FREIGHT DATA
STATE AND MEGAREGIONS

Rickey Fitzgerald, *Florida Department of Transportation*
(Moderator)

Development of a Statewide Freight Transportation Network Optimization Strategy

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Agenda

- **Quetica Overview**
- **Freight Network Optimization Concept**
- **Project Approach**
- **Case Study**
- **Questions**

Consulting Practices

- **Supply Chain and Transportation**

- **Information Technology**

- **Global Trade, Finance and Payments**

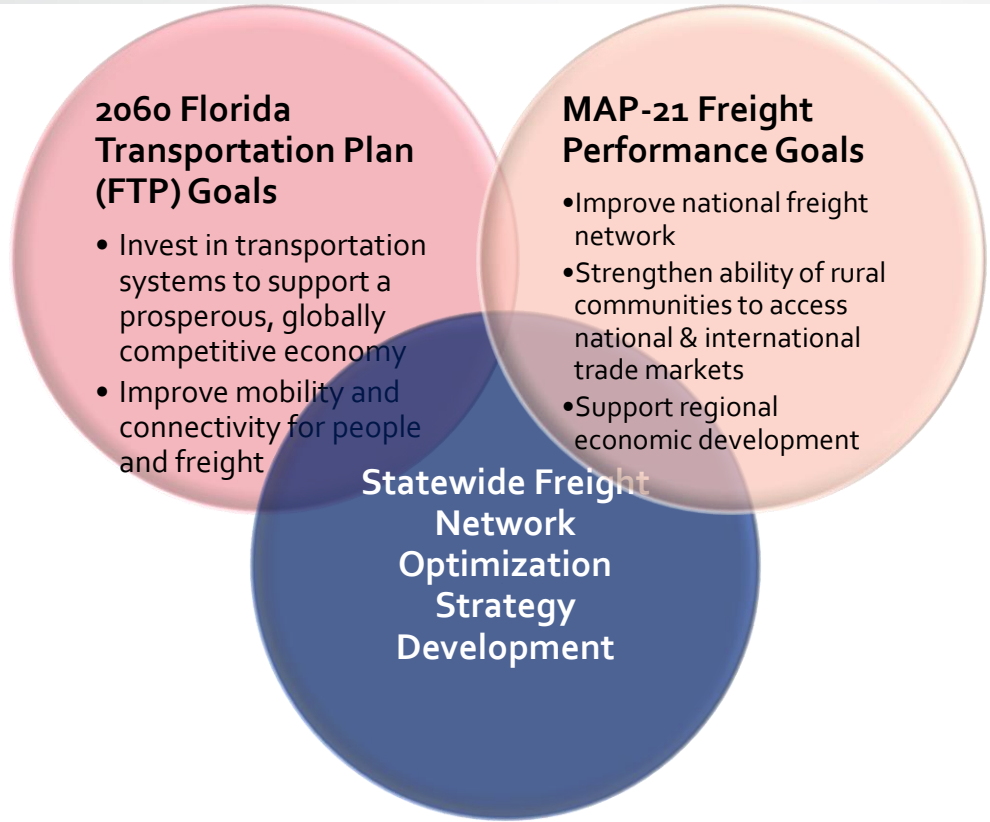- **General Management Consulting**

Business Vision

To effectively identify and prioritize investment opportunities for an optimized freight transportation network to lower transportation costs for Florida businesses and promote business growth in Florida.

2060 Florida Transportation Plan (FTP) Goals

- Invest in transportation systems to support a prosperous, globally competitive economy
- Improve mobility and connectivity for people and freight

MAP-21 Freight Performance Goals

- Improve national freight network
- Strengthen ability of rural communities to access national & international trade markets
- Support regional economic development

Statewide Freight Network Optimization Strategy Development

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Demand-Based Freight Network Optimization

- **Supply Chain Network**

  - *Suppliers, plants, warehouses, and flows of products from origin to the final customer*

  - *80% of the landed costs are locked in with the location of the facilities and the determination of product flows between them*

- **Supply Chain Network Design**

  - *The discipline to determine the optimal location and size of facilities and the flow through the facility network*

- **Demand-Based Freight Transportation Network Optimization**

  - *Applies supply chain network design and optimization techniques to freight transportation network*

  - *Leverages advanced algorithms and tools developed in commercial supply chain network optimization and management*

  - *Identifies opportunities to use lower cost transportation modes and additional infrastructure elements to enable lower cost routes for state DOT planning*
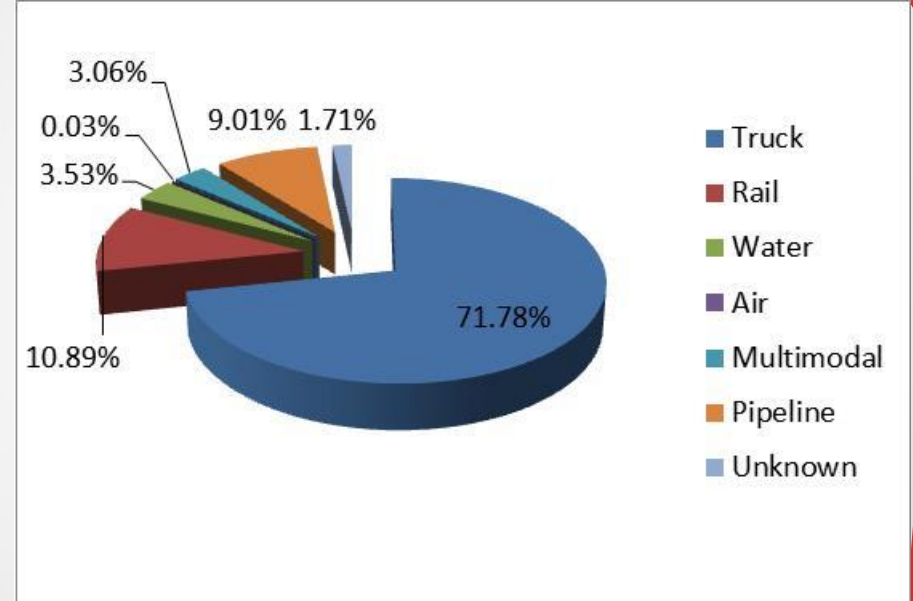
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Opportunities in Current Florida Freight Flow

Florida Tonnage by Mode in FAF3
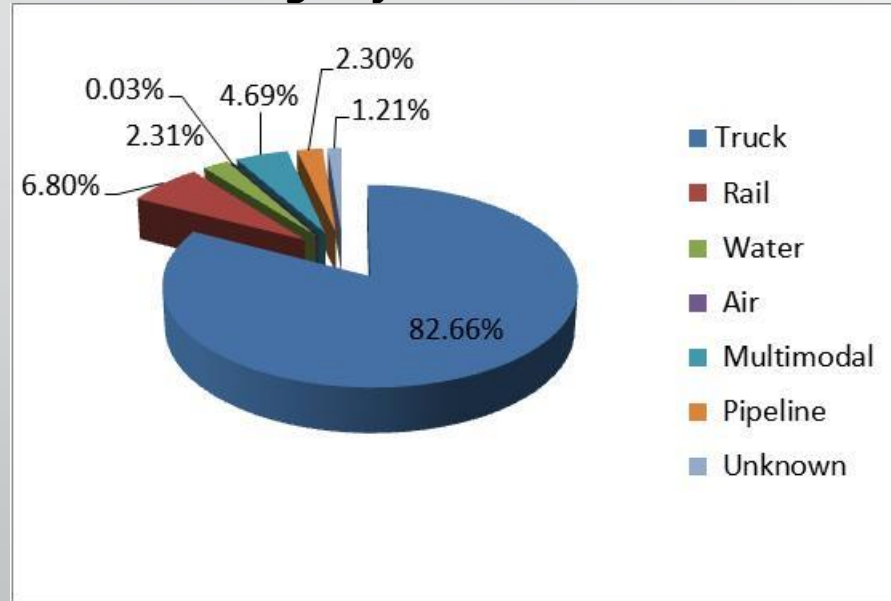
National Average Tonnage by Mode

- **Observations**
  - *Florida has much higher % of truck tonnage than national average*
  - *Florida has lower % of rail and pipeline tonnage than national average*
  - *How to leverage lower cost modes to reduce transportation costs for FL businesses?*

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Opportunities in Florida's Top Commodities

- **Florida's top 15 commodities represent over 80% of overall tonnage**

- **How to optimize FL's freight network to reduce transportation costs for the high volume commodities?**

Code	Commodity	% of Total Tonnage	Accum. %
12	Gravel	16.40%	16.40%
31	Nonmetal min. prods.	15.57%	31.97%
41	Waste/scrap	7.13%	39.10%
17	Gasoline	6.54%	45.64%
11	Natural sands	4.30%	49.94%
19	Coal-n.e.c.	4.17%	54.11%
07	Other foodstuffs	3.66%	57.78%
22	Fertilizers	3.61%	61.38%
15	Coal	3.47%	64.85%
13	Nonmetallic minerals	3.04%	67.89%
02	Cereal grains	2.79%	70.69%
03	Other ag prods.	2.76%	73.44%
18	Fuel oils	2.55%	76.00%
25	Logs	2.34%	78.33%
26	Wood prods.	2.15%	80.49%
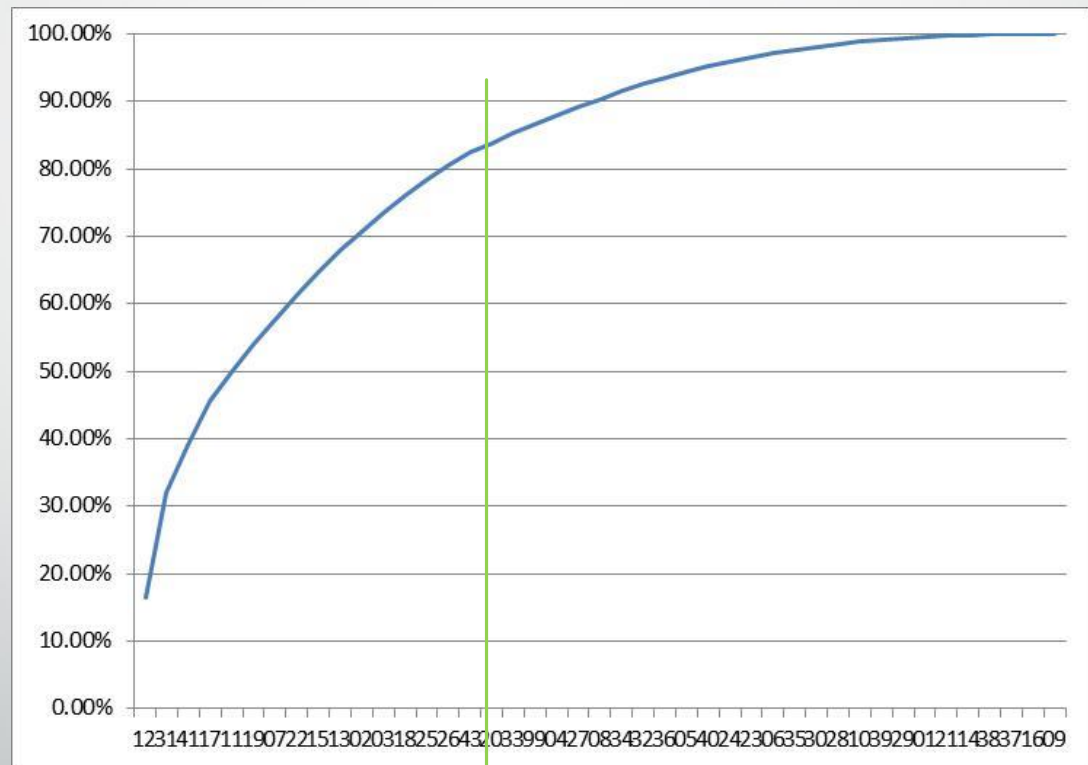
Approach Overview
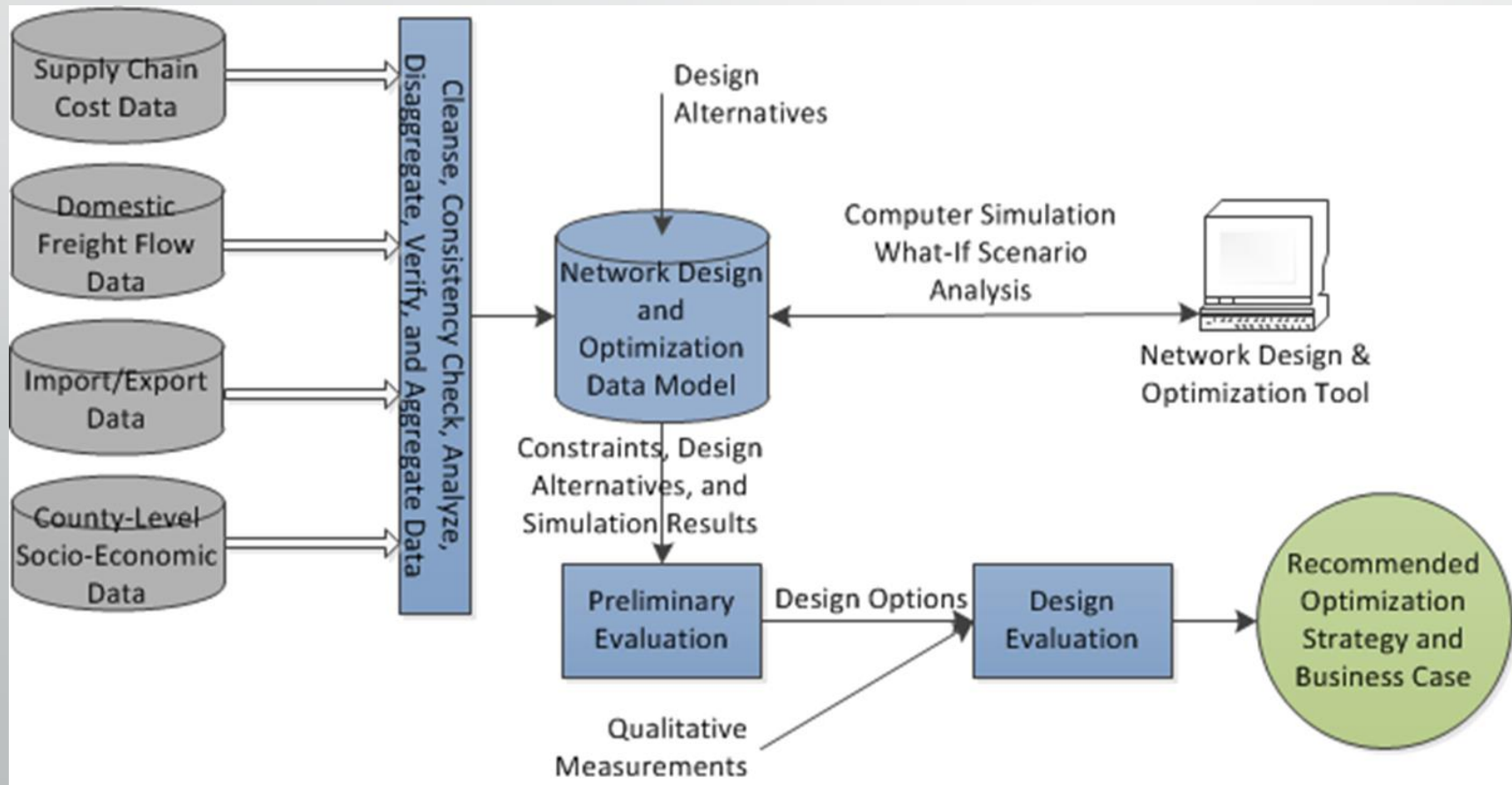
Demand Data Processing Steps – An Example
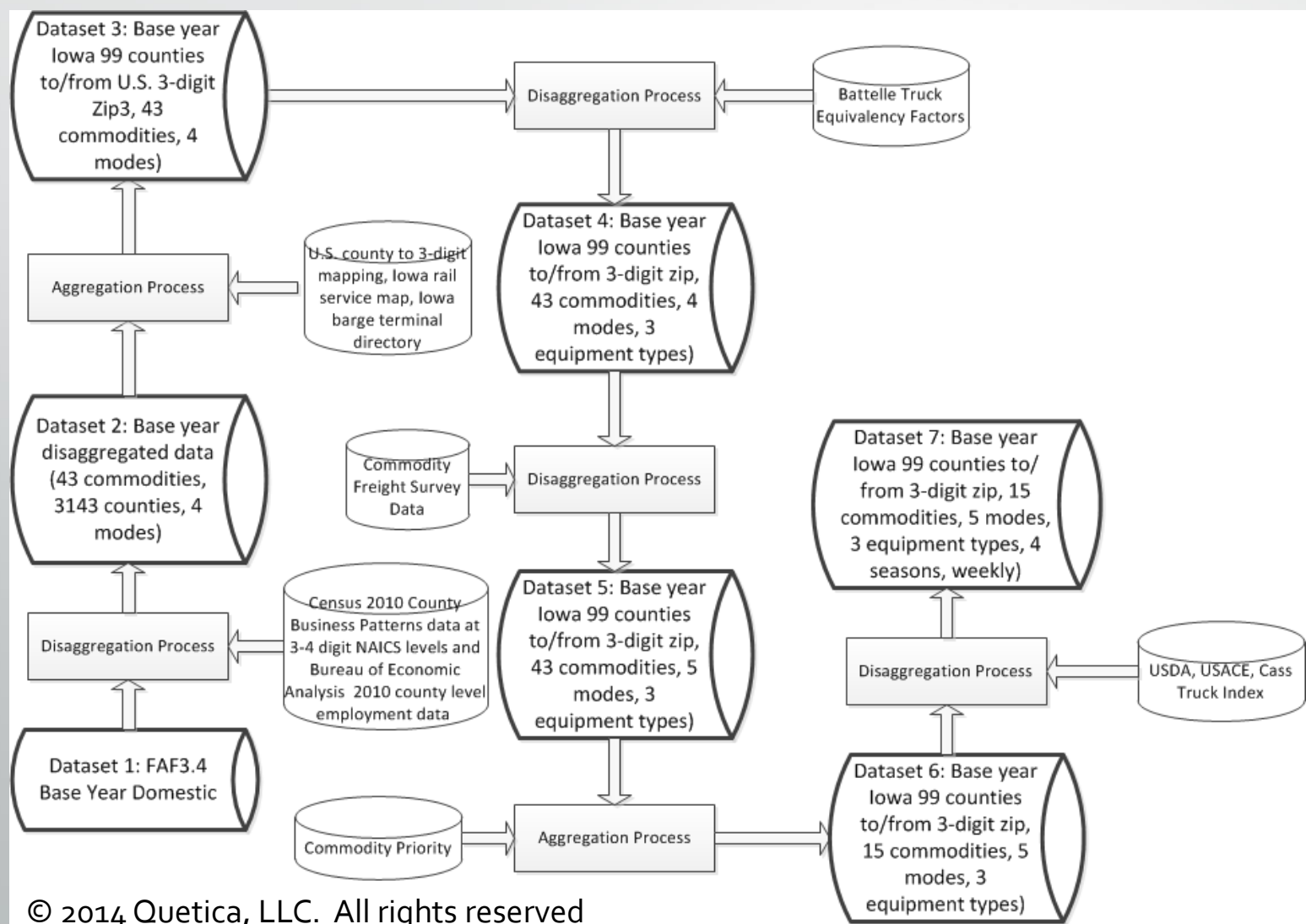
Expected Results

- **Baseline Optimization**

  - *Answer this question: How do we best use the current freight network to deliver optimized results?*

  - *Identifies alternative routes, alternative modes, etc. in current network*

- **Greenfield Scenario Analysis**

  - *Answer these questions: What are the infrastructure elements to develop and where should they be located to optimize the network?*

  - *Identifies new intermodal facilities, commodity consolidation points, rail and barge terminals, roadways, rail lines, etc.*
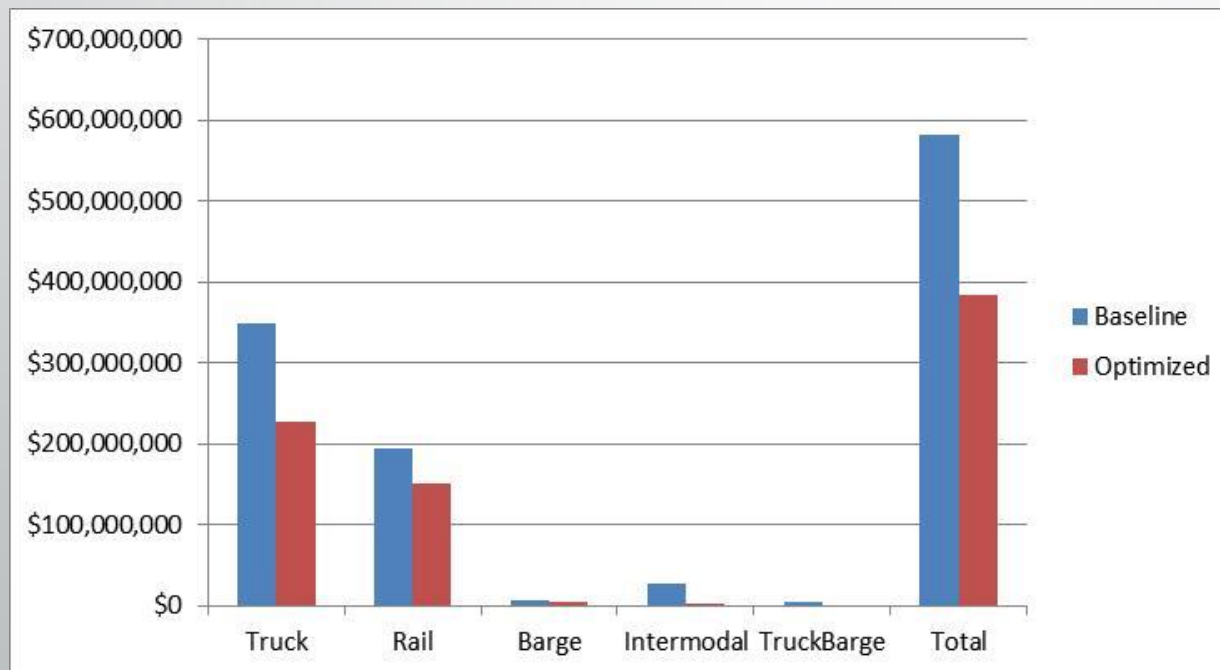
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Results – Overall Iowa Transportation Network Optimized
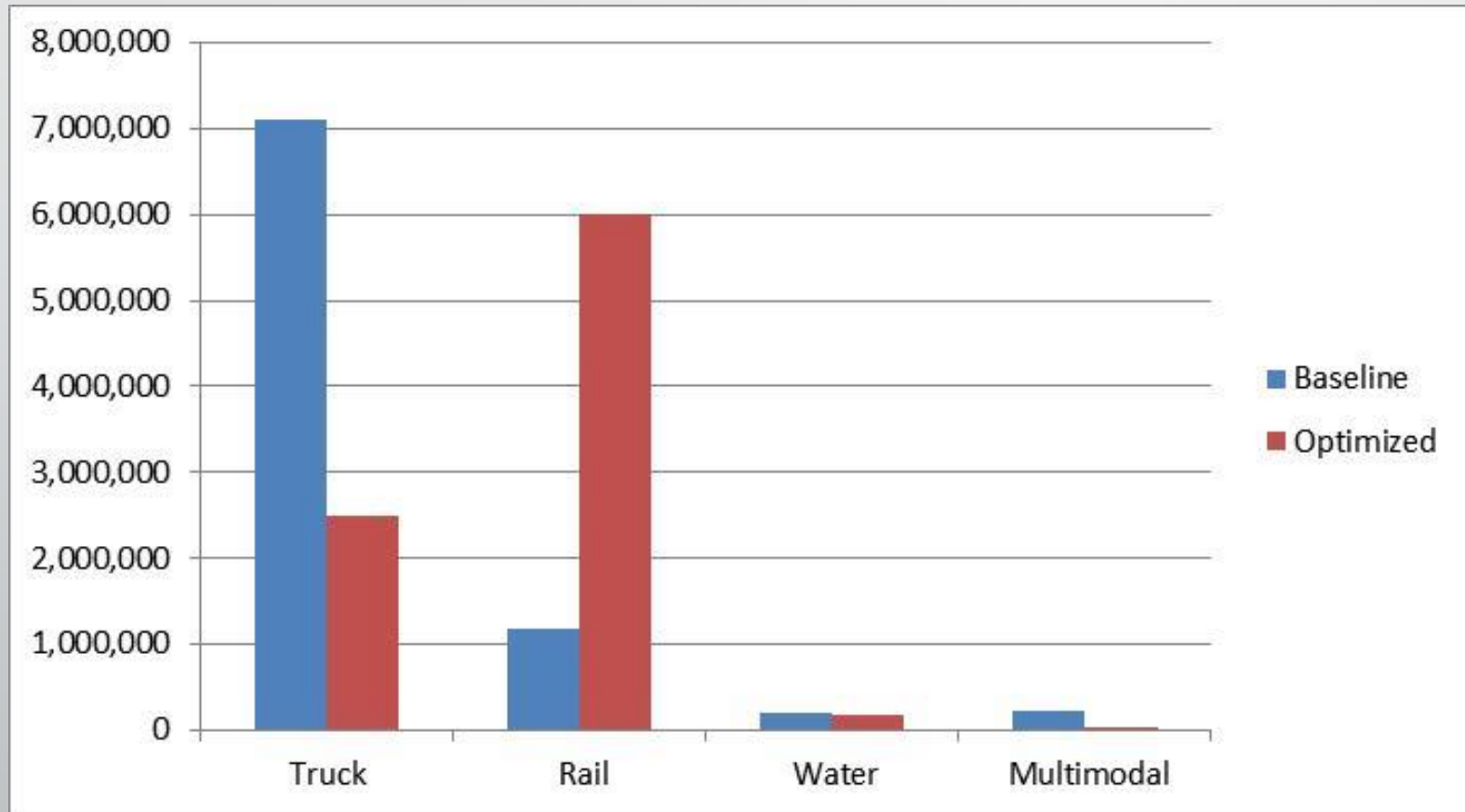
Weekly Costs by Mode: Baseline vs. Optimized

- **Baseline transportation cost / Iowa gross state product: ~21%**

- **Optimized baseline transportation cost / Iowa gross state product: ~14%**

Weekly Tonnage by Mode: Baseline vs. Optimized

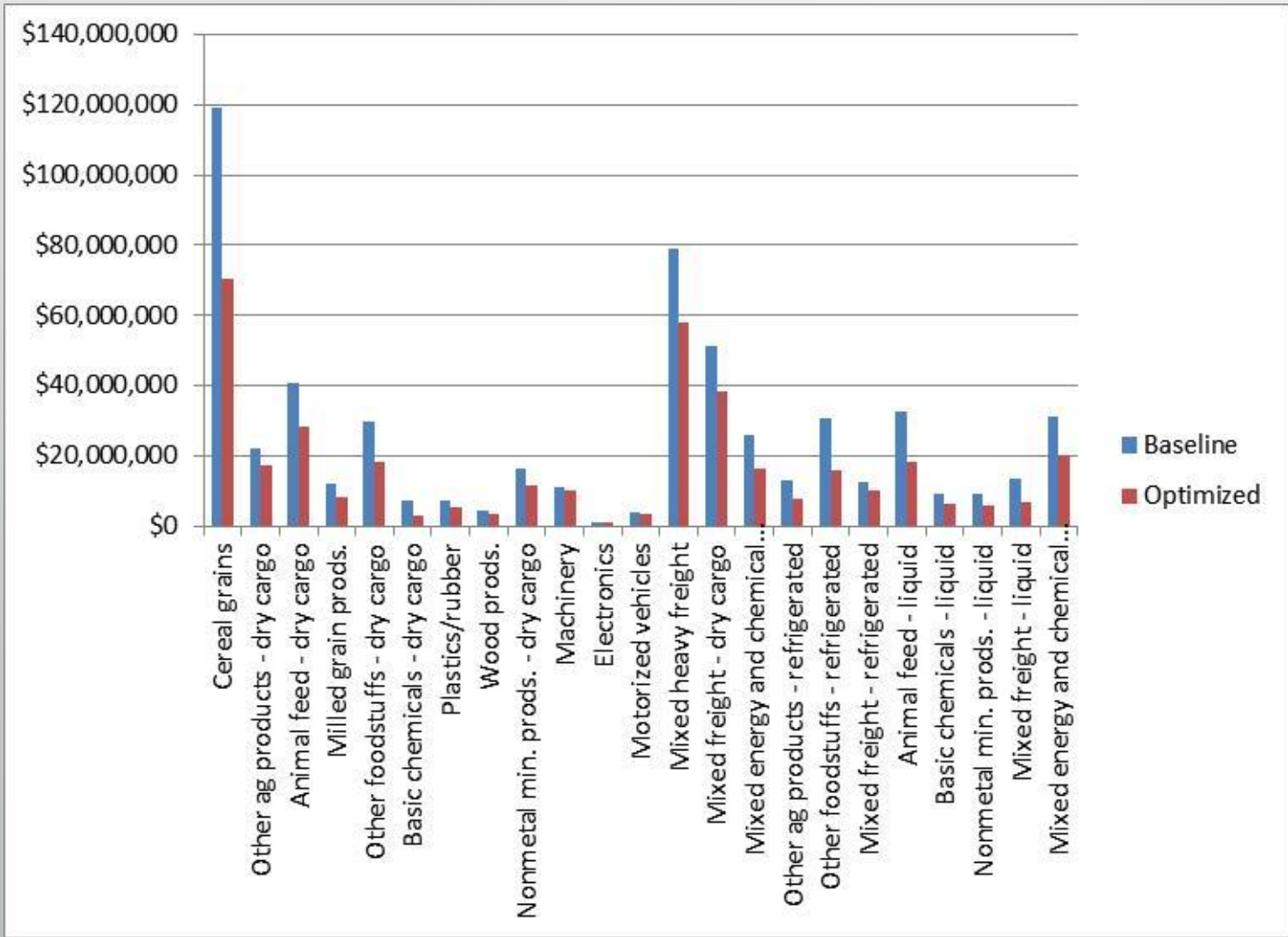- **Implication: reliable rail transportation using existing network can significantly reduce transportation costs for Iowa businesses**

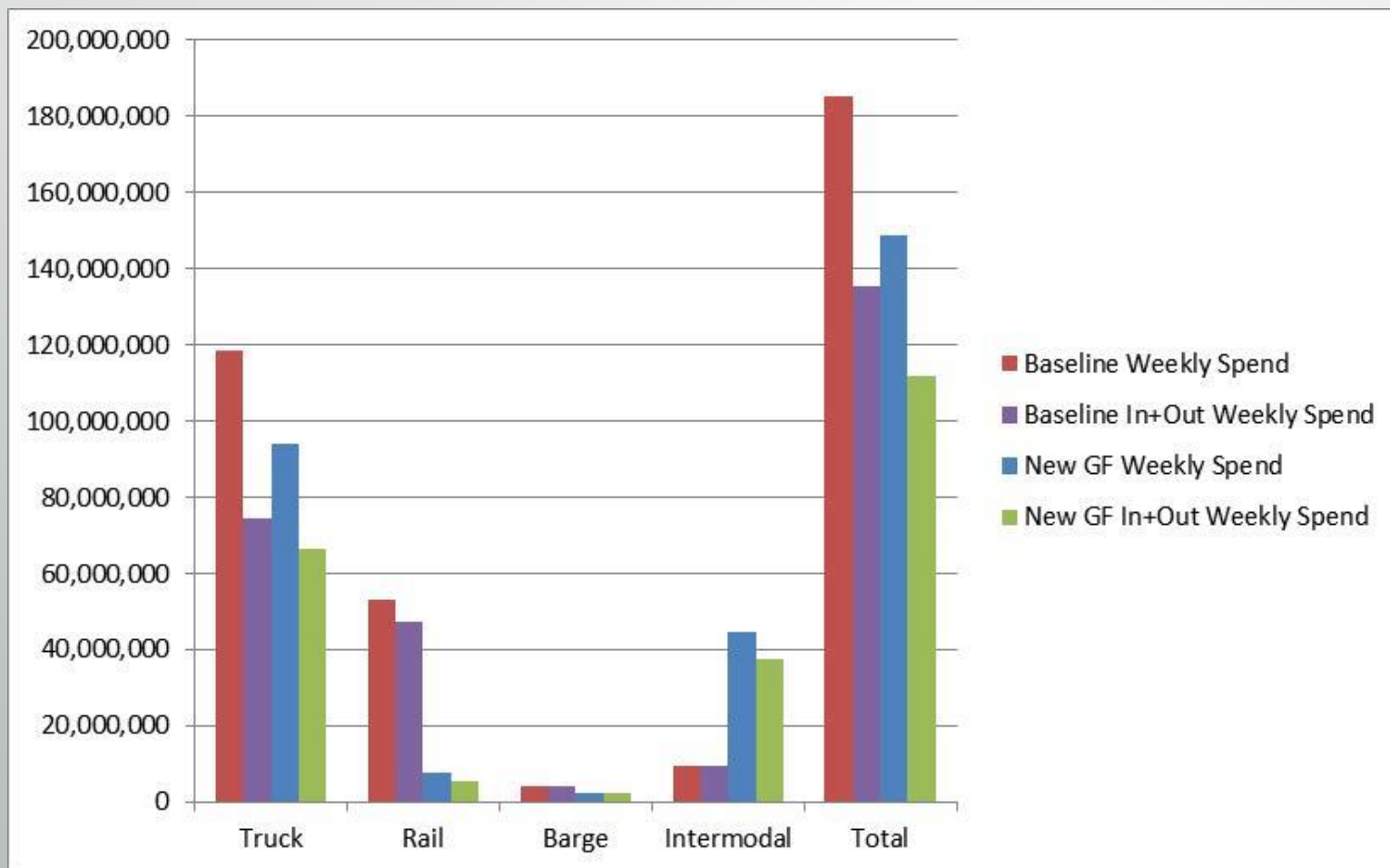# Weekly Cost by Product: Baseline vs. Optimized

Case Study: Intermodal Yard

Intermodal Yard – Cedar Rapids Area

- **Comparing Transportation Spend with Baseline**

GF Cost Saving Opportunity

- **Scenario: A new intermodal yard in Cedar Rapids area**
- **Commodities: general dry cargo**
- **Freight flow: inbound and outbound**

	Tonnage thru GF Site	Baseline Spend	Greenfield Spend
Weekly Inbound Tonnage	49,050		
Weekly Outbound Tonnage	180,071		
Total Weekly	229,121	$31,213,664	$54,816,950
Total Annual	11,456,082	$2,740,847,476	$1,560,683,198
Weekly Savings			**$23,603,286**
Annual Savings			**$1,180,164,278**

Data Analytics for Economic Development

Additional Project Benefits

The rich datasets collected in freight transportation network optimization can be leveraged:

*To transform transportation network, supply chain cost, commodities, equipment and socio-economic data in a centralized data warehouse to quantitative **information** and **knowledge**, together with easy-to-use information access tools, for state government agencies and their customers to **make informed operational and investment decisions***

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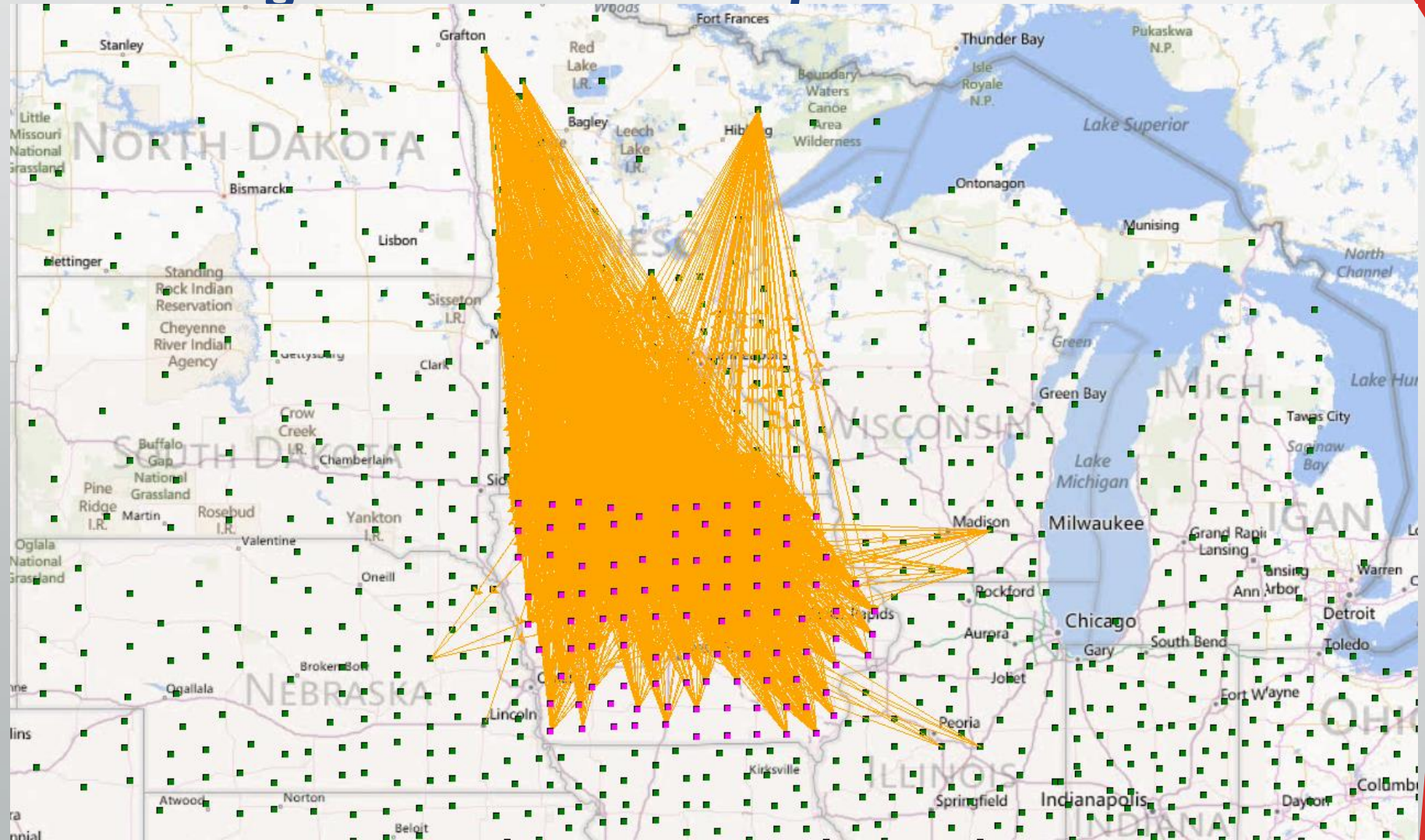
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Data Analytics Case Study 2: Steel Industry Regional Freight Optimization for Expansion

Annual Freight in Muscatine County (Short Ton)
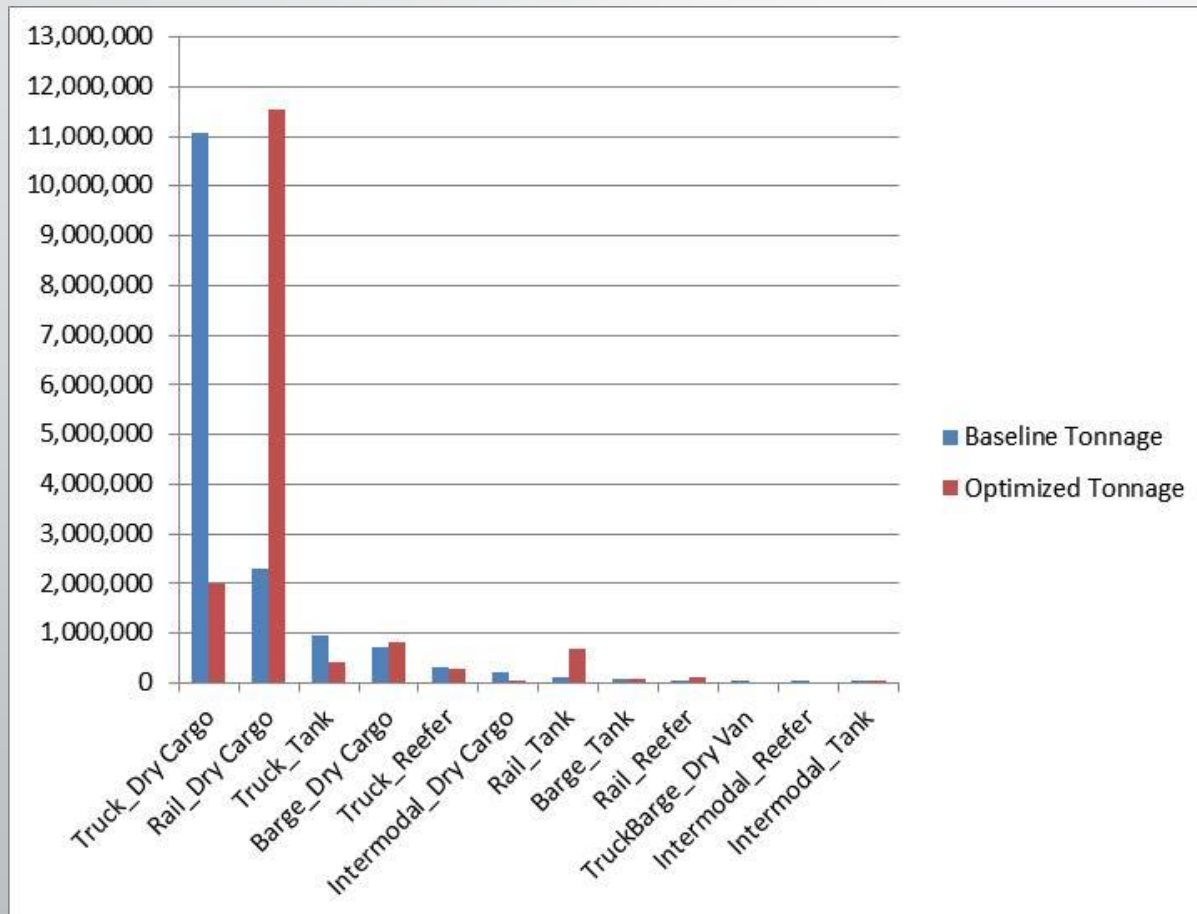
Case Study 2: MPO/RPC (Muscatine County) Transportation Optimization for Expansion
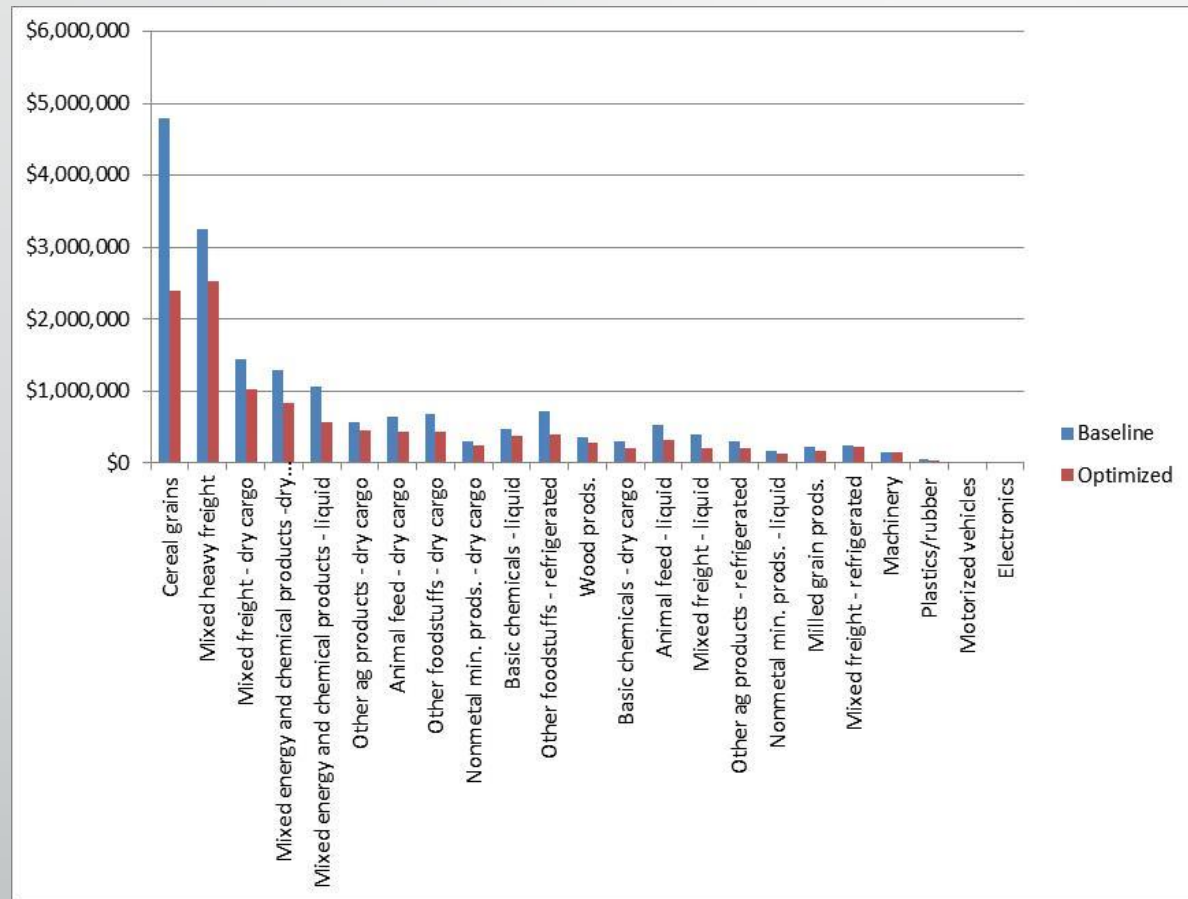
Unit of Measure: Weekly Transportation Costs

Data Analytics Case Study 3: Propane Supply Chain Optimization

Propane Demand Baseline - Iowa

Millions of Gallons

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
5 Yr. Avg. Agriculture/Comm'l	4.57	3.30	8.64	11.99	18.17	23.99	41.06	41.47	35.64	34.37	24.71	17.42
5 Yr. Avg. Residential	10.35	5.74	2.87	2.33	2.66	4.88	10.22	15.89	25.10	28.64	22.54	17.07
5 Yr. Avg. Total	14.92	9.04	11.51	14.32	20.83	28.87	51.29	57.35	60.74	63.01	47.26	34.49
Historical Minimum	9.97	6.65	9.95	11.66	16.74	17.83	24.05	28.14	43.46	48.43	39.11	21.45
Historical Maximum	20.99	10.40	12.97	15.86	23.50	37.14	89.36	131.79	79.08	72.47	55.27	40.17
2013 Total	20.99	10.40	11.18	15.83	21.56	23.47	89.36	65.94	70.50	72.47	43.43	40.17

5 year Average (Apr-2009 to Mar-2014)

- *Decrease in Demand (e.g. warm weather, price increase, switching fuels)*

- *Increase in Demand (e.g. cold weather, weather impact on agriculture, historical/theoretical extremes)*

- *Timing of demand (e.g. change in inventory practices for residential)*

- *Additional scenarios TBD for inventory, transportation changes, etc.*

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Business Analytic Capability Summary

- **Economic and Business Development**
  - *Supply chain cost analysis to recruit and retain businesses*
  - *Florida product demand analysis*
  - *Strategic industries for new businesses*
  - *Competitive analysis – Florida product landed costs vs. competitors'*
  - *Strategic site location analysis*
- **Industry Specific Supply Chain Design**
  - Supply chain design for agriculture, energy, international trade, etc.

- **Shipper Supply Chain Analysis**
  - *Supply chain constraint analysis and optimization*
  - *Supply chain cost benchmarking*
  - *New plat/warehouse site selection*
  - *Supplier performance/freight rate benchmarking*
- **Transportation Company Investment Analysis**
  - *Transportation demand analysis*
  - *Market segmentation and cost analysis*
  - *Demand forecast*
  - *Site selection for new facilities*

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Business Analytic Capability Summary (cont'd)

- Transportation Network Management

    - Infrastructure inventory analysis

    - Network capacity analysis

    - Network utilization trend analysis

    - Contingence-based planning and business impact assessment

    - Value assessment of transportation network

- Network Optimization

    - Ongoing state-wide transportation network optimization

    - Industry specific transportation network optimization

    - Private sector supply chain network optimization

- DOT Operational Key Performance Indicators (KPI) Analysis

    - Trend analysis

    - Slice and dice, drill down, roll up, and pivot analysis to understand constraints in transportation systems

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THANK YOU !

Freight Transportation Network Optimization Strategy (Macro level)

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Up Next:

FRATIS: Route Optimization Strategy (Micro level)

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