

# Quantifying the Impacts of Regional Sourcing on Sustainability



Sustainability Initiative

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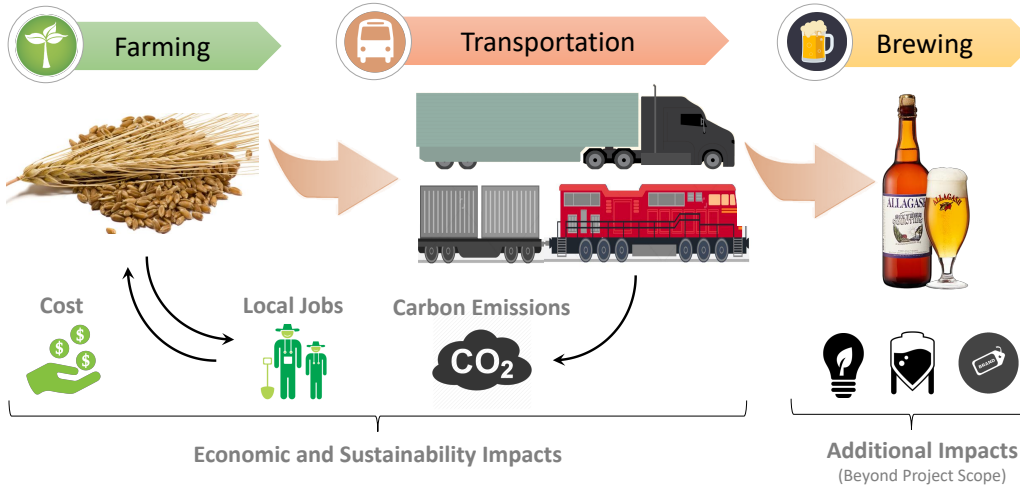
## Project Overview

### Problem Statement

The Allagash Brewing Company is committed to reducing its environmental impact and improving sustainable business practices. To meet its sustainability goals, Allagash asked us to quantify the economic and sustainability impacts of locally sourced Maine grains compared to industrial Midwest grains.



## Grain Sourcing



### Supplier Landscape

The brewing supply chain involves several steps, starting with farmers processing grains such as barley, wheat, and oats (key ingredients in beer), then transporting those raw materials, then brewing the beer, then bottling the beer, and finally distributing the beer. All of these phases of the supply chain have sustainability and economic impacts. Our project scope focuses upstream on the farming and transportation phases of the supply chain, comparing the impacts of three supplier characteristics: (1) cost, (2) local jobs created, and (3) carbon emissions.

## Optimization Modeling

### Sourcing Optimization Model

We created a sourcing optimization model to help Allagash determine the right mix of Maine and Midwest suppliers to meet its local sourcing targets while quantifying the impacts on the local economy and CO2 emissions.

The model minimizes the total cost of Allagash's sourcing decision and deals with each supplier's capacity and sustainability impacts.



Summary Table

	Difference (New Supplier Mix minus Business As Usual)					Minimize Costs - Optimal Supplier Mix					Business As Usual <sup>1</sup>				
	Cost Impact			Sustainability Impact		Cost Impact			Sustainability Impact		Cost Impact			Sustainability Impact	
	Supply (lbs)	Price (\$/lb)	Cost (\$/yr)	Local Jobs Created (count)	Global Warming (kg CO2 eq)	Supply (lbs)	Price (\$/lb)	Cost (\$/yr)	Local Jobs Created (count)	Global Warming (kg CO2 eq)	Supply (lbs)	Price (\$/lb)	Cost (\$/yr)	Local Jobs Created (count)	Global Warming (kg CO2 eq)
<b>Barley</b>															
Midwest	100,000	\$0.00	-\$1,577,500	n/a	-2,873,408	3,750,000	\$0.20	\$750,000	n/a	0	3,715,613	\$0.20	\$2,327,500	n/a	6,589,021
Local	-100,000	n/a	n/a	-23	-83,575	0	#DIV/0!	n/a	0	0	100,000	\$1.00	\$66,521	23	93,575
<b>Wheat</b>															
Midwest	-375,000	\$0.00	-\$270,000	n/a	-837,323	0	\$0.10	\$0	n/a	0	375,000	\$0.10	\$270,000	n/a	837,323
Local	375,000	n/a	n/a	84	317,535	375,000	\$0.61	\$228,356	84	317,535	0	n/a	n/a	0	0
<b>Oats</b>															
Midwest	-125,000	\$0.00	-\$245,000	n/a	-458,315	250,000	\$0.10	\$25,000	n/a	176,275	375,000	\$0.10	\$270,000	n/a	634,591
Local	125,000	n/a	n/a	28	71,717	125,000	\$0.69	\$86,533.45	28	71,717	0	n/a	n/a	0	0
<b>Total</b>	<b>0</b>	<b>#DIV/0!</b>	<b>-\$1,844,132</b>	<b>90</b>	<b>-3,873,369</b>	<b>4,500,000</b>	<b>#DIV/0!</b>	<b>\$1,089,890</b>	<b>113</b>	<b>4,281,140</b>	<b>6,500,000</b>	<b>\$0.20</b>	<b>\$2,934,021</b>	<b>28</b>	<b>8,154,509</b>

Detailed Supplier Inputs/Outputs

Total Cost		Sustainability Impact													
Name	Category	MI (lb)	Price (\$/lb)	Cost (\$)	Capacity (lb/yr)	CO2 (lb)	Jobs (count)	LE (lbs/pound)	MI (lb)	Price (\$/lb)	Cost (\$)	Capacity (lb/yr)	CO2 (lb)	Jobs (count)	LE (lbs/pound)
<b>Total</b>		<b>4,500,000</b>													
<b>Inputs</b>															
<b>Outputs</b>															
<b>Annual Demand</b>															
<b>Total Beer Demand</b>															
<b>Midwest</b>															
<b>Local</b>															
<b>Total</b>															
<b>Midwest Total</b>															
<b>Local Total</b>															

Note: The data shown above is intended for illustrative purposes only and does not reflect true market information