 1 in 5 farmer expressed willingness to supply wheat straw to the Project, amounting to 20% of total potential growers, and serving as our 'base rate of interest.'

ii) The projected rates of grower interest are then assumed to be 38% and 58% of total farmers, based on the study carried out for Melville BDO zone These rates are based on the number of farmers interested and the acres of land they are willing to lease if a biomass facility comes up.***Limitations to our methodology.***

Two main assumptions exist within our methodology:

1) Farmers who verbally indicated willingness to supply will do so (given fair wheat straw prices);

2) Farmers who indicated they are currently not interested in supplying may change their mind once the project is commissioned, price becomes attractive, and the supply chain develops.

While there may be risks that some of the interested farmers may not wish to proceed in future, this risk is likely to balance out by the increased number of farmers who may be more interested once the facility is closer to being developed/commissioned. Therefore, we intend to keep the participation rates at 58%, 38%, and 20%, recognizing that more research needs to be done to understand the actual availability of wheat straw.

1-in-10 and 1-in-20-year lows

Wheat production, and therefore wheat straw potential availability, varies yearly. 1-in-10 and 1-in-20-year low statistics are available from BIMAT. Therefore, by determining the predicted percentage of annual availability that makes up the 1-in-10 and 1-in-20-year lows, we estimated the expected lows for each scenario. For example, BIMAT estimates indicate that during a 1-in-10-year low year, wheat straw potential availability is 61% of an average year (within 10 km of Regina), and during a 1-in-20-year low is 53%. We then applied the 61% and 53% factors to the Expected, Upside and Downside scenarios.

Wheat Straw Cost

Except for relatively small cattle bedding market and mushroom markets (estimated 5% of all potential wheat straw production), there is no other identified market for wheat straw. Moreover, this market is scattered and unreliable,

often operating on a "special deal" or friend and family rate basis, meaning that our understanding of wheat straw market price is limited.

Presently no index exists that tracks the price of wheat straw in the region. For these reasons, we estimated price based on farmers' verbal indications.

Limitations. When interpreting prices verbally indicated by farmers, two limitations should be considered:

- Farmers provide 'ask' prices. In regular markets, ask prices tend to be higher than the market price as sellers attempt to raise prices. Therefore, reported 'ask' prices tend to overestimate the actual price.

- With high demand for feedstock, price can increase significantly. Farmers base their price indications on variables such as the cost of replacing fertilizer, cost of baling, and the current market price for bedding straw. Once a large-scale facility significantly increases demand for straw, farmers may increase prices realizing the Project's need for straw[4].

Tables 3 and 4 show verbal price indications provided by farmers. Original prices were provided with a bale as a unit, these prices were then converted to ODMT for consistency.

Material cost. Material cost refers to the cost of wheat straw paid to the farmers. 10 farmers indicated material cost, which ranged from $15 to $40 per bale, with an average of $27.50/bale. Assuming a wheat straw moisture content of 14%[5] and 0.5MT of wheat straw per bale, material cost ranged from $34.88 to $93.02 per ODMT, with an average of $63.95/ODMT.

Baling cost. Baling cost includes material baling, staging, and loading. 11 farmers indicated baling cost, which ranged from $10 to $15 per bale, with an average of $12.50/bale (the figure most often reported was $10.63/bale)[6]. Assuming wheat straw moisture content of 14% and 0.5MT of wheat straw per bale, baling cost ranged from $23.26 to $34.88/ODMT, with an average of $29.07/ODMT.

Total cost. Based on material and baling costs indicated by farmers, total wheat straw costs (delivered price supplier) range between $25 and $55 per bale, with an average of $40/bale. Assuming a wheat straw moisture content of 14% and 0.5MT of wheat straw per bale, the total indicated cost for wheat straw delivered price supplier ranges between $58.14 and $127.91 per ODMT, with an average of $93.02/ODMT.

Note on cost ranges. Tables 3 and 4 indicate large ranges between the low and high costs. These ranges should be taken with caution as they are skewed by singular indications. For example, only one farmer indicated that the material cost is $20/bale, and another individual farmer indicated that baling cost is $15/bale. Therefore, a better measure of expected cost is the average cost, which averages all cost indications and puts emphasis on cost estimates most often indicated.

Table 3: Verbal price indications provided by farmers. Prices per bale

	Low	High	Average
Material Cost ($/bale)	$15.00	$40.00	$27.50

[4] One way to mitigate price increases due to increased demand is through fixed-price contracts. At this point, however, we do not know whether farmers would be open to such agreements.
[5] Reported wheat straw moisture content ranged between 10% and 18%, with an average of 14%.
[6] Note that costs here refer to baling costs if baling was to be conducted by farmers or *local* custom balers. They do not estimate the costs of hiring a large third-party baling company.

Baling Cost ($/bale)	$10.00	$15.00	$12.50
Total Cost ($/bale)	$25.00	$55.00	$40.00

Table 4: Verbal price indications provided by farmers. Prices per ODMT

$/ODMT assuming 0.5 MT per bale

	Low	High	Average
Material Cost ($/ODMT)	$34.88	$93.02	$63.95
Baling Cost ($/ODMT)	$23.26	$34.88	$29.07
Total Cost ($/ODMT)	$58.14	$127.91	$93.02

Transportation Cost

Five verbal indications for transportation costs were acquired. Transportation cost indications were provided in $/Km (Table 5), with rates including 1 hour of loading and 1 hour of unloading. Any additional time is ranged from $100 and $120 per hour. The average indicated cost of transporting wheat straw is $0.35 per loaded km and per ODMT.

Note on minimum hours. Many trucking companies in the region are located at a distance to Regina, and if engaged, they would need to bring trucks in. For this reason, a minimum number of hours is sometimes required, as companies are reluctant to bring trucks in just for one haul.

Table 5: Transportation cost indications

Rates based on km travel

Km	Rate ($)	$/km
25	450	18
50	500	10
75	550	7.33
100	600	6.00
125	650	5.20
150	700	4.67
175	750	4.29
200	800	4.00
225	850	3.78
250	900	3.6
Average		6.69

Transportation rates provided above are expressed in $/loaded km for an entire load. For modelling purposes, we estimated cost per ODMT. First, we estimated the number of bales that can be fit on a trailer based on indications provided by these companies (Table 6). Then we converted these estimates to MT per trailer (Table 7), finally arriving at a cost per km per ODMT (Table 8).

There are two types of trailers that are fit to transport round bales, 53” flatbed and super-B flat bed trailers. Between 30 and 34 (average 32) round bales fit on a 53” flatbed trailer, while a super-B flat bed can haul on average

34 and 42 bales (average 38)[7]. These estimates convert to between 18.38 and 20.83 MT/trailer (average 19.60 MT/trailer) for a 53" flatbed trailer and between 20.83 and 25.73 MT/trailer (average 23.28 MT/trailer) for a super-B flat bed. This then correlates to transportation costs of $0.26/ODMT/loaded km and $0.22/ODMT/loaded km for a 53" flat bed and super-B flat bed trailers, respectively. The average $0.24/ODMT/loaded km is a cost estimate that we use in modelling (Table 8).

Note that all estimates are based on round bales. This is because the vast majority of balers currently available in the region are round. Of note, round bales tend to be less efficient to transport than square bales, meaning that these estimates are conservative, and costs could be slightly less.

Table 6: Number of bales per trailer indications

Source	round bales/53" flat bed	round bale/Super-B flat bed	Square bales/flat bed	Square bales/trailer
1	34	42	48	60
2	30	34	50	64
Average	**32**	**38**	49	62

Table 7: Estimated number of MT per trailer

Source	round bales/53" flat bed	round bale/Super-B flat bed	Square bales/flat bed	Square bales/trailer
1	20.83	25.73	19.68	27
2	18.38	20.83	25.00	28.80
Average	**19.60**	**23.28**	**22.34**	**28**

Table 8: Estimated transport cost $/ODMT/loaded km

round bales/53" flat bed	round bale/Super-B flat bed	Square bales/trail	Square bales/53 ft triaxle
$0.40	**$0.33**	**$0.35**	**$0.27**

3.0 PROJECTED AVAILABILITY AND COST

Based on the assumptions provided in Section 2.3 above, we developed projected supply and cost curves.

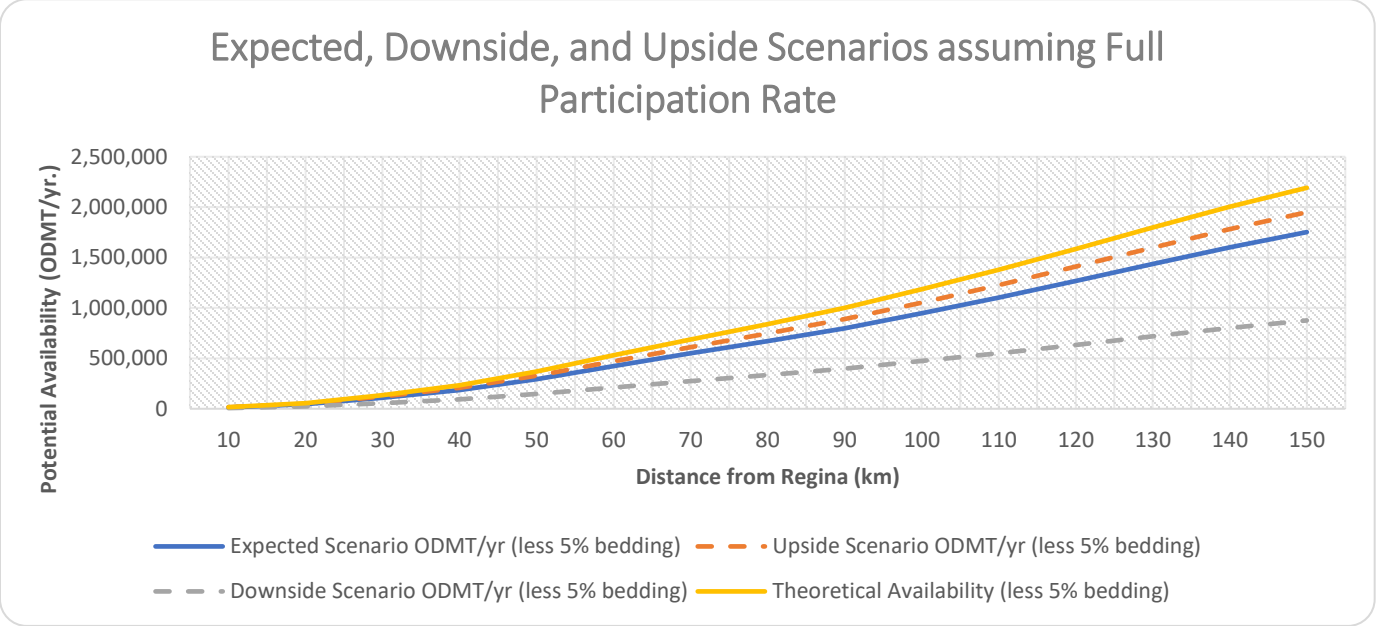
[7] These verbal indications can be easily verified with more trucking and equipment companies.

Figure 1 shows potential supply plotted against distance from Regina, based on the Theoretical, Expected, Downside and Upside scenarios. The Theoretical scenario is derived from BIMAT and adjusted for recent wheat yield data from Statistics Canada. The Expected, Downside and Upside scenarios are derived from assumptions based on the direct feedback from potential suppliers.

First, note that the Theoretical scenario closely follows the Expected scenario. In other words, the two methods to derive projected supply curves verify each other. Consequently, in our analysis we apply the Expected scenario as a baseline. The Upside and Downside scenarios serve as an upper and lower boundary of where the price could go, provided research to date. In addition to the three scenarios, we also project potential availability and cost based on 1-in-10 and 1-in-20-year wheat yield lows.

Our analysis is based on 58%, 38% and 20% participation rate levels, as explained in the subsection 2.3. For comparison, we provided projected supply cost curves at 100% participation rate.

Figure 1: Expected, downside, and upside scenarios assuming 100% participation rate



3.1 Comparison between 58%, 38% and 20% participation rates

Figure 2 and Table 10 indicate differences between 58%, 38% and 20% participation rates. The two solid (as opposed to dashed) supply curves indicate the Expected scenarios. Under the 58% participation rate, the Project can potentially acquire all of its required feedstock within 70 km of Regina, including 318,510 ODMT/yr. While under the 38% participation rate, the Project can potentially acquire all of its required feedstock within 90 km of Regina, and that of 303,657 ODMT/yr. Finally, under the 20% participation rate, the Project cannot potentially acquire all of its required feedstock within 140 km of Regina, with an estimated 320,496 ODMT/yr available.

A more detailed analysis under different scenarios is provided in subsequent subsections. Here it is important to understand that because of large differences in participation rates, the total average delivered cost of feedstock does change significantly. That is, there is a significant difference in feedstock cost due to participation rate. Under the 58% participation rate (in the Expected scenario), the average feedstock cost is estimated at $116.36/ODMT delivered Regina; under the 38% participation rate this cost is estimated at $123.02/ODMT delivered Regina and under the 20% participation rate this cost is estimated at $139.69/ODMT delivered Regina (Table 9).

This small difference in average delivered feedstock cost is because incremental transportation cost makes up for a relatively small portion of the total cost. For example, to acquire 300,000 ODMT/yr. of feedstock (under the Expected scenario), the maximum distance to travel under the 58% participation rate is 70 km, while under the 38% participation rate it is 90 km. This difference of 10 km translates to an additional transport cost of only $3.33/ODMT.

Figure 2: Summary of all scenarios based on 58%, 38% and 20%participation rates



Table 9: Average projected feedstock cost assuming 300,000 ODMT/yr. intake ($/ODMT)

	58% participation rate	38% participation rate	20% participation rate
Expected	$116.36	$123.02	$139.69
Upside	$77.04	$82.44	$93.23
Downside	$171.54	$183.44	-

3.2 Participation rate assumption – 58%

This subsection provides an analysis of projected feedstock supply and costs based on the 58% participation rate assumption.

Figure 3 compares supply curves for the Expected, Upside, and Downside scenarios. In the Expected scenario, the Proposed project can acquire its total feedstock requirement of 300,000 ODMT/yr. within 70 km of Regina. In the Upside and Downside scenario the Project can acquire its total feedstock requirement within 70 km and 110 km, respectively. More detailed analysis of projected availability under each scenario is provided below.

Figure 3: Expected, downside, and upside scenarios assuming 58% participation rate

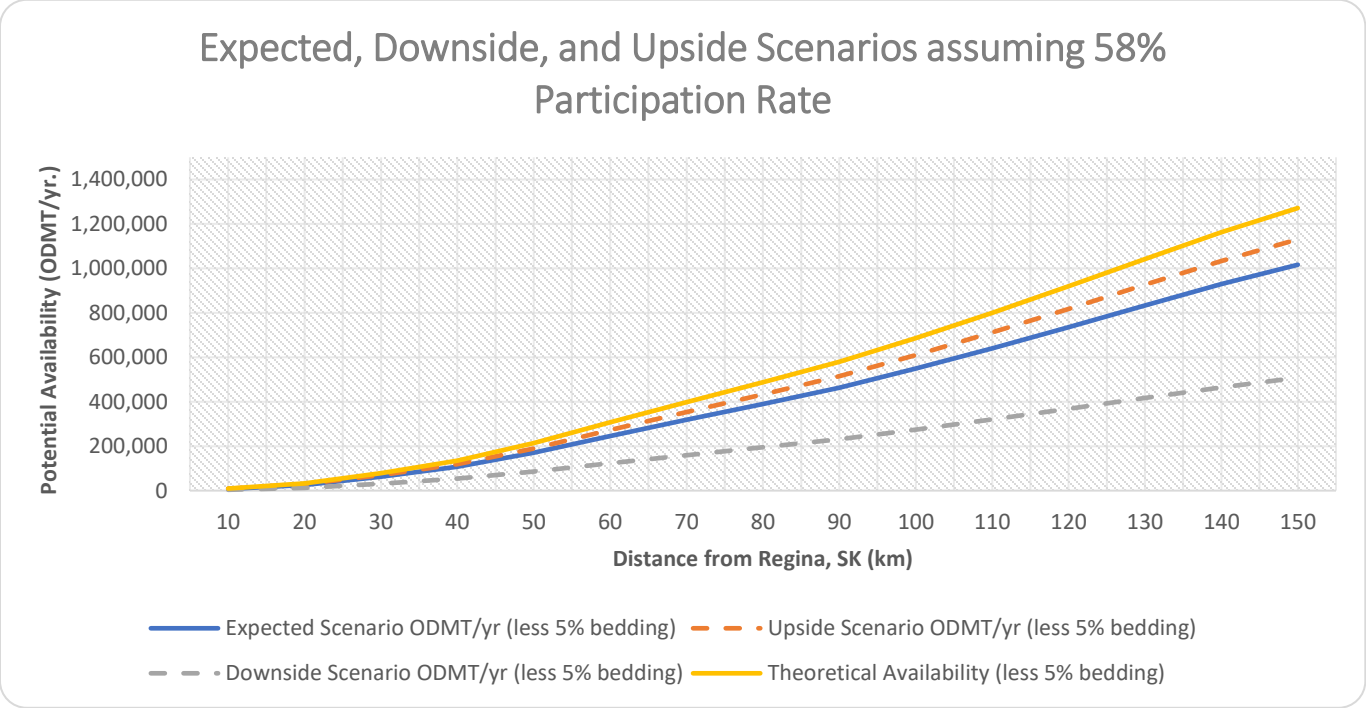


Table 10 summarizes projected feedstock cost under each scenario. In the Expected scenario, in an average wheat yield year, the average wheat straw cost is estimated at $109.25 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $32,776,293 /year (based on 300,000 ODMT/yr intake). In the Upside scenario, the average wheat straw cost is estimated at $70.82 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $21,247,087 /year. In the Downside scenario, the average wheat straw cost is estimated at $156.06 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $46,819,432 /year.

1-in-10-year low

In a 1-in-10-year low wheat yield case, in the Expected scenario, the average wheat straw cost is estimated at $115.49 /ODMT delivered price Regina; which is an equivalent of a total feedstock cost of $34,646,538 /year. In the Upside scenario, the average wheat straw cost is estimated at $74.61 /ODMT delivered price Regina; which is an equivalent of a total feedstock cost of $22,381,615 /year. In the Downside scenario, the average wheat straw cost is estimated at $164.75 /ODMT delivered price Regina; which is an equivalent of a total feedstock cost of $49,426,134 /year.

1-in-20-year low

In a 1-in-20-year low wheat yield case, in the Expected scenario, the average wheat straw cost is estimated at $116.10 /ODMT delivered price Regina; which is an equivalent of a total feedstock cost of $34,830,612 /year. In the Upside scenario, the average wheat straw cost is estimated at $76.20 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $22,860,283 /year. In the Downside scenario, the average wheat straw cost is estimated at $166.27 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $49,881,246 /year.

Note that the estimated average feedstock cost difference between the average year, 1-in-10 year low, and 1-in-20-year low differences is small. The reason for this is similar to why average cost does not respond significantly to participation rates; transportation cost makes up for a relatively small portion of the total cost (the estimated cost of travelling an additional 10 km is $3.33/ODMT).

Table 10: Projected feedstock cost per ODMT assuming 300,000 ODMT/yr. Intake assuming 58% participation. rate

Average year			
	Expected	Upside	Downside
Total	$32,776,293	$21,247,087	$46,819,432
Avg Per ODMT	$109.25	$70.82	$156.06
1-in-10-year low			
	Expected	Upside	Downside
Total	$34,646,538	$22,381,615	$49,426,134
Avg Per ODMT	$115.49	$74.61	$164.75
1-in-20-year low			
	Expected	Upside	Downside
Total	$34,830,612	$22,860,283	$49,881,246
Avg Per ODMT	$116.10	$76.20	$166.27

Expected Scenario assuming 58% participation rate

Figure 4 indicates projected feedstock availability under the Expected scenario, assuming 58% participation rate. Under these assumptions, on an average year the Project can acquire its feedstock requirement within 70 km of Regina, including 318,510 ODMT/yr. In a 1-in-10-year low case the Project can acquire its feedstock requirement within 110 km of Regina, including 349,104 ODMT/yr. In a 1-in-20-year low case the Project can acquire its feedstock requirement within 120 km, including 344,387 ODMT/yr.

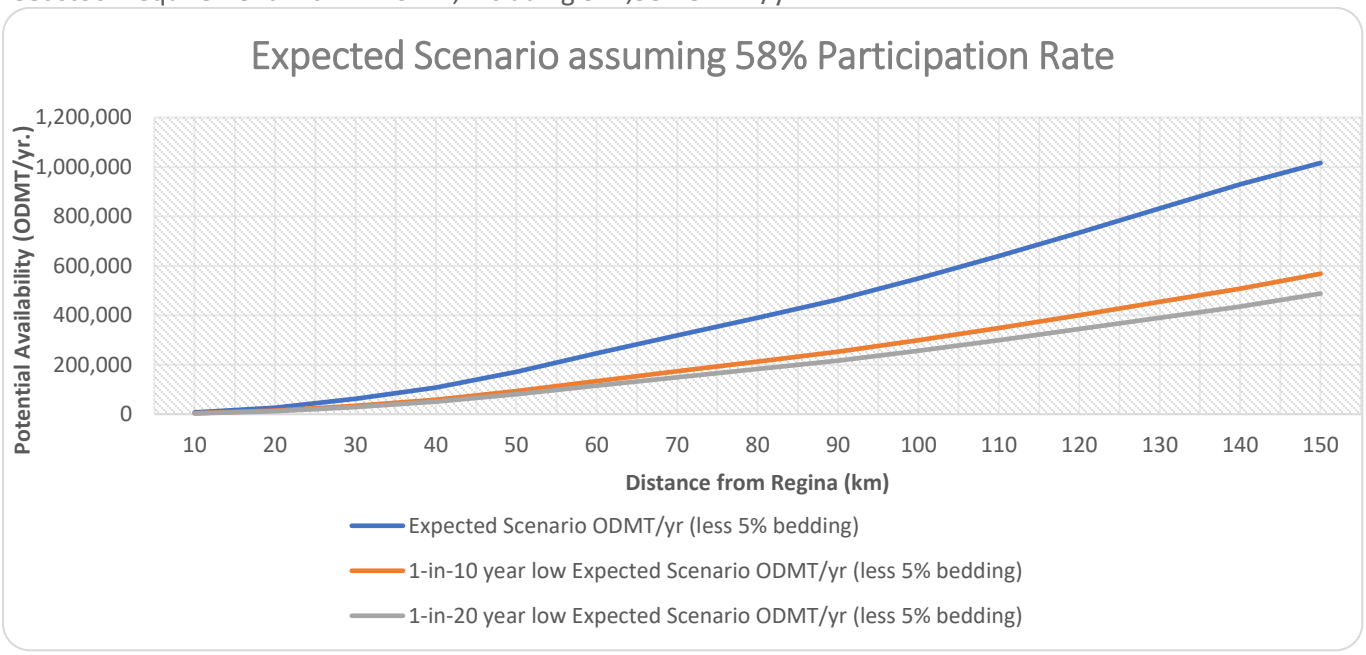


Figure 4: Feedstock supply curve -- Expected scenario assuming 58% participation rate

The purpose of Figure 5 and Table 11 is to demonstrate quantities of wheat straw potentially available at each 10 km distance interval from Regina.

Figure 5: Feedstock cost projection – Expected scenario assuming 58% participation rate

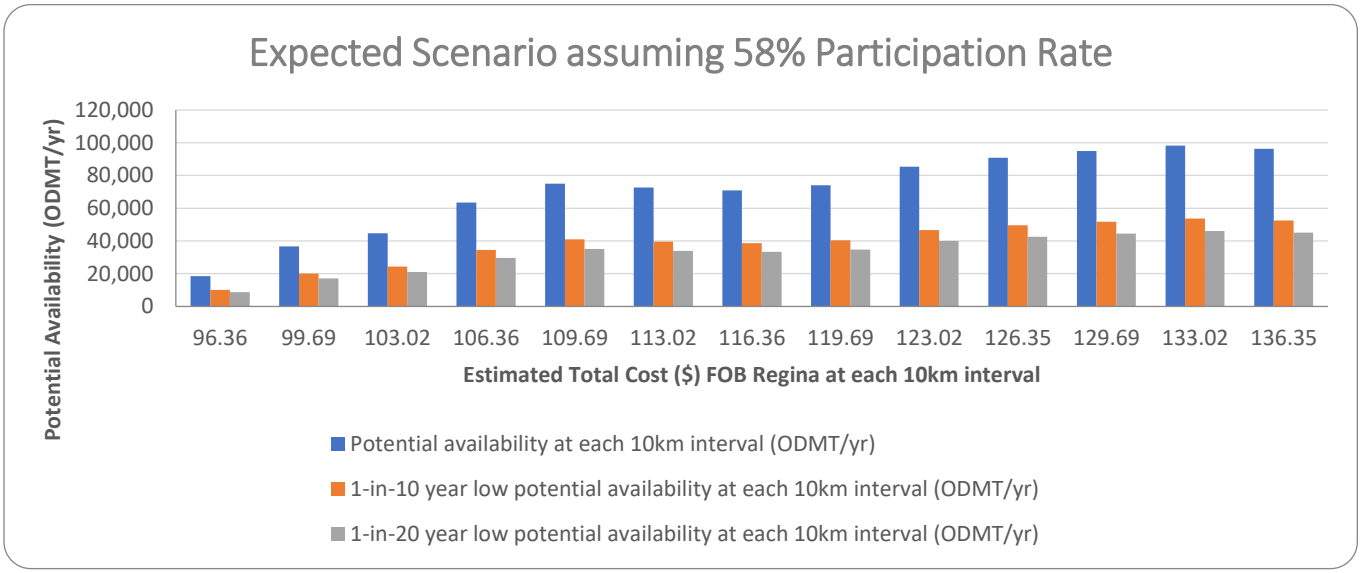


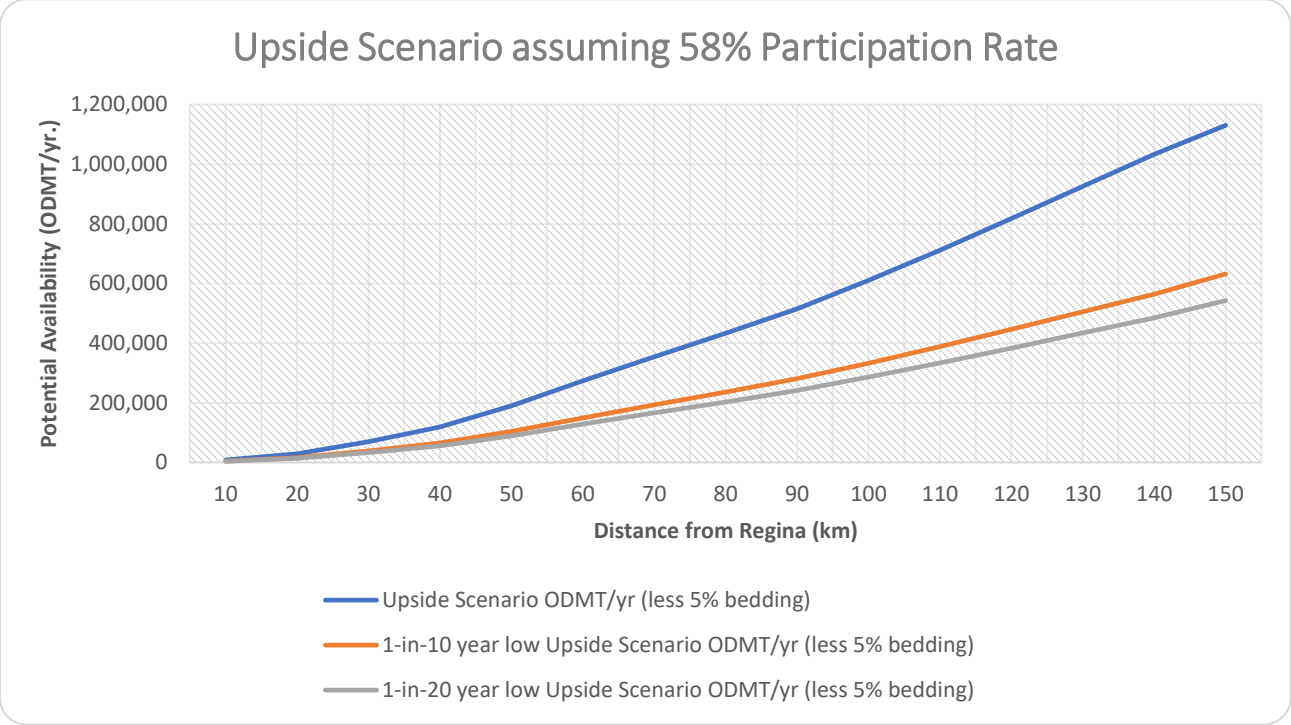
Table 11: Projected feedstock supply and cost – Expected scenario assuming 58% participation rate

Distance from Project (km)	Delivered cost ($/ODMT)	Cumulative potential availability ODMT/yr.	Potential availability at each 10km interval (ODMT/yr.)	1-in-10-year low cumulative potential availability ODMT/yr.	1-in-10-year low potential availability at each 10km interval (ODMT/yr.)	1-in-20-year low cumulative potential availability ODMT/yr.	1-in-20-year low potential availability at each 10km interval (ODMT/yr.)
10	$96.36	7,481	7,481	4,082	4,082	3,507	3,507
20	$99.69	26,014	18,534	14,197	10,115	12,194	8,688
30	$103.02	62,735	36,721	34,237	20,040	29,407	17,213
40	$106.36	107,501	44,766	58,668	24,431	50,392	20,984
50	$109.69	170,958	63,457	93,299	34,631	80,138	29,746
60	$113.02	245,935	74,977	134,218	40,918	115,284	35,146
70	$116.36	318,510	72,574	173,825	39,607	149,304	34,020
80	$119.69	389,500	70,991	212,567	38,743	182,581	33,277
90	$123.02	463,477	73,976	252,939	40,372	217,258	34,677
100	$126.35	548,813	85,337	299,511	46,572	257,260	40,002
110	$129.69	639,685	90,872	349,104	49,593	299,857	42,597
120	$133.02	734,679	94,994	400,946	51,842	344,387	44,529
130	$136.35	833,030	98,350	454,620	53,674	390,489	46,103
140	$139.69	929,439	96,409	507,235	52,615	435,682	45,192
150	$143.02	1,016,354	86,916	568,299	61,064	488,132	52,450

Upside Scenario assuming 58% participation rate

Figure 6 indicates the projected feedstock availability under the Upside scenario, assuming a 58% participation rate. Under these assumptions, on an average year the Project can acquire its feedstock requirement within 70 km of Regina, including 354,342 ODMT/yr. In a 1-in-10-year low case the Project can acquire its feedstock requirement within 110 km of Regina, including 333,206 ODMT/yr. In a 1-in-20-year low case the Project can acquire its feedstock requirement within 110 km, including 333,591 ODMT/yr.

Figure 6: Feedstock supply curve -- Upside scenario assuming 58% participation rate



The purpose of Figure 7 and Table 12 is to demonstrate quantities of wheat straw potentially available at each 10 km distance interval from Regina.

Figure 7: Feedstock cost projection – Upside scenario assuming 58% participation rate

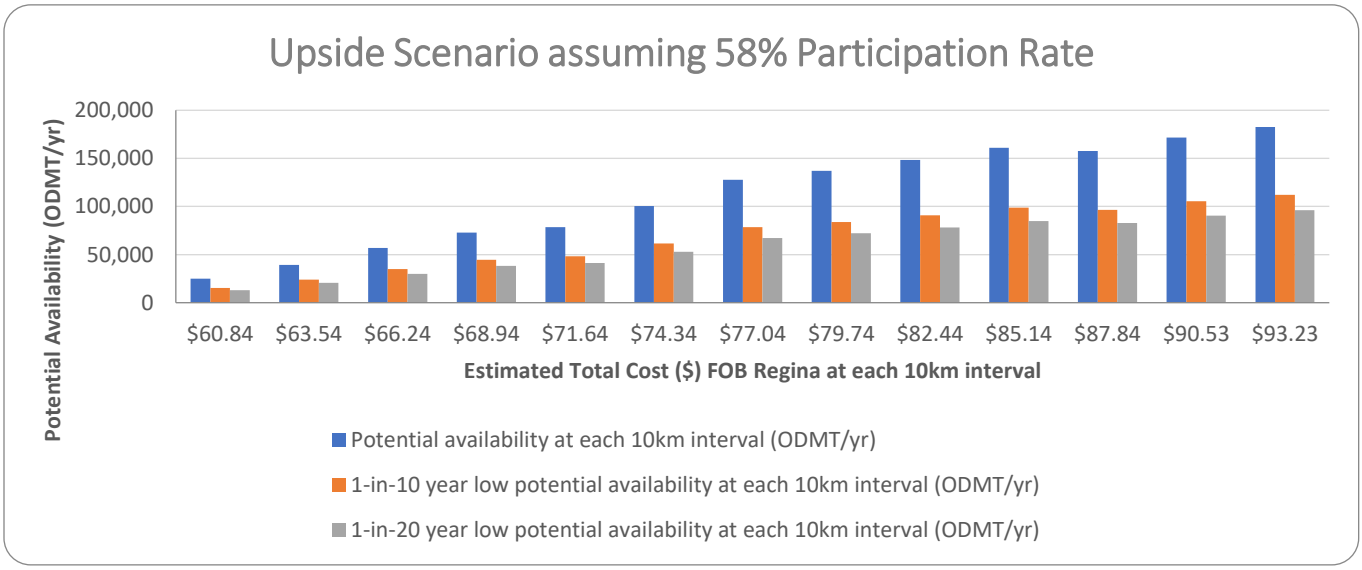


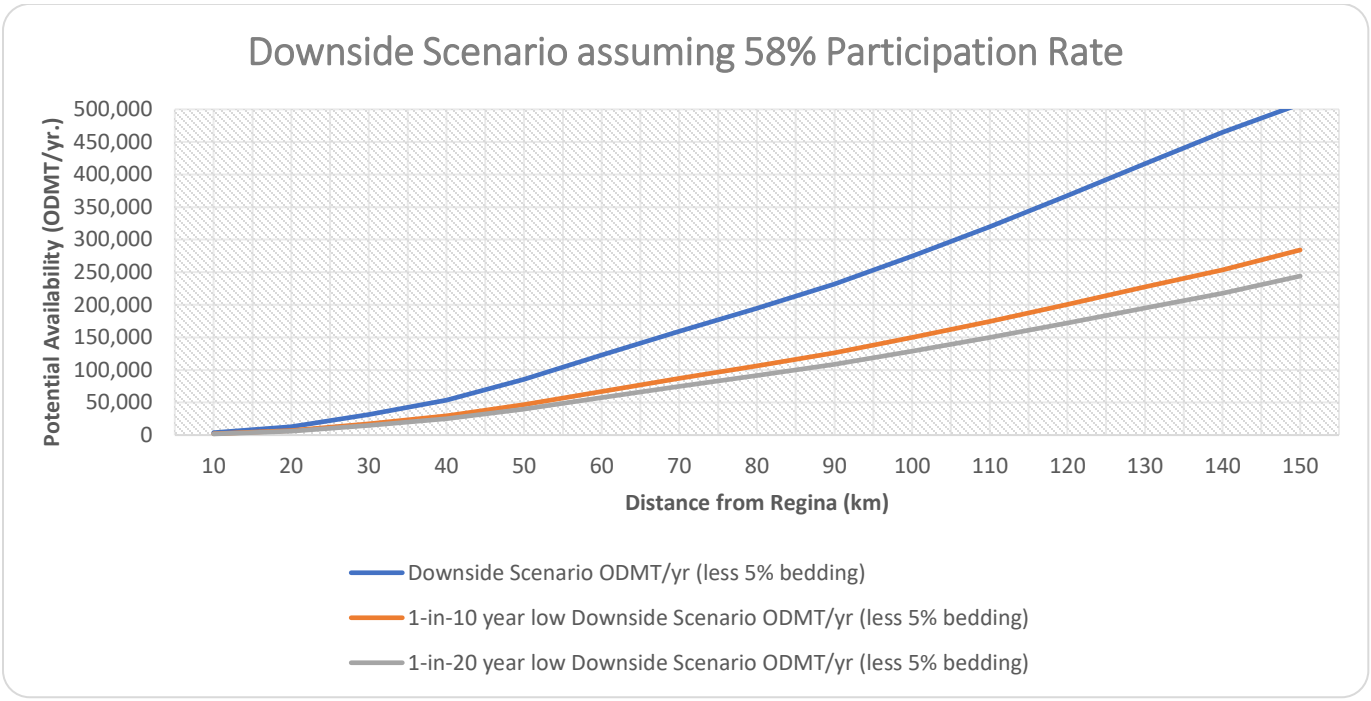
Table 12: Projected feedstock supply and cost – Upside scenario assuming 58% participation rate

Distance from Project (km)	Delivered cost ($/ODMT)	Cumulative potential availability ODMT/yr.	Potential availability at each 10km interval (ODMT/yr.)	1-in-10-year low cumulative potential availability ODMT/yr.	1-in-10-year low potential availability at each 10km interval (ODMT/yr.)	1-in-20-year low cumulative potential availability ODMT/yr.	1-in-20-year low potential availability at each 10km interval (ODMT/yr.)
10	$60.84	8,322	10,545	6,466	6,466	5,554	5,554
20	$63.54	28,941	24,975	21,782	15,316	18,709	13,155
30	$66.24	69,792	39,303	45,884	24,102	39,411	20,702
40	$68.94	119,595	56,908	80,781	34,897	69,385	29,974
50	$71.64	190,191	72,734	125,383	44,602	107,696	38,310
60	$74.34	273,603	78,533	173,542	48,158	149,061	41,365
70	$77.04	354,342	100,343	235,074	61,533	201,914	52,853
80	$79.74	433,319	127,844	313,472	78,397	269,252	67,338
90	$82.44	515,618	136,980	397,471	84,000	341,402	72,150
100	$85.14	610,555	148,295	488,410	90,939	419,512	78,110
110	$87.84	711,650	161,077	587,187	98,777	504,355	84,843
120	$90.53	817,331	157,599	683,830	96,643	587,365	83,010
130	$93.23	926,746	171,747	789,150	105,319	677,828	90,463
140	$95.93	1,034,001	182,556	901,097	111,948	773,984	96,156
150	$98.63	1,130,694	182,556	901,097	111,948	773,984	96,156

Downside Scenario assuming 58% participation rate

Figure 8 indicates projected feedstock availability under the Downside scenario, assuming a 58% participation rate. Under these assumptions, on an average year the Project can acquire its feedstock requirement within 80 km of Regina, including 335,776 ODMT/yr. In a 1-in-10-year low case the Project can acquire its feedstock requirement within 110 km of Regina, including 300,952 ODMT/yr. In a 1-in-20-year low case the Project can acquire its feedstock requirement within 130 km, including 336,629 ODMT/yr.

Figure 8: Feedstock supply curve -- Downside scenario assuming 58% participation rate



The purpose of Figure 9 and Table 13 is to demonstrate quantities of wheat straw potentially available at each 10 km distance interval from Regina.

Figure 9: Feedstock cost projection – Downside scenario assuming 58% participation rate

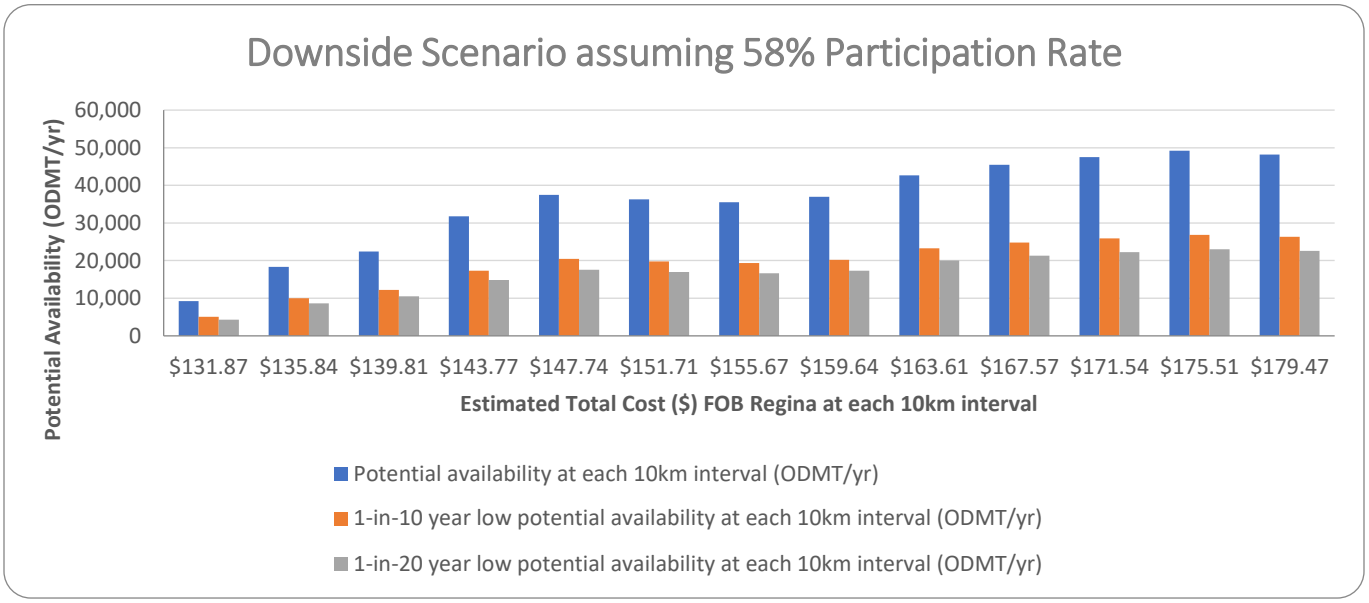


Table 13: Projected feedstock supply and cost – Downside scenario assuming 58% participation rate

Distance from Project (km)	Delivered cost ($/ODMT)	Cumulative potential availability ODMT/yr.	Potential availability at each 10km interval (ODMT/yr.)	1-in-10-year low cumulative potential availability ODMT/yr.	1-in-10-year low potential availability at each 10km interval (ODMT/yr.)	1-in-20-year low cumulative potential availability ODMT/yr.	1-in-20-year low potential availability at each 10km interval (ODMT/yr.)
10	$131.87	3,740	3,740	2,041	2,041	1,753	1,753
20	$135.84	13,007	9,267	7,099	5,057	6,097	4,344
30	$139.81	31,367	18,360	17,119	10,020	14,704	8,607
40	$143.77	53,750	22,383	29,334	12,215	25,196	10,492
50	$147.74	85,479	31,729	46,650	17,316	40,069	14,873
60	$151.71	122,968	37,489	67,109	20,459	57,642	17,573
70	$155.67	159,255	36,287	86,912	19,803	74,652	17,010
80	$159.64	194,750	35,495	106,284	19,371	91,291	16,639
90	$163.61	231,738	36,988	126,470	20,186	108,629	17,338
100	$167.57	274,407	42,668	149,756	23,286	128,630	20,001
110	$171.54	319,842	45,436	174,552	24,796	149,929	21,298
120	$175.51	367,340	47,497	200,473	25,921	172,193	22,265
130	$179.47	416,515	49,175	227,310	26,837	195,245	23,051
140	$183.44	464,719	48,205	253,617	26,307	217,841	22,596
150	$187.41	508,177	43,458	284,150	30,532	244,066	26,225

3.3 Participation rate assumption – 38%

This subsection provides an analysis of projected feedstock supply and costs based on the 38% participation rate assumption.

Figure 10 compares supply curves for the Expected, Upside, and Downside scenarios. In the Expected scenario, the Project can acquire its total feedstock requirement of 300,000 ODMT/yr within 90 km of Regina. In the Upside and Downside scenario the Project can acquire its total feedstock requirement within 90 km and beyond 140 km, respectively. More detailed analysis of projected availability under each scenario is provided below.

Figure 10: Expected, downside, and upside scenarios assuming 38% participation rate

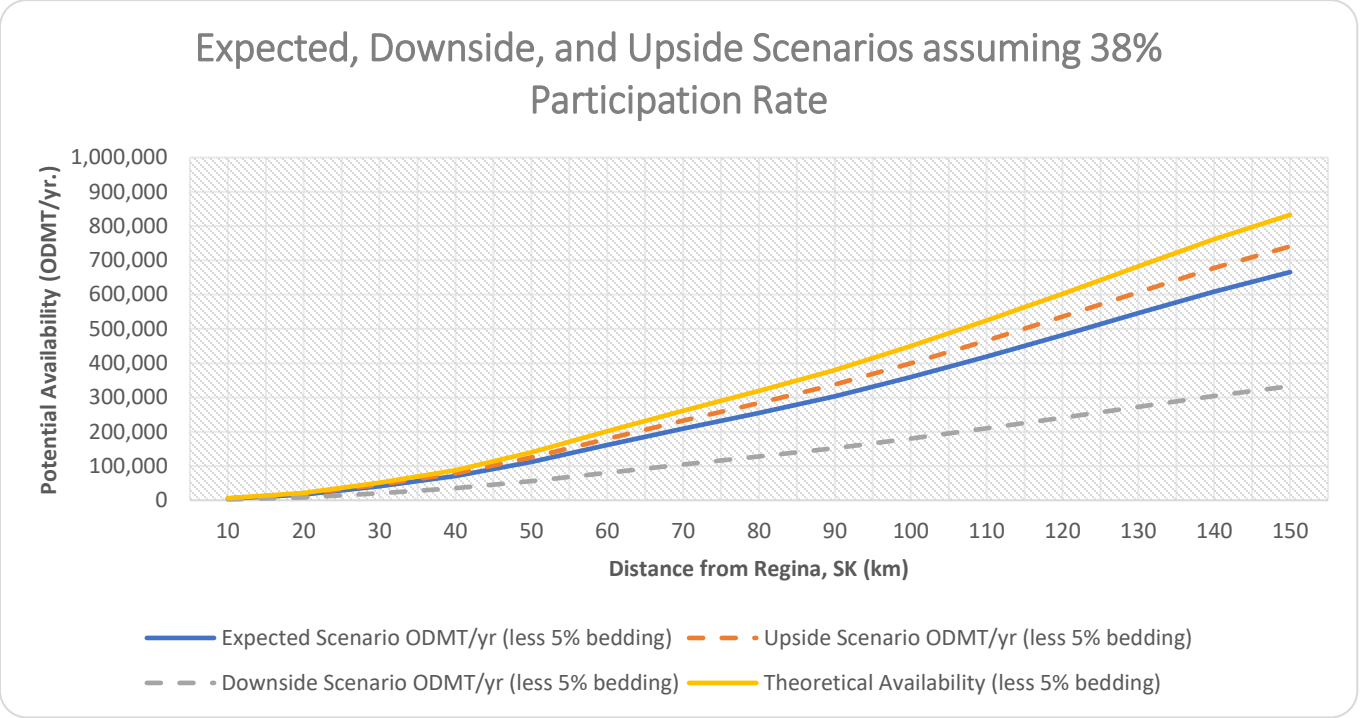


Table 14 summarizes projected feedstock cost under each scenario. In the Expected scenario, in an average wheat yield year, the average wheat straw cost is estimated at $113.31 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $33,992,873 /year (based on 300,000 ODMT/yr. intake). In the Upside scenario, the average wheat straw cost is estimated at $73.72 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $22,116,437 /year. In the Downside scenario, the average wheat straw cost is estimated at $161.40 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $48,420,442 /year.

1-in-10-year low

In a 1-in-10-year low wheat yield case, in the Expected scenario, the average wheat straw cost is estimated at $121.59 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $36,478,478 /year. In the Upside scenario, the average wheat straw cost is estimated at $79.94 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $23,980,621 /year. In the Downside scenario, the average wheat straw cost is estimated at $174.46 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $52,337,812 /year.

1-in-20-year low

In a 1-in-20-year low wheat yield case, in the Expected scenario, the average wheat straw cost is estimated at $121.70 /ODMT delivered price Regina; which is an equivalent of a total feedstock cost of $36,510,095. In the Upside scenario, the average wheat straw cost is estimated at $81.95 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $24,584,943 /year. In the Downside scenario, the average wheat straw cost is estimated at $176.29 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $52,885,801 /year.

Table 14: Projected Feedstock Cost per ODMT assuming 300,000 ODMT/yr. Intake assuming 38% participation .

Average year

	Expected	Upside	Downside
Total	$33,992,873	$22,116,437	$48,420,442
Avg Per ODMT	$113.31	$73.72	$161.40

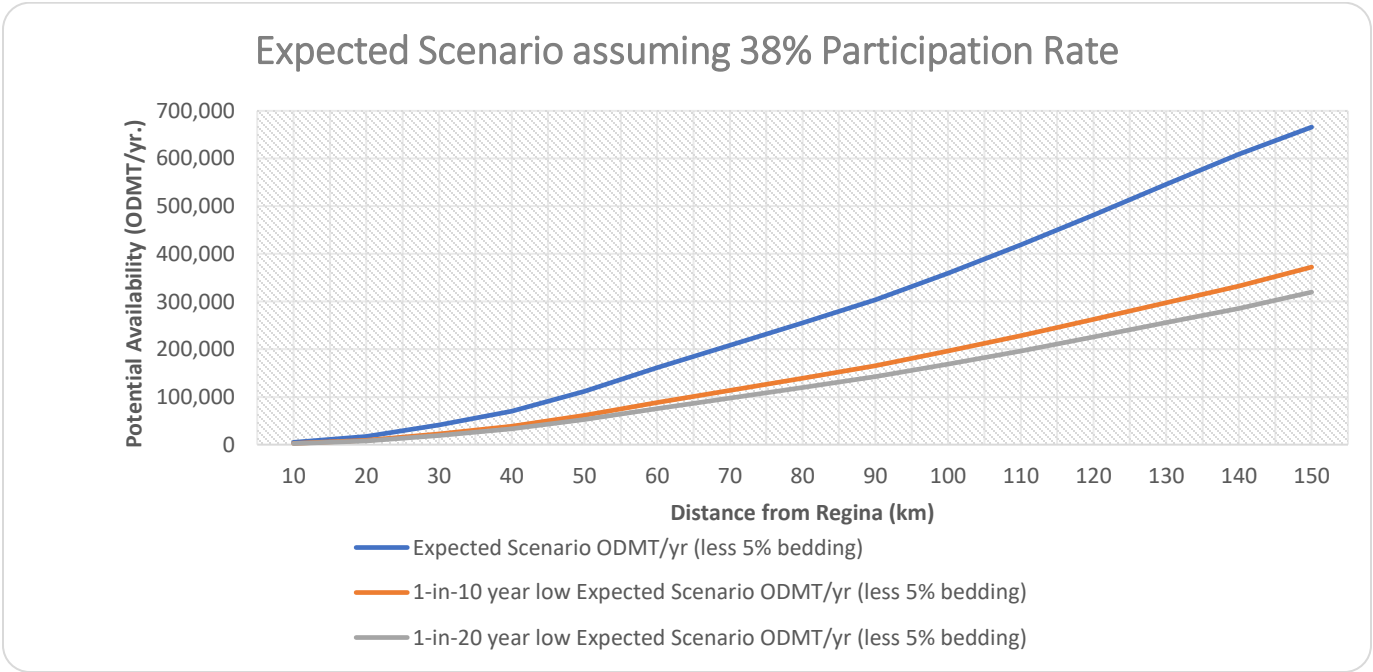
		1-in-10-year low	
	Expected	Upside	Downside
Total	$36,478,478	$23,980,621	$52,337,812
Avg Per ODMT	$121.59	$79.94	$174.46

		1-in-20-year low	
	Expected	Upside	Downside
Total	$36,510,095	$24,584,943	$52,885,801
Avg Per ODMT	$121.70	$81.95	$176.29

Expected Scenario assuming 38% participation rate

Figure 11 indicates projected feedstock availability under the Expected scenario, assuming a 38% participation rate. Under these assumptions, on an average year the Project can acquire its feedstock requirement within 90 km of Regina, including 303,657 ODMT/yr. In a 1-in-10-year low case the Project can acquire its feedstock requirement within 140 km of Regina, including 332,326 ODMT/yr. In a 1-in-20-year low case the Project can acquire its feedstock requirement, including 319,810 ODMT/yr. is met within 150 km.

Figure 11: Feedstock supply curve -- Expected scenario assuming 38% participation rate



The purpose of Figure 12 and Table 15 is to demonstrate quantities of wheat straw potentially available at each 10 km distance interval from Regina.

Figure 12: Feedstock cost projection – Expected scenario assuming 38% participation rate

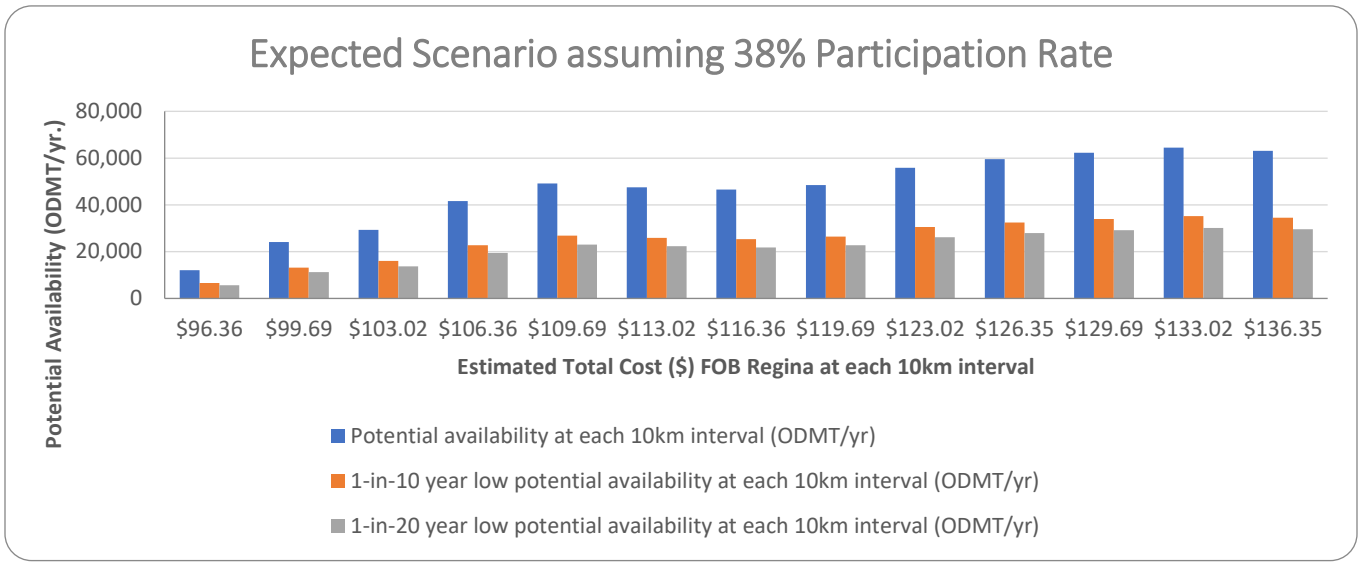


Table 15: Projected feedstock supply and cost – Expected scenario assuming 38% participation rate

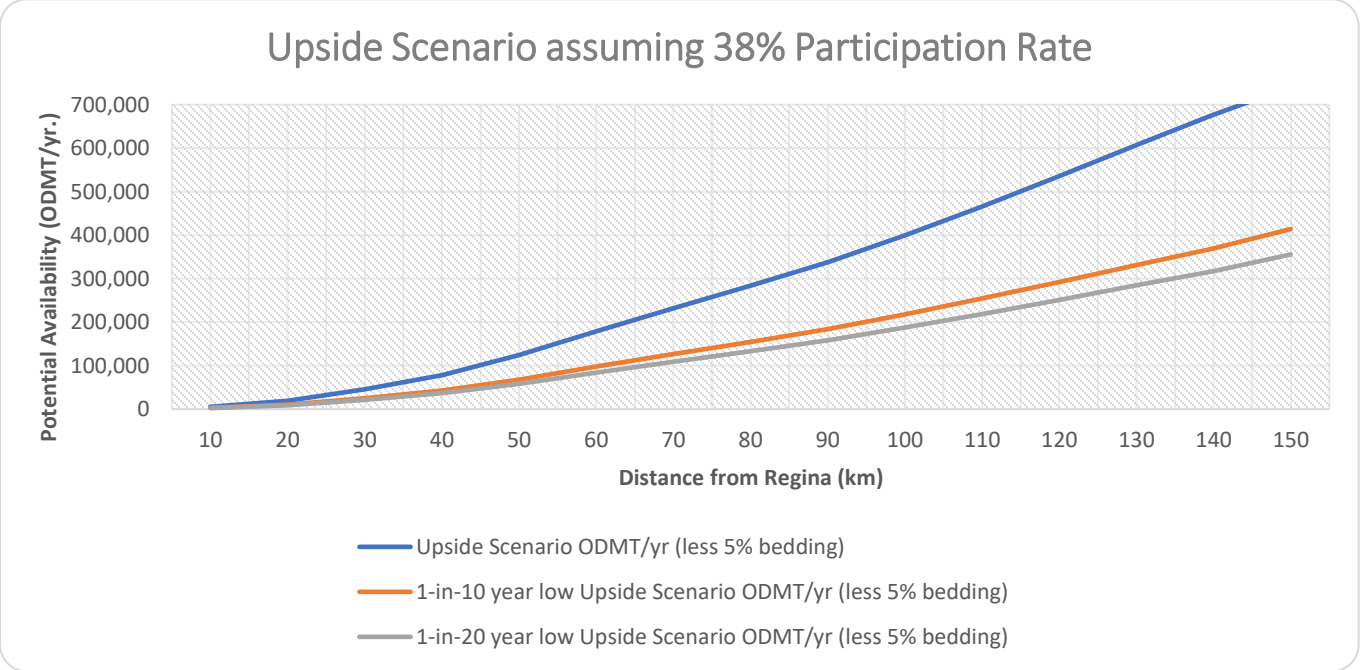
Distance from Project (km)	Delivered cost ($/ODMT)	Cumulative potential availability ODMT/yr.	Potential availability at each 10km interval (ODMT/yr.)	1-in-10-year low cumulative potential availability ODMT/yr.	1-in-10-year low potential availability at each 10km interval (ODMT/yr.)	1-in-20-year low cumulative potential availability ODMT/yr.	1-in-20-year low potential availability at each 10km interval (ODMT/yr.)
10	$96.36	4,901	4,901	2,675	2,675	2,297	2,297
20	$99.69	17,044	12,143	9,302	6,627	7,989	5,692
30	$103.02	41,102	24,058	22,431	13,130	19,267	11,277
40	$106.36	70,432	29,330	38,438	16,006	33,015	13,748
50	$109.69	112,007	41,576	61,127	22,690	52,504	19,489
60	$113.02	161,130	49,123	87,936	26,809	75,531	23,027
70	$116.36	208,679	47,549	113,885	25,949	97,820	22,289
80	$119.69	255,190	46,511	139,268	25,383	119,622	21,802
90	$123.02	303,657	48,467	165,719	26,451	142,342	22,719
100	$126.35	359,567	55,910	196,231	30,513	168,550	26,208
110	$129.69	419,104	59,537	228,723	32,492	196,458	27,908
120	$133.02	481,342	62,238	262,689	33,966	225,633	29,174
130	$136.35	545,778	64,437	297,855	35,166	255,838	30,205
140	$139.69	608,943	63,165	332,326	34,472	285,447	29,609
150	$143.02	665,887	56,945	372,334	40,008	319,810	34,364

Upside Scenario assuming 38% participation rate

Figure 13 indicates projected feedstock availability under the Upside scenario, assuming a 38% participation rate. Under these assumptions, on an average year the Project can acquire its feedstock requirement within 90 km of Regina, including 337,819 ODMT/yr. In a 1-in-10-year low case the Project can acquire its feedstock requirement

within 130 km of Regina, including 331,363 ODMT/yr. within 130 km. In a 1-in-20-year low case the Project can acquire its feedstock requirement within 140 km, including 317,559 ODMT/yr.

Figure 13: Feedstock supply curve -- Upside scenario assuming 38% participation rate



The purpose of Figure 14 and Table 16 is to demonstrate quantities of wheat straw potentially available at each 10 km distance interval from Regina.

Figure 14: Feedstock cost projection – Upside scenario assuming 38% participation rate

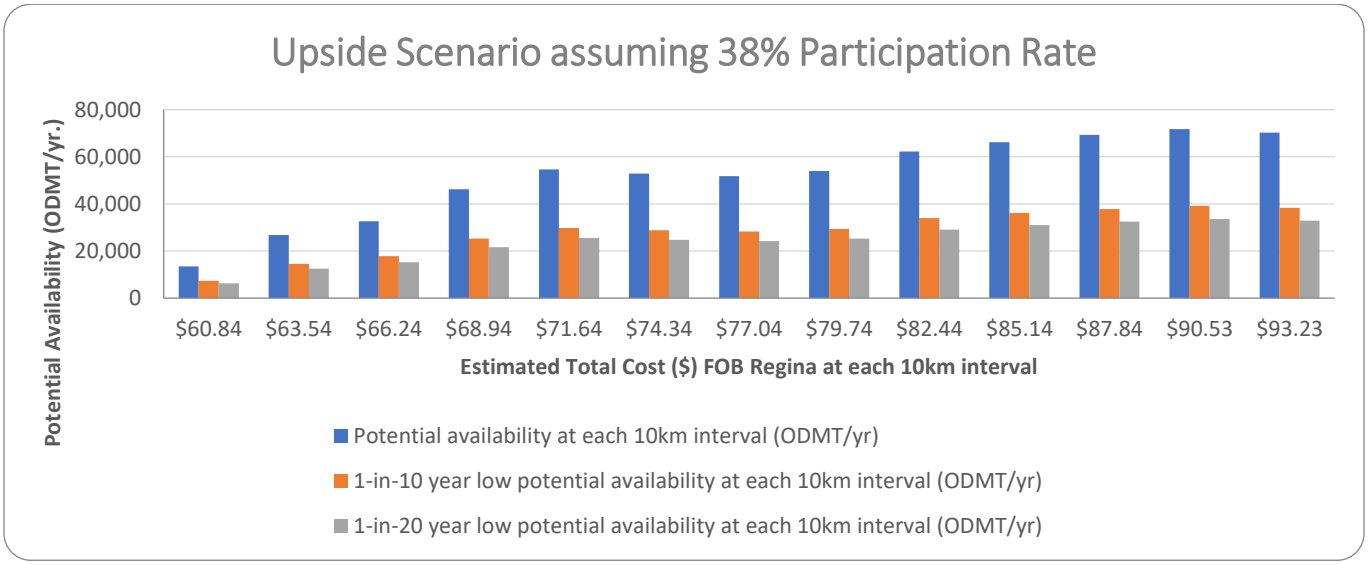


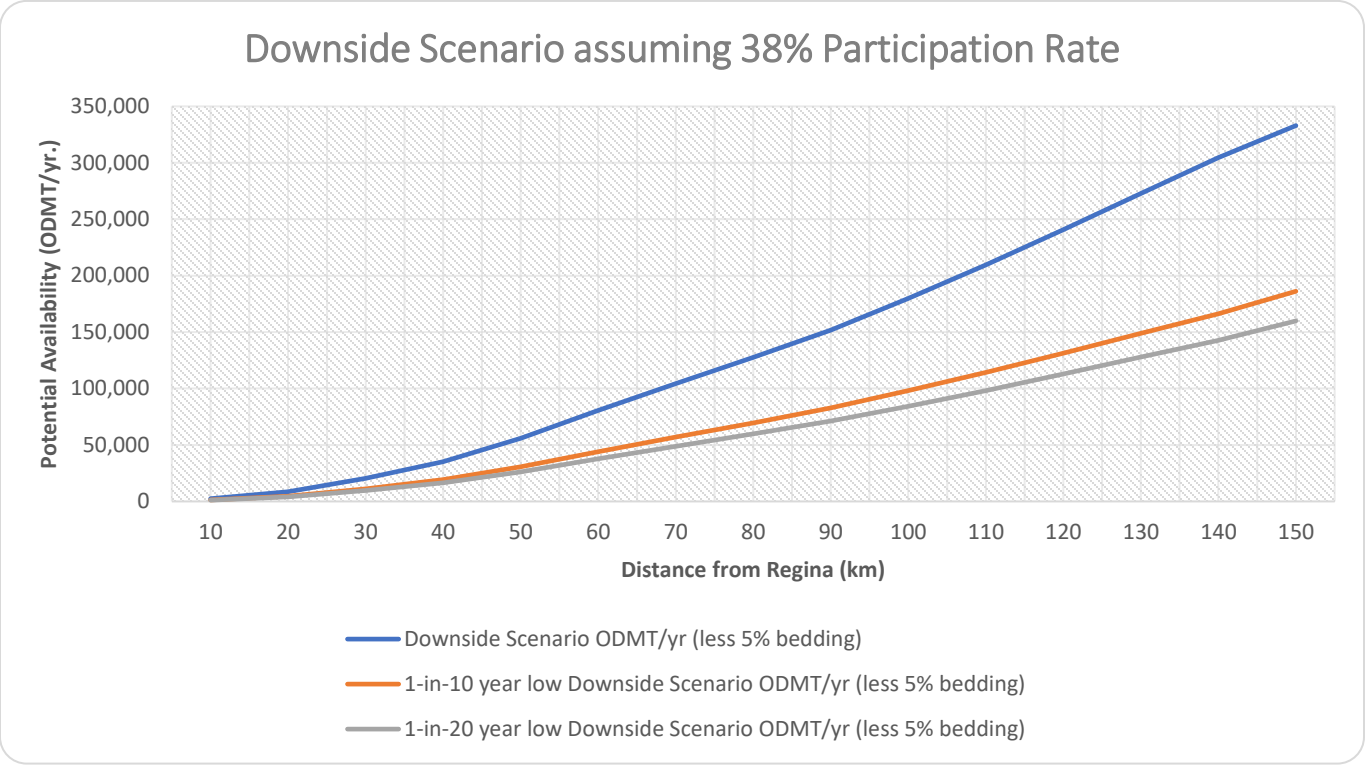
Table 16: Projected feedstock supply and cost – Upside scenario assuming 38% participation rate

Distance from Project (km)	Delivered cost ($/ODMT)	Cumulative potential availability ODMT/yr.	Potential availability at each 10km interval (ODMT/yr.)	1-in-10-year low cumulative potential availability ODMT/yr.	1-in-10-year low potential availability at each 10km interval (ODMT/yr.)	1-in-20-year low cumulative potential availability ODMT/yr.	1-in-20-year low potential availability at each 10km interval (ODMT/yr.)
10	$60.84	5,452	5,452	2,976	2,976	2,556	2,556
20	$63.54	18,961	13,509	10,348	7,372	8,888	6,332
30	$66.24	45,726	26,765	24,955	14,607	21,434	12,546
40	$68.94	78,355	32,629	42,762	17,807	36,730	15,295
50	$71.64	124,608	46,253	68,004	25,242	58,411	21,681
60	$74.34	179,257	54,649	97,828	29,825	84,028	25,617
70	$77.04	232,155	52,898	126,697	28,869	108,825	24,796
80	$79.74	283,899	51,744	154,936	28,239	133,080	24,255
90	$82.44	337,819	53,920	184,362	29,426	158,355	25,275
100	$85.14	400,019	62,200	218,307	33,945	187,512	29,157
110	$87.84	466,253	66,235	254,455	36,147	218,560	31,048
120	$90.53	535,493	69,239	292,241	37,787	251,016	32,456
130	$93.23	607,178	71,686	331,363	39,122	284,619	33,603
140	$95.93	677,449	70,271	369,713	38,350	317,559	32,940
150	$98.63	740,800	63,351	414,221	44,508	355,789	38,230

Downside Scenario assuming 38% participation rate

Figure 15 indicates projected feedstock availability under the Downside scenario, and assuming 38% participation rate. Under these assumptions, on an average year the Project cannot acquire its feedstock requirement within 140 km of Regina, with availability estimated at 304,471 ODMT/yr. In a 1-in-10-year low case the Project cannot acquire its feedstock requirement within 150 km of Regina, including 186,167 ODMT/yr. within 150 km. In a 1-in-20-year low case the Project can acquire its feedstock requirement within 150 km, including 159,905 ODMT/yr. within 150 km.

Figure 15: Feedstock supply curve -- Downside scenario assuming 38% participation rate



The purpose of Figure 16 and Table 17 is to demonstrate quantities of wheat straw potentially available at each 10 km distance interval from Regina.

Figure 16: Feedstock cost projection – Downside scenario assuming 38% participation rate

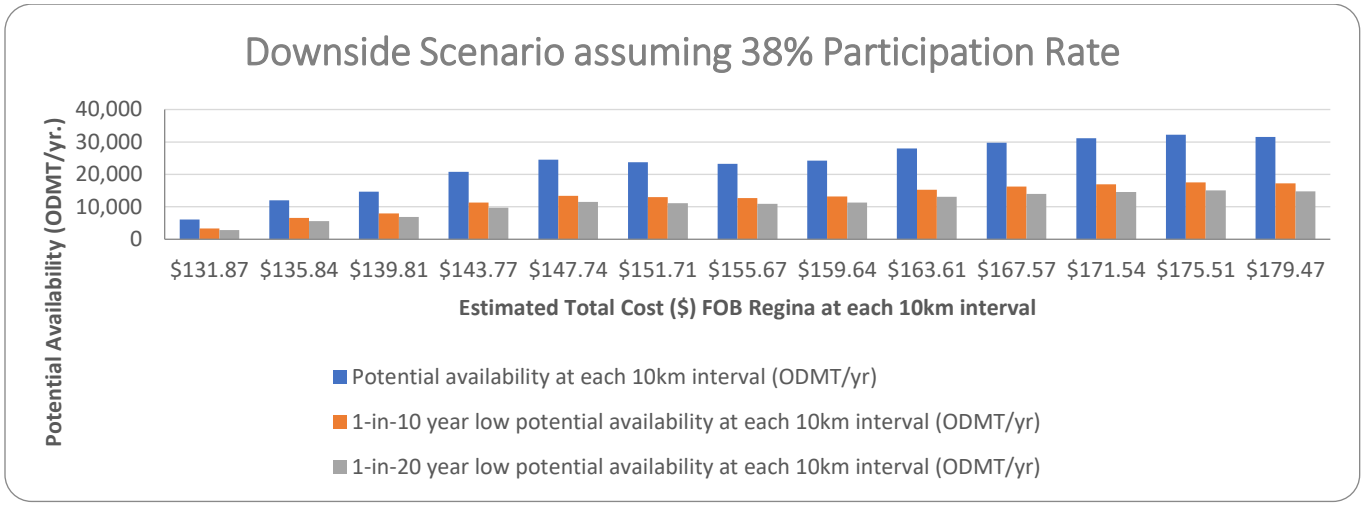


Table 17: Projected feedstock supply and cost – Downside scenario assuming 38% participation rate

Distance from Project (km)	Delivered cost ($/ODMT)	Cumulative potential availability ODMT/yr.	Potential availability at each 10km interval (ODMT/yr.)	1-in-10-year low cumulative potential availability ODMT/yr.	1-in-10-year low potential availability at each 10km interval (ODMT/yr.)	1-in-20-year low cumulative potential availability ODMT/yr.	1-in-20-year low potential availability at each 10km interval (ODMT/yr.)
10	$131.87	2,451	2,451	1,337	1,337	1,149	1,149
20	$135.84	8,522	6,071	4,651	3,313	3,995	2,846
30	$139.81	20,551	12,029	11,216	6,565	9,633	5,639
40	$143.77	35,216	14,665	19,219	8,003	16,508	6,874
50	$147.74	56,004	20,788	30,564	11,345	26,252	9,744
60	$151.71	80,565	24,562	43,968	13,404	37,766	11,513
70	$155.67	104,339	23,774	56,943	12,975	48,910	11,144
80	$159.64	127,595	23,256	69,634	12,692	59,811	10,901
90	$163.61	151,829	24,234	82,859	13,225	71,171	11,360
100	$167.57	179,784	27,955	98,116	15,256	84,275	13,104
110	$171.54	209,552	29,768	114,362	16,246	98,229	13,954
120	$175.51	240,671	31,119	131,344	16,983	112,816	14,587
130	$179.47	272,889	32,218	148,927	17,583	127,919	15,103
140	$183.44	304,471	31,582	166,163	17,236	142,723	14,804
150	$187.41	332,944	28,472	186,167	20,004	159,905	17,182

3.4 Participation rate assumption – 20%

This subsection provides an analysis of projected feedstock supply and costs based on the 20% participation rate assumption.

Figure 17 compares supply curves for the Expected, Upside, and Downside scenarios. In the Expected scenario, the Project can acquire its total feedstock requirement of 300,000 ODMT/yr. cannot be attained within the radius of 140 km of Regina with 320,496 ODMT/yr. In the Upside and Downside scenario the Project can acquire its total

feedstock requirement within 130 km and beyond 150 km, respectively. More detailed analysis of projected availability under each scenario is provided below.

Figure 17: Expected, downside, and upside scenarios assuming 20% participation rate

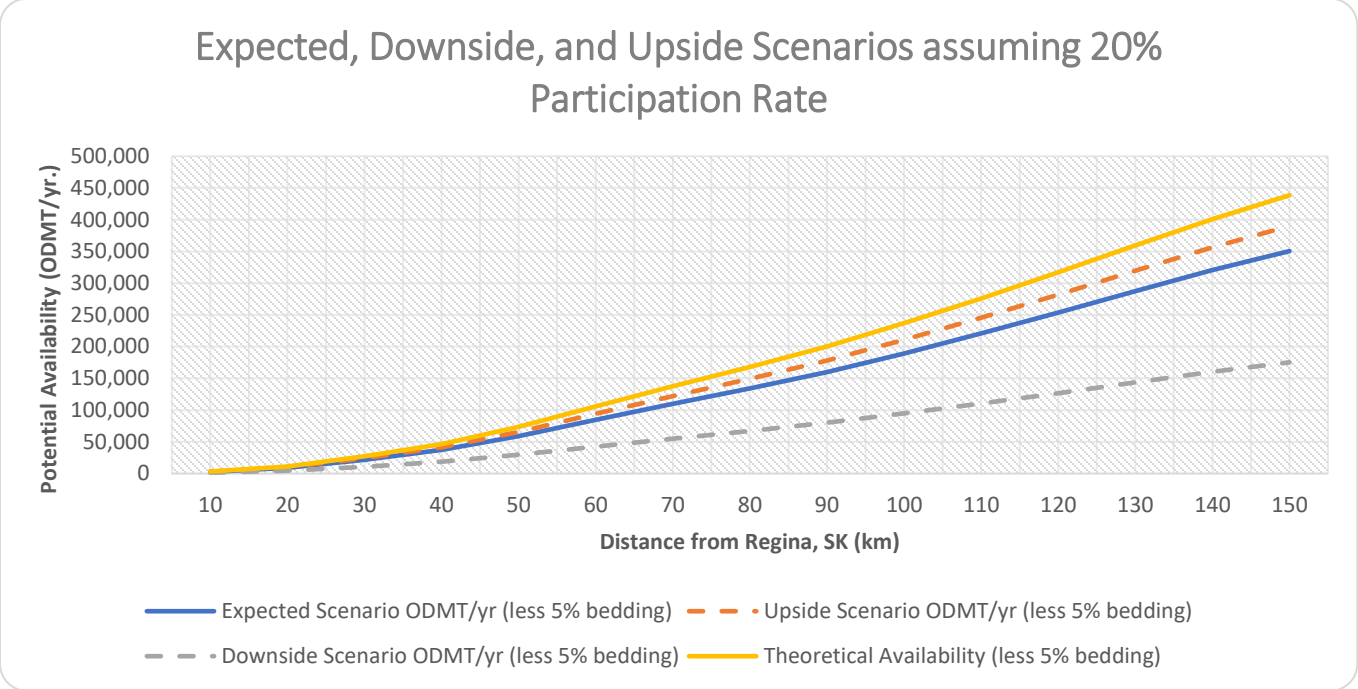


Table 18 summarizes projected feedstock cost under each scenario. In the Expected scenario, in an average wheat yield year, the average wheat straw cost is estimated at $116.09 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $34,827,173 /year (based on 300,000 ODMT/yr. intake). In the Upside scenario, the average wheat straw cost is estimated at $76.49 ODMT delivered Regina; which is an equivalent of a total feedstock cost of $22,948,296 /year. In the Downside scenario, the average wheat straw cost is estimated at $166.20 /ODMT delivered price Regina; which is an equivalent of a total feedstock cost of $49,861,350 /year.

1-in-10-year low

In a 1-in-10-year low wheat yield case, in the Expected scenario, the average wheat straw cost is estimated at $122.14 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $36,643,366 /year. In the Upside scenario, the average wheat straw cost is estimated at $81.34 ODMT delivered Regina; which is an equivalent of a total feedstock cost of $24,402,524 /year. In the Downside scenario, the average wheat straw cost is estimated at $179.75 /ODMT delivered price Regina; which is an equivalent of a total feedstock cost of $53,925,094 /year.

1-in-20-year low

In a 1-in-20-year low wheat yield case, in the Expected scenario, the average wheat straw cost is estimated at $124.96 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $37,489,250. In the Upside scenario, the average wheat straw cost is estimated at $81.88 /ODMT delivered price Regina; which is an equivalent of a total feedstock cost of $24,563,072/year. In the Downside scenario, the average wheat straw cost is estimated at $180.83 /ODMT delivered Regina; which is an equivalent of a total feedstock cost of $54,249,172 /year.

Table 18: Projected Feedstock Cost per ODMT assuming 300,000 ODMT/yr Intake assuming 20% participation rate

Average year

	Expected	Upside	Downside
Total	$34,827,173	$22,948,296	$49,861,350
Avg Per ODMT	$116.09	$76.49	$166.20

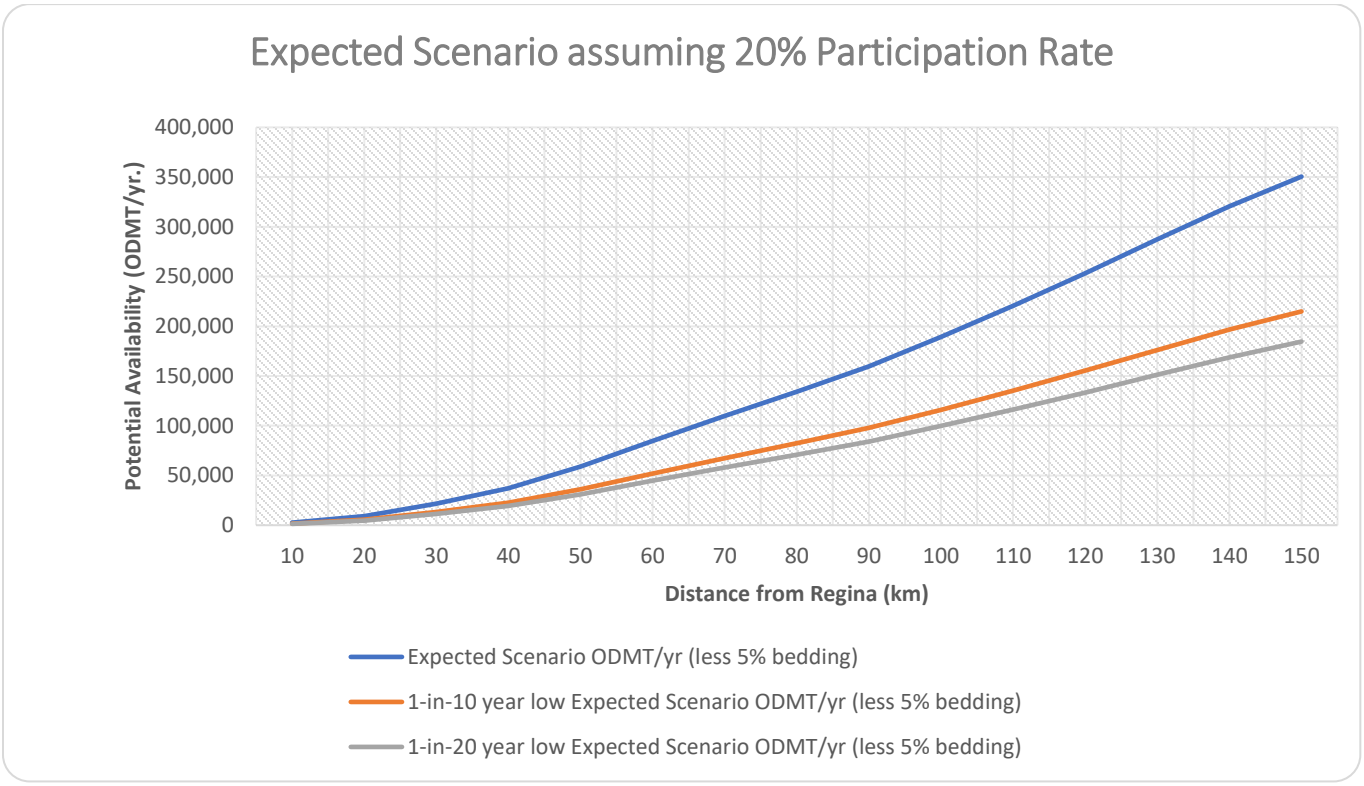
		1-in-10-year low	
	Expected	Upside	Downside
Total	$36,643,366	$24,402,524	$53,925,094
Avg Per ODMT	$122.14	$81.34	$179.75

		1-in-20-year low	
	Expected	Upside	Downside
Total	$37,489,250	$24,563,072	$54,249,172
Avg Per ODMT	$124.96	$81.88	$180.83

Expected Scenario assuming 20% participation rate

Figure 18 indicates projected feedstock availability under the Expected scenario, assuming a 20% participation rate. Under these assumptions, on an average year the Project cannot acquire its feedstock requirement within 140 km of Regina, including 320,496 ODMT/yr. In a 1-in-10-year low case the Project cannot acquire its feedstock requirement within 150 km of Regina, including 214,915 ODMT/yr. within 150 km. In a 1-in-20-year low case the Project can acquire its feedstock requirement beyond 150 km, including 184,598 ODMT/yr. within 150 km.

Figure 18: Feedstock supply curve -- Expected scenario assuming 20% participation rate



The purpose of Figure 19 and Table 19 is to demonstrate quantities of wheat straw potentially available at each 10 km distance interval from Regina.

Figure 19: Feedstock cost projection – Expected scenario assuming 20% participation rate

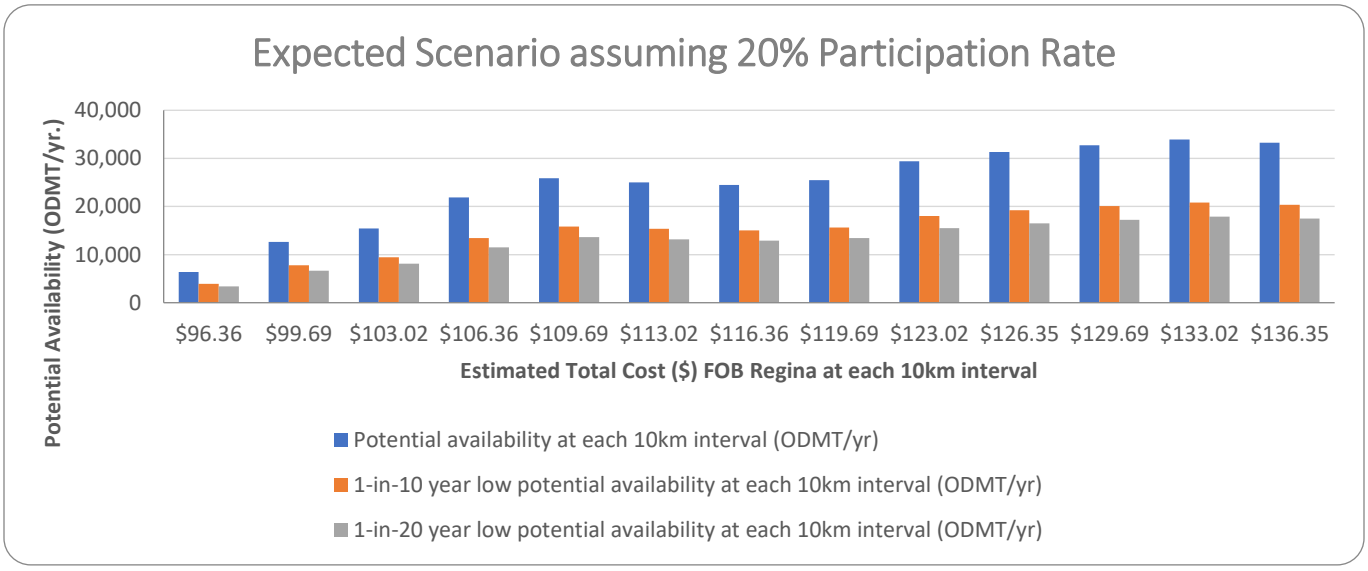


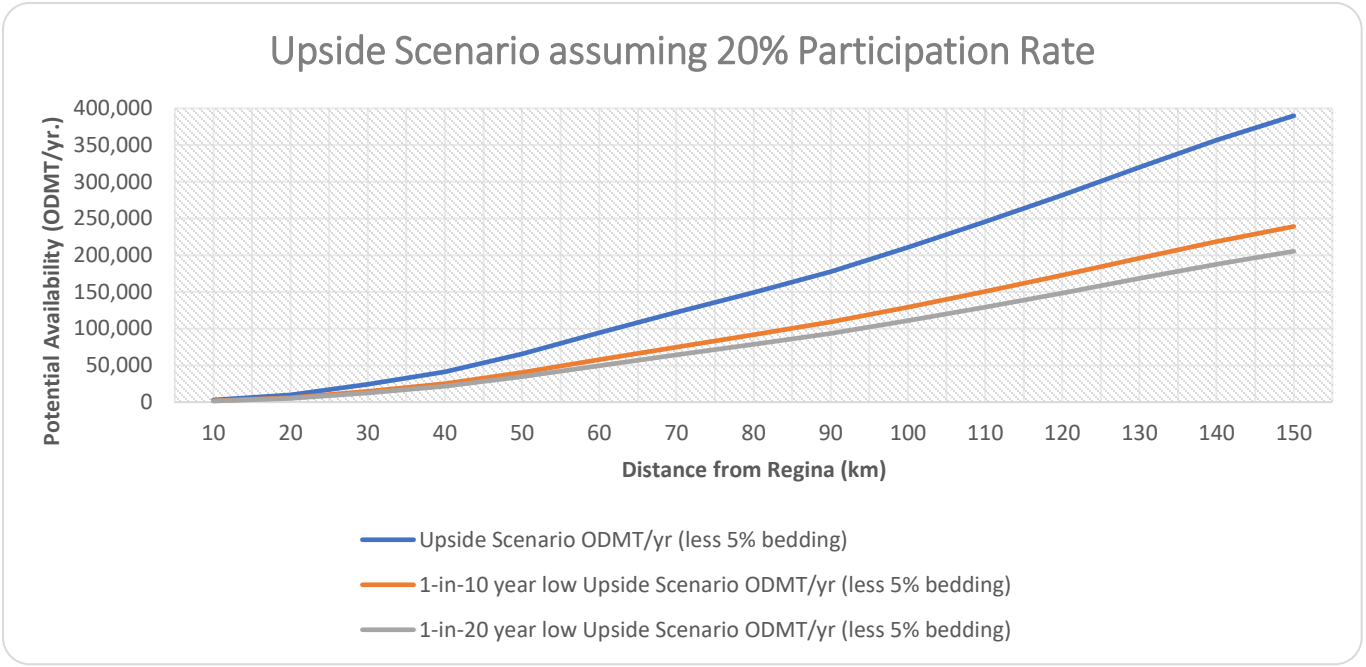
Table 19: Projected feedstock supply and cost – Expected scenario assuming 20% participation rate

Distance from Project (km)	Delivered cost ($/ODMT)	Cumulative potential availability ODMT/yr.	Potential availability at each 10km interval (ODMT/yr.)	1-in-10-year low cumulative potential availability ODMT/yr.	1-in-10-year low potential availability at each 10km interval (ODMT/yr.)	1-in-20-year low cumulative potential availability ODMT/yr.	1-in-20-year low potential availability at each 10km interval (ODMT/yr.)
10	$96.36	2,580	2,580	1,582	1,582	1,359	1,359
20	$99.69	8,970	6,391	5,501	3,919	4,725	3,366
30	$103.02	21,633	12,662	13,266	7,765	11,394	6,669
40	$106.36	37,069	15,437	22,732	9,466	19,525	8,131
50	$109.69	58,951	21,882	36,150	13,419	31,051	11,526
60	$113.02	84,805	25,854	52,005	15,854	44,669	13,618
70	$116.36	109,831	25,026	67,351	15,346	57,850	13,181
80	$119.69	134,311	24,480	82,363	15,012	70,744	12,894
90	$123.02	159,820	25,509	98,005	15,643	84,180	13,436
100	$126.35	189,246	29,426	116,050	18,045	99,680	15,499
110	$129.69	220,581	31,335	135,266	19,215	116,185	16,505
120	$133.02	253,338	32,757	155,353	20,087	133,438	17,254
130	$136.35	287,252	33,914	176,150	20,797	151,301	17,863
140	$139.69	320,496	33,244	196,536	20,386	168,812	17,511
150	$143.02	350,467	29,971	214,915	18,379	184,598	15,786

Upside Scenario assuming 20% participation rate

Figure 20 indicates projected feedstock availability under the Upside scenario, assuming a 20% participation rate. Under these assumptions, on an average year the Project can acquire its feedstock requirement within 150 km of Regina, including 319,567 ODMT/yr. within 130 km. In a 1-in-10-year low case the Project cannot acquire its feedstock requirement within 150 km of Regina, including 239,093 ODMT/yr. within 150 km. In a 1-in-20-year low case the Project cannot acquire its feedstock requirement within 150 km, including 205,365 ODMT/yr. within 150 km.

Figure 20: Feedstock supply curve -- Upside scenario assuming 20% participation rate



The purpose of Figure 21 and Table 20 is to demonstrate quantities of wheat straw potentially available at each 10 km distance interval from Regina.

Figure 21: Feedstock cost projection – Upside scenario assuming 20% participation rate

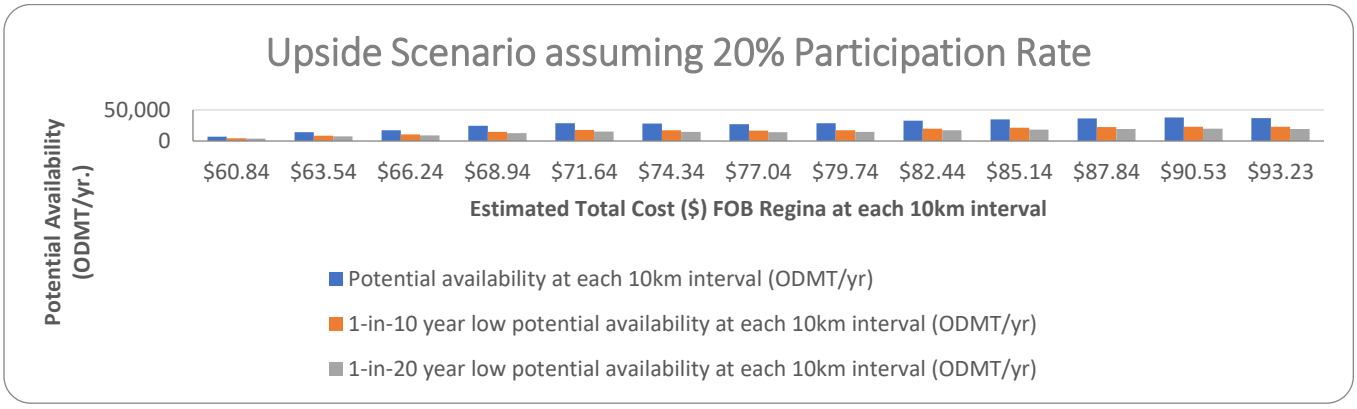


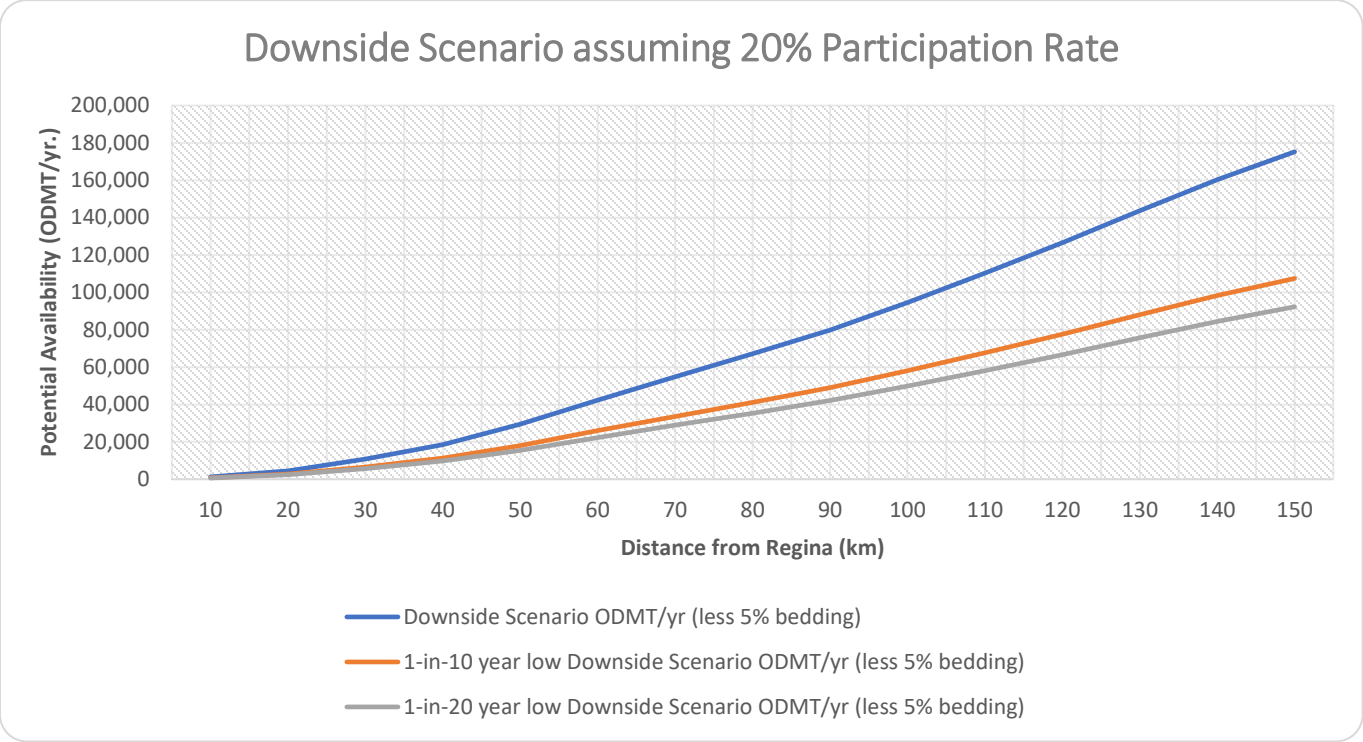
Table 20: Projected feedstock supply and cost – Upside scenario assuming 20% participation rate

Distance from Project (km)	Delivered cost ($/ODMT)	Cumulative potential availability ODMT/yr.	Potential availability at each 10km interval (ODMT/yr.)	1-in-10-year low cumulative potential availability ODMT/yr.	1-in-10-year low potential availability at each 10km interval (ODMT/yr.)	1-in-20-year low cumulative potential availability ODMT/yr.	1-in-20-year low potential availability at each 10km interval (ODMT/yr.)
10	$60.84	2,870	2,870	1,760	1,760	1,512	1,512
20	$63.54	9,980	7,110	6,120	4,360	5,256	3,745
30	$66.24	24,066	14,087	14,758	8,638	12,676	7,420
40	$68.94	41,240	17,173	25,289	10,531	21,722	9,045
50	$71.64	65,583	24,344	40,217	14,928	34,544	12,822
60	$74.34	94,346	28,763	57,855	17,638	49,694	15,150
70	$77.04	122,187	27,841	74,928	17,073	64,358	14,664
80	$79.74	149,420	27,234	91,628	16,700	78,703	14,344
90	$82.44	177,799	28,379	109,031	17,403	93,651	14,948
100	$85.14	210,536	32,737	129,106	20,075	110,894	17,243
110	$87.84	245,396	34,860	150,483	21,377	129,255	18,362
120	$90.53	281,838	36,442	172,830	22,347	148,450	19,195
130	$93.23	319,567	37,729	195,967	23,137	168,323	19,873
140	$95.93	356,552	36,984	218,647	22,680	187,803	19,480
150	$98.63	389,895	33,343	239,093	20,447	205,365	17,562

Downside Scenario assuming 20% participation rate

Figure 22 indicates projected feedstock availability under the Downside scenario, assuming a 20% participation rate. Under these assumptions, on an average year the Project cannot acquire its feedstock requirement within 150 km of Regina, with availability estimated at 175,234 ODMT/yr. within 150 km. In a 1-in-10-year low case the Project cannot acquire its feedstock requirement within 150 km of Regina, including 107,458 ODMT/yr. within 150 km. In a 1-in-20-year low case the Project cannot acquire its feedstock requirement within 150 km, including 92,299 ODMT/yr. within 150 km.

Figure 22: Feedstock supply curve -- Downside scenario assuming 20% participation rate



The purpose of Figure 23 and Table 21 is to demonstrate quantities of wheat straw potentially available at each 10 km distance interval from Regina.

Figure 23: Feedstock cost projection – Downside scenario assuming 20% participation rate

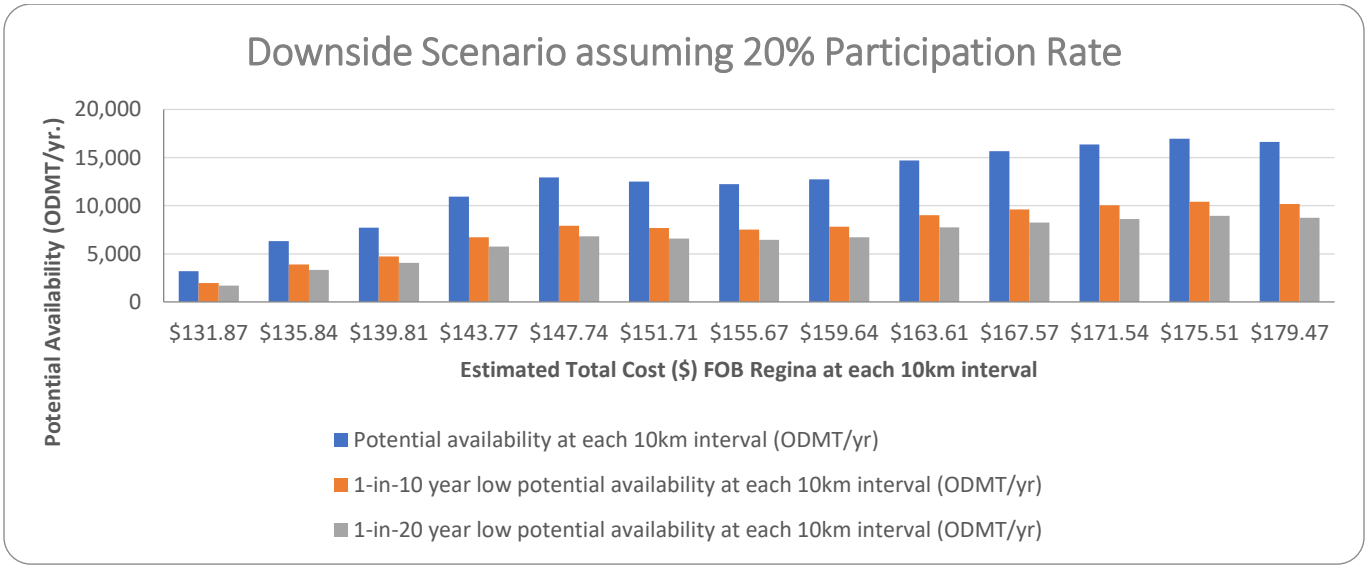


Table 21: Projected feedstock supply and cost – Downside scenario assuming 20% participation rate

Distance from Project (km)	Delivered cost ($/ODMT)	Cumulative potential availability ODMT/yr.	Potential availability at each 10km interval (ODMT/yr.)	1-in-10-year low cumulative potential availability ODMT/yr.	1-in-10-year low potential availability at each 10km interval (ODMT/yr.)	1-in-20-year low cumulative potential availability ODMT/yr.	1-in-20-year low potential availability at each 10km interval (ODMT/yr.)
10	$131.87	1,290	1,290	791	791	679	679
20	$135.84	4,485	3,195	2,750	1,960	2,362	1,683
30	$139.81	10,816	6,331	6,633	3,882	5,697	3,335
40	$143.77	18,535	7,718	11,366	4,733	9,763	4,065
50	$147.74	29,476	10,941	18,075	6,709	15,525	5,763
60	$151.71	42,403	12,927	26,002	7,927	22,334	6,809
70	$155.67	54,915	12,513	33,676	7,673	28,925	6,591
80	$159.64	67,155	12,240	41,181	7,506	35,372	6,447
90	$163.61	79,910	12,755	49,003	7,821	42,090	6,718
100	$167.57	94,623	14,713	58,025	9,023	49,840	7,750
110	$171.54	110,291	15,668	67,633	9,608	58,092	8,252
120	$175.51	126,669	16,378	77,677	10,044	66,719	8,627
130	$179.47	143,626	16,957	88,075	10,398	75,651	8,932
140	$183.44	160,248	16,622	98,268	10,193	84,406	8,755
150	$187.41	175,234	14,985	107,458	9,189	92,299	7,893

APPENDIX C: PROJECTED COST ESTIMATES BY DISTANCE

Tables below indicate projected cost estimates by distance.

Table 22: Expected scenario cost projections

Distance from Project (km)	Transport Cost AVG ($/ODMT)	Material Cost ($/ODMT)	Baling and Loading Cost ($/ODMT)	Total Cost ($/ODMT)
10	$3.33	$63.95	$29.07	$96.36
20	$6.67	$63.95	$29.07	$99.69
30	$10.00	$63.95	$29.07	$103.02
40	$13.33	$63.95	$29.07	$106.36
50	$16.67	$63.95	$29.07	$109.69
60	$20.00	$63.95	$29.07	$113.02
70	$23.33	$63.95	$29.07	$116.36
80	$26.67	$63.95	$29.07	$119.69
90	$30.00	$63.95	$29.07	$123.02
100	$33.33	$63.95	$29.07	$126.35
110	$36.66	$63.95	$29.07	$129.69
120	$40.00	$63.95	$29.07	$133.02
130	$43.33	$63.95	$29.07	$136.35
140	$46.66	$63.95	$29.07	$139.69
150	$50.00	$63.95	$29.07	$143.02

Table 23: Upside scenario cost projections

Distance from Project (km)	Transport Cost LOW ($/ODMT)	Material Cost ($/ODMT)	Baling and Loading Cost ($/ODMT)	Total Cost ($/ODMT)
10	$2.70	$34.88	$23.26	$60.84
20	$5.40	$34.88	$23.26	$63.54
30	$8.10	$34.88	$23.26	$66.24
40	$10.80	$34.88	$23.26	$68.94
50	$13.50	$34.88	$23.26	$71.64
60	$16.20	$34.88	$23.26	$74.34
70	$18.90	$34.88	$23.26	$77.04
80	$21.60	$34.88	$23.26	$79.74
90	$24.30	$34.88	$23.26	$82.44
100	$27.00	$34.88	$23.26	$85.14
110	$29.70	$34.88	$23.26	$87.84
120	$32.40	$34.88	$23.26	$90.53
130	$35.09	$34.88	$23.26	$93.23
140	$37.79	$34.88	$23.26	$95.93
150	$40.49	$34.88	$23.26	$98.63

Table 24: Downside scenario cost projections

Distance from Project (km)	Transport Cost HIGH ($/ODMT)	Material Cost ($/ODMT)	Baling and Loading Cost ($/ODMT)	Total Cost ($/ODMT)
10	$3.97	$93.02	$34.88	$131.87
20	$7.93	$93.02	$34.88	$135.84
30	$11.90	$93.02	$34.88	$139.81
40	$15.87	$93.02	$34.88	$143.77
50	$19.83	$93.02	$34.88	$147.74
60	$23.80	$93.02	$34.88	$151.71
70	$27.77	$93.02	$34.88	$155.67
80	$31.73	$93.02	$34.88	$159.64
90	$35.70	$93.02	$34.88	$163.61
100	$39.67	$93.02	$34.88	$167.57
110	$43.63	$93.02	$34.88	$171.54
120	$47.60	$93.02	$34.88	$175.51
130	$51.57	$93.02	$34.88	$179.47
140	$55.53	$93.02	$34.88	$183.44
150	$59.50	$93.02	$34.88	$187.41

APPENDIX D: LEGAL DISCLAIMER

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