

# Analysis of Propane Supply Alternatives: Final Results Discussion

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Island Resort and Casino  
Wolf Conference Room  
W399 Hwy 2 & 41 Harris, Michigan 49845  
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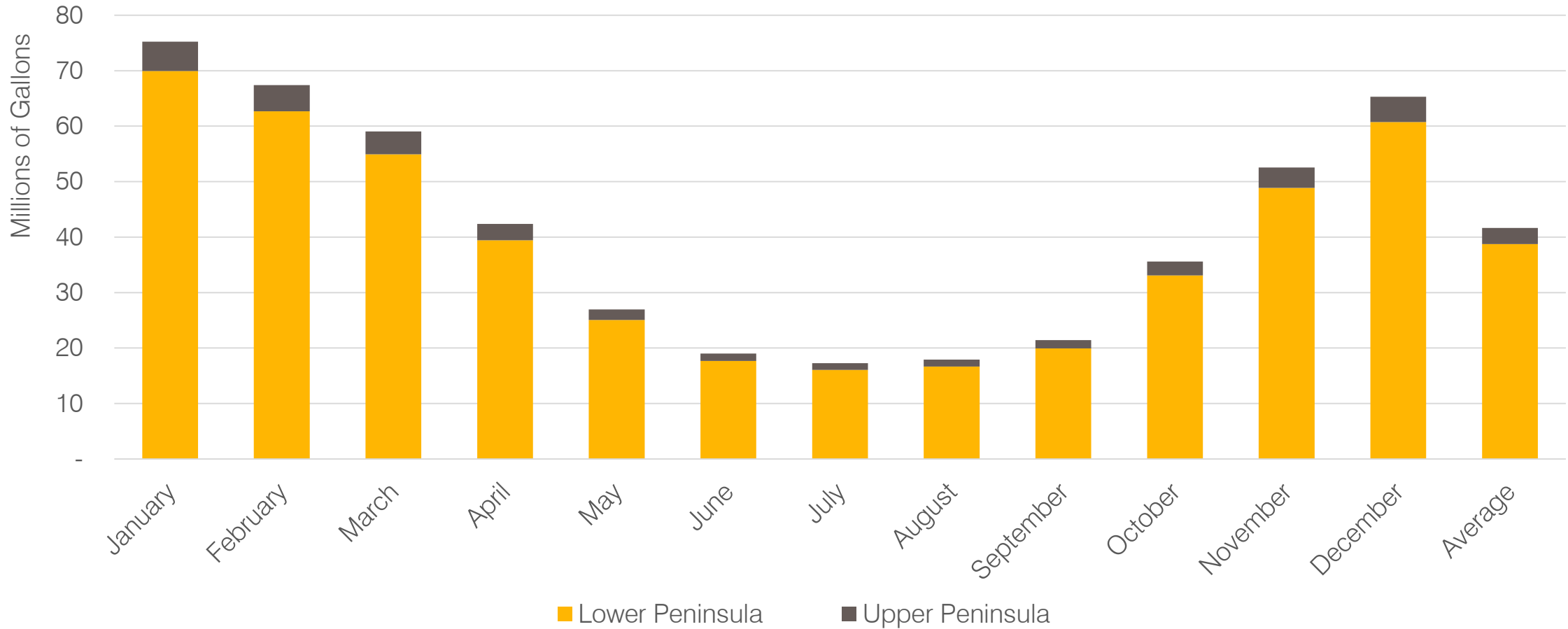
# Michigan Propane Study Objectives

- Model current propane supplies system based upon existing research that assesses Michigan's existing propane supply and distribution system throughout the state and with respect to each peninsula.
- Identify alternative approaches to meeting the propane needs of Michigan's residents and businesses to optimize the propane distribution network for reliability, cost, and emergency preparedness

# Scenarios Evaluated

- **Scenario One:** Supply Disruption on Enbridge's Lakehead system between Edmonton, Alberta to Superior, Wisconsin
- **Scenario Two:** Supply Disruption on Enbridge's Line 5 from Superior, Wisconsin to Sarnia, Ontario
- **Scenario Three:** Weather related supply disruption (including polar vortex and/or wet/ late drying season)

# Michigan's Weather-normalized Propane Demand



# Scenario One – Enbridge Line 1 Disruption

Facility	Owner	Location	Annual Production	Percentage of Peninsula's Supply
Rapid River Fractionator	Plains Midstream Canada	Rapid River, Michigan	30,660,000	87.6%
Superior Fractionator	Plains Midstream Canada	Superior, Wisconsin	2,170,000	6.2%
<b>Total Upper Peninsula Propane Supply Impact</b>			<b>32,830,000</b>	<b>93.8%</b>
Ontario Facilities	Plains Midstream Canada	Sarnia, Ontario	199,428,558	42.9%
<b>Total Lower Peninsula Propane Supply Impact</b>			<b>199,428,558</b>	<b>42.9%</b>
<b>Total Statewide Propane Supply Impact</b>			<b>232,258,558</b>	<b>46.5%</b>

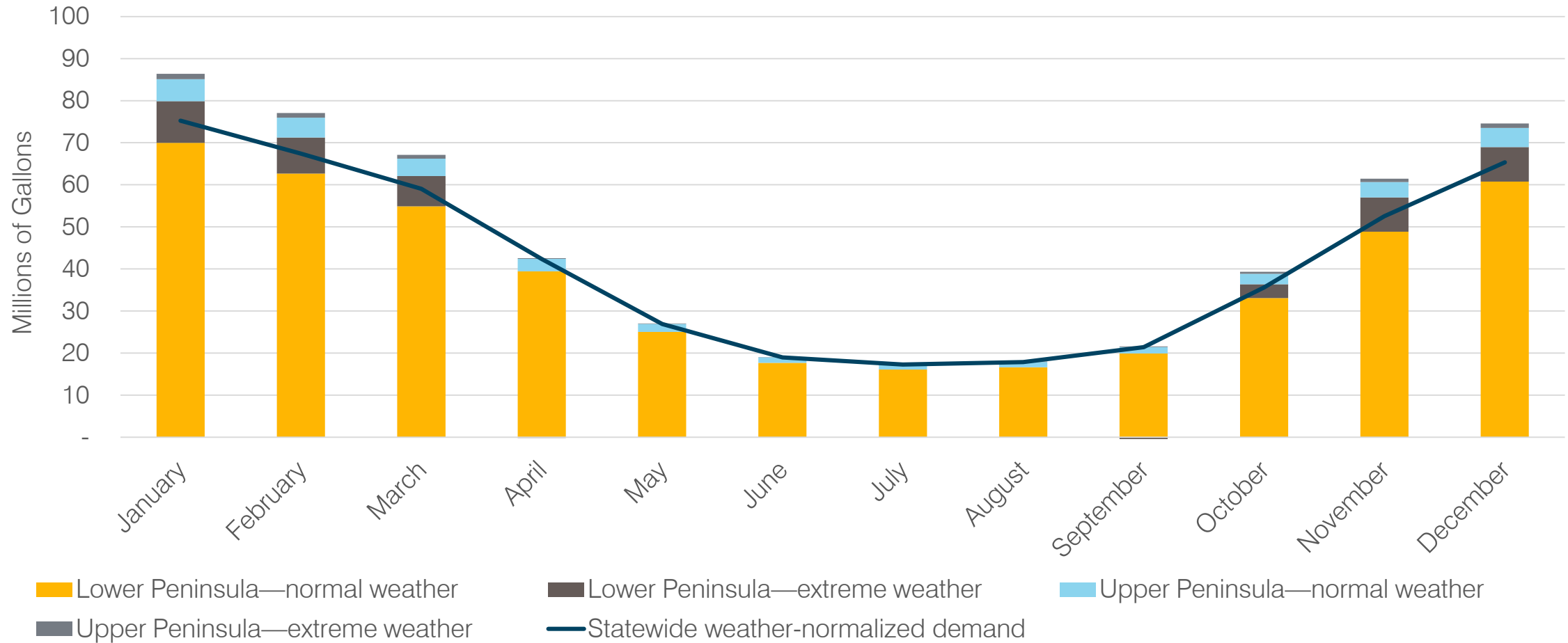
Source: PSC calculations

# Scenario Two – Enbridge Line 5 Disruption

Facility	Owner	Location	Annual Production	Percentage of Peninsula's Supply
Rapid River Fractionator	Plains Midstream Canada	Rapid River, Michigan	30,660,000	87.6%
<b>Total Upper Peninsula Propane Supply Impact</b>			<b>30,660,000</b>	<b>87.6%</b>
Ontario Facilities	Plains Midstream Canada	Sarnia, Ontario	199,428,558	42.9%
<b>Total Lower Peninsula Propane Supply Impact</b>			<b>199,428,558</b>	<b>42.9%</b>
<b>Total Statewide Propane Supply Impact</b>			<b>230,088,558</b>	<b>46.02%</b>

Source: PSC calculations

# Scenario Three – Extreme Weather Events



# Sensitivities Analysis

- **Sensitivity One: Weather Variability Affecting Seasonal Heating Demand**
  - Results in increase or decrease in propane demand based on seasonal temperatures (Scenarios 1&2)
- **Sensitivity Two: Demand Reduction through Conservation**
  - Results in decreased propane demand over the long run, estimated at 1.5 percent per year (All Scenarios)
- **Sensitivity Three: Customer Storage Optimization**
  - Results in increased propane stocks within the state that can potentially mitigate seasonal pricing impacts (All Scenarios)



# Modeling Results

# Priority Options for Delivery to Rapid River

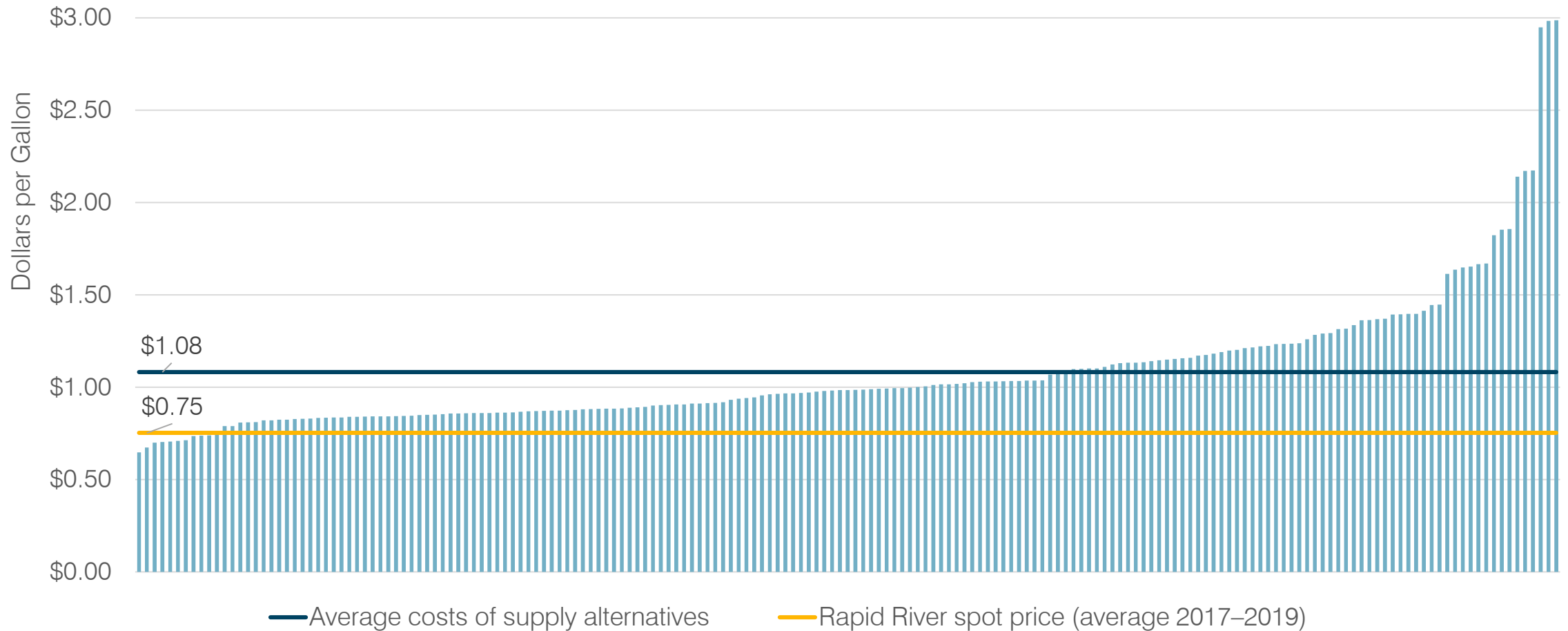
Option	Acquisition Pattern	Commodity	Costs (Dollars per Gallon)			Total
			Transport to Intermediate Location	Transport to Final Location	Storage	
Edmonton, Alberta, to Escanaba, Michigan (by rail), to Rapid River, Michigan (by truck)	Two-one	\$0.2770	\$0.1913	\$0.0200	\$0.1585	\$0.6468
Conway, Kansas, to Janesville, Wisconsin (by pipeline), to Rapid River, Michigan (by truck)	Flat demand	\$0.4739	\$0.0856	\$0.1400	\$0.0897	\$0.7892
Conway, Kansas, to Dubuque, Iowa (by pipeline), to Rapid River, Michigan (by truck)	Flat demand	\$0.4739	\$0.0738h	\$0.1705	\$0.0897	\$0.8079
Conway, Kansas, to Inver Heights Grove, Minnesota (by pipeline), to Rapid River, Michigan (by truck)	Flat demand	\$0.4739	\$0.0735	\$0.2498	\$0.0299	\$0.8272



# Priority Options for Delivery to Kincheloe

Option	Acquisition Pattern	Commodity	Costs (Dollars per Gallon)			Total
			Transport to Intermediate Location	Transport to Final Location	Storage	
Edmonton, Alberta, to Kincheloe, Michigan (by rail)	Normal weather (just-in-time)	\$0.3387	\$0.2528	\$0.0000	\$0.0299	\$0.6214
Conway, Kansas, to Kincheloe, Michigan (by rail)	Two-one	\$0.4571	\$0.2111	\$0.0000	\$0.1595	\$0.8277
Conway, Kansas, to East Chicago, Indiana (by pipeline), to Kincheloe, Michigan (by truck)	Flat demand	\$0.4739	\$0.1077	\$0.1962	\$0.0897	\$0.8675
Conway, Kansas, to Janesville, Wisconsin (by pipeline), to Kincheloe, Michigan (by truck)	Flat demand	\$0.4739	\$0.0856	\$0.2316	\$0.0897	\$0.8808

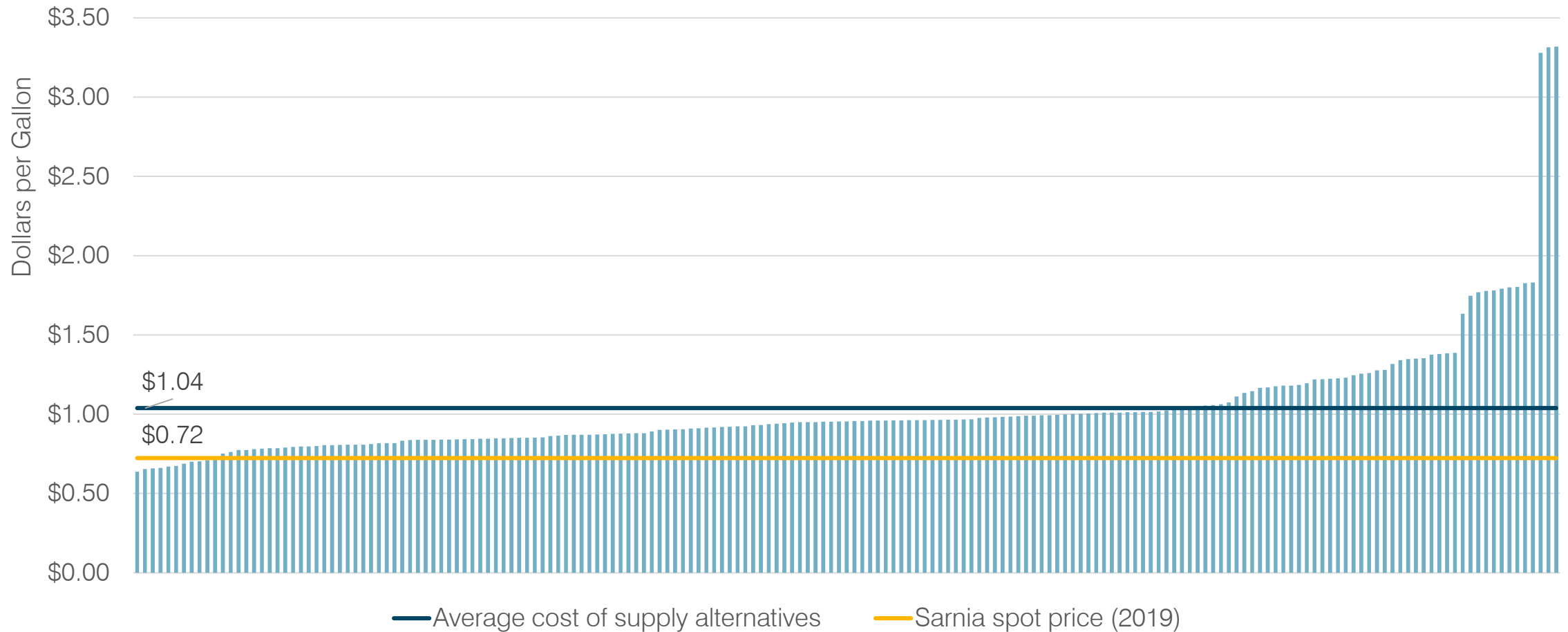
# All Options for Delivery to Kincheloe



# Priority Options for Delivery to Alto, Michigan

Option	Acquisition Pattern	Commodity	Costs (Dollars per Gallon)			Total
			Transport to Intermediate Location	Transport to Final Location	Storage	
Edmonton, Alberta, to Alto, Michigan (by rail)	Two-one	\$0.2770	\$0.2240	\$0.0000	\$0.1369	\$0.6379
Conway, Kansas, to Alto, Michigan (by rail)	Normal weather (just-in-time)	\$0.5053	\$0.2447	\$0.0000	\$0.0000	\$0.7500
Conway, Kansas, to East Chicago, Indiana (by pipeline), to Alto, Michigan (by truck)	Flat demand	\$0.4739	\$0.1077	\$0.1238	\$0.0459	\$0.7513
Edmonton, Alberta, to Escanaba, Michigan (by rail), to Alto, Michigan (by truck)	Two-one	\$0.2770	\$0.1909	\$0.1754	\$0.1369	\$0.7803

# Priority Options for Delivery to Alto, Michigan

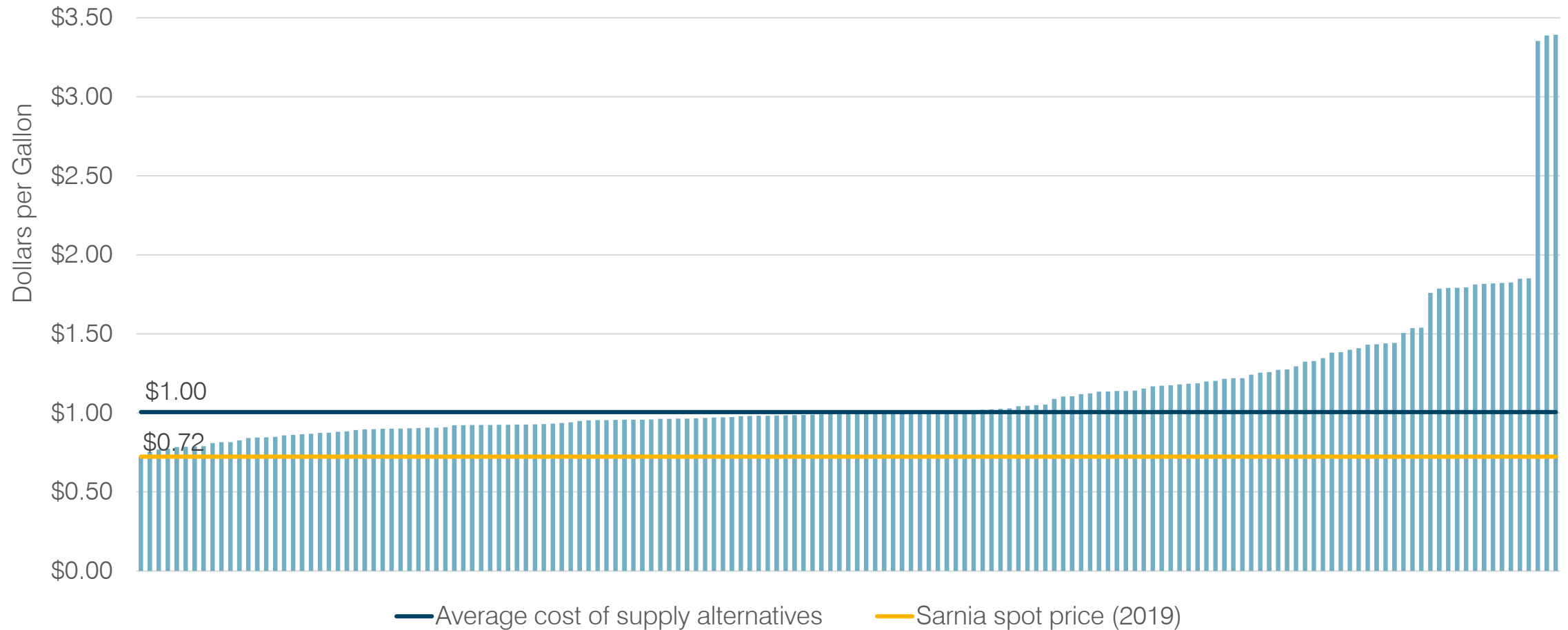


# Options for Delivery to Kalkaska, Michigan

Option	Acquisition Pattern	Commodity	Costs (Dollars per Gallon)			Total
			Transport to Intermediate Location	Transport to Final Location	Storage	
Edmonton, Alberta, to Escanaba, Michigan (by rail), to Kalkaska, Michigan (by truck)	Two-one	\$0.2770	\$0.1909	\$0.1171	\$0.1369	\$0.7219
Conway, Kansas, to East Chicago, Indiana (by pipeline), to Kalkaska, Michigan (by truck)	Normal weather (just-in-time)	\$0.5053	\$0.1077	\$0.1868	\$0.0000	\$0.7997
Conway, Kansas, to East Chicago, Indiana (by pipeline), to Kalkaska, Michigan (by truck)	Flat demand	\$0.4739	\$0.1077	\$0.1369	\$0.0910	\$0.8096
Conway, Kansas, to Janesville, Wisconsin (by pipeline), to Kalkaska, Michigan (by truck)	Flat demand	\$0.4739	\$0.0856	\$0.2222	\$0.0910	\$0.8728



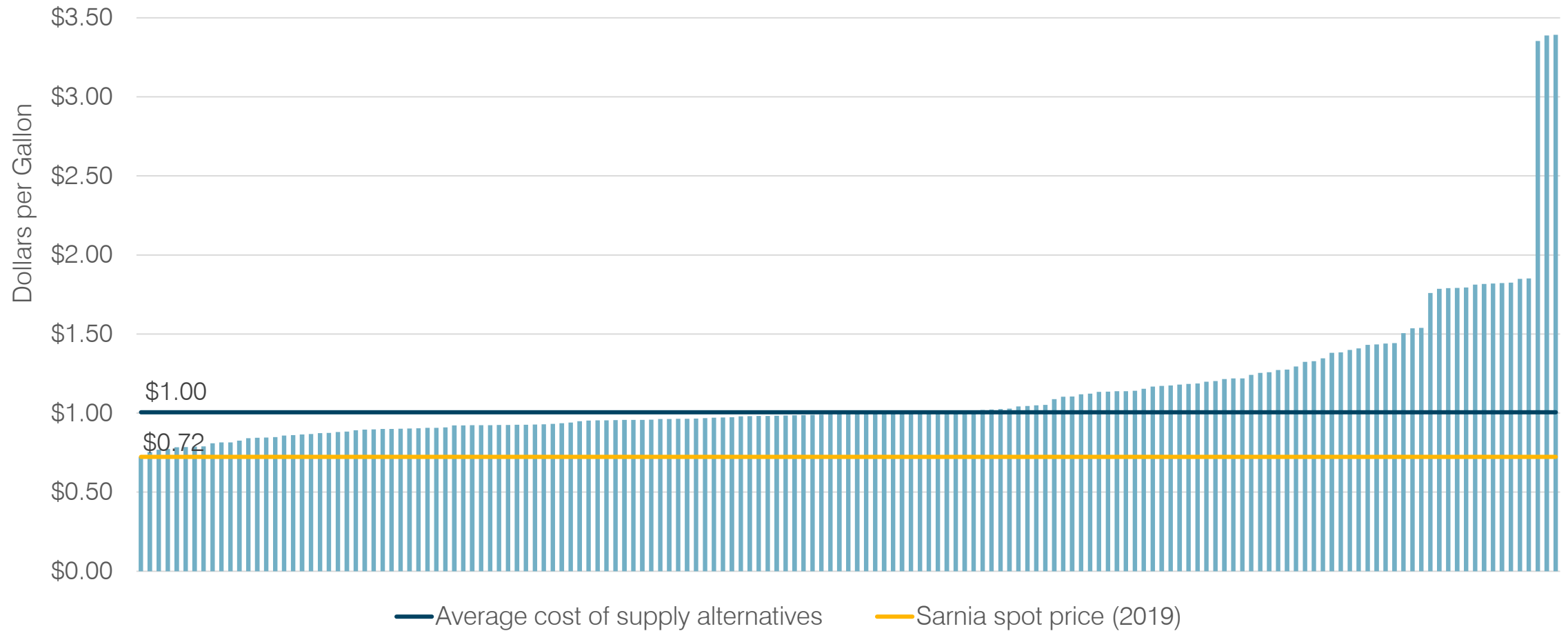
# Options for Delivery to Kalkaska, Michigan



# Priority Options for Delivery to Marysville, Michigan

Option	Acquisition Pattern	Commodity	Costs (Dollars per Gallon)			Total
			Transport to Intermediate Location	Transport to Final Location	Storage	
Edmonton, Alberta, to Marysville, Michigan (by rail)	Two-one	\$0.2770	\$0.2360	\$0.00	\$0.1370	\$0.6501
Conway, Kansas, to East Chicago, Indiana (by pipeline), to Marysville, Michigan (by truck)	Flat demand	\$0.4739	\$0.1077	\$0.1456	\$0.0914	\$0.8186
Conway, Kansas, to Marysville, Michigan (by rail)	Two-one	\$0.4571	\$0.2409	\$0.000	\$0.1370	\$0.8351
Conway, Kansas, to Dubuque, Iowa (by pipeline), to Marysville, Michigan by truck	Flat demand	\$0.4739	\$0.0738	\$0.2399	\$0.0914	\$0.8790

# All Options for Delivery to Marysville, Michigan



# Supply Costs for Scenario One: Supply Disruption on Enbridge's Line 1

Location of Supply Delivery	Base	Sensitivity One—Severe Weather	Sensitivity Two—Energy-efficiency Reduction	Sensitivity Three—Customer Storage
Kincheloe, Michigan	\$9.6	\$11.5	\$9.2	\$8.0
Rapid River, Michigan	\$14.2	\$16.9	\$13.8	\$12.6
Alto, Michigan	\$42.5	\$51.9	\$41.3	\$36.2
Kalkaska, Michigan	\$46.9	\$57.2	\$45.5	\$39.9
Marysville, Michigan	\$59.8	\$73.0	\$58.9	\$50.9
<b>Total</b>	<b>\$173.1</b>	<b>\$210.4</b>	<b>\$168.0</b>	<b>\$147.6</b>

# Supply Costs for Scenario Two: Supply Disruption on Enbridge's Line 5

Location of Supply Delivery	Base	Sensitivity One—Severe Weather	Sensitivity Two—Energy-efficiency Reduction	Sensitivity Three—Customer Storage
Kincheloe, Michigan	\$9.0	\$10.8	\$8.6	\$7.3
Rapid River, Michigan	\$13.3	\$16.0	\$12.9	\$11.7
Alto, Michigan	\$42.5	\$51.9	\$41.3	\$36.2
Kalkaska, Michigan	\$46.9	\$57.2	\$45.5	\$39.9
Marysville, Michigan	\$59.8	\$73.0	\$58.9	\$50.9
<b>Total</b>	<b>\$171.6</b>	<b>\$208.8</b>	<b>\$166.4</b>	<b>\$146.02</b>

# Supply Costs for Scenario Three: Weather-related Supply Disruption

Location of Supply Delivery	Extreme Weather—Severe	Sensitivity One—Mild Weather
Kincheloe, Michigan	\$2.2	-\$1.5
Rapid River, Michigan	\$3.1	-\$2.1
Alto, Michigan	\$10.2	-\$7.3
Kalkaska, Michigan	\$11.5	-\$8.2
Marysville, Michigan	\$15.4	-\$11.1
<b>Total</b>	<b>\$42.4</b>	<b>-\$30.2</b>

# Impacts of Increased Reliance on Line 5

- PSC also calculated supply impacts and associated costs for scenarios one and two assuming that Line 5 is the only supply source for Sarnia propane production delivered to Michigan.
  - The impact of scenario one would be a 51.38 percent reduction in propane supplies.
  - The estimated impact of scenario two would be slightly smaller, at 50.95 percent.
- In each scenario, costs increase by at least \$15 million (8.7 percent increase in base case); however, because PSC assumed production from Sarnia is consumed in the Lower Peninsula, cost in the Upper Peninsula remained the same.



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