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Southeast Minnesota Regional Freight Study:

Executive Summary

Overview of the Region and its Freight Transportation;

Southeast Minnesota, in particular the area serviced by MnDOT District 6, consists of 11 counties roughly bounded by I-35 on the west, Iowa on the south, the Mississippi River on the east, and the Metro region on the north. Outside of the Twin Cities Metro, it is the second most populous region and the second highest concentration of manufacturing after Central Minnesota. It is the second largest supplier of agricultural products, after Southwest Minnesota, reflecting its long history as an area based on extensive and highly productive farming. Led by Rochester, the second largest urban center in the state, the region is the fastest growing economic area in Minnesota and a key supplier of cutting edge medical technology and services. It is an important observation of the study that while this part of the state reflects the steady shift away from a manufacturing to a service economy; both sectors contribute significantly to the wealth of this region, along with its agricultural production. The region boasts seven secondary regional trade centers, more than any other economic area of the state, in turn signifying a robust, diverse, and well distributed industrial base that supports a healthy local economy, with good income levels and high employment. In all, the region originates and terminates roughly 14 million tons of goods with a market value exceeding $11 billion, 13% of the commodities attributed to Minnesota enterprise.

The region is well served by the freight transportation network. Interstates and state trunk highways supply heavy-duty and high-capacity routes for commercial trucking. These include I-35 between the Metro and Iowa, I-90 east and west through Albert Lea to La Crosse, Wisconsin, Interregional corridors along Hwy 61 along the river, Hwy 52 from the Metro to Rochester, and Hwy 14 across the area from Winona through Owatonna, and regional connectors including Hwy 63 into Iowa. Extensive rail service is provided by two Class 1 railroads, Canadian Pacific and Union Pacific, and a short line, Progressive Rail. Water transport is served by two public port authorities in Red Wing and Winona, and complimented by the Port of La Crosse. Commercial aviation is available through scheduled service at Rochester, supplemented by other air cargo services at MSP in the Twin Cities and at the La Crosse regional airport.

The region is unique in several ways. Food processing, consisting of everything from meat packing to cereal production and every form of processed and pre-prepared food product, is a key activity in virtually every major city in the area. The Mississippi River shaped the settlement and agricultural market conditions for this region, and continues to be a major economic link for bulk products to a full range of domestic and international markets. Five major highway river crossings along the Mississippi are critical links to Wisconsin, carrying enough commercial and commuter traffic to and from that neighboring state to create a highly inter-dependent economic zone. Unlike Central Minnesota, whose trade is tightly linked to the Twin Cities, Southeast Minnesota exhibits an unusually high profile in exporting goods to both the U.S and internationally, led by Rochester and including a wide range of other producers and manufacturers across the region. The private sector has excelled in innovative products and processes that include medical technology, genetic products, glass and construction materials, industrial fasteners, fabricated metal and transportation products, and processed foods. The innovation extends to the energy field, from being a major source of wind-powered electrical generation, to a gradual ramping up of alternative fuels production such as ethanol. Cost-effective transportation shares in this attribute as well, with a large number of local third-party logistics (3PL) firms specializing in one-stop expert transportation services, answering the full range of shipping needs for farm and food producers as well as many manufacturers, giving them seamless access across multiple modes and borders to virtually any market in the world.

Findings:

Highway Conditions;

- Road surface and smoothness of ride; A consistent theme shared particularly among equipment fabricators during the interviews and open houses was a concern for pavement condition. While some goods, such as large scale plate glass and machinery sub-systems, were reported to be relatively unaffected by rough pavement, the final assemblies, including wind turbine parts, industrial HVAC units, and electronic assemblies were prone to expensive damage in transit from road-related impacts, stresses, and vibration. Shippers generally rated the current conditions of roads to be good, but had concerns about a possible future decline in highway maintenance on roads at all levels. Most were aware of funding issues and trends.
- Access management and connections to the system; Commercial trucking has steadily grown in the volume of traffic and the size of vehicles. Shippers noted that truck routes and local connections to businesses were adequate for today's needs, and appreciated cooperation from MnDOT and local jurisdictions in designing new accesses and working with business. Concerns were shared about recognizing the size of semi-tractor-trailer rigs now in common use, often with a total rig length of 70 feet or more, and a total wheelbase of up to 67 feet (WB67), and designing safety features and turn geometry recognizing WB65 or WB67.
- Innovative intersection design; MnDOT has been responding to two issues, the high cost and the safety of improving traditional road intersections at grade, with innovative design, including roundabouts and J-turns. Both innovations are recognized for a significant improvement for safety and reductions in accident severity, under proper conditions. The trucking community has been generally very receptive of these innovations, with the caveat that design should be monitored and given public review in order to easily handle long, heavy commercial vehicles safely, and that crossing traffic consisting of heavy

trucks (on the minor route) not be compromised by these installations if significant new truck volumes appear, in turn discouraging use of some routes by large volume commercial shippers and impacting trade levels.

River Crossings;

- Industry in and near the Mississippi River Valley shared a common concern that that good access to Wisconsin should be maintained and improved as a priority for MnDOT and WisDOT. Much of the awareness of this issue in the business community springs from the I-35 bridge collapse, MnDOT's accelerated bridge inspection and replacement program, and in particular the 10-day shutdown of the Winona Bridge in 2011 for preventive maintenance. The shutdown highlighted the fact that almost a fourth of Winona's labor force commute from Wisconsin, and the concentrated manufacturing and transportation business in Winona faced reduced transportation options, significant cost increases for detours, and reduction in business levels. The local consensus was that these impacts over a long term would be unsustainable, and permanently damage the local economy and lifestyle. Other river communities consistently echoed the concern. The concerns have resulted in MnDOT's upgrade of inspections and traffic monitoring on these bridges, especially Winona with Weigh-In-Motion devices and monitor cameras.

Ports and Waterways Access;

- South East Minnesota has direct access to two of the five river ports in the state, Red Wing and Winona, with Winona handling significant tonnage inbound and outbound, well over a thousand barge loads in 2012. The region also has easy access to another major port in La Crosse, WI. Water-borne freight has always been a major benefit and competitive advantage for Minnesota, and still accounts for 6% of the state's tonnage being moved, notably higher than the national average of 4% of total freight tonnage. Both Minnesota ports have good commercial access via State Trunk Highways, local arterials, and Class 1 railroads. After reductions in traffic in the 2003-2008 period, driven in part by grain diversion to ethanol plants in southwestern Minnesota, the facilities have seen gradual increases in growth over recent years. This has been spurred in large part by increased farm production driven by high prices, especially increased acreage brought under cultivation in Wisconsin. A condition exists with the Upper Mississippi lock and dam system that threatens ongoing cost-effective river transportation that has been instrumental to the health of the region's farm and bulk materials industries. This network of navigation aids maintains a nine-foot deep navigation channel on the river and is the responsibility of the U.S. Army Corps of Engineers. Although authorized for needed lock and dam expansion to maintain the economies of barge traffic, federal funding has been unavailable to implement the expansion projects.

- Port facilities in the two ports, as well as Minnesota's other public port facilities, collect regular freight tariffs on goods handled across their docks. These are sufficient to pay for operating costs, but do not provide the revenue necessary for major capital improvements. These include items such as replacement dock walls, warehouses, and dock-side dredging. As needs arise, the ports have benefitted from periodic state grants, administered by MnDOT's Port Development Assistance Program, for facility upgrades and modernization. Port Authorities, port tenants (terminal operators), and shippers have all identified a need for a more formalized state assistance program, with an ongoing funding source, project solicitation guidelines, and removal of some restrictions such as one-time-only funding for local dredging.

Railroad Intermodal Access;

- Rail intermodal traffic, including containers-on -flatcars (COFC) and trailers-on-flatcars (TOFC), represent the fastest growing sector of rail traffic, in particular COFC traffic utilizing double-stacked containers in articulated 'well cars' for both international containers and domestic containers, usually moving in dedicated, high-priority trains. The domestic container trade continued its year-to-year growth even during the worst period of the recent recession. Intermodal traffic has the multiple advantages of saving fuel, taking trucks off of highways, and maintaining fast, reliable shipment schedules with little loss or damage. Minnesota has two major intermodal container terminals, both in the Twin Cities, sitting astride the Chicago-to-Pacific Northwest corridor. Many businesses in the region, in particular food processing and wholesale distribution, utilize containerized transport, often coordinated through a 3PL, but have to truck the container cargo to Chicago or Kansas City to access supplies or markets coming through the Ports of Long Beach/Los Angeles, the largest in North America, or the East Coast ports. This presents a real cost and service barrier to many shippers.
- Several intermodal terminal proposals have been identified in the region to address this issue. Class 1 railroads normally site terminals after determining a market potential of 50,000-100,000 lifts (container or trailer moves on or off of a train car) to justify their investment. Alternately, existing trackside road access and a dedicated large customer may justify a smaller operation with minimal

investment needed, similar to Canadian National's small yard operation in Chippewa falls, WI. A private intermodal terminal in Winona has been built on a similar business model, but continues to face challenges of attracting major customers and having only limited support from the servicing railroad. Other proposals by business development agencies in logical 'crossroads' areas such as Albert Lea face the same challenges, as well as competitive terminal development interests nearby in Iowa and Minnesota.

Over-Size/Over-weight Permitted Truck Transport;

- South East Minnesota terminates an unusually large number of over-size/over-weight (OS/OW) truck loads that require special permits for routes and curfews, and often require special services including escorts and heavy equipment such as cranes to accomplish their moves. This includes virtually all moves needed for wind turbine installations, a large and growing electrical energy producer centered in this area and the far southwest of the state. Single shipments can exceed 40 tons per piece, or stretch to 180 feet in length for a single component of the turbines, including generator nacelles, blades, and masts. The south east region also offers routing by default for many loads that may not qualify for shipment across Iowa, for instance, or are detouring through Wisconsin to bypass the Twin Cities' restricted clearances and congestion. A major national OS/OW carrier is headquartered in the region, and a similarly large OS/OW carrier from St. Cloud also has a high presence in the area. With the aid of these carriers, MnDOT's Office of Freight and Commercial Vehicle Operations (OFCVO) permit section and planning embarked on an extended project to identify currently preferred routes and their specific characteristics. The resulting map illustrates routes that should not be degraded during local or state-initiated highway projects, and is a resource to help support the OS/OW permit process on both repetitive and new moves. In the case of District 6 and some other local areas, it also points out discontinuities in the current preferred routes, specific physical barriers, and the potential for incremental route improvement during upgrades or reconstruction projects.

New and emerging commodity trends;

- **Increase in containerized traffic through the Panama Canal, via the Mississippi River;** With the expansion of the Panama Canal to be completed no later than 2014, many projections of new routes for international container shipping have been conjectured. One of the major impacts is a potential for Pacific Rim trade to increase through Gulf Coast ports instead of California, in particular through the Port of New Orleans. Containers for import or export may be trans-loaded between vessels in New Orleans and river barges, than moving throughout the Mississippi and Ohio River systems in the Midwest. This may open new potential barge traffic in Winona and Red Wing as well as the Twin Cities. Given the complexity of possible multi-modal routings through various ports and onto competing railroads and highways, and the volatile nature of transportation pricing, it remains difficult to accurately model how much if any, this major development will impact Minnesota, the southeast region, and the ports.

- **Agricultural production gains;** The southeast region has enjoyed a steady increase in agricultural production from year to year, and produces a third of all Minnesota produce as well as being the state leader in dairy production. This is due largely to improved crop genetics and farm management practices, and is further bolstered by price-driven farming expansion in western Wisconsin that finds a ready outlet through Minnesota. Although a few ethanol plants have been constructed recently in the southeast, the majority of product still goes for food production, animal feed, and export, unlike the southwest Minnesota region. While much of the product is trucked to other areas in processed form, or shipped by truck to plants, rail elevators, and ports outside the region, the river remains the single largest outlet for bulk movements in this area. This emphasizes the combined importance of the ports and bridges to the region, in combination with the rail and trunk highway system for the balance of the area for this key industry.
- **Silica sand for hydraulic fracturing of oil and gas fields;** South East Minnesota has historically been a major producer of high-quality sand from several different geologic formations for over a century, supplying high-purity silica sand for foundries, glass making, construction, and even electronics. Several million tons a year have been produced from both surface and underground mines. Beginning in 2000, new technologies of horizontal drilling and advanced hydraulic fracturing opened up vast new reserves of oil and gas in deep deposits of heretofore impervious and unproductive shale beds in several areas of the U.S., including Pennsylvania, Texas, Oklahoma, and the Bakken fields in North Dakota. Pure silica sand in Wisconsin and Minnesota proved to have ideal properties to prop open the fractured shale in these deep wells, including consistent size, roundness, and hardness, able to withstand over 12,000 PSI of pressure (previous sands sourced from Arizona and Texas were able to withstand 4,000 PSI in comparison). Sand with these unique properties is now dubbed ‘frac sand’, referring to its use in hydraulic fracturing. Beginning in 2010,

the acceleration in shale drilling outstripped the frac sand supply, driving up prices, and created a boom in Wisconsin and Minnesota sand production that extended until the summer of 2012. Sand production in Wisconsin grew from 5 million tons to about 33 million tons annually in 2012, while Minnesota grew but remained with only a fifth of Wisconsin's active mines and processing plants. Sand began to flow into Winona from Wisconsin to load into rail cars at the Port's public terminal, supplementing sand being produced from two Winona mines, and originating from 1-3 100-car unit trains per week for destinations around the country. Wabasha is also planning on trans-loading Wisconsin and local sand to rail starting in 2013. The traffic levels of loaded sand trucks across the river bridges, while of local concern by opponents of frac sand and the petroleum industry, consist of legal weight, tarped loads that still represent only a minor fraction of total heavy commercial truck volumes across these bridges. The trunk highway system is designed to carry these loads, but local, light-duty roads have been seriously impacted by high wear levels on the designated routes. MnDOT has supported efforts by local county engineers and officials to negotiate road use maintenance agreements (RUMA's) with the sand companies to defray their extraordinary costs, based on examples of best practices researched by Winona County and CFIRE, and used in Wisconsin and Ohio. Silica dust has been another point of contention in transporting sand with opponents and environmentalists, with the potential in heavy exposures to cause silicosis and lung cancer. Current industry and state-mandated practices, along with local conditional-use-permit conditions, are adequate to contain all primary and fugitive dust production within all federally-defined particulate contamination levels.

Resulting Actions:

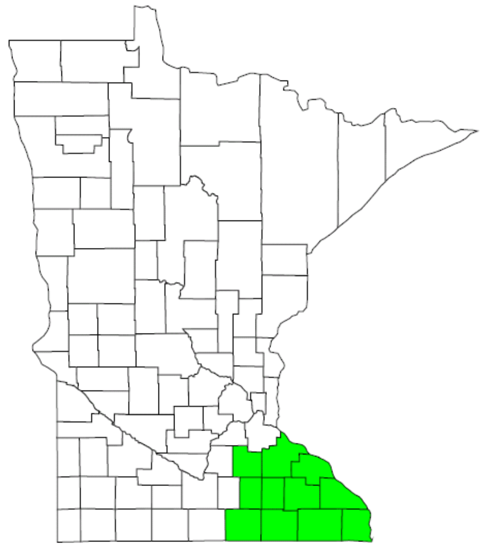
- **Road Conditions;** OFCVO and District 6 are actively engaging in public outreach, information sharing, and design review with internal agency and local road and intersection project designers.
- **Ports and Waterways Access;** MnDOT along with the Port Authorities may support a revised Ports Assistance Program, based on policy directions developed in the state's first Ports and Waterways Plan to be finished by June 30, 2013, and integrated into the State Transportation Plan. The Plan initiative was begun as a result of input provided in large part during the research phase of the freight study.

- **Railroad Intermodal Access;** OFCVO and the District have been and will continue to work with client agencies such as the Albert Lea Development Agency, private shippers and transporters, developers, and the railroads to determine the business potential of several different terminal business models that may result in establishing rail intermodal service from South East Minnesota to a southern California gateway, and other domestic markets.
- **Over-Size/Over-Weight Transport;** OFCVO Permit Group, District planners and engineers, and several OS/OW carriers have cooperated in a preferred route mapping exercise, to institutionalize some of the operational knowledge in this subject area and to inform others in and beyond MnDOT who are effected by OS/OW considerations. The map will be posted as information to the MnDOT website in conjunction with this study.
- **Emerging Commodity Trends;** MnDOT will continue to actively monitor developments in the containerized traffic corridors as the Panama Canal improvements come on stream, in order to respond to new distribution patterns that may emerge. The District and OFCVO will also remain in close touch with the agriculture sector and shipping associations to evaluate the ongoing trends in produce markets and modal selections of the shippers, locally, nationally, and internationally. The transportation of bulk frac sand from mine to processing plant to oil field will continue to be an area of intensive concentration. MnDOT has established formal working associations with Wisconsin and North Dakota to stay abreast of the issues and best practices, and is participating in an interagency task force to evaluate state policy options. MnDOT and the District will provide all possible assistance to local jurisdictions, review mine and plant permits, and aid in traffic and road use studies as requested and appropriate. In OFCVO's role in providing industry interface with freight shippers, trucking firms, ports, and the railroads, the agency will continue to facilitate discussions and disseminate factual information.

INTRODUCTION AND BACKGROUND

The regional freight study for Southeastern Minnesota is defined by a study area representing eleven counties that define MnDOT District 6, as well as Economic Development Region 10 (EDR 10):

1. Dodge
2. Fillmore
3. Freeborn
4. Goodhue
5. Houston
6. Mower
7. Olmsted
8. Rice
9. Steele
10. Wabasha
11. Winona



The study area also includes Rochester, a tier-1 trade center, as well as several tier-2 trade centers; Winona, Owatonna, Red Wing, Albert Lea, and Austin [*]

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[*] Trade center hierarchy as defined by the Center for Urban and Regional Affairs, University of Minnesota

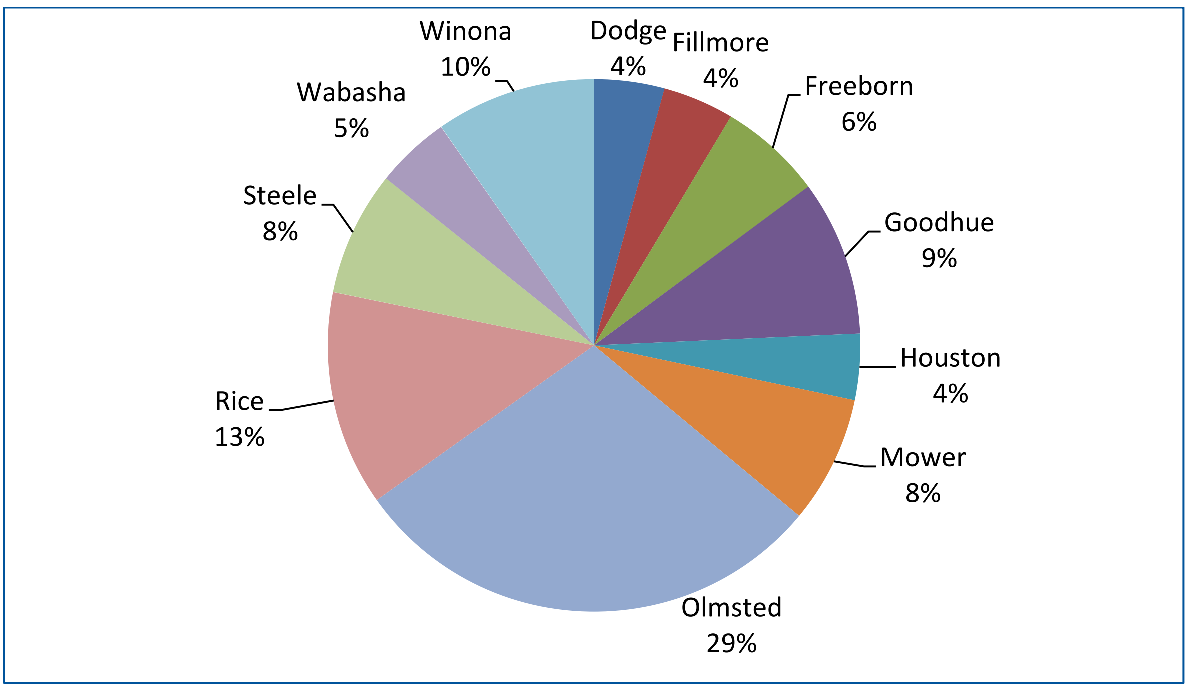
DEMOGRAPHIC AND ECONOMIC TRENDS

One of the first steps to understanding the importance of freight to Southeastern Minnesota's regional economy is to understand population and employment growth and the associated impact on economic activities. The national economy in the U.S. has been transitioning for decades; migrating from a resource extraction and durable manufacturing-based economy to a more service-based and high-technology economy today. As a result, Southeastern Minnesota industries in the future may experience growth rates that differ from historical patterns of the past. Therefore, it is important to determine the industries that will remain an integral part of Southeastern Minnesota's economy going forward. This section summarizes and interprets available demographic and economic data for that purpose and provides a high-level description of the study area's economy.

Population

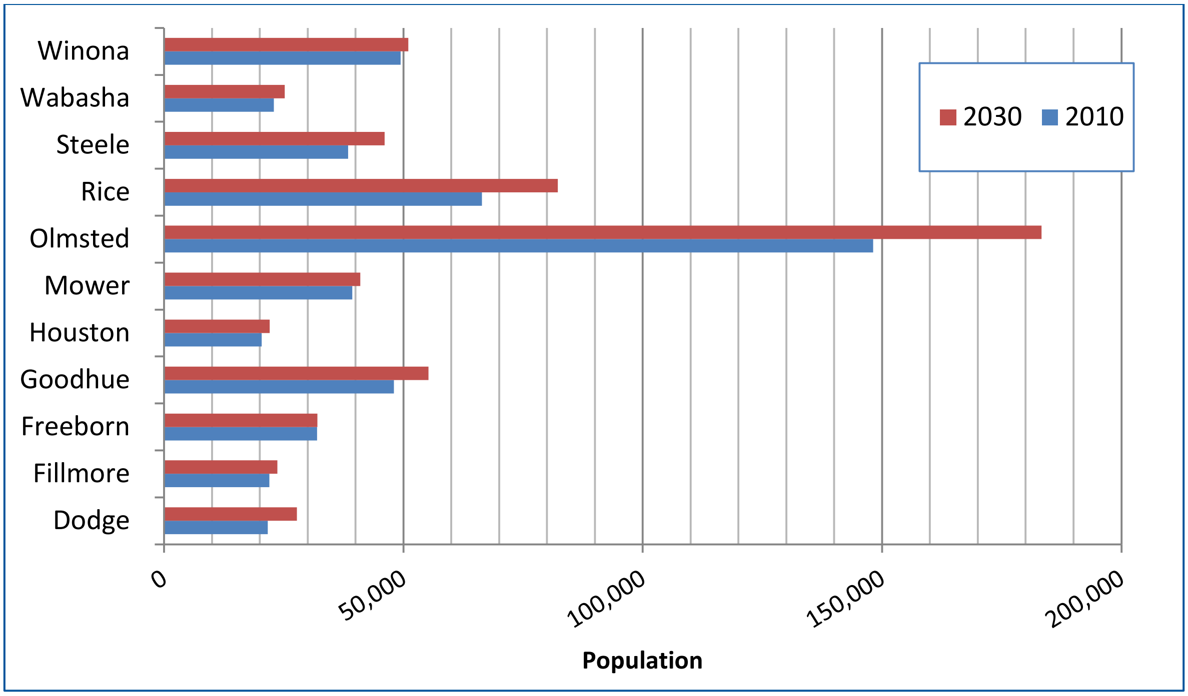
Between 2000 and 2010, the population of the Southeastern Minnesota study area increased 10.54 percent raising the total population of the region to 508,610. ***Exhibit 1*** shows the distribution of population between the 12 counties in the study area. Two counties, Olmstead and Rice, account for 42 percent of the population of the region.

Exhibit 1: Population Distribution in the Southeastern Minnesota Region by County



By 2030, population in the 11-county region is expected to increase 16 percent; approaching 600,000 people (***Exhibit 2***).

Exhibit 2: Southeastern Minnesota Population, 2009 and Projected 2030



Overall, population in the Southeast Region of the state is expected to grow at about the same pace as the statewide population over the next 20 years. Projected population growth for the region is 15.9 percent between 2010 and 2030, versus 15.6 percent statewide. Three counties in the region are projected to see population growth exceed 20 percent:

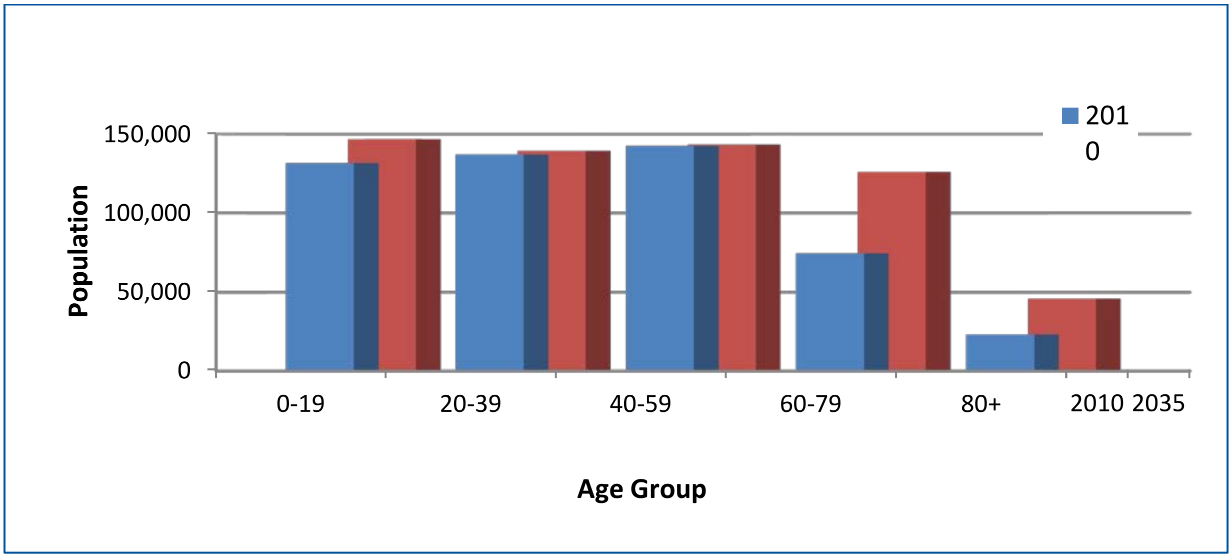
- Dodge (28.1%)
- Olmsted (23.7%)
- Rice (23.8%)

Population growth is a significant driver of freight movements, especially truck traffic.

As discussed in the *Freight Trends and Issues* working paper of the project, the continued aging of the baby boom population will produce an explosion in the number of people ages 55 to 69 during the coming decade. Between 2010 and 2035, populations over the age of 60 in Minnesota will grow by 80 percent. In the Southeast region of the state the population will grow only about 10 percent.[†] The graph in ***Exhibit 3*** shows population projects by age group in the Southeastern study area. The graphic suggests that very little growth in population will occur for working age populations, the youngest population group will grow slightly; however, groups over 60 show significant growths.

[†] Minnesota Department of Administration, Office of Geographic and Demographic Analysis: *Projections – Population and Characteristics of the Future* http://www.demography.state.mn.us/projections.html

Exhibit 3: Population Growth by Age Group in the Southeast Region

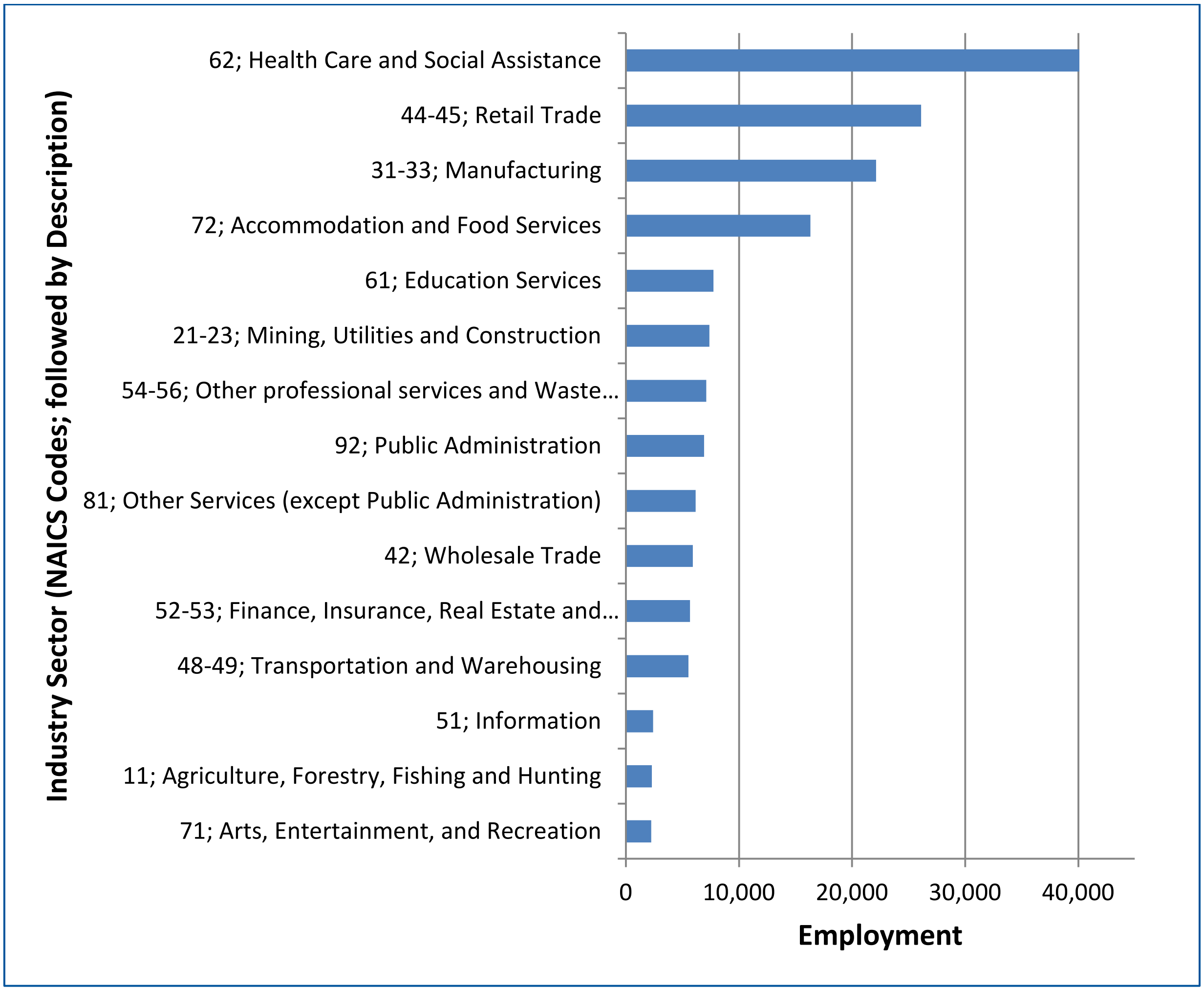


Source: MN Department of Administration, Office of Geographic and Demographic Analysis, graph by CDM Smith

EMPLOYMENT AND ECONOMIC GROWTH

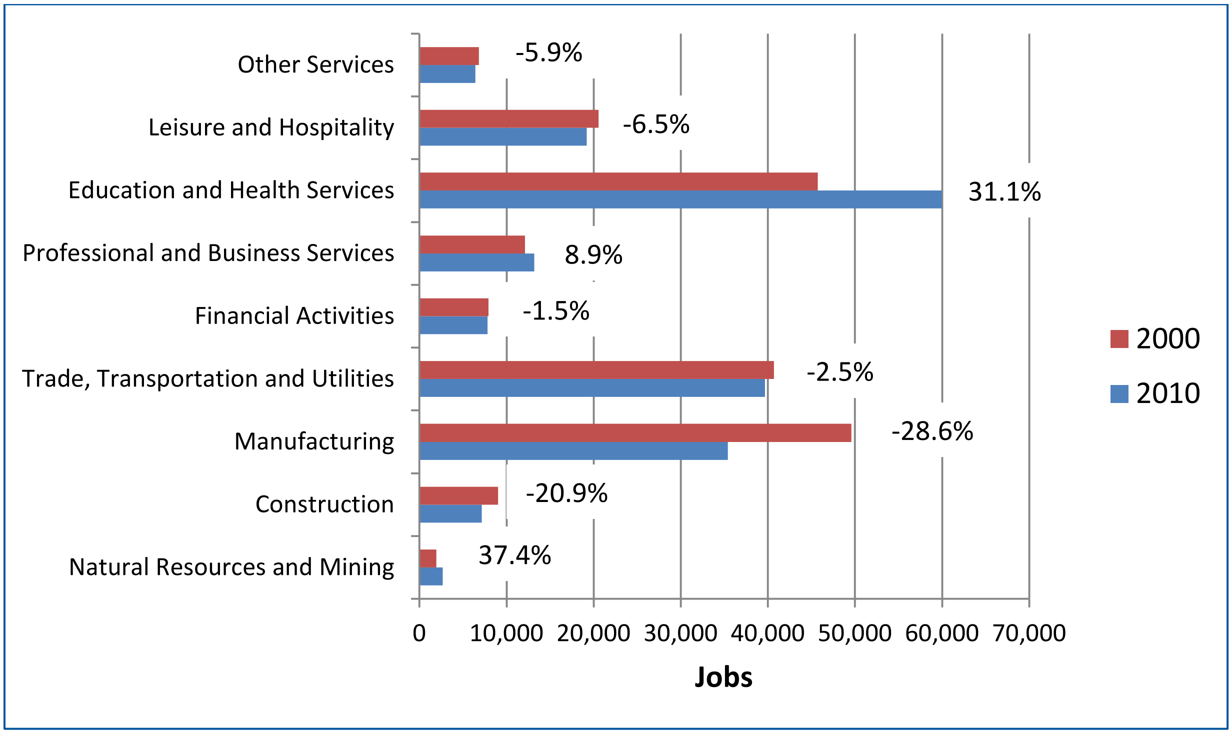
The Southeastern Minnesota study area is comprised of the same 11 counties forming Economic Development Region 10 (EDR 10) as defined by the Minnesota Department of Employment and Economic Development. The bar chart in ***Exhibit 4*** displays total employment for EDR 10 in the Southeastern Minnesota Region for all major industry sectors. As might be expected, the largest employer in the region is *Health Care*, followed by *Retail Trade* and *Manufacturing*. (Note: The numbers preceding the industry sector description are from the North American Industry Classification System or "NAICS". In some cases, the industries shown are combinations of industries at the two-digit NAICS level.)

Exhibit 4: Total Employment by Select Industry Sector, District 6 (EDR 10)



The bar chart in Exhibit 5 shows employment by major industry sector (excluding Government) for the years 2000 and 2010, as well as the percentage change in employment for each sector. The greatest decline in employment among the sectors displayed was in *Manufacturing* (-28.6%), followed by *Construction* (-20.9%). The largest percentage gain was in the *Natural Resources* and *Mining* sectors; however, overall employment in *Mining* remains minor compared with other sectors. The largest overall gains were in the *Education* and *Health Services* sectors.

Exhibit 5: Private Sector Employment in the Southeast Region, 2000 and 2010 (with percent change)



INDUSTRY CONCENTATIONS IN THE SOUTHEASTERN REGION

Location quotient is a measure of the relative industrial concentration within a specific geographic area in comparison to a broader base geographic or economic region. It is calculated as the ratio of an industry's share of the local economy to the respective industry's share of the base economy. Industrial share of the economy is calculated as a percentage of employment in the industry, to the total employment within the economy. Relative employment, though imperfect, serves as a good proxy for the industrial comparison of an economy.

An industry with a location quotient of less than 1.0 has a share of the local economy proportionally smaller than the same industry's share in the base economy. As a result, a location quotient less than 1.0 indicates that the local economy is likely to be a net importer of the goods and services of that industry from the base economy. An industry with a location quotient greater than 1.0 has a share of the local economy proportionally larger than the same industry's share in the base economy. A location quotient greater than 1.0 suggests local production of an industry exceeds local demand for the goods and services of that industry allowing the excess production to be exported.

The table in Exhibit 6 provides a list of those industries, at a three-digit NAICS level in Southeastern Minnesota with an employment location quotient greater than 1.0.The industries represented in this listing are those sectors that are relatively more concentrated in the Southeastern portion of Minnesota, compared to the general makeup of the U.S. economy. Not surprisingly, the industries that

Southeastern Minnesota has long been known for appear at the top of the list: *Animal Production and Food Process*, *Health Care*, and *Nursing Care Services*.

Exhibit 6: Concentrated Industries in Southeastern Minnesota based on Employment Location Quotient

Industry Sector	Location Quotient
Animal Production	4.31
Food Manufacturing	3.89
Ambulatory Health Care Services	2.49
Nursing and Residential Care Facilities	1.95
Gasoline Stations	1.84
Broadcasting, except Internet	1.82
Fabricated Metal Product Manufacturing	1.65
Miscellaneous Manufacturing	1.40
Building Material and Garden Supply Stores	1.31
Transit and Ground Passenger Transportation	1.20
Membership Associations and Organizations	1.18
Printing and Related Support Activities	1.18
Truck Transportation	1.17
General Merchandise Stores	1.14
Food and Beverage Stores	1.05
Sporting Goods, Hobby, Book and Music Stores	1.04
Nonmetallic Mineral Product Manufacturing	1.02
Motor Vehicle and Parts Dealers	1.01

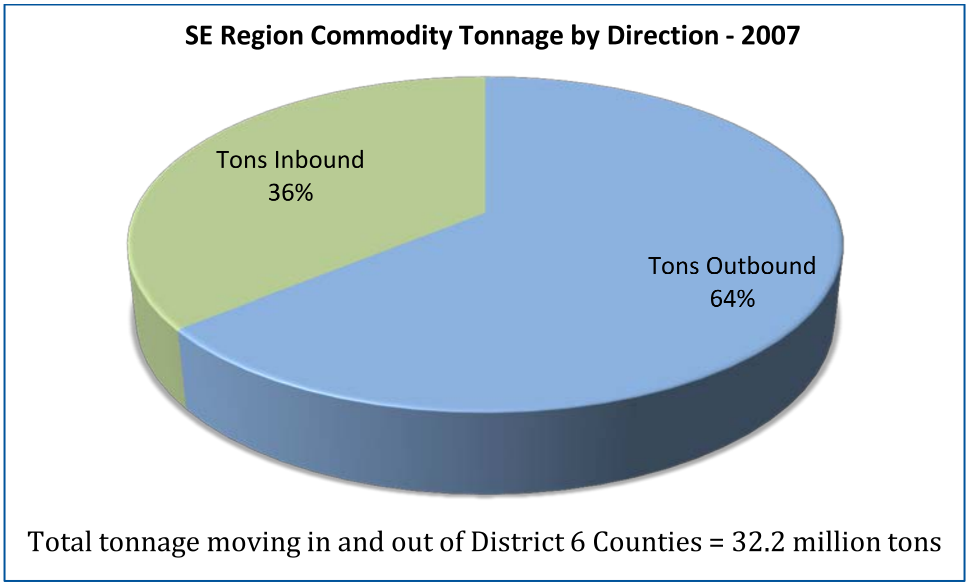
FREIGHT FLOW OVERVIEW

This analysis primarily uses IHS Global Insight's 2007 TRANSEARCH® database and the Surface Transportation Board's 2007 Rail Waybill Sample. These datasets provide county-level data for freight moves originating and terminating within Minnesota, and BEA-level information for those moves originating or terminating beyond state borders. This information provides a quantitative description of the movement of goods between regional origins and destinations by mode. The TRANSEARCH® database also provides traffic projections for years 2020 and 2030. These forecasts predict goods movements between regions, and are not general economic projections. They take into account industry, regional and national economic trends to estimate commodity-level trade flows. This information can help identify transportation improvements, freight planning objectives and other strategies that will benefit the economic competitiveness of the region.

Directional Flows

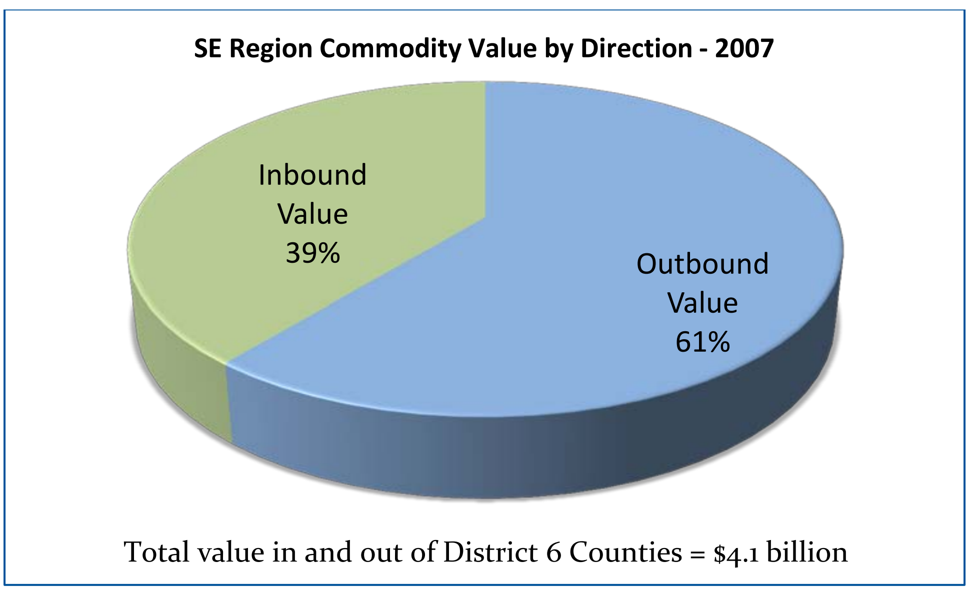
According to the TRANSEARCH® database, over 32 million tons of freight valued at $4.1 billion moved into and out of the Southeastern Region of the state across all surface and waterway modes in 2007. ***Exhibit 7*** and ***Exhibit 8*** indicate that 64 percent of the freight by tonnage and 61 percent of the freight by value was related to goods exported from the 11-county region.

Exhibit 7: Southeastern Minnesota Directional Flows by Tonnage



Source: TRANSEARCH®

Exhibit 8: Southeastern Minnesota Direction Freight Flows by Value

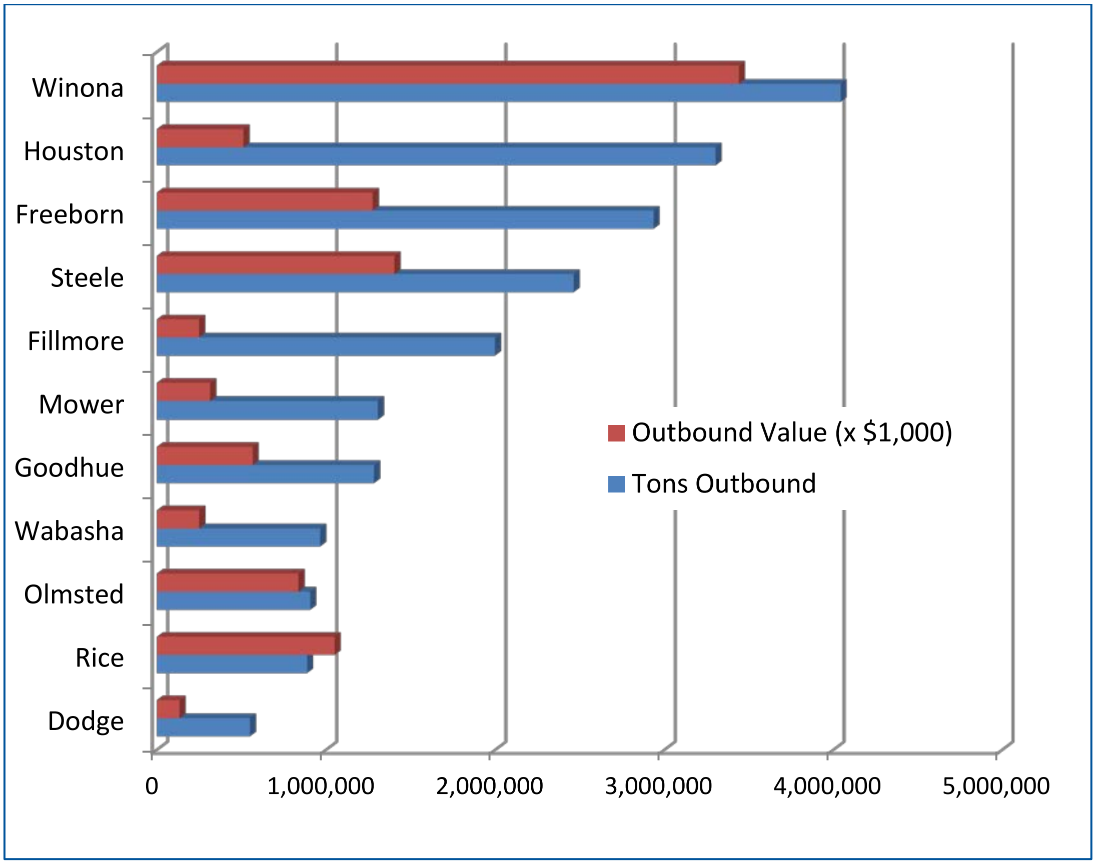


Source: TRANSEARCH®

Tonnage versus Value by County

The bar chart in ***Exhibit 9*** displays the distribution of regional commodity exports by county for both weight and value. Winona County leads the region in outbound commodity movements by both tonnage and value likely due to the Port of Winona's role as a regional gateway. The Winona port handles about 2 million tons of products each year, with soybeans and corn making up the majority of outbound products.‡ Houston County shows the second highest outbound values by tonnage, but relatively low value goods leaving the county. The La Crescent area of Houston County currently has limestone mining operations and has significant deposits of silica sand that could be mined to support the hydraulic fracturing shade oil and gas extraction process. Steele County, which includes the City of Owatonna, displays the second highest movement of goods export by value.

Exhibit 9: Outbound Commodities by Tonnage and Value in the Southeastern Counties

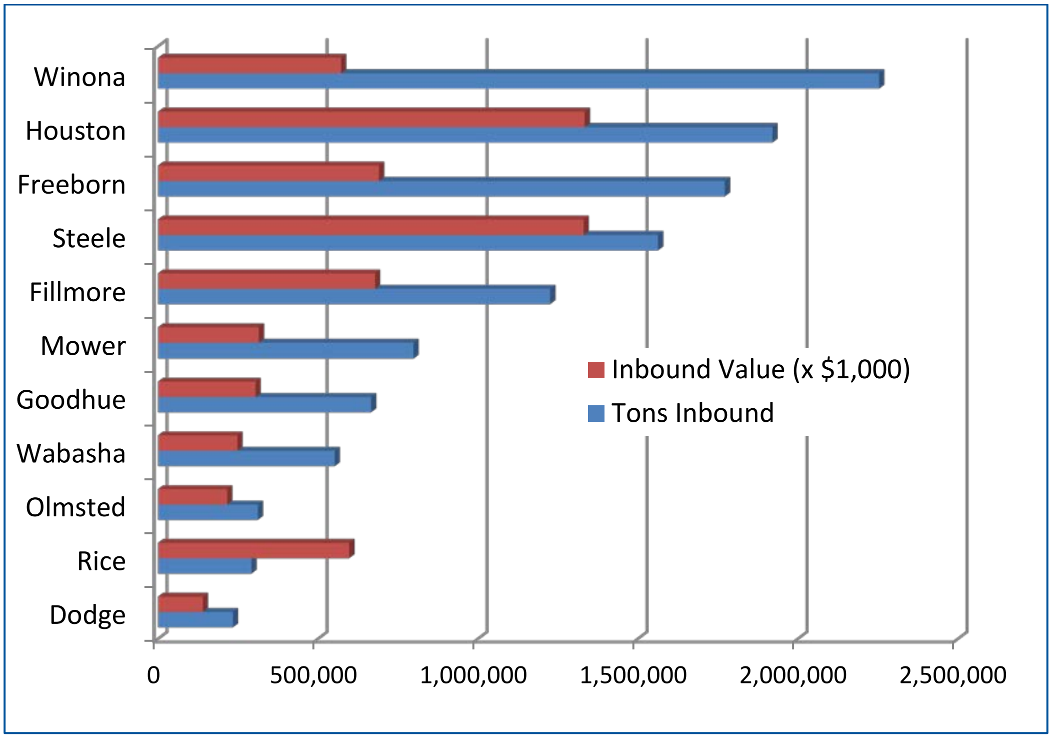


Source: TRANSEARCH®

The bar chart in ***Exhibit 10*** displays the distribution of regional commodity imports by county for both weight and value. As with exports, Winona County is also the leading area for inbound commodity movements by tonnage. On the inbound side, the Port of Winona receives fertilizers going to Southern Minnesota farms, as well as coal and road salt used by the City of Winona. Houston and Steele Counties area nearly tied in terms of counties with the highest values of inbound commodities by value.

‡ *2010 – River Traffic Up This Year*, Port Authority of Winona website
http://www.portofwinona.com/2010/12/2010-river-traffic-up-this-year/

Exhibit 10: Inbound Commodities by Tonnage and Value in the Southeastern Counties

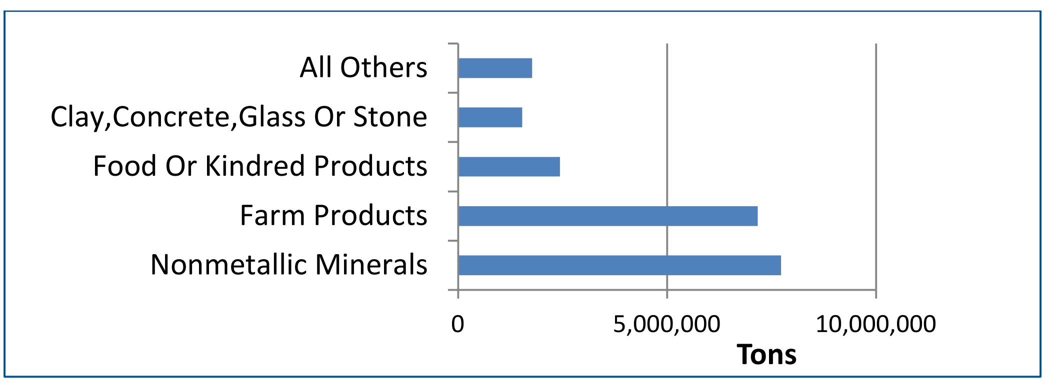


Source: TRANSEARCH®

Key Originating Commodities

The largest commodities originating in Southeastern Minnesota by tonnage are *Nonmetallic Minerals* and *Farm Products*, which together make up nearly 70 percent (68.8%) of all outbound shipments. *Nonmetallic Minerals* include sand and gravel, and dimension quarry stone. The *Farm Products* group consists of primarily grain and field crops. Another notable outbound group by tonnage in the region is *Food and Kindred Products*. ***Exhibit 11*** lists the top individual commodity groups originating in the region, and *All Other*. The top four groups account for 87 percent of all outbound tonnage.

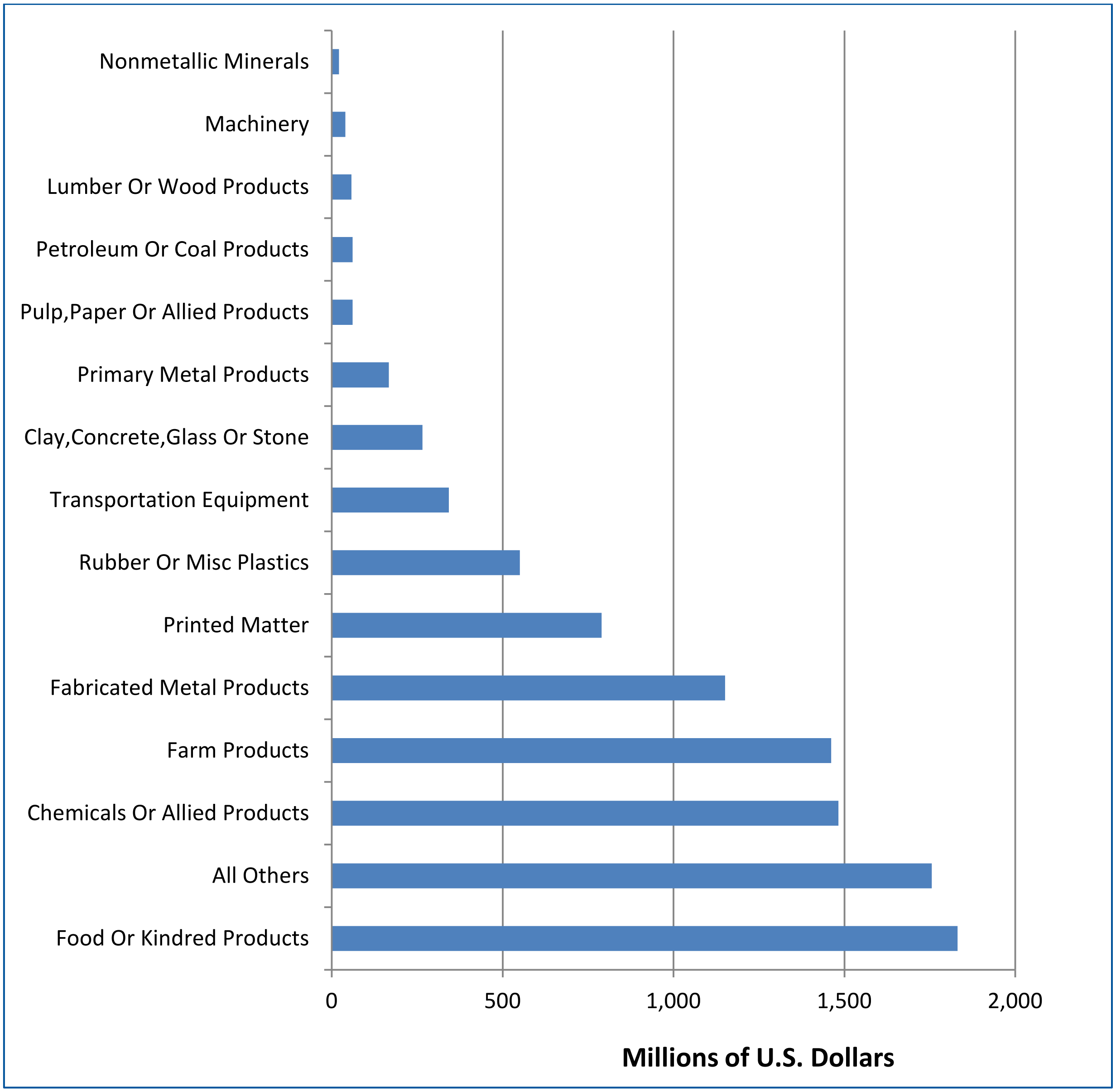
Exhibit 11: Top Outbound Commodity Groups by Weight in Southeastern Minnesota, 2007



Source: TRANSEARCH®

By value, the top commodities being transported out of the Southeastern Region are much more diverse. *Food and Kindred Products* is the top originating commodity group in the region by value. Among 14 other categories, *All Other* (representing approximately 40 additional commodity groups) ranks 2nd. *Chemicals and Allied Products* which makes up less than 2 percent of outbound tonnage ranks 3rd by outbound value. *Farm Products* ranks fourth, while *Nonmetallic Minerals*, first by weight ranks 14th among individual commodity groups by value. ***Exhibit 12*** shows the top 15 commodity groups by value, including *All Other*.

Exhibit 12: Top Outbound Commodity Groups by Value in the Southeastern Region, 2007

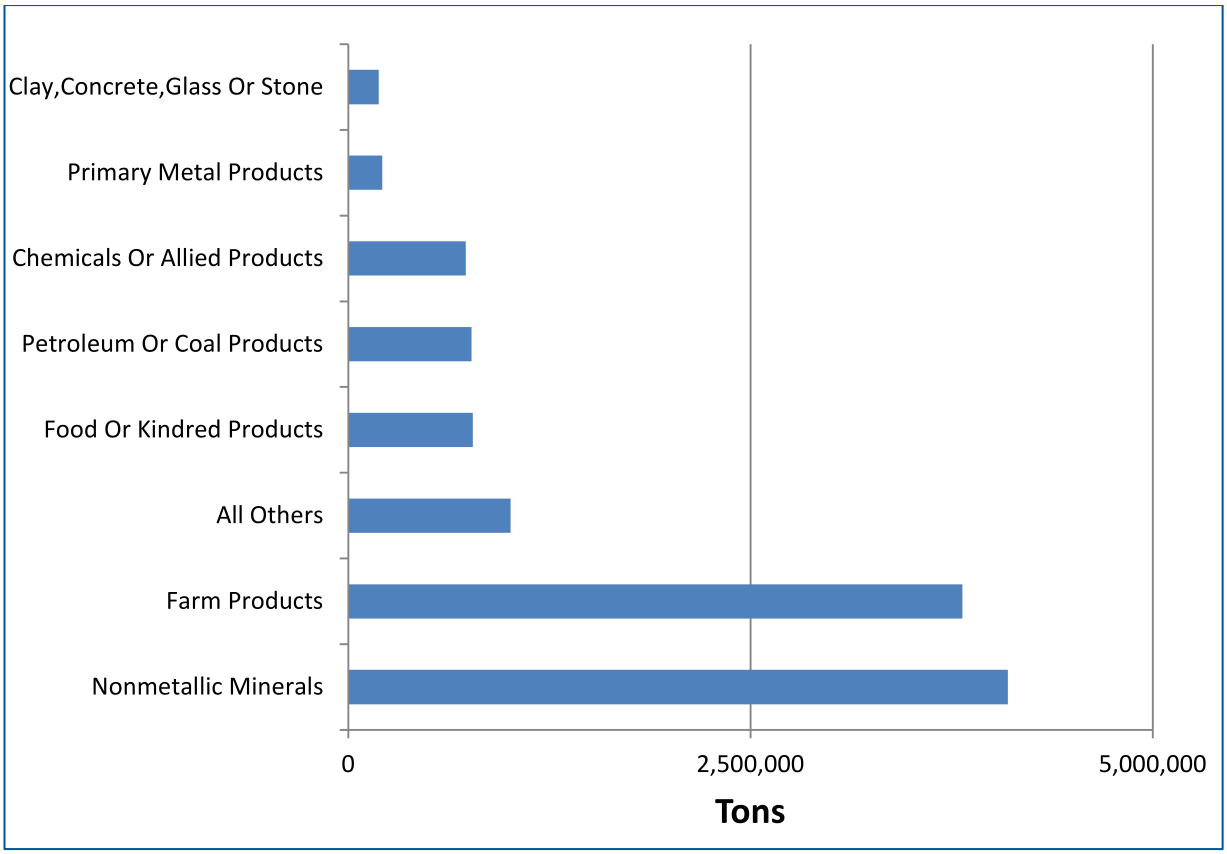


Source: TRANSEARCH®

KEY TERMINATING COMMODITIES

As with originating commodity groups, the largest movements by weight in Southeastern Minnesota are *Nonmetallic Minerals* and *Farm Products*; however, the overall volumes are considerably less than outbound volumes. It is possible that some of this tonnage is recounted as terminating values in transload hubs such as the Port of Winona and regional railroad facilities. Unlike originating volumes, outbound commodities by weight exhibit more diversity across products. ***Exhibit 13*** lists the top 8 terminating commodities by tonnage, including *All Other*.

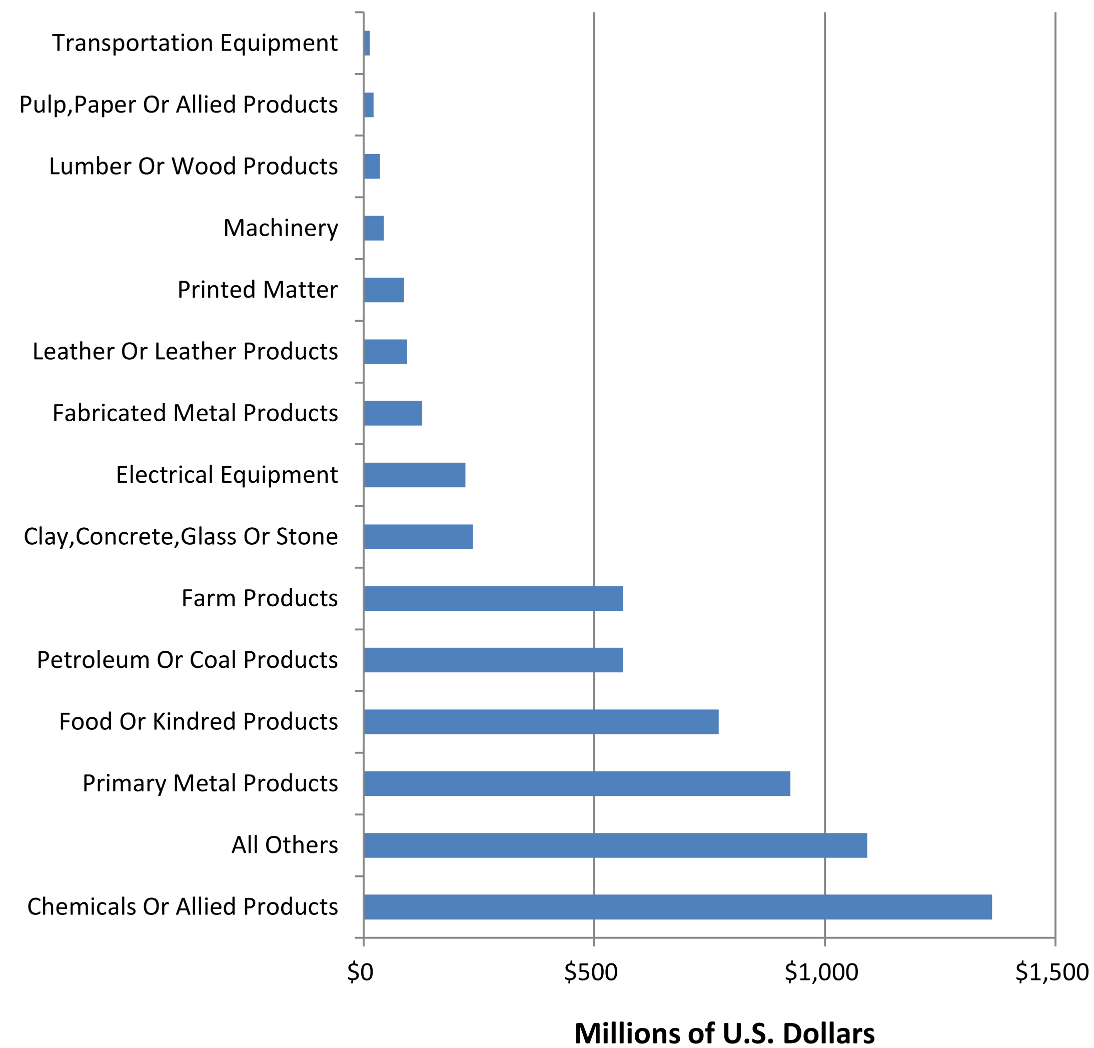
Exhibit 13: Top Inbound Commodities by Weight in the Southeastern Region, 2007



Source: TRANSEARCH®

By value, the top commodities being transported into the Southeastern Region are also much more diverse. *Chemicals or Allied Products* is the largest inbound commodity group in the region by value, likely reflecting chemical and fertilizer inputs to regional agriculture. And, as with outbound commodities by value, *All Other* representing 40 different commodity groups, ranks 2nd. *Primary Metal Products*, which accounts for about 15 percent of inbound tonnage, ranks 3rd. ***Exhibit 14*** shows the top 15 commodity groups by value, including *All Other*.

Exhibit 14: Top Inbound Commodity Groups by Value in the Southeastern Region, 2007

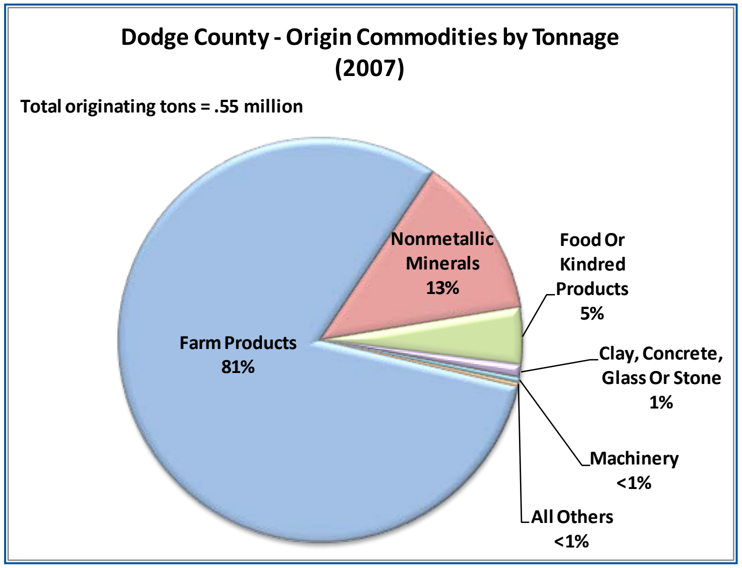


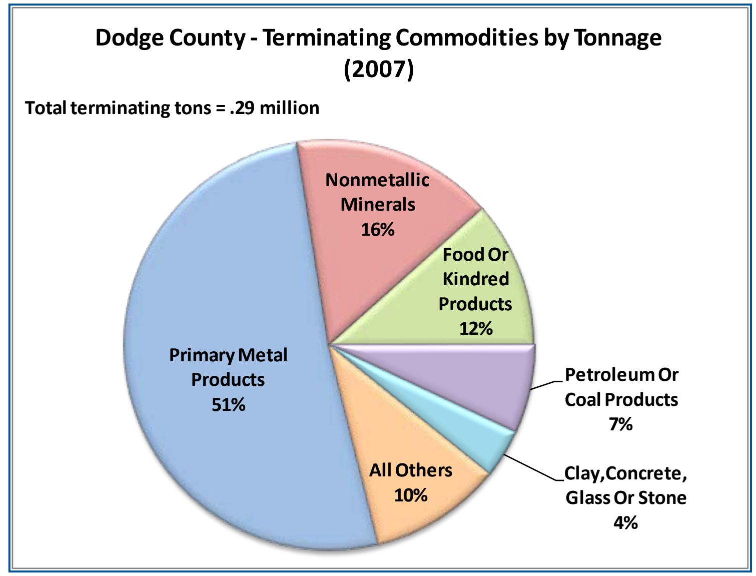
COUNTY LEVEL COMMODITY PROFILES

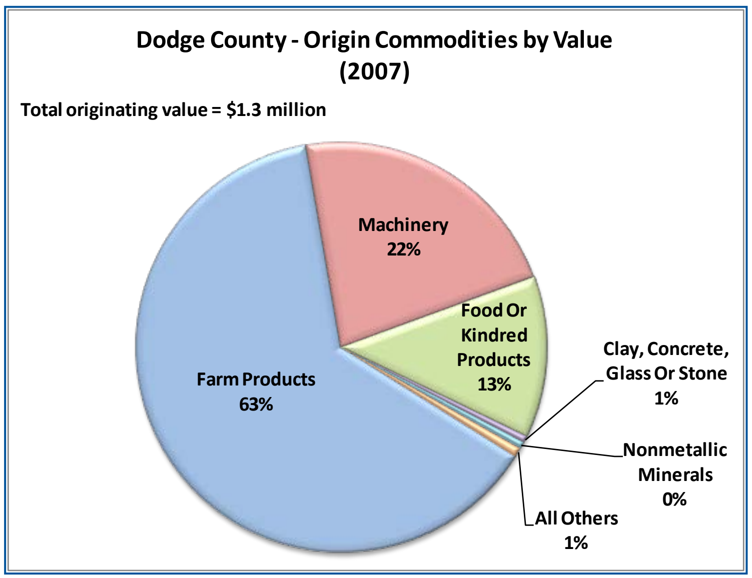
The remaining pages present the following commodity flow information for each county in the region:

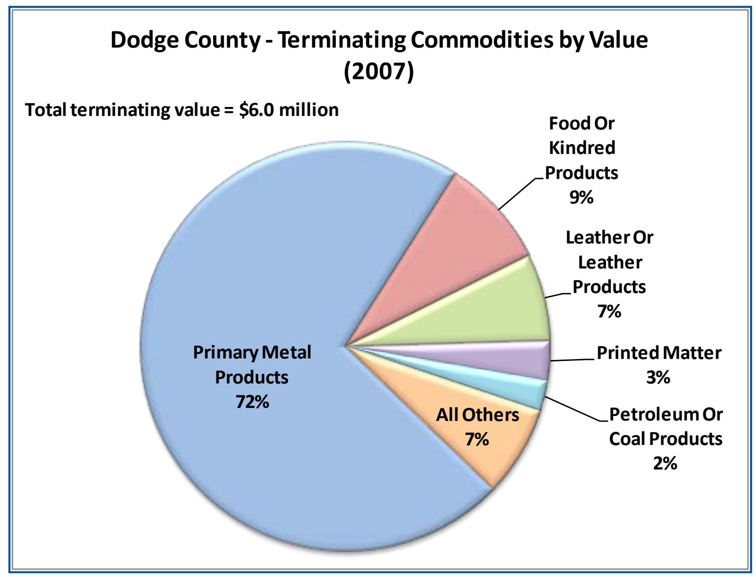
- Originating (outbound) Commodity Share by Tonnage
- Originating (outbound) Commodity Share by Value
- Terminating (inbound) Commodity Share by Tonnage
- Terminating (inbound) Commodity Share by Value

Dodge County

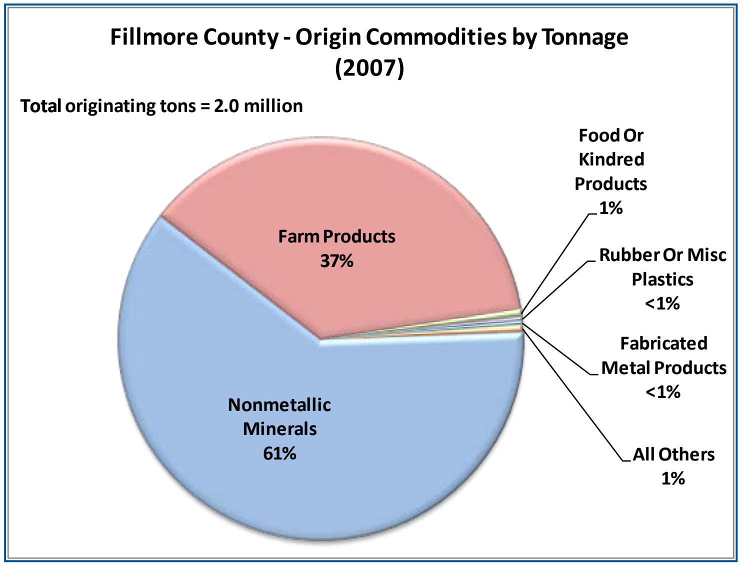


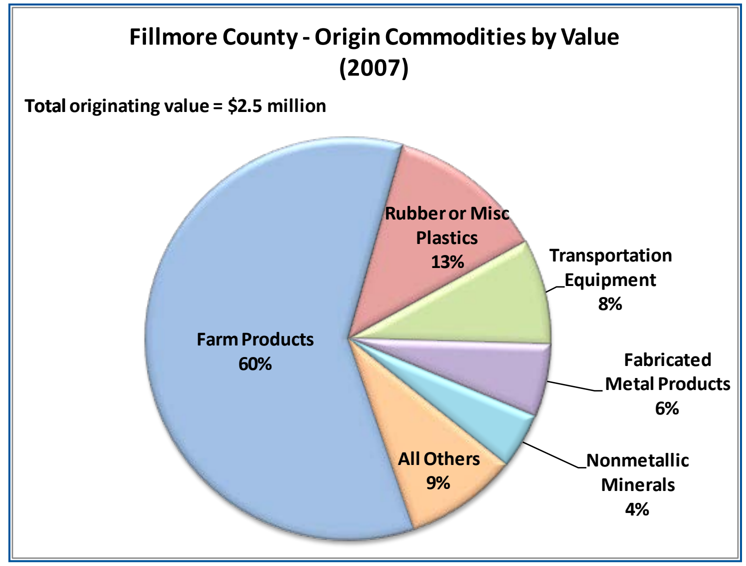


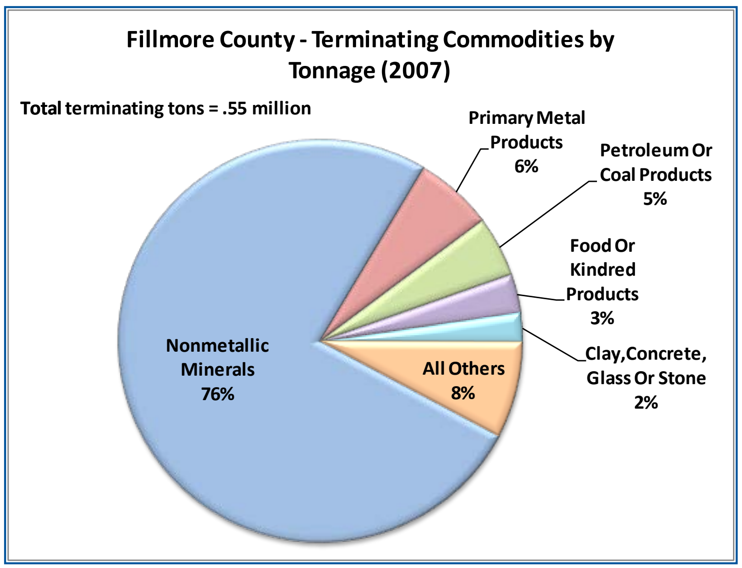


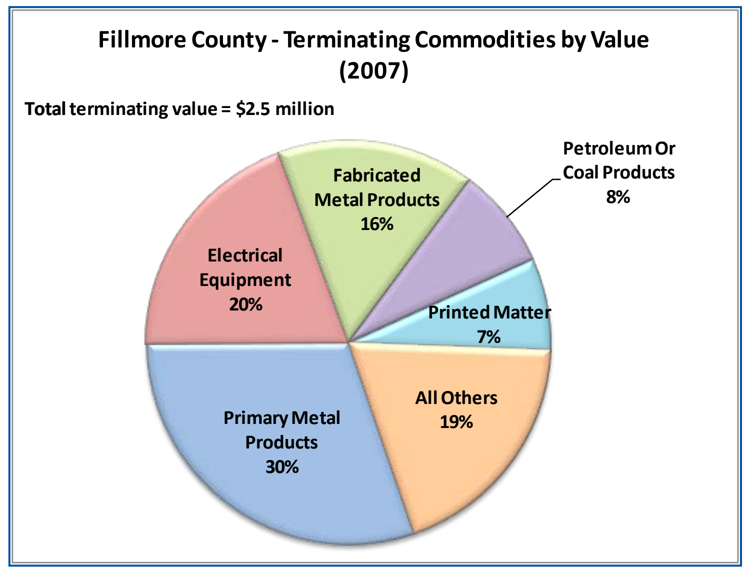


Fillmore County

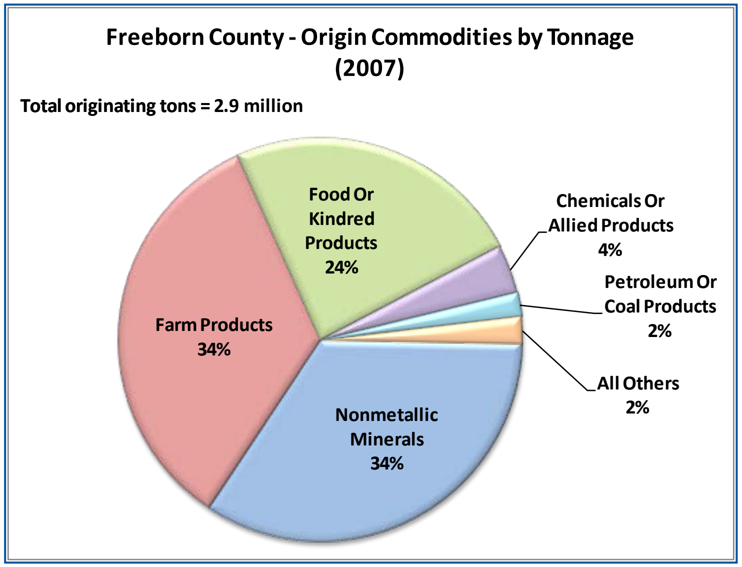


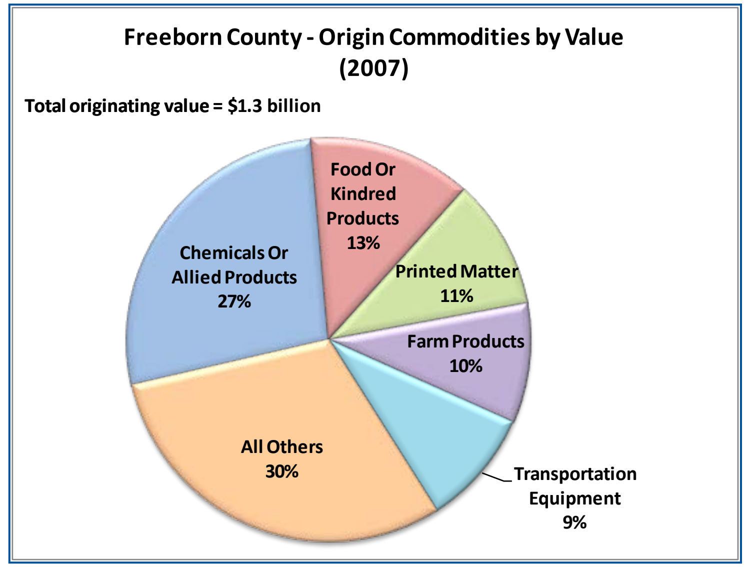


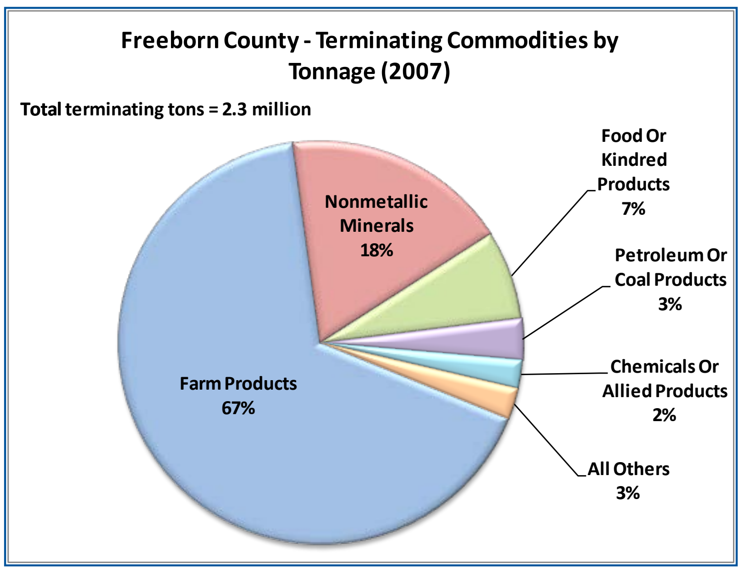


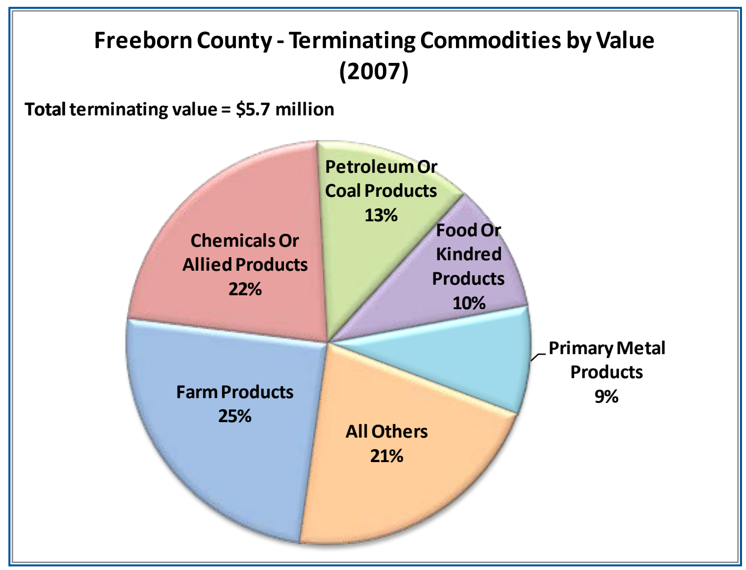


Freeborn County

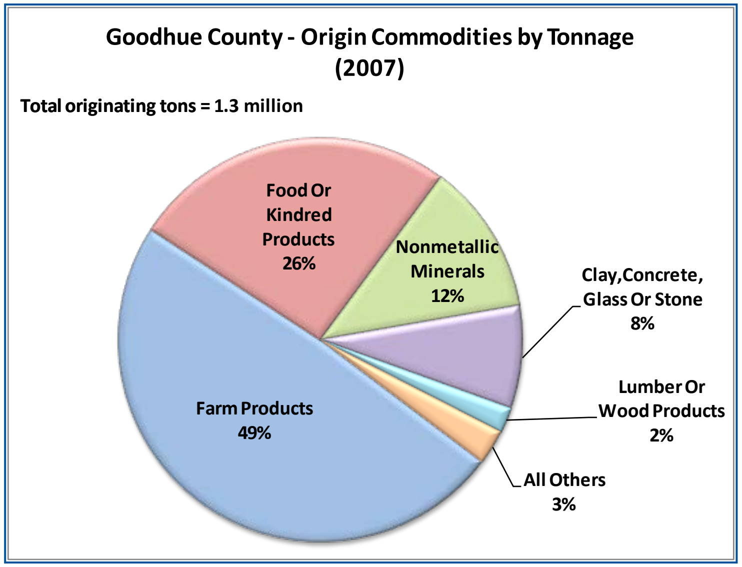


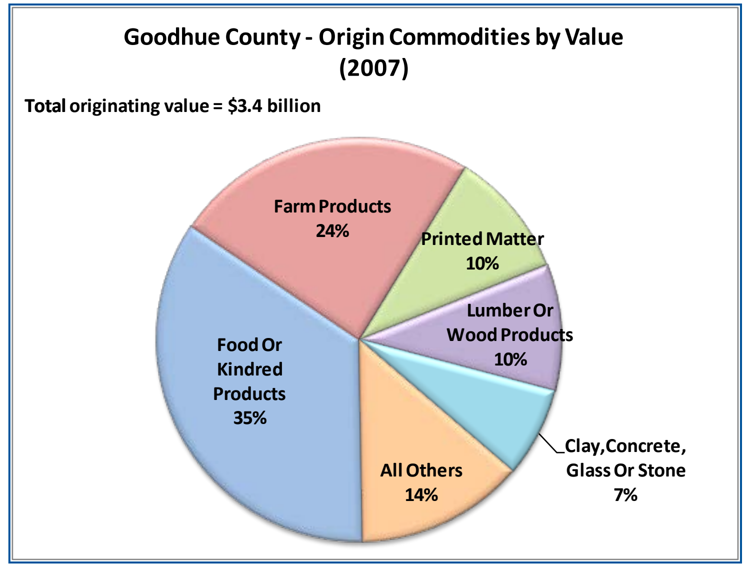


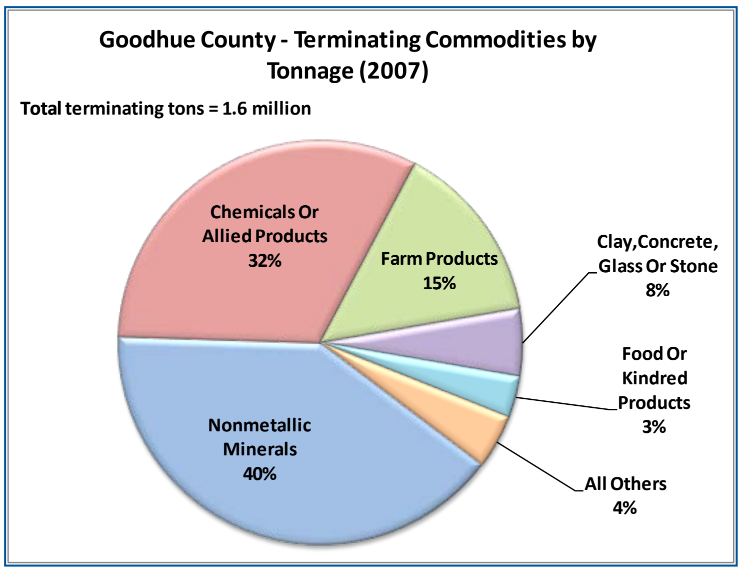


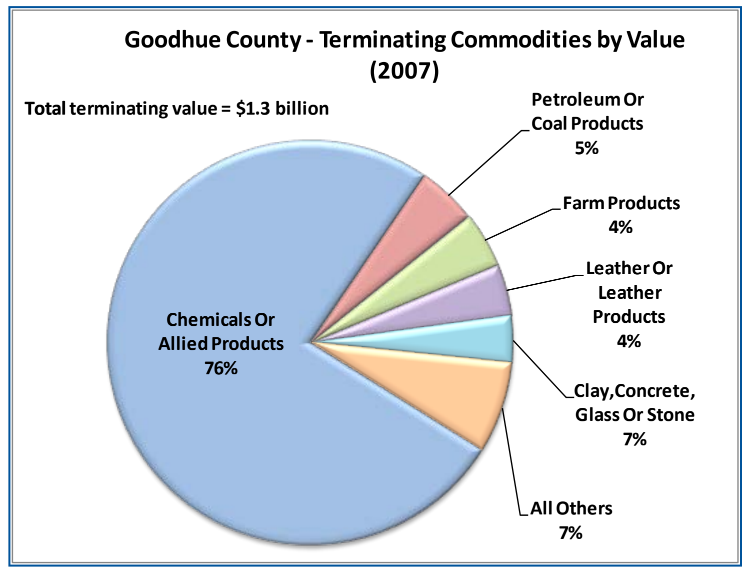


Goodhue County

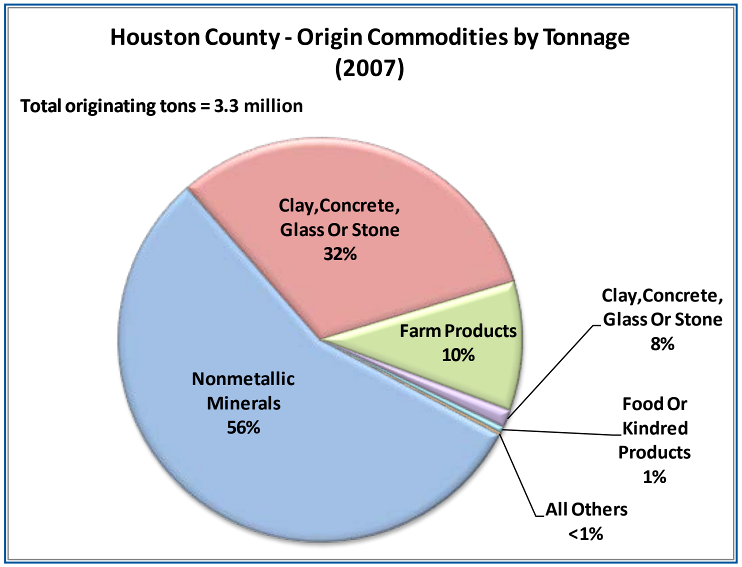


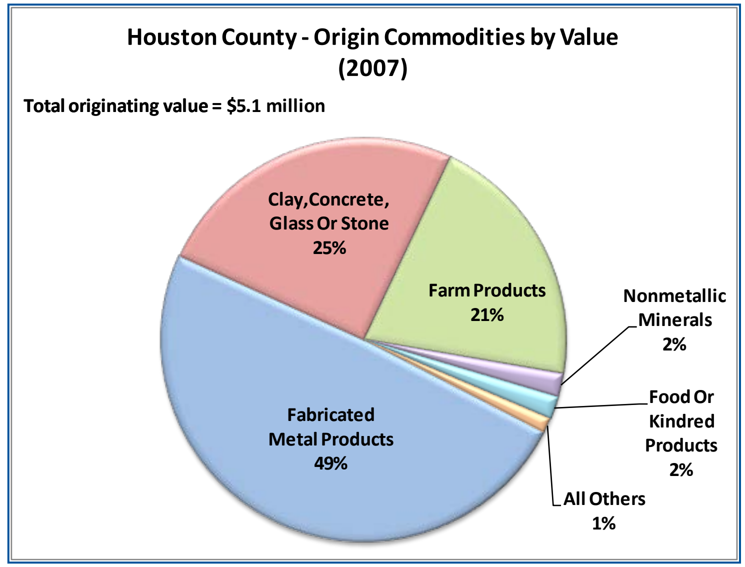


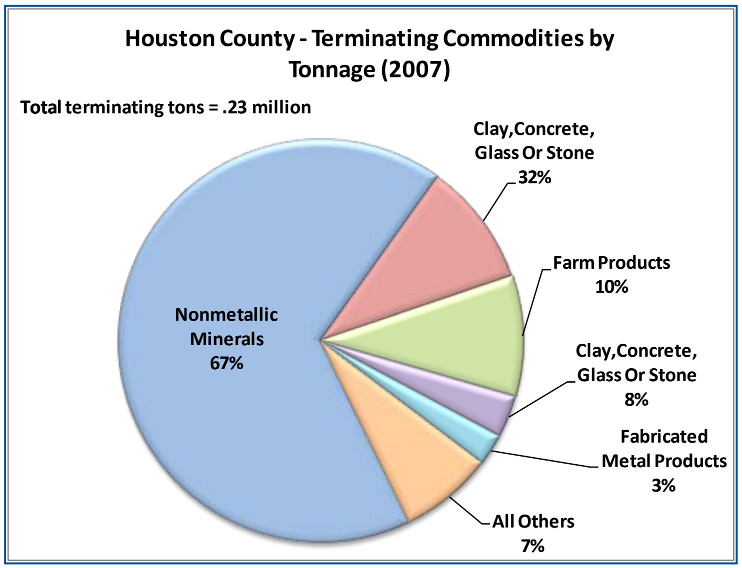


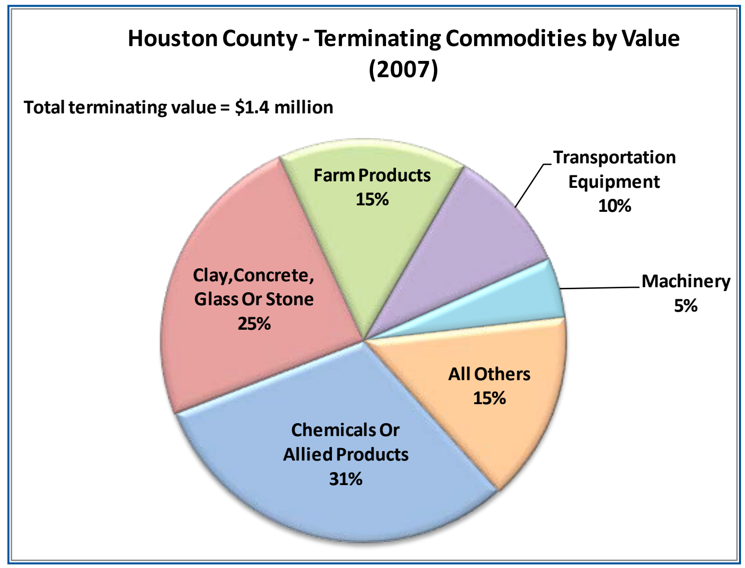


Houston County

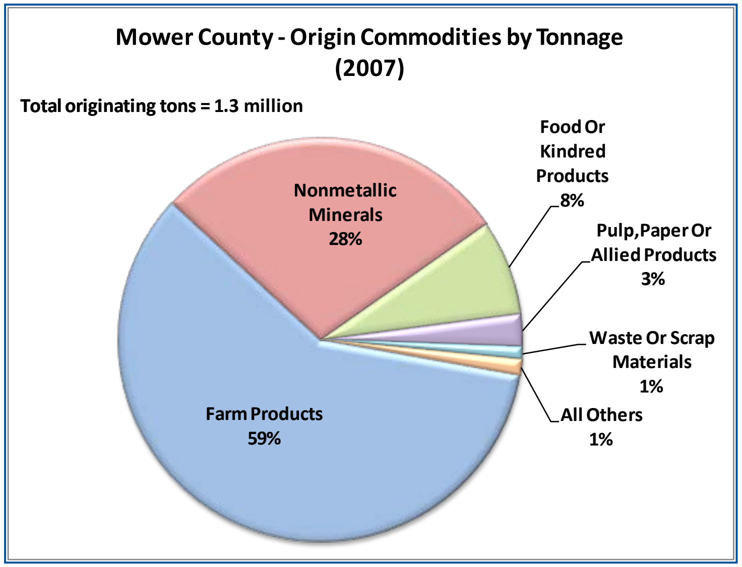


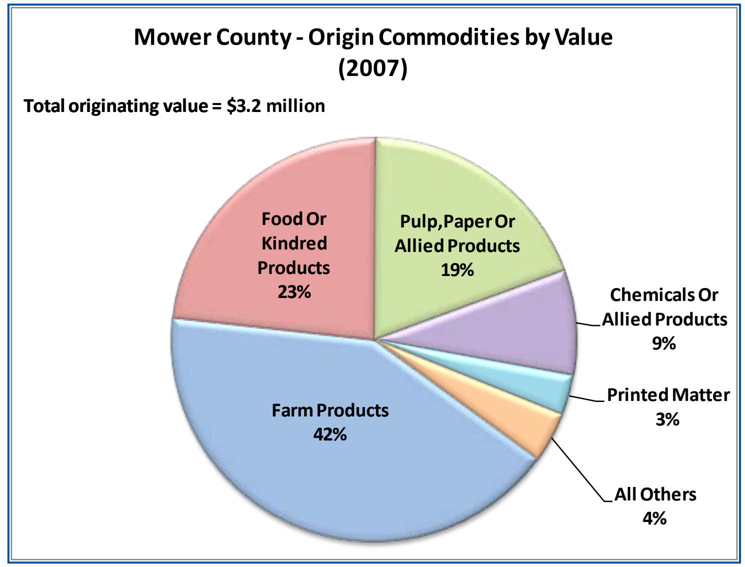


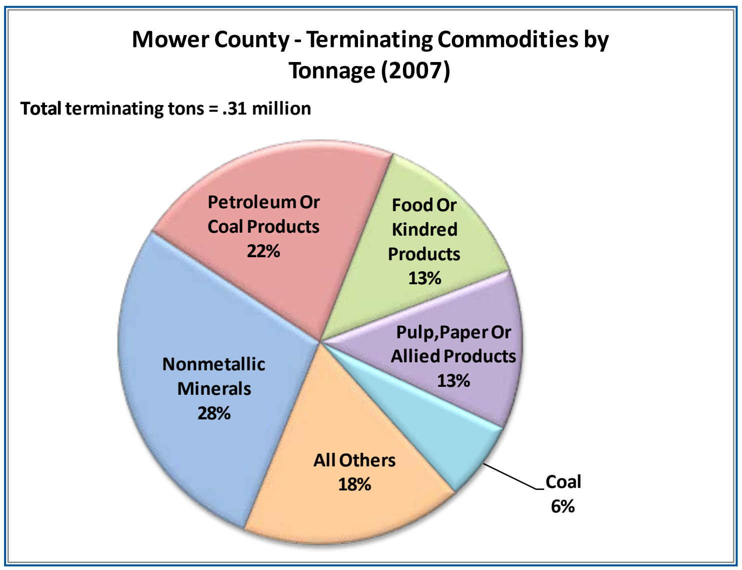


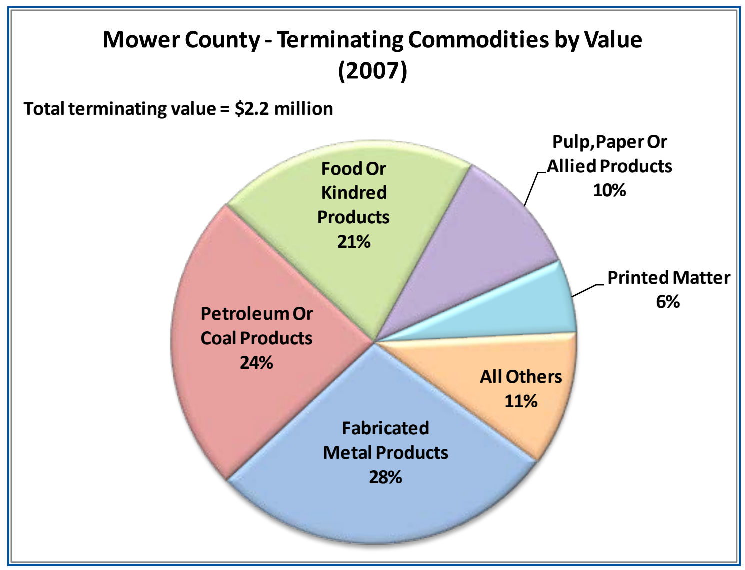


Mower County





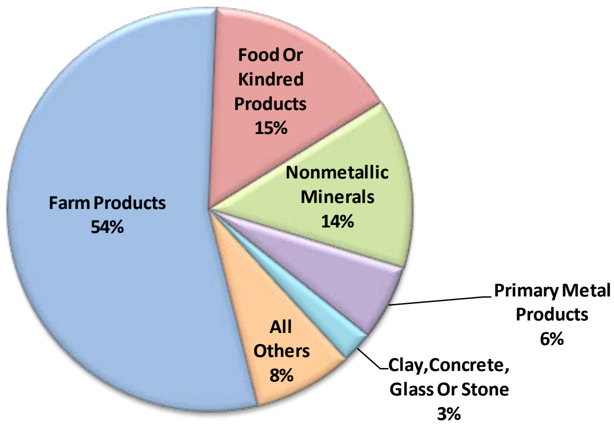




Olmsted County

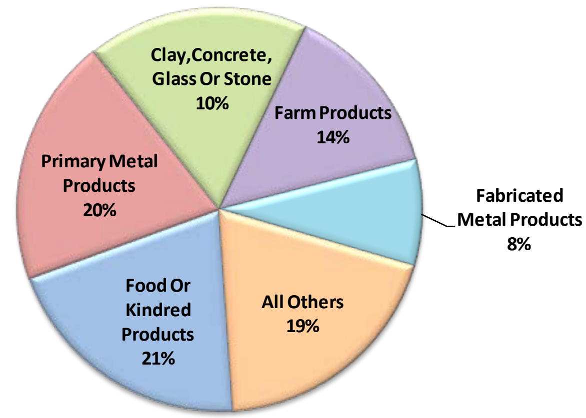
Olmsted County - Origin Commodities by Tonnage (2007)

Total originating tons = .91 million



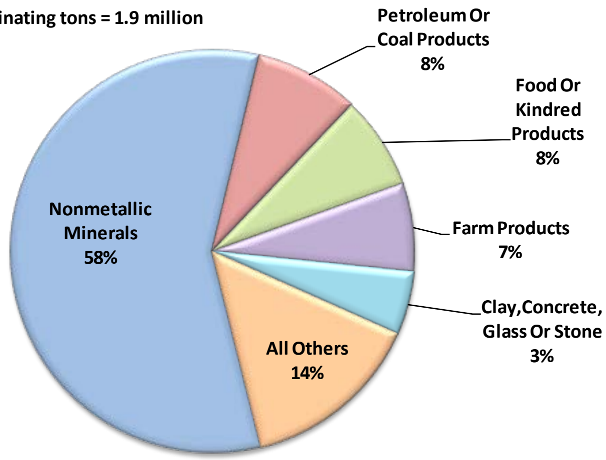
Olmsted County - Originating Commodities by Value (2007)

Total originating value = $8.4 million



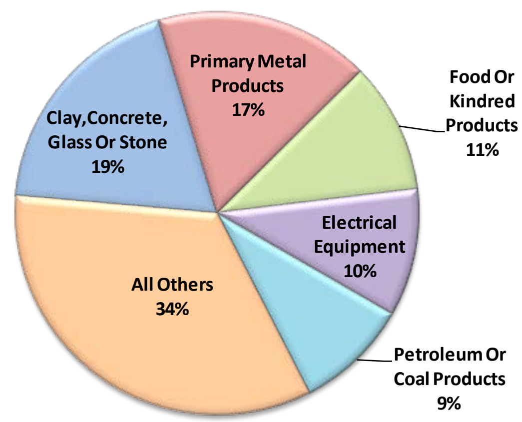
Olmsted County - Terminating Commodities by Tonnage (2007)

Total terminating tons = 1.9 million

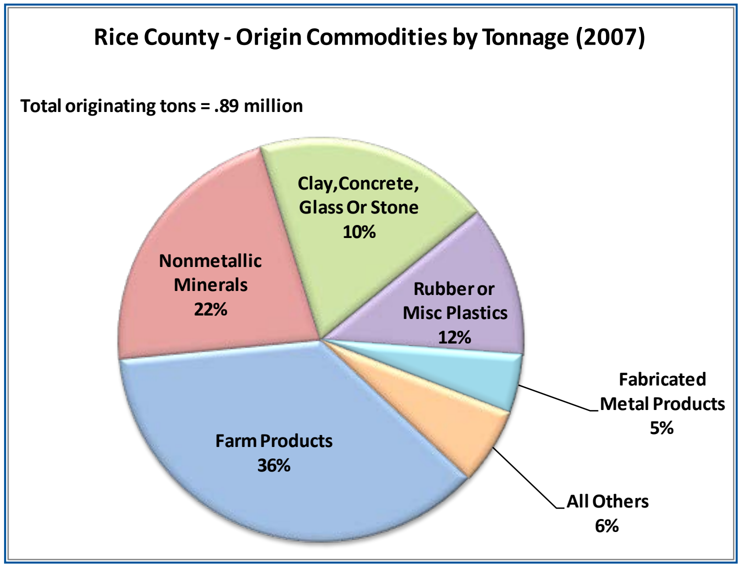


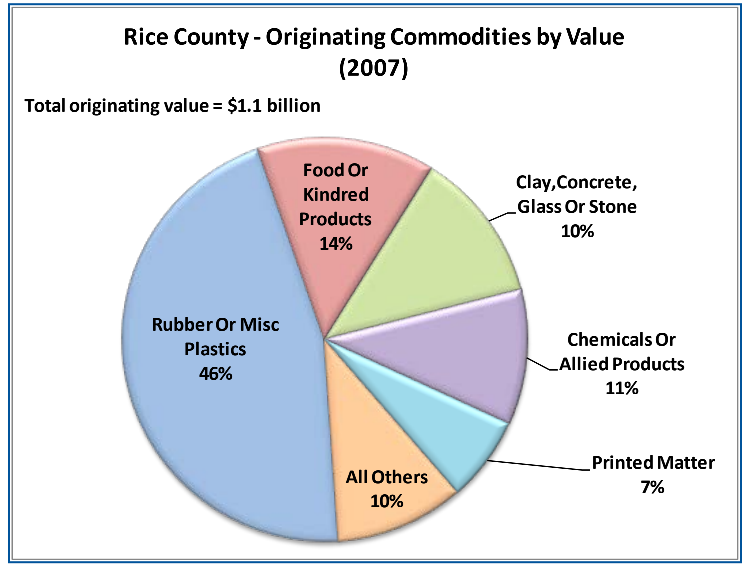
Olmsted County - Terminating Commodities by Value (2007)

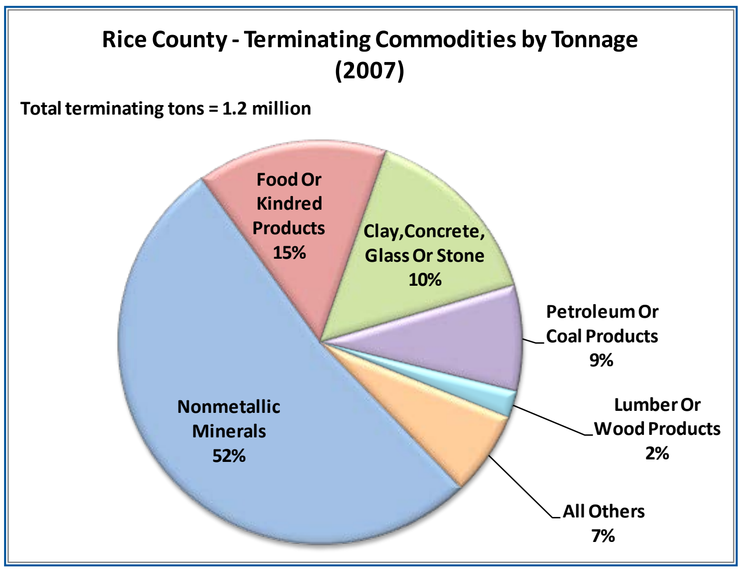
Total terminating value = $1.3 billion

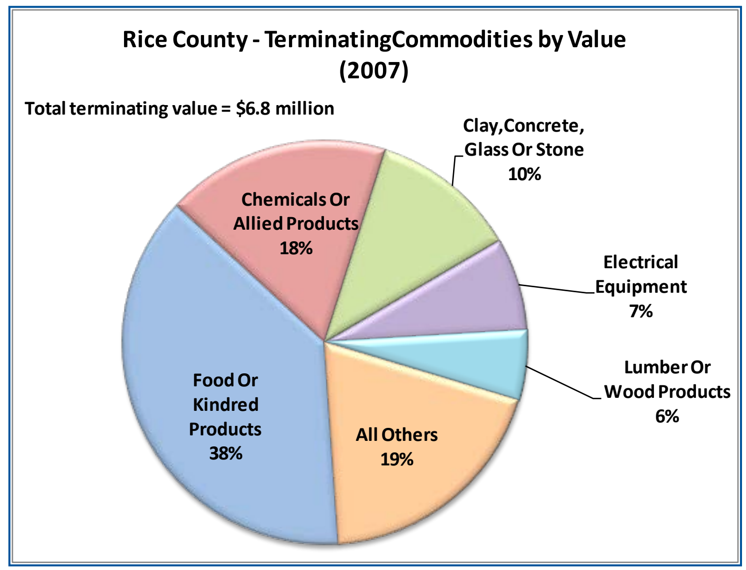


Rice County

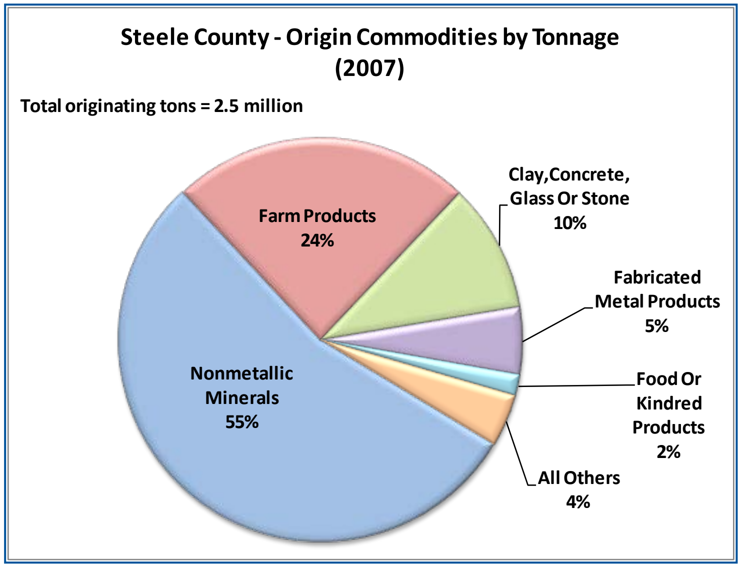

Rice County - Origin Commodities by Tonnage (2007)
Total originating tons = .89 million
Clay,Concrete, Glass Or Stone 10%
Nonmetallic Minerals 22%
Rubber or Misc Plastics 12%
Fabricated Metal Products 5%
Farm Products 36%
All Others 6%

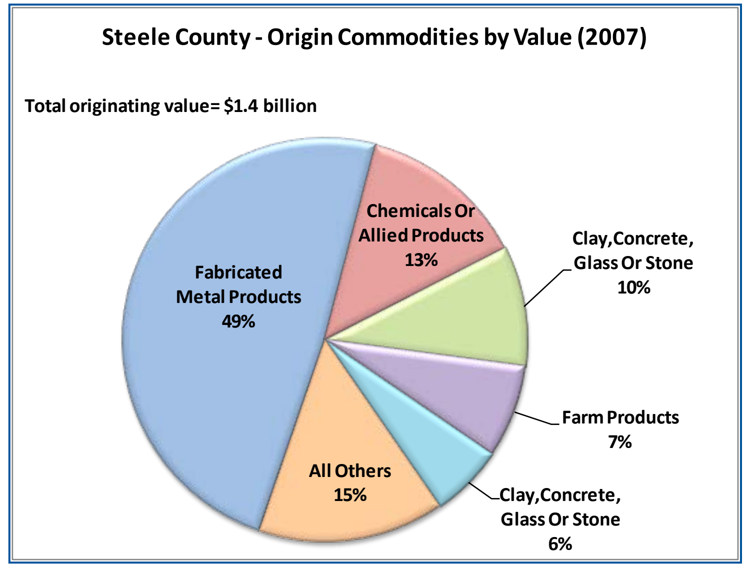

Rice County - Originating Commodities by Value (2007)
Total originating value = $1.1 billion
Food Or Kindred Products 14%
Clay,Concrete, Glass Or Stone 10%
Rubber Or Misc Plastics 46%
Chemicals Or Allied Products 11%
Printed Matter 7%
All Others 10%

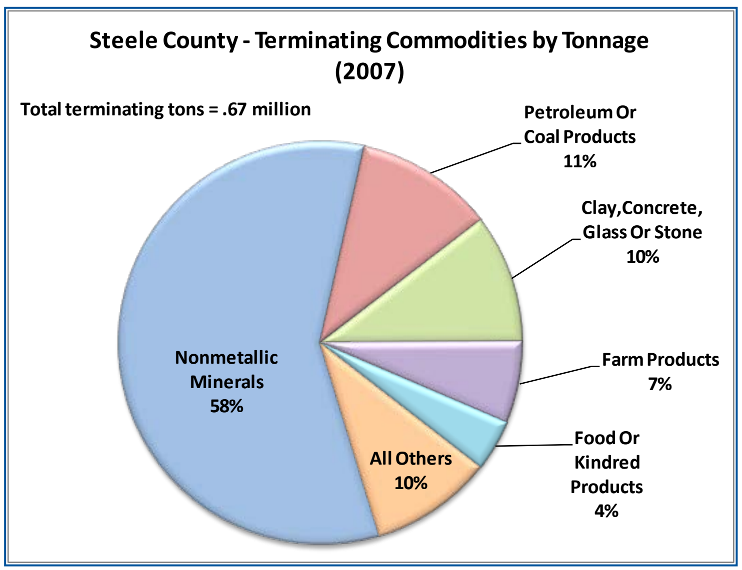

Rice County - Terminating Commodities by Tonnage (2007)
Total terminating tons = 1.2 million
Food Or Kindred Products 15%
Clay,Concrete, Glass Or Stone 10%
Petroleum Or Coal Products 9%
Nonmetallic Minerals 52%
Lumber Or Wood Products 2%
All Others 7%

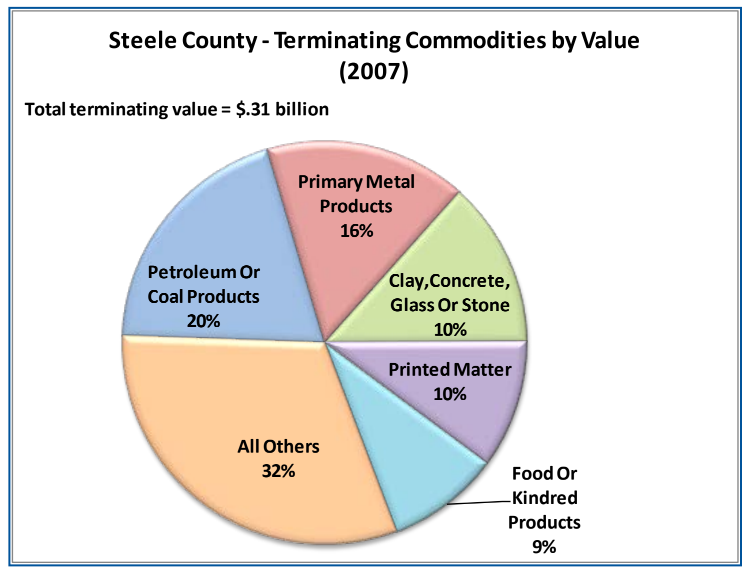

Rice County - TerminatingCommodities by Value (2007)
Total terminating value = $6.8 million
Clay,Concrete, Glass Or Stone 10%
Chemicals Or Allied Products 18%
Electrical Equipment 7%
Lumber Or Wood Products 6%
Food Or Kindred Products 38%
All Others 19%

Steele County

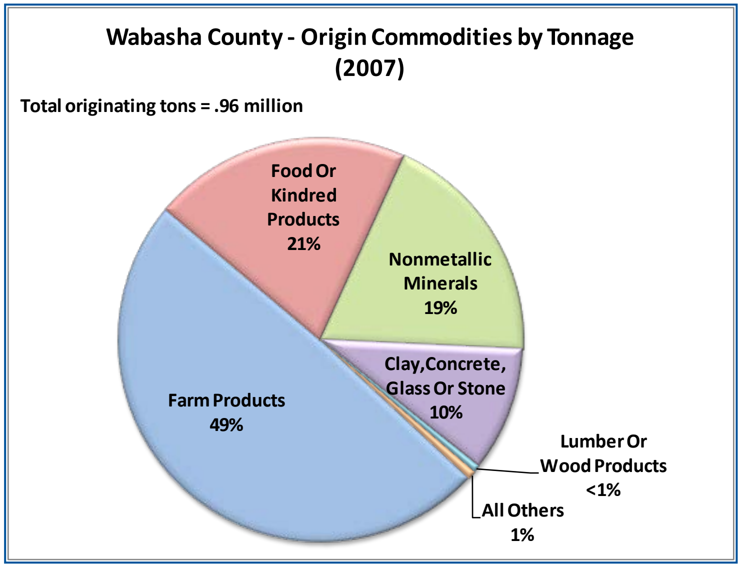


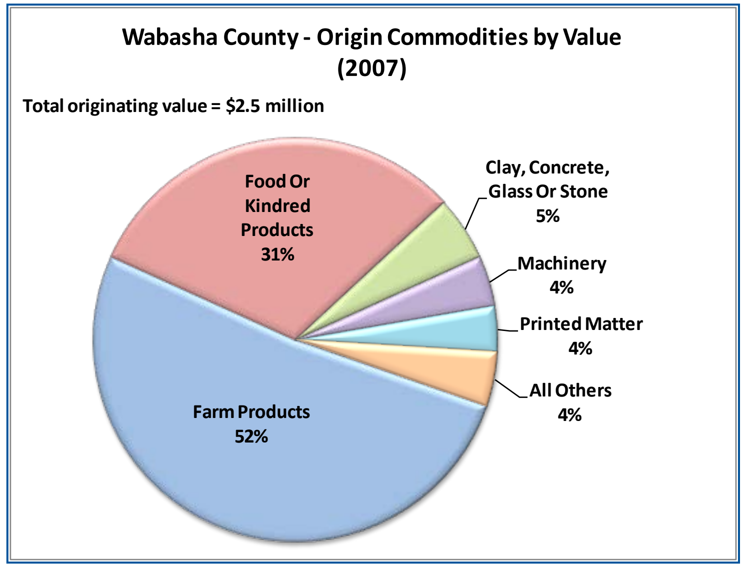


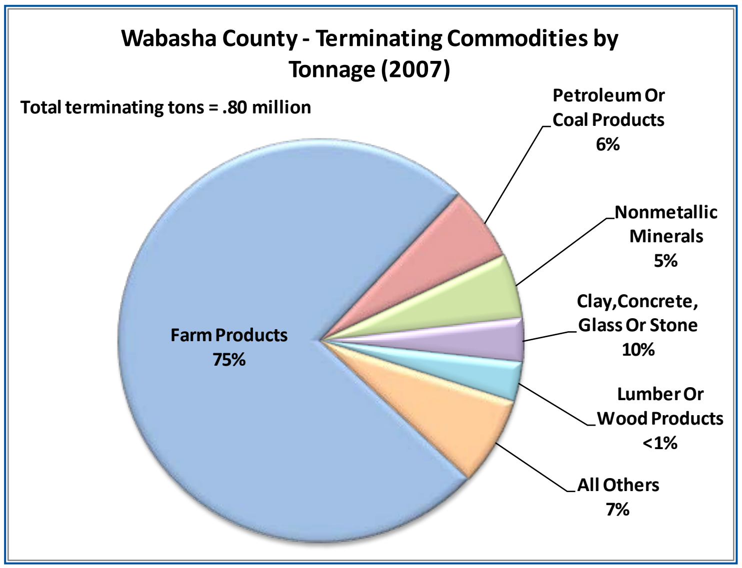


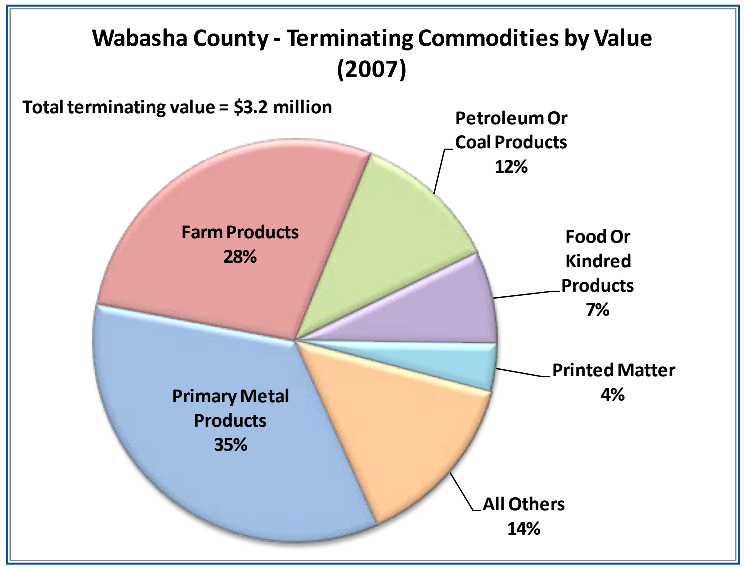


Wabasha County

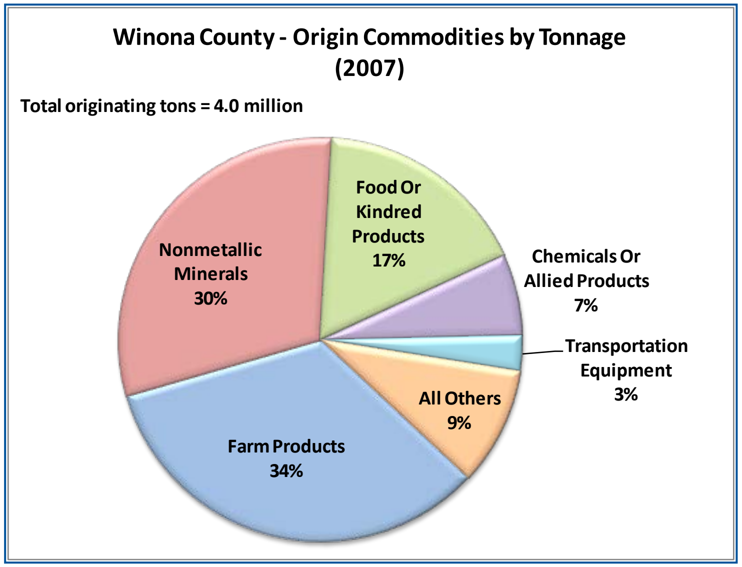


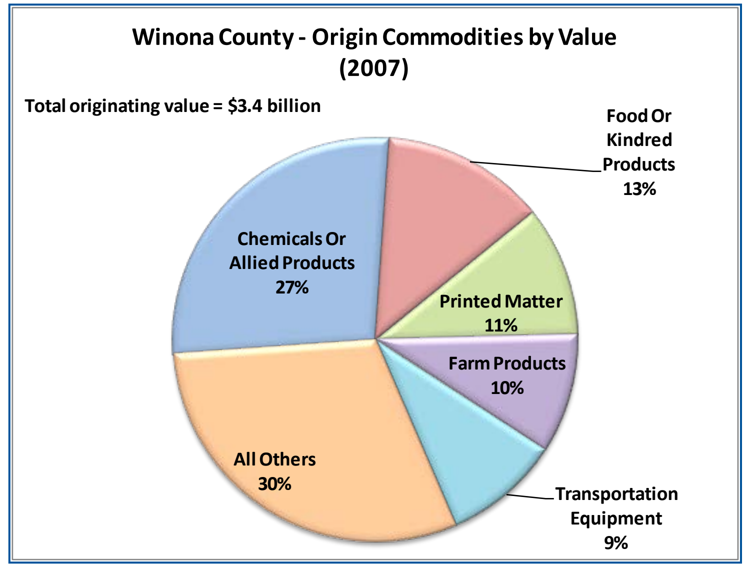


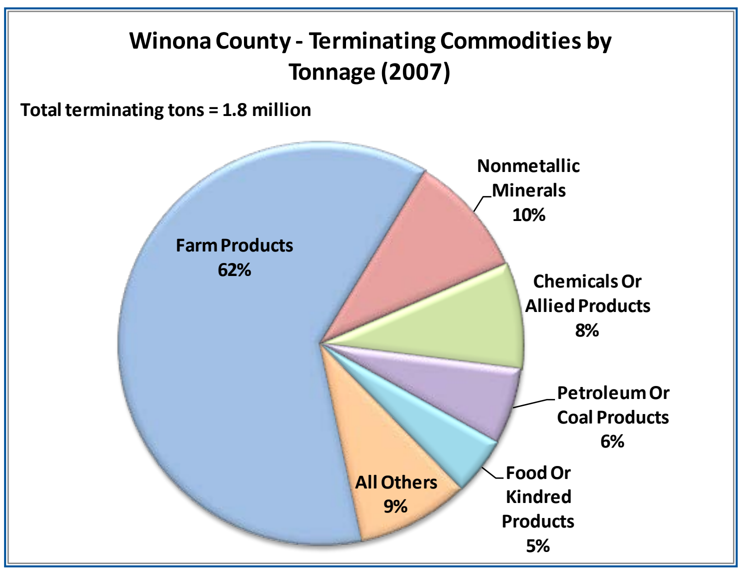




Winona County







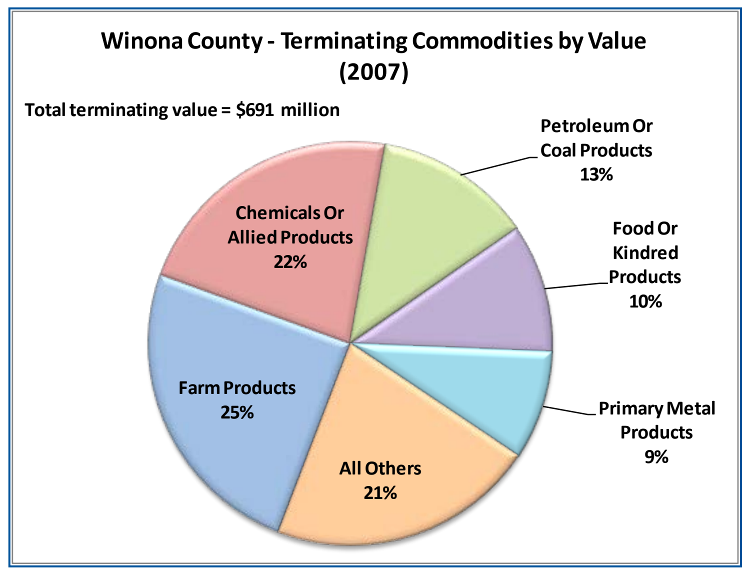


Table of Contents

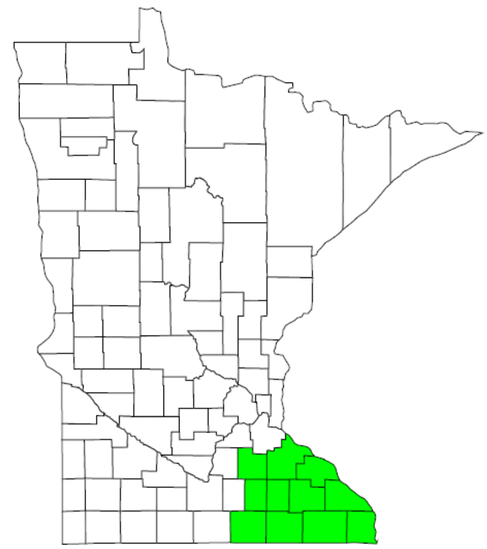
List of Exhibits

Trends and Issues Affecting Freight Transportation in Southeastern Minnesota

Introduction and Background

The regional freight study for Southeastern Minnesota is defined by a study area representing eleven counties that define MnDOT District 6, as well as Economic Development Region 10:

1. Dodge
2. Fillmore
3. Freeborn
4. Goodhue
5. Houston
6. Mower
7. Olmsted
8. Rice
9. Steele
10. Wabasha
11. Winona



The purpose of this working paper is to identify and explore broad trends and issues that impact the Southeastern region of Minnesota with respect to future freight mobility and economic development. These issues and trends will help establish areas for further exploration during the stakeholder outreach process and subsequent analysis tasks. The paper discusses these trends and issues with regard to freight mobility in the region and likely impacts on the ability of the region to attract and maintain business to support economic development and job creation.

Promoting economic development and related job growth requires regional economies to maintain existing business and attract new ones. Access to efficient freight transportation is a key element in business site selection. Competing in the global market environment has raised the importance of efficient, reliable, and secure supply chain networks. In business vernacular, the "supply chain" is a *group of physical entities such as manufacturing plants, distribution centers, conveyances, retail outlets, people and information which are linked together through processes (such as procurement or logistics) in an integrated fashion, to supply goods or services from source through consumption*. Certainly retail and manufacturing operations rely heavily on supply chain networks, not only to meet the supply needs of their customers but also to contribute to their profitability. Freight transportation has a critical role in a company's site selection decisions. However, it isn't just the physical facilities and infrastructure that are important. The conditions in an area that drive pricing, safety, and security in logistics are equally important. Resiliency is a key criterion, that being access to a network which offers mode choice, service flexibility, and reliability – not dependent on only one or a few components which might fail. The idea of resiliency is to return to normal or near normal business conditions as quickly as possible in the event of a service interruption of some sort, for example highway closures.

Changing Demographics: Older, More Concentrated Populations

Developed countries, including the U.S. are facing a trend likely to have implications for our economy in the future; an aging population:

> *"In 1900, nearly two-thirds of Minnesota's population lived in rural areas (66%) and three-fourths of the rural population lived on a farm (74%). By 2000, after rapid growth in urban areas and little growth in rural areas, only 29 percent of the state population lived in rural Minnesota and only 10 percent of the rural population lived on a farm."*[4]

The U.S., like much of the world, is in the midst of a long term migration of people choosing to live in more densely populated urban areas: More than four out of five people in the United States live and work in urban areas.[5] At the turn of the century, farm populations in Minnesota made up nearly half (49%) of the state's entire population; today the farm population of Minnesota is less than 3 percent of the total population. Today over 83 percent of the U.S. population live and work in urban areas. In Minnesota, 74 percent of the population is categorized as "urban".[6]

Between 2010 and 2050, the United States is projected to experience rapid growth in its older population. In 2050, the number of Americans aged 65 and older is projected to be 88.5 million, more than double its projected population of 40.2 million in 2010.[7] Minnesota's population is projected to grow to 5,709,700 by 2015 and 6,446,300 by 2035. The Twin Cities suburbs and the Rochester and St. Cloud regions are all expected to see substantial growth over the next 30 years. The continued aging of the baby boom will produce an explosion in the number of people aged 55 to 69 during the coming decade. Over the longer term, between now and 2035, populations over age 65 will more than double, from 623,200 in 2005 to 1,400,000 in 2035. By contrast, the population under age 65 will grow only 10 percent.[8] The line graphs in ***Exhibit 1*** show population projects by age for Minnesota and for the Southeast Economic Development Region 10 (EDR-10).

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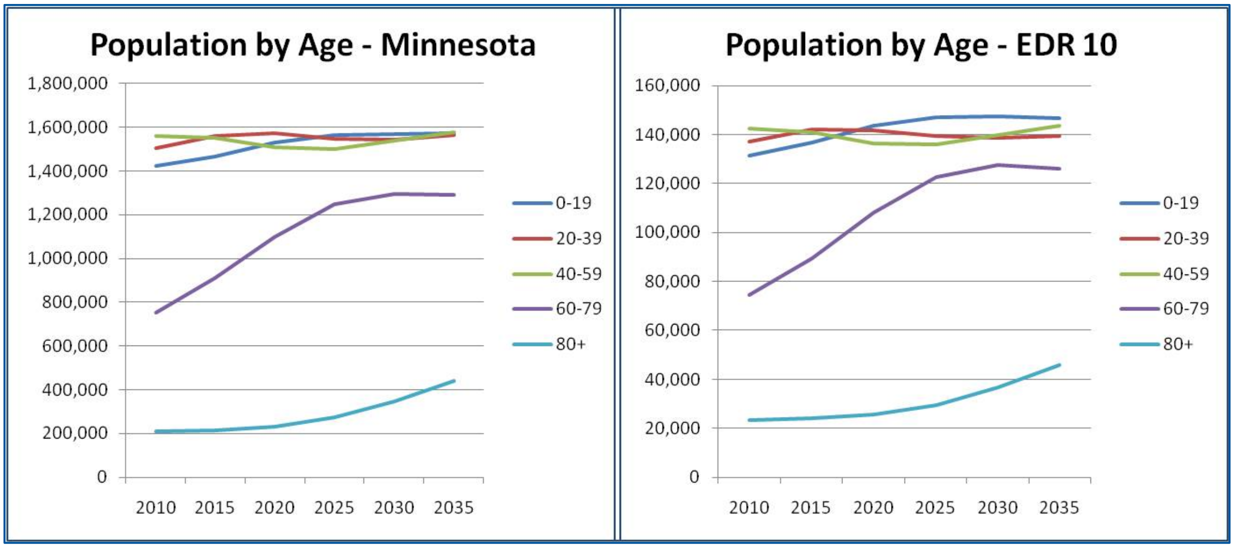
[4] R. Thomas Gillaspy, *The Demographics of Ruralplexs*. Rural Minnesota Journal, January 2006. page 33.
[5] U.S. Census, 2009
[6] U.S. Department of Agriculture; Economic Research Service. State Fact Sheets: Minnesota. *http://www.ers.usda.gov/StateFacts/MN.htm*
[7] U.S. Census Bureau, *2011 National Total Population Estimates*: *http://www.census.gov/prpest/index.html*
[8] MN Department of Administration, Office of Geographic and Demographic Analysis: Projections – Population and Characteristics of the Future. *http://www.demography.state.mn.us/projections.html*

Exhibit 155: Population Trends by Age in Minnesota and the Southeast Region



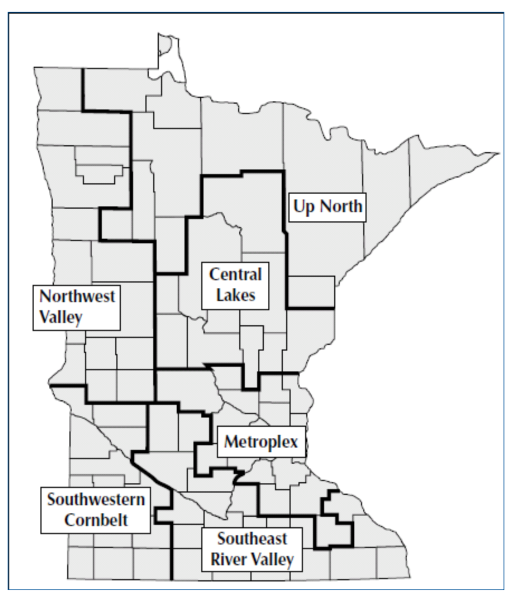
Source: Minnesota Department of Administration, Office of Geographic and Demographic Analysis Data graphed by CDM Smith – note that the scales for the two graphs differ

In 2010, the eleven counties making up the Southeast region had a population of 508,610 people and represented 9.3 percent of the state's total population. The statewide and southeast regional population compositions by age are nearly mirror images of one another. The line graphs show current and predicted age population trends, for the population segregated into 20-year groups. While age groups under 60 years of age show modest or no gains over the 25-year forecast period, populations aged 60 to 79 years are predicted to grow approximately 70 percent for both the state and the region, while the population 80 years and older is projected to grow 98 percent in the region, and 111 percent statewide.

The Emergence of the Ruralplex

Before his retirement in 2012, Minnesota State Demographer Tom Gillaspy explored the changing demographic dynamics of Minnesota's rural landscape and helped coin the term "ruralplex". Dr. Gillaspy argues that traditional ways of thinking about rural Minnesota in terms of county boundaries and Economic Development Regions no longer serve to adequately describe the profound changes taking place in rural Minnesota. Instead, Dr. Gillaspy suggests an alternative is to think rural communities as specially separated neighborhoods with shared characteristics. Under this premise, the state is organized into five ruralplex areas and one metroplex. These new geographies are defined by combining existing counties with similar traits for the sake of data and analysis. In the ruralplex geography shown in ***Exhibit 2***, Goodhue, Olmsted and

Exhibit 16: Minnesota Ruralplex Regions



Source: Rural Minnesota

Rice Counties become part of the Metroplex extending from Rochester through the traditional metro counties up through St. Cloud.

The remaining EDR 10 counties are combined with EDR 6E and EDR 9 to the west and northwest. In a 2006 essay on demographic changes of the Minnesota's ruralplex regions for the *Rural Minnesota Journal*, Dr. Gillaspy notes that several regions, including the Southeastern River Valley will see slow labor force growth in the coming years, due to the declining populations in young people. The conclusion drawn from this trend is that "future economic growth will depend almost exclusively on increased per-worker productivity".[9]

Structural Changes to the U.S. Economy

In our modern global economy, cost-effective, time-sensitive transportation services are increasingly a strategy for competitive advantage in manufacturing, mining, agriculture, and service-based industries. Businesses compete regionally, nationally and globally for raw materials, parts, and labor.

The globalization of the world economy has grown at a rapid pace over the past several decades and virtually all sectors of the U.S. economy now compete against global competitors. Advances in technology and management practices allow U.S. firms to employ strategies that enable customized products for mass-market distribution. In this environment, the ability of state and regional infrastructure managers to deliver robust transportation systems is directly tied to the economic competitiveness and community vitality:

> *"The changes at work in the American economy are profound. The agricultural and manufacturing economy of the 20th Century has evolved. Services have become the fastest-growing sector of the economy. Logistics and transportation sectors are second…The American economy demands increasing volumes of trade if it is to continue to grow. The economic sectors that remain robust will require far more trade and travel per unit of output than was required 30 years ago."*[10]

The Shift from Manufacturing to Services

In the early 1980's, manufacturing was the leading sector the U.S. economy, roughly equal in economic contribution of the Services and "FIRE" (finance, insurance, and real estate) sectors combined. However, over the course of the past several decades, the services sector of the U.S. economy has significantly outpaced manufacturing growth as a percentage of Gross Domestic Product (GDP). By 2005, the service industries sector had increased its share of the national economy to account for 68 percent of current dollar GDP.[11] However, it must be noted that while manufacturing as a share of the U.S. economy has declined, by value the U.S. remains the world's leading manufacturer: *The United States remains by far the world's leading manufacturer by value of goods produced. It hit a record $1.6 trillion in 2007 – nearly double the $811 billion of 1987. For every $1 of value produced in China factories, the United States generates $2.50.*[12] By value, the U.S. produces 21 percent of the worlds

[9] Ibid. Gillaspy, January 2006.

[10] *Transportation Invest in Our Future: America's Freight Challenge*. American Association of State Highway and Transportation Officials (AASHTO), May 2007.

[11] BEA News, *Gross Domestic Product by Industry for 2003*: www.bea.doc.gov/bea/newsrel

[12] New York Times; *Is Anything Made in the U.S.A. anymore? You'd be surprised*. February 2, 2009

manufacturing output, while China is second at 15 percent, and Japan third at 12 percent.[13] In terms of manufacturing exports, the European Union and China lead all countries.

Developing countries, by definition, are changing the structure of their economies as well, moving away from sustenance economies toward greater reliance on manufacturing and striving to become globally competitive with developed counties. In general, the U.S. economy is continuing to shift from basic, resource-oriented industries, such as agriculture, mining and basic manufacturing, toward a more diverse industry mix including high value-added industries such as microelectronics, medical technology and aerospace. In turn, demand for moving goods is shifting from bulk movements via rail, truckload and water to small, higher-value shipments via air freight, courier and less-than-truckload. This is particularly true in high-tech industries.

It should also be noted that the U.S. is a net exporter of services and leads the world in service exports:

> *The United States has been losing ground in terms of its share of global goods exports, as one would expect given the rapid economic growth of many developing countries. Over the last five years, products made in China, India, Brazil, and the Middle Eastern countries have made up an increasing share of world goods exports. The United States, though, is the global leader in service exports; selling $525.8 billion worth to foreign residents in 2008. This represented 13.8 percent of global commercial service exports, making the United States by far the world's dominant service exporter.*

Exports of services cover transportation and related services (e.g., tourism), educational services, intellectual property (royalties and licenses), financial services and other private services. In 2009, the service sector contributed a positive $148.7 billion toward the overall U.S. trade deficit. In terms of Minnesota's service industry exports: "No official comprehensive state-level export data for services are available. Estimates by DEED show that Minnesota service exports were valued at $9.8 billion in 2009, up 2 percent from 2008."[14] Further, an analysis by the Brookings Institute found that the Minneapolis/St. Paul Metro region ranked 22nd in service export intensity among all metropolitan areas and second among Great Lakes Metropolitan Areas.[15]

Globalization

The *"Global Economy"* is an often used phrase to describe the increasingly integrated and complex global systems of production and exchange between countries. Over the last several decades, economic activity has been shifting from traditional industrial countries like the U.S. to developing countries such as China, India, Russia, and other engineering economies throughout Asia and South America. The largest share of U.S. GDP is consumption (71%) with an increasing share of U.S. consumption coming from imports. The top countries supply U.S. imported goods are China, Canada,

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[13] National Association of Manufacturers. *http://www.nam.org/Statistics-And-Data/Facts-About-Manufacturing/Landing.aspx*

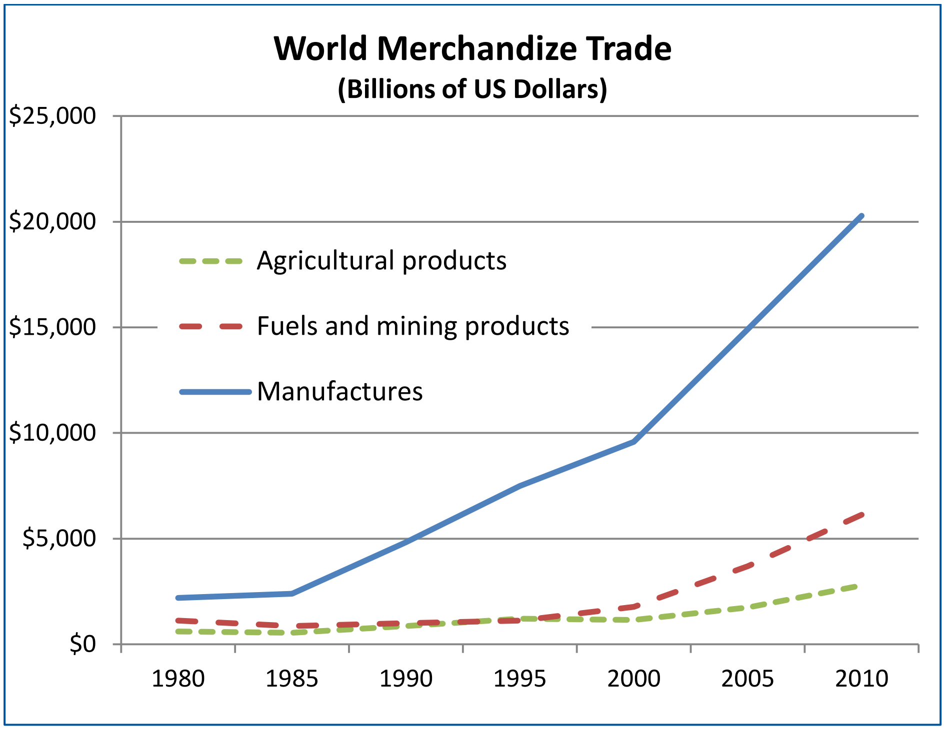
[14] Minnesota Department of Employment and Economic Development (DEED), *Minnesota Annual Export Statistics (2010)*. *http://www.positivelyminnesota.com/Data_Publications/Data/Export_Statistics/2010_Stats/Export_Annual_2010.pdf*

[15] Jennifer Bradley, Emily Istrate and Jonathan Rothwell, *Exports in the Great Lakes: How Great Lakes Metros Can Build on Exports and Boost Competitiveness*. Brookings Institute; Metropolitan Policy Program. July 2010, pp. 8.

and Mexico. The growing importance of trade in the U.S. economy is a reflection of world economic trends.

Exhibit 3 and ***Exhibit 4*** summarize the growth in trade by major product group since 2000.

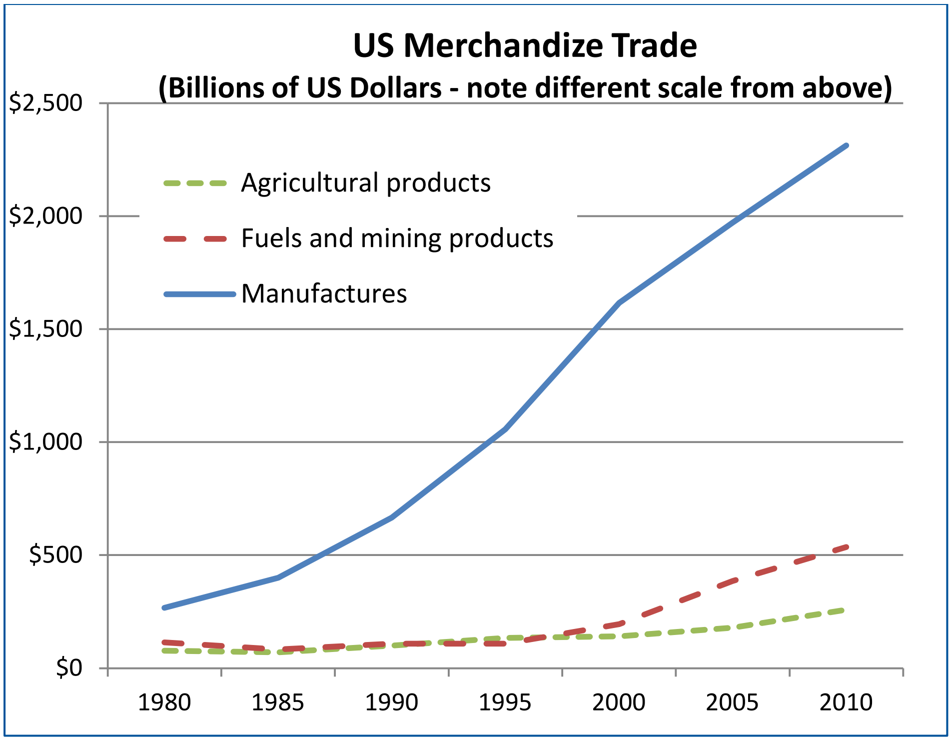
Exhibit 17: World Merchandise Trade by Major Product Groups[16]



Source: World Trade Organization Data, Charted by CDM Smith

Exhibit 16: U.S. Merchandise Trade by Major Product Group

[16] World Trade Organization Trade Profiles Data, downloaded on March 25, 2012. Charted by CDM Smith *http://stat.wto.org/CountyProfile/WSDBCCountryPFHome.aspx?Language=E*



Source: World Trade Organization, Charted by CDM Smith

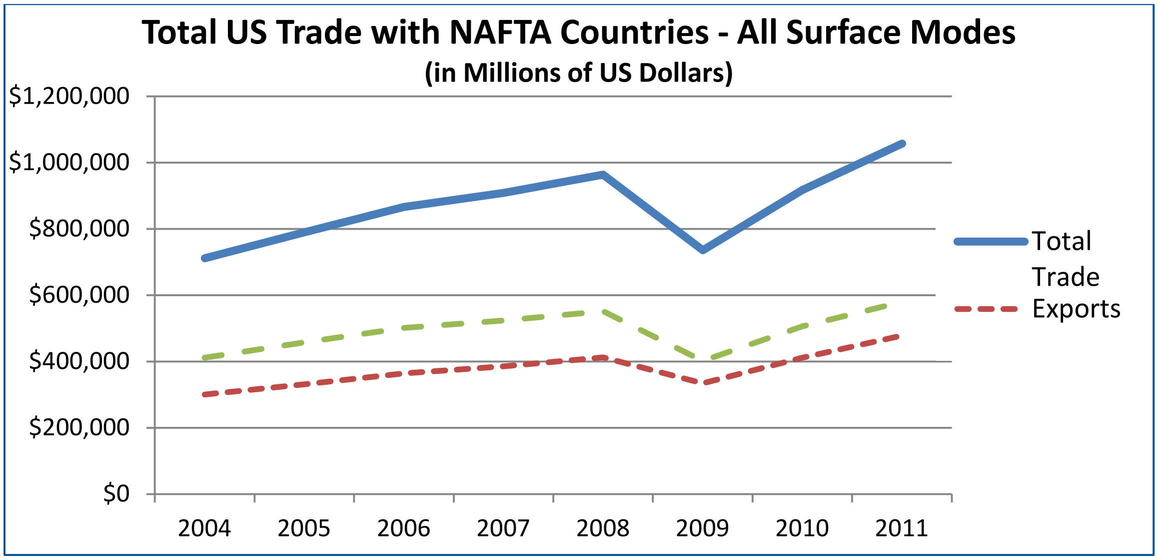
Between 1960 and 1999, world merchandise trade (exports and imports) grew at an average annualized rate of over 10 percent (in 2002 dollars). Globalization has been a significant element of the growth in the U.S. economy. Growth in trade, its significance in the economy, and the changing characteristics of trade partnerships can be traced to a number of factors, including:

- Liberalization of world trade policies
- Growth of multinational trade blocks and multinational corporations
- Accelerated adoption of advanced information technologies

As the previous exhibits show, there has been a significant growth in *Agricultural Products* and *Fuels and Mining Products*. However, the most dramatic increase has been in the trade of Manu*facturing Goods*. As trade becomes an increasingly significant component of the U.S. economy, services such as transportation and warehousing must grow to support the need for moving goods to consumer markets. Freight transportation is also becoming more multimodal as many goods travel farther and sophisticated supply chain management systems seek to maximize inherent benefits offered by each mode.

For the U.S., a significant portion of the growth in international trade can be attributed to trade within North America between the U.S. and its neighbors, Mexico and Canada. North American Free Trade Agreement (NAFTA) has been a pivotal driver of trade increases since its implementation in 1994. Total two-way trade between the U.S. and NAFTA partners grew a remarkable 111 percent between 1993 and 2003, while total two-way trade between the U.S. and the rest of the world grew by 79 percent.[17] ***Exhibit 5*** shows U.S. NAFTA trade from 2004 to 2010. During that time frame, trade increased nearly 50 percent (48/7%), with exports increasing 60 percent, versus 41 percent for imports. Preliminary results suggested that in 2011, total NAFTA trade increased by more than 14 percent over 2010.

Exhibit 17: U.S. NAFTA Trade, 2004-2011



Source: Bureau of Transportation Statistics (BTS) – North American Transborder Freight Data

Exhibit 6 shows NAFTA trade for Minnesota. While imports account for nearly 70 percent of Minnesota's NAFTA trade, NAFTA exports from Minnesota have increased 89 percent since 2004, versus 66 percent for imports. The largest commodity traded between Minnesota and NAFTA partners is *Mineral Fuels: Oils and Waxes*, a category that includes light crude often moving by pipeline, most likely oil and natural gas from Canada. The largest NAFTA exports from Minnesota include *Vehicles other than Railway* and *Computer-Related Machinery and Parts*.

Exhibit 18: Minnesota NAFTA Trade, 2004-2011

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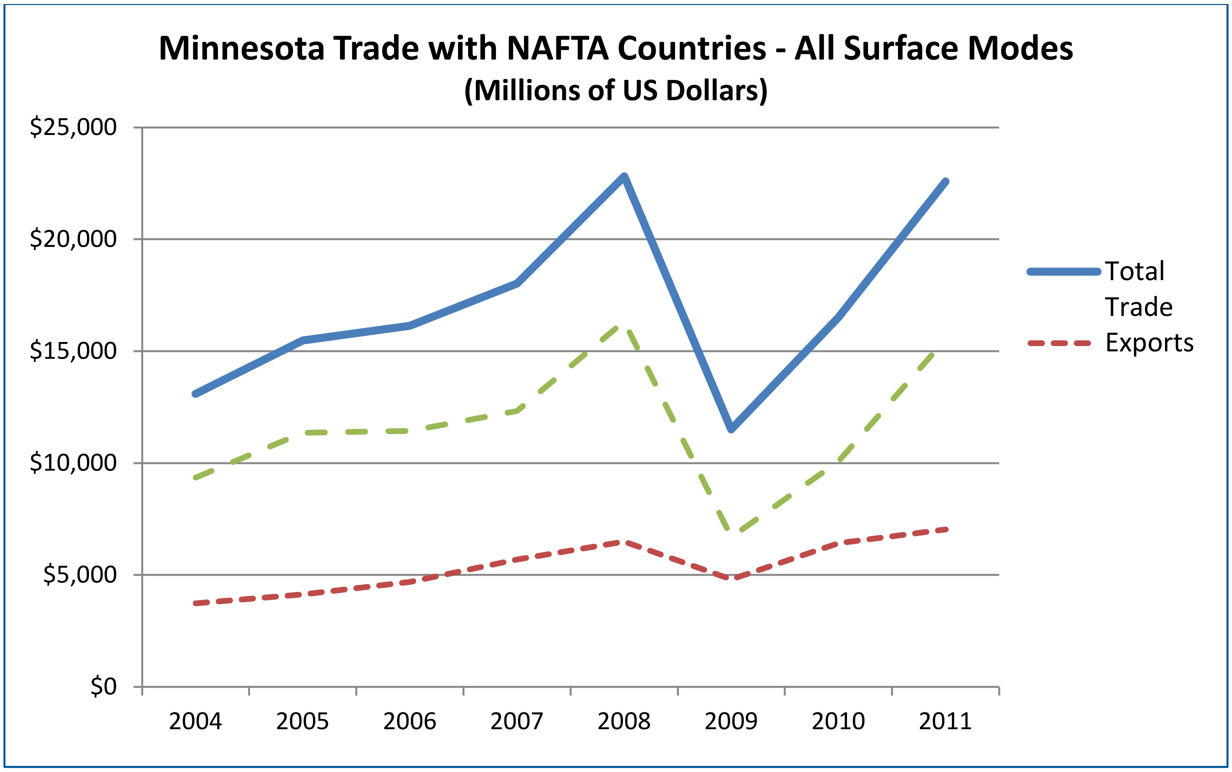
[17] NAFTA 10 Years Later. Overview. U.S. Department of Commerce, International Trade Administration, Office of Industry Trade Policy.



Source: Bureau of Transportation Statistics (BTS) – North American Transborder Freight Data

A Renewed Focus on Exports and Manufacturing through Innovation

In his 2010 State of the Union address, President Barack Obama announced the *National Export Initiative* that established an ambitious goal of doubling U.S. exports by the end of 2014. IN 2010, U.S. exports of goods increased 21 percent over 2009, totaling $1.28 trillion; total exports including services exceeded $1.8 trillion. In 2011, total U.S. exports reached an all time high of $2.1 trillion, with the exports of goods up 16% over 2010, totaling nearly $1.5 trillion. The U.S. Department of Commerce estimates that in 2011, export trade supported 9.7 million jobs in the U.S.[18]

In Minnesota, total exports for 2010 were estimated at $31 billion, with 55 percent of the states exports coming from manufacturing industries.[19] In 2010, the Minneapolis/St. Paul metropolitan area exported over $23 billion in goods, more than all other urban areas in the state combined. However, excluding the Twin Cities area, Rochester was the largest exporting metro area in the state, accounting for just under $1 billion in goods exports (***Exhibit 7***).

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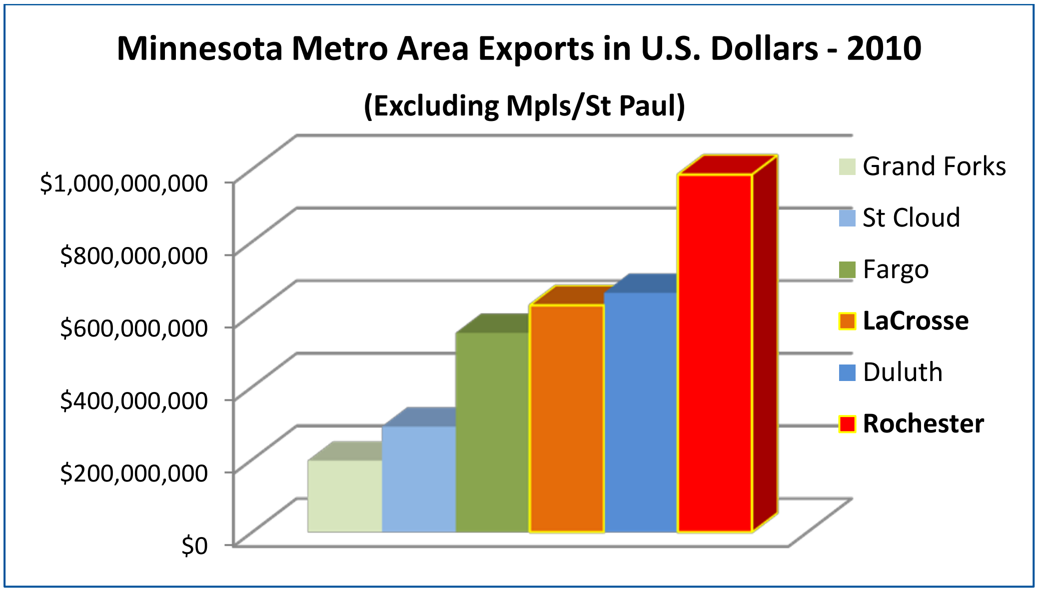
[18] U.S. Department of Commerce, International Trade Administration. *Jobs Supported by Exports: An Update*. Released March 12, 2012. http://www.trade.gov/press/press-releases/2012/jobs-supported-by-exports-031212.pdf

[19] Ibid. Minnesota DEED, Annual Export Statistics. pp. 13.

Exhibit 19: Exports of Goods from Minnesota Metro Areas (excluding the Twin Cities), 2010



Based on available data, Rochester's primary export categories are: Machinery Manufacturing, Transportation Equipment Manufacturing, and Food Manufacturing. It should be noted that data for some specific industry categories has been withheld to avoid disclosing figures for individual companies. According to the Brookings Institute, exports account for 10.9 percent of the Rochester economy and support 2,800 jobs.[20] The La Crosse/La Crescent area is the third largest goods exported among second tier areas in the state, with exports of $625 billion in 2010. Together, the La Crosse and Rochester areas account for roughly half (48.7%) of all goods exports from second tier urban areas in the state.

A majority of Rochester's exports are destined for countries in the Asian-Pacific Economic Cooperation, a forum representing 21 Pacific Rim countries.

Exhibit 20: Rochester's Export Destinations by International Economic Region

[20] *Export Nation 2012 – Minnesota*. Metropolitan Policy Program. Brookings Institute.

Researchers at the Brookings Institute argue that increasing exports from metropolitan areas in the Great Lakes Region provides an opportunity for creating future economic growth and thousands of new jobs. The challenge facing many traditional industrial cities in the Great Lakes Region is the ability to innovate. In this regard, Minnesota and the Southeastern region of the state appear to be well positioned. Data from the U.S. Patent and Trademark Office shows that from 2006 through 2010, companies in the Twin Cities were granted 11,366 patents, while businesses in Rochester were granted 1,789 patents, ranking the two metropolitan areas 8th and 47th, respectively, out of 374 Metropolitan Statistical Areas (MSA). The Rochester *Post Bulletin* reported in January 2011 that IBM broke a record for new patents coming from the Rochester facility.

A recent study by the U.S. Council on Competitiveness identified "regions" as a critical building block for the economy.[21] "In order to compete successfully in the new global marketplace, firms must have access to the assets – human, financial, institutional, and physical – that support innovation. Although national and state policies create a platform for innovation, the focus of innovation activities is at the regional level where workers, companies, educational institutions and government interface most directly. Supporting dynamic firms requires that regions provide access to skilled labor, a solid transportation and communications infrastructure, and a business culture that supports entrepreneurship and risk-taking."[22]

The Impact of Technology in the New Trade Economy

A major factor in facilitating global trade has been the development and accelerated adoption of new information technologies. Fast, reliable information technologies have:

> *"Enabled radically new levels of global collaboration, new ways to conduct business, and insights about markets and customers…Firms are rethinking their total cost of production to include factors like worker productivity, supply chain resilience and intellectual property protection – and deciding to bring production back to America. U.S. firms are at the forefront of new*

[21] Council on Competitiveness, *Guide for Effective Engagement of Business Leaders in Regional Development*

[22] Ibid. Council on Competitiveness, pp. 5

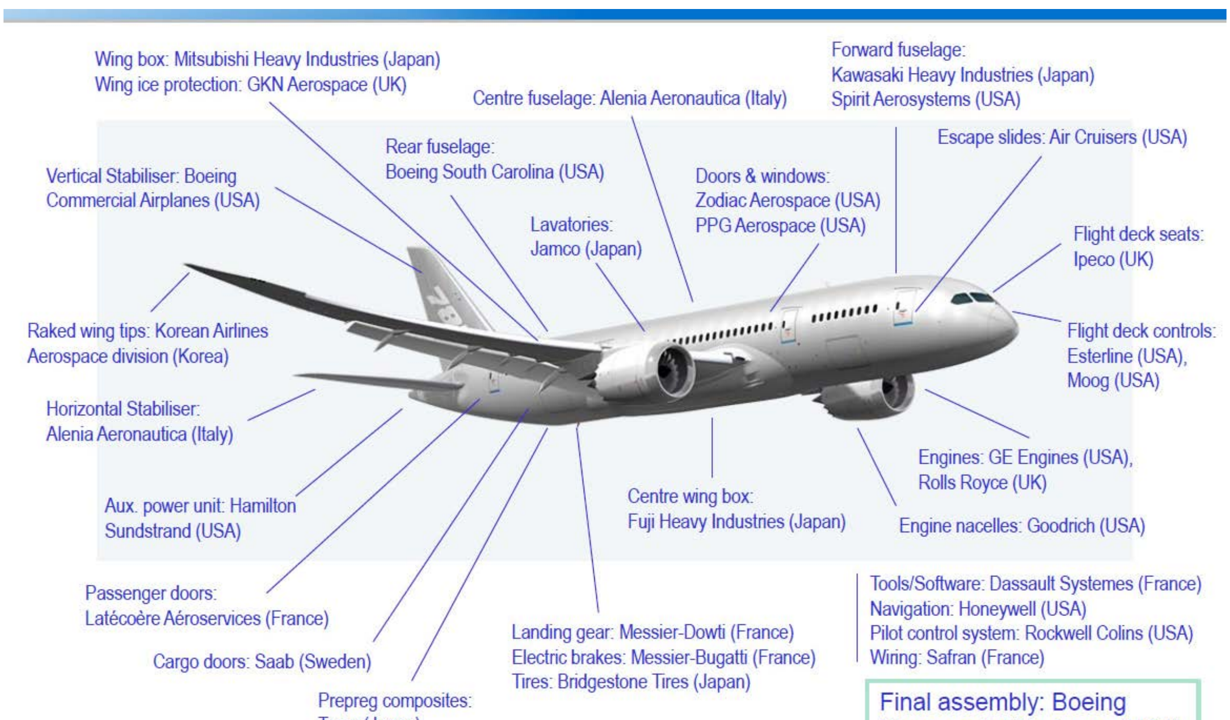
technologies, production processes, customized manufacturing and the use of high performance computing that could lead to a manufacturing renaissance."[23]

Remaining economically competitive in a global marketplace that continues to create new challenges for business and industry and the multimodal transportation networks that serve them requires agility and perseverance. Historically, the ability to produce and deliver high quality goods and services at competitive prices was a strategic advantage for the U.S. Minnesota's economy is intrinsically linked to its ability to move materials, components, and finished goods within the state and to national and international destinations. As the economy continues to be transformed, our ability to manage the complex supply chains necessary to move these goods remains critical to a prosperous economic future.

One area where the advancement of information technology has had a significant impact on the modern business enterprise is supply chain management. The integration of information and reliable transportation has allowed companies to disperse their operations to take advantage of competitive conditions throughout the world while reducing inventories and meeting higher service requirements.

With the emergence of worldwide production markets for consumer products, supply chains have taken on more prominence in business strategy. In manufacturing, globalization and information have created deeply complex supply chains, involving multiple parties and many transportation transactions. ***Exhibit 9*** shows the international team responsible for systems and components on the new Boeing 787 Dreamliner passenger jet.

Exhibit 21: Global Sourcing & Supply Chains: The Boeing 787 Dreamliner



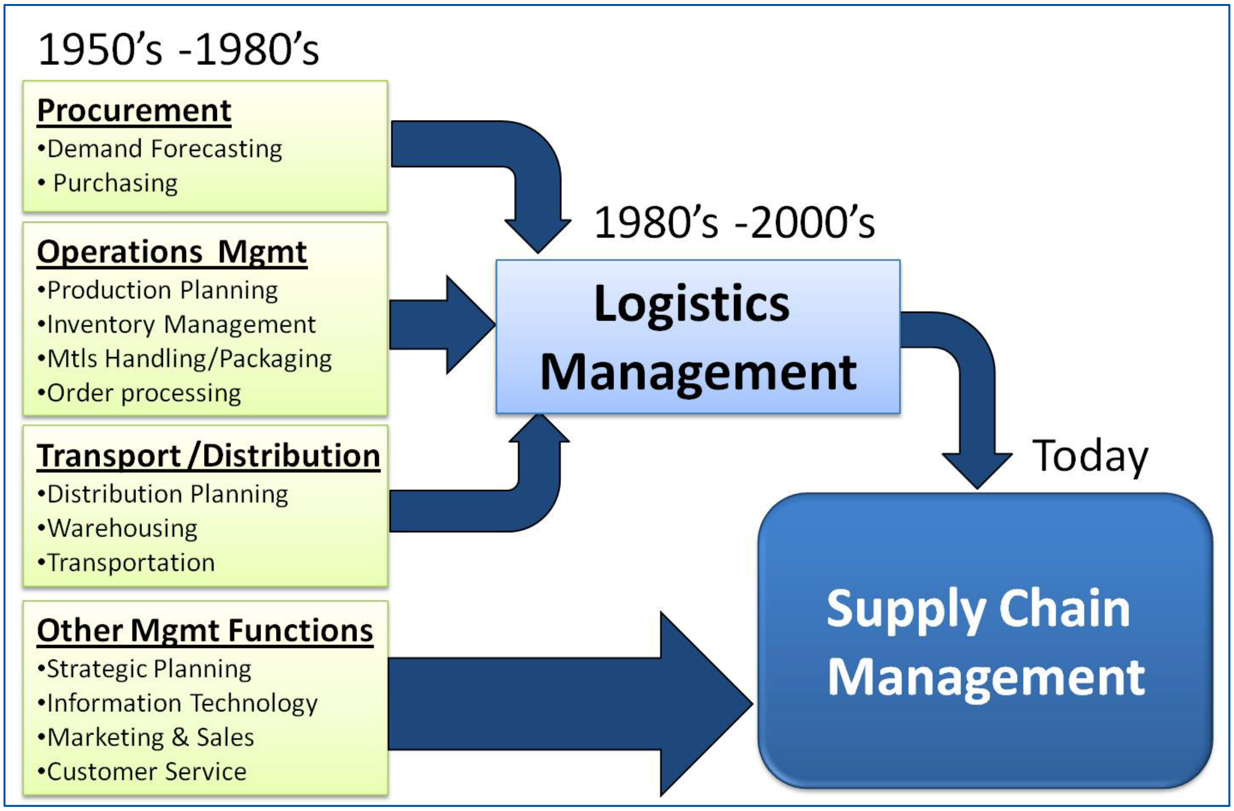
Source: www.newairplane.com

[23] Council on Competitiveness. *Make: An American Manufacturing Movement*. December 2011. pp. 8-10.

Picture Source: http://siteresources.worldbank.org/INTTRADERESEARCH/Images/Boeing787.jpg

In WWII, logistics (having the right materials in the right place at the right time) played a key role in the Allied victory. After the war logistics management entered the mainstream of American business practice. Early logistics management focused on delivering finished products to consumers. In the latter half of the Twentieth Century, logistics management became a legitimate business function that continued to evolve toward a more integrated chain linking previously separate functions: material sourcing and procurement, manufacturing, inventory management, distribution, and transportation. As the science of logistics evolved into what is today supply chain management, businesses refocused from just delivering products and reducing inventory, to using supply chain strategies to create a competitive advantage and contribute to the bottom line. ***Exhibit 10*** provides a simplistic depiction of the logistics, supply chain evolution.

Exhibit 22: Logistics and Supply Chain Management Evolution



Source: CDM Smith

Up until the 1990s, most businesses operated under what is sometimes referred to as the "push" model of inventory management: Manufacturers would run a production line of a particular product and then "push out" shipment to lots of retailers and distributors. Retailers were then challenged with holding the goods inventory until the entire lot was sold. Weak sales for certain items would result in clearance sales to clear inventories of unwanted items.

Technology enables the development of the "pull" inventory model. For leading edge retailers like Wal-Mart, pull logistics moved the control of inventories away from suppliers: Under the pull inventory model as customers purchase an item, information technology immediately sends and order to the supplier that an additional product is needed. This information enabled inventory management greatly reduced the need for tradition inventory or safety stock (i.e., excess inventory to cover potential supply disruptions), and has also reduced lost opportunity sales. For instance, in 2002 the Grocery Manufacturers Association estimated that U.S. grocers lost $6 billion in sales due to "out of stock" episodes.

Today, businesses define how goods move by the nature of their supply chains: people, processes and physical entities linked together by information and transportation. This "logistics revolution" over the past three decades has redefined many business sectors. Wal-Mart is an often noted example of a business that redefined the retail industry primarily due to its superior supply chain management practices.

> "*Supply-chaining is a method of collaborating horizontally - among suppliers, retailers, and customers - to create value. Supply-chaining is both enabled by the flattening of the world and a hugely important flattener itself, because the more they grow and proliferate, the more they force the adoption of common standards between companies (so that every link of every supply chain can interface with the next), the more they eliminate friction at borders, the more they encourage global collaboration."*[24]

One measure of the productivity resulting from supply chain management over the past several decades is that the cost associated with getting goods from the point of production to the final consumer as a percentage of the economy has gone from about 11 percent of GDP in the mid-1990s, to a low of 7.7 percent in recent years. Each percentage reduction in logistics as a portion of the GDP is equivalent to about $125 billion that is then available to other economic activities.

As electronic-commerce "or e-commerce" (the buying and selling of goods over the internet) is adopted by more of the population, the complexities of fulfilling orders increases. Minnesota based consumer giant Best Buy experienced the complexities of fulfilling e-commerce orders when just days before Christmas 2011, the retailer was forced to tell customers that it could not fill online orders going back as far as November.

The New American Energy Revolution

"The great economic revolutions in history occur when new communication technologies converge with new energy systems. New energy revolutions make possible more expansive and integrated trade. Accompanying communication revolutions manage the new complex commercial activities made possible by the new energy flows…Today, Internet technology and renewable energies are beginning to merge to create a new infrastructure for a Third Industrial Revolution (TIR) that will change the way power is distributed in the 21st Century."[25]

While this vision of an energy future largely free of dependence on fossil fuels may be desirable, it does not appear to be a reality in the near-term (10 to 15 years). The current trend appears to focus on relieving American's from dependence on foreign oil through a combination of using new technology for U.S. based oil and gas production, coupled with renewable energy development; what has recently been coined as the "all of the above" policy toward U.S. energy development.

U.S. Shale Oil Plays

The traditional means of extracting crude oil has been accomplished by drilling a bole into geological structures forming oil reservoirs. For most of the Twentieth Century pumping oil from crude oil deposits fuel the world. Early drilling techniques for oil involved vertical wells, however modern drilling favors slant techniques that expose a greater portion of the well pipe in the reservoir and also well heads to be groups together.

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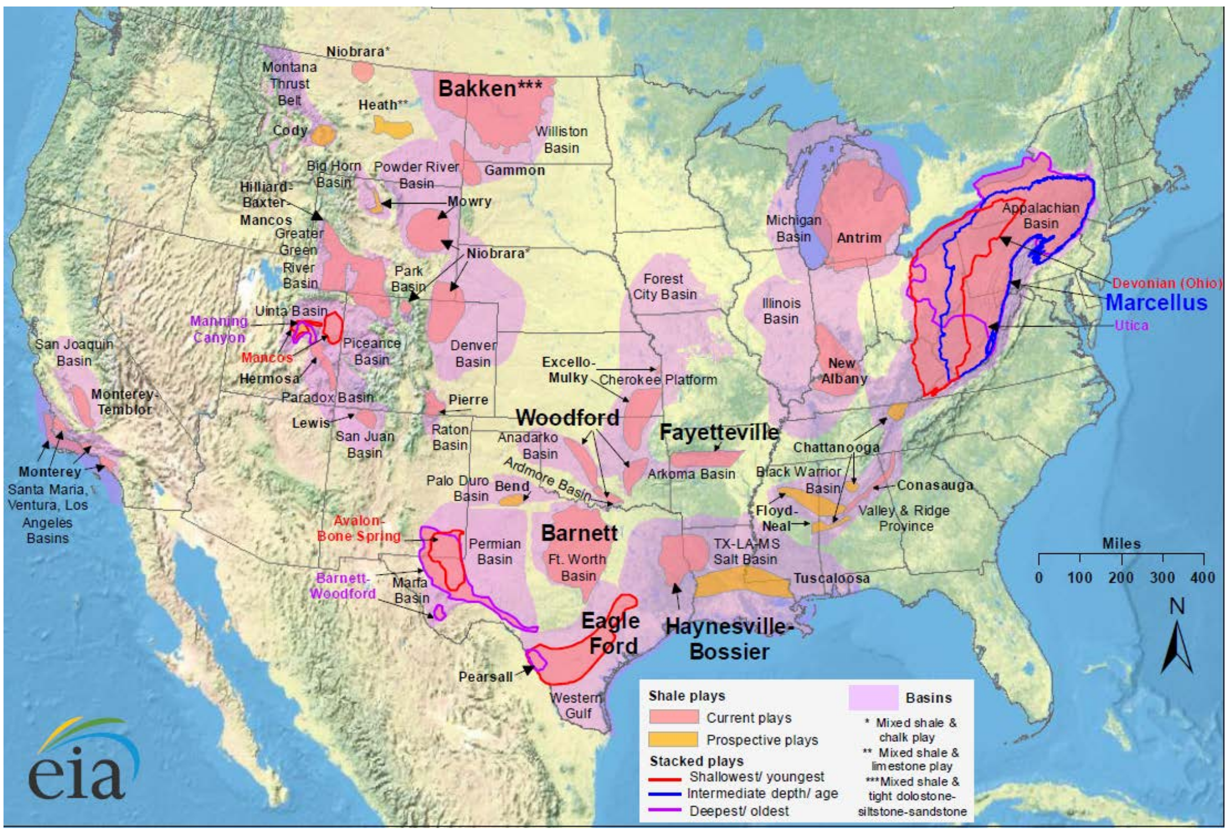
[24] Thomas Freidman. *The World is Flat: A Brief History of the 21st Century*. Farrar, Staus and Giroux Publishers, New York. 2005. pp. 129.

[25] Jeremy Rifkin. *The Third Industrial Revolution: How the Internet, Green Electricity, and 3-D Printing Are Ushering in a Sustainable Era of Distributed Capitalism*. The Huffington Post Online (Huff Post Tech – The Blog). March 28, 2012. *http://www.huffingtonpost.com/jeremy-rifkin/the-third-industrial-revo_1_b_1386430.html?ref=technology*

As drilling and excavation techniques evolved, the ability to extract oil from unconventional formations has become more feasible and cost effective. While North Dakota had produced oil via vertical drilling since the 1950s, in 2006 the state accounted for about 1 percent of total domestic production, 9th among all U.S. oil production states. However, as world oil prices rose in recent years, oil companies began to use new drilling techniques to tap into shale oil formations (***Exhibit 11***). In 1995, the U.S. Geological Survey (USGS) estimated the amount of oil technically recoverable form the Bakken Formation in Western North Dakota and Eastern Montana at 151 million barrels of oil. In 2008, the USGS raised the estimate to between 3.0 and 4.3 billion barrels of recoverable oil – making it the largest oil accumulation in the lower 48 states. Some recent estimates suggest the amount of oil recoverable from the Bakken formation to be several times that of the 2008 USGS.

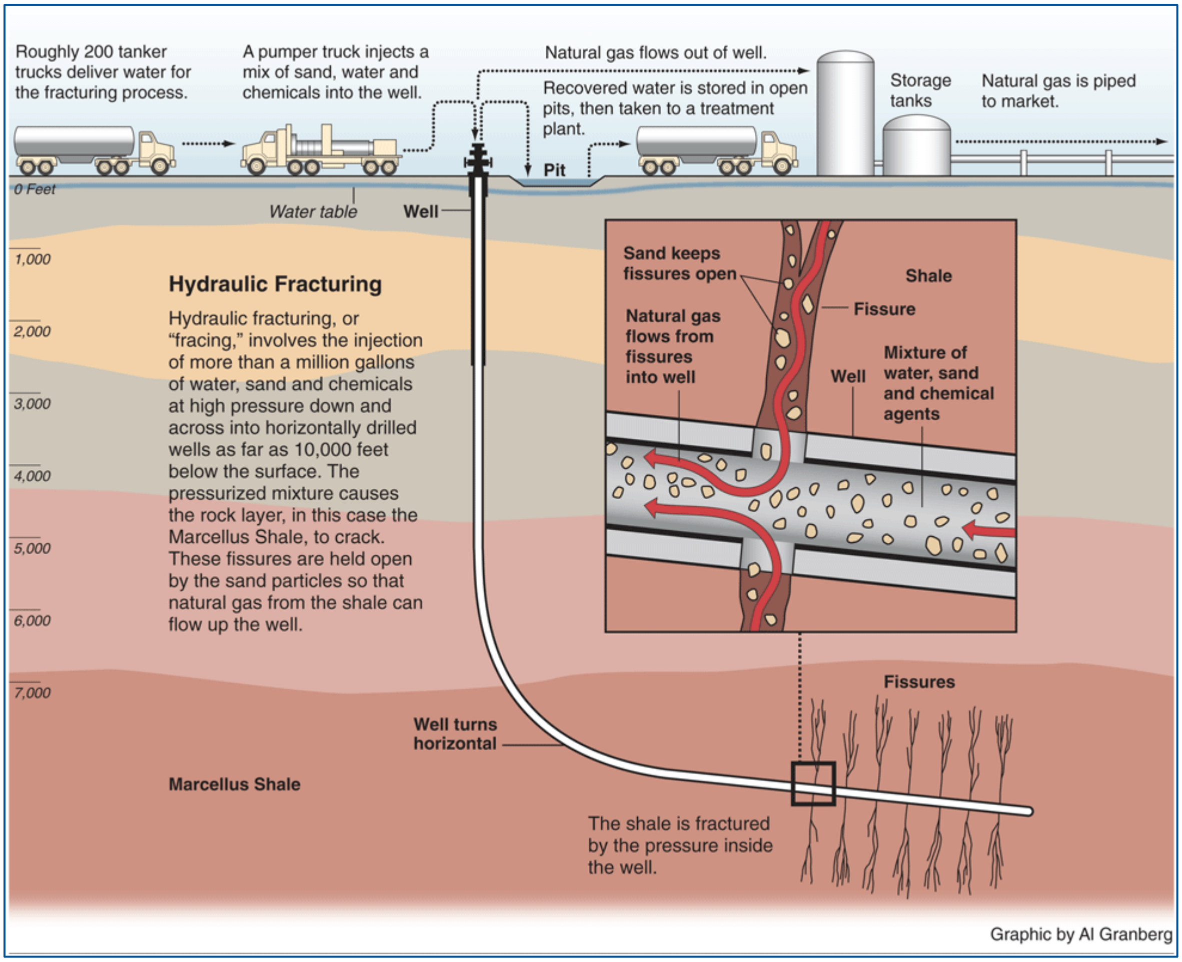
Exhibit 23: Lower 48 States Shale Oil Plays



Source: Energy Information Administration based on data from various published studies – Updated May 9, 2011

The technology used to extract oil and natural gas from shale formations involves a process called hydraulic fracturing or "*fracking*". The fracking process involves pumping large amounts of water, chemicals and sand at high pressures deep underground to create fissures in the shale and allow the oil to flow out (***Exhibit 12***). (Note the process shown is for natural gas extraction from shale formations – but essentially the same process is used to extract crude oil.)

Exhibit 24: Hydraulic Fracturing Process for Shale Oil and Gas Extraction



Source: Pro Publica: http://propublica.org/special/hydraulic-fracturing-national

Shale Oil Production and Frack Sand Mining

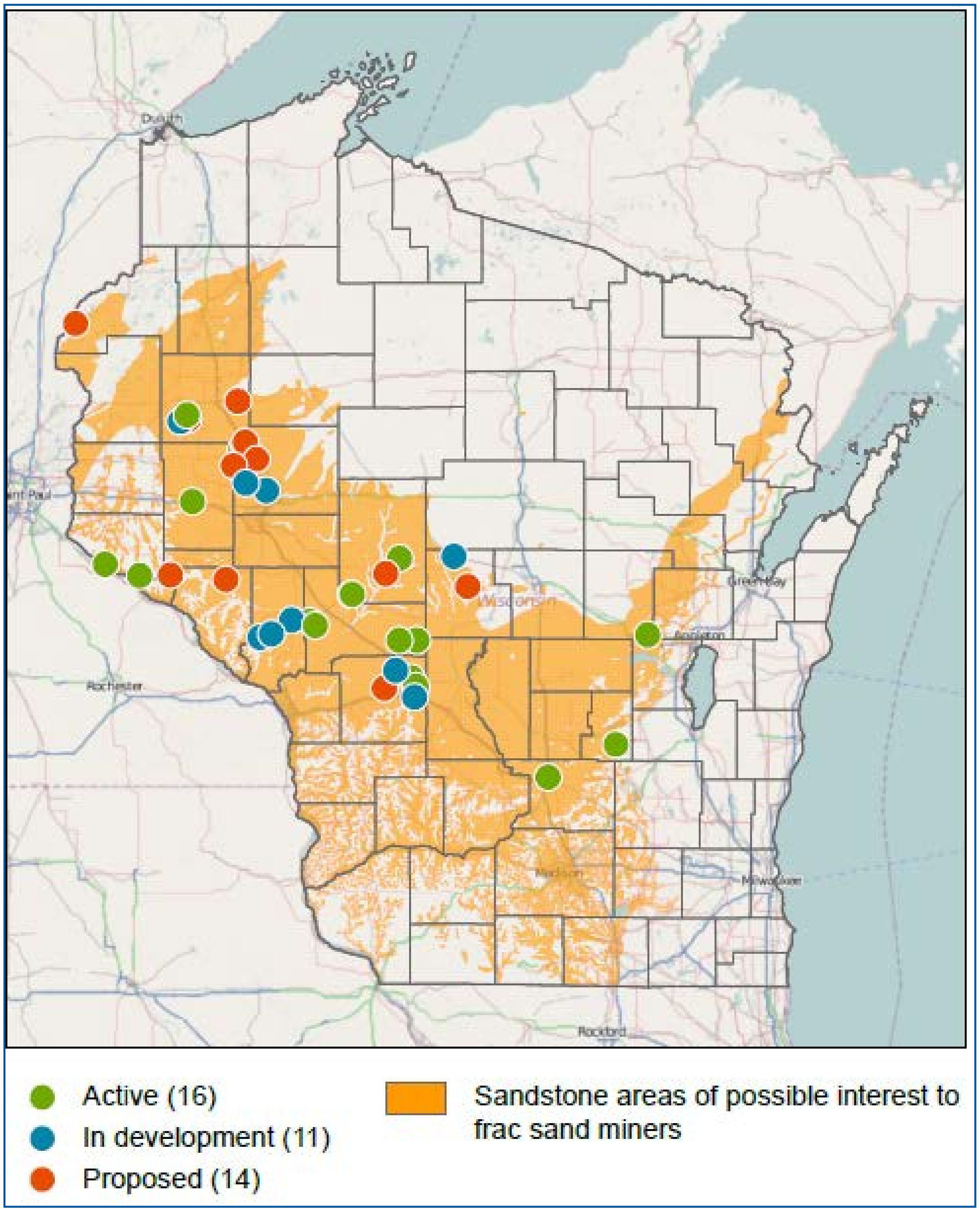
While the boom in U.S. shale oil production is changing the energy landscape, the process for capturing shale oil is coming under increasing scrutiny. One of the major inputs to the fracking process is "frack sand". The best sand for the fracking process is silica sane, especially deposits consisting of large hard, round grains. As it turns out, silica sand found along the Mississippi River Valley in Western Wisconsin and Southeastern Minnesota is perfect for the fracking process.

To date, most of the frack sand mining has taken place in Western and Central Wisconsin: *"At least 16 frac-sand mines and processing facilities are operating, and an additional 25 sites are proposed, in a diagonal swath stretching across 15 Wisconsin counties from Burnett to Columbia…Chippewa County has seen the most action."* (see ***Exhibit 13***)

While most of the frack sand mining has to-date taken place in Wisconsin, moving sand from Wisconsin to oil shale deposits in North Dakota and elsewhere in the U.S. often involves the use of Southeastern Minnesota transportation networks. And, during 2011 and early 2012, mining companies began buying land containing sand deposits. During 2011, both Goodhue County and

Wabasha County passed one-year moratoriums on sand mining to allow more time to study the impact.

Exhibit 25: Silica Sand Mining Operations in Wisconsin



A recent article published in the Minneapolis Star Tribune raised the specter of thousands of sand trucks rumbling down main street Winona: *"Without the epicenter of a new Midwestern gold rush; frac sand mining…Nearly 50 mining operations have opened nearby in the past few years, producing enough sand to send 54,000 semitrailer trucks rumbling down Winona's main street in a year."*[26]

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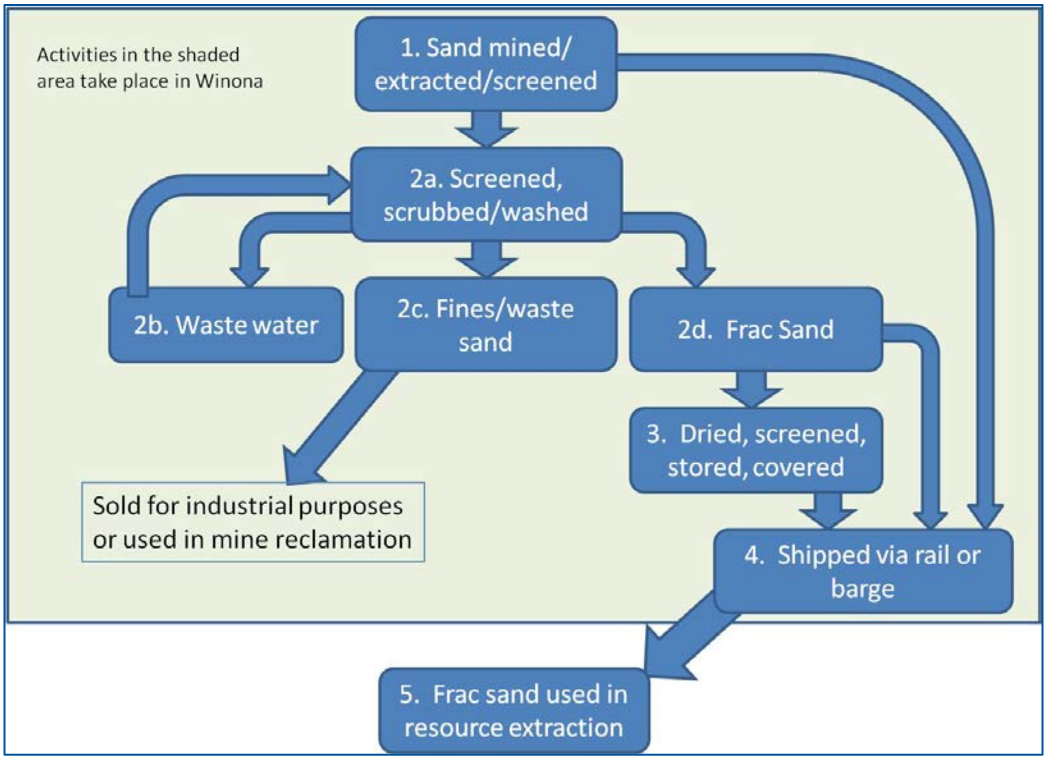
[26] Josephine Marcotty. *Energy boom's uncertain cost*. Minneapolis Star Tribune. March 11, 2012.

In response to concerns raised by City Council members, Winona city planning staff prepared a Frac Sand Report that was presented to the City Council on January 6, 2012, which described the frack sand mining and processing process as shown in ***Exhibit 14***.

Exhibit 26: Frack Sand Mining Process – Winona Operations



Adapted from "Frac Sand Report"; Judy Bodway, Acting Winona City Manager and Carlos Espinosa, Assistant City Planner

As noted in the Star Tribune article, truck traffic generated by sand mining operations is raising concerns over road and bridge damage. The report produced by Winona planning staff notes that while Winona currently has designated truck routes, the city is currently looking at establishing routes specific to mining operations. Data from a MnDOT weigh-in-motion (WIM) scale located on MN-43 near the interstate bridge crossing over the Mississippi into Wisconsin had suggested a high number of trucks exceeding 80,000 lbs. However, a recent article in the Winona Post indicated that the overweight truck issue appeared to result from the WIM scale being out of calibration:

> *"But Mn/DOT says the scales were wrong. The WIM device was recalibrated at the end of January and again in February, months after the scale data began showing the trend…It's not frac trucks. One thing is clear: the instance of overweight trucks crossing the Interstate bridge is not due to frac sand, with zero citations issued to trucks carrying sand since October. Officials say they've stopped nearly 100 sand trucks without an identified violation."*[27]

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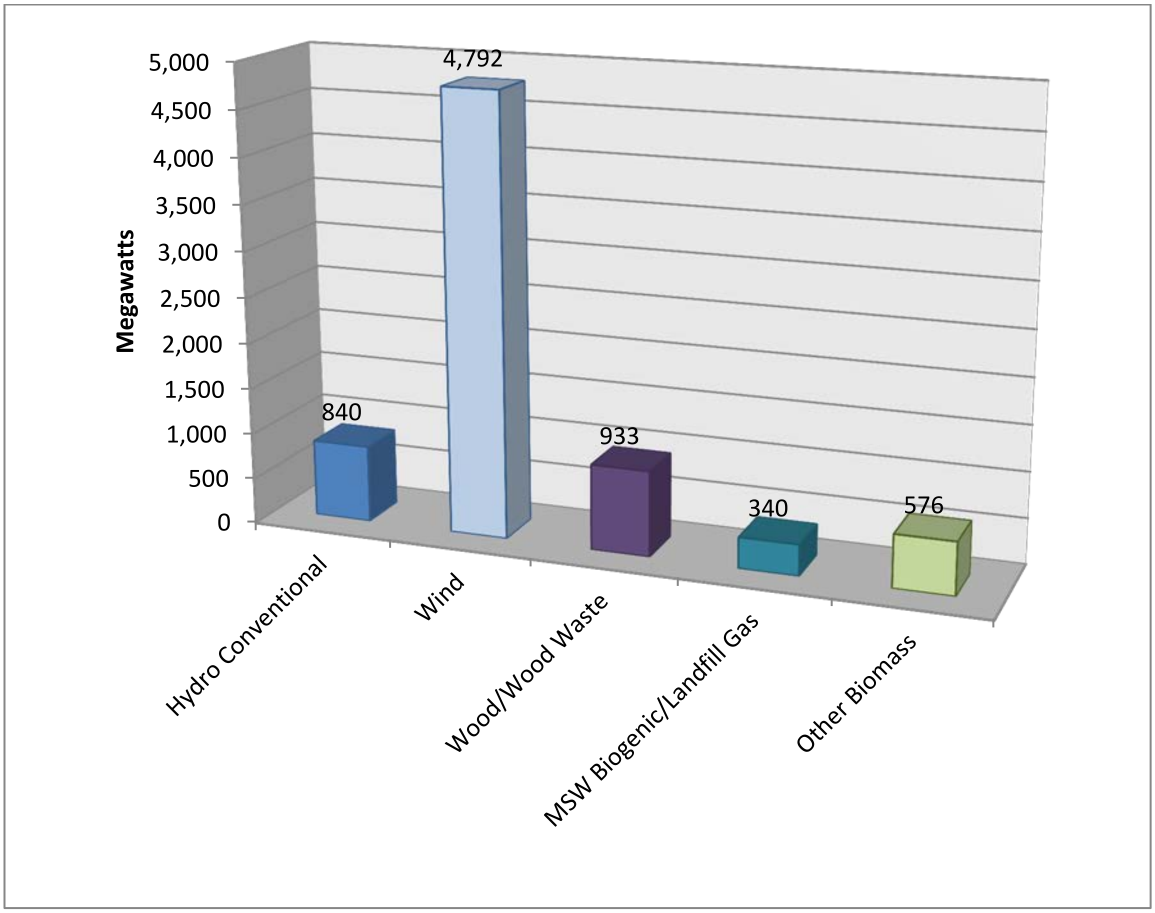
[27] Sarah Squires and Emily Buss. *Is it overweight frac sand trucks on the bridge – No*. Winona Post. March 18, 2012.

Alternative Energy in Southeastern Minnesota

Recent data from the U.S Energy Information Administration (EIA) ranks Minnesota 12th among all states in terms of net electricity generation from renewable energy resources. In 2010, Minnesota generated 7.48 gigawatt hours of electricity from renewable sources.[28] The chart in ***Exhibit 15*** shows Minnesota's electricity production for 2010 by renewable energy source.

[28] U.S. Energy Information Administration, State Renewable Electricity Profiles. March 8, 2012. *http://www.eia.gov/renewable/state/*

Exhibit 27: Total Renewable Net Electricity Generation – Minnesota, 2010



Source: Data from EIA, charted by CDM Smith (Note: MSW = Municipal Solid Waste)

As the chart above shows, Minnesota's primary source of alternative energy derived electricity comes from wind power. According to the American Wind Energy Association, nearly 10 percent (9.7%) of Minnesota's electrical generating capacity came from wind turbines in 2010. Minnesota currently ranks fifth nationally among all states for installed wind generating capacity and was fourth among states for the most new capacity added in 2011.[29]

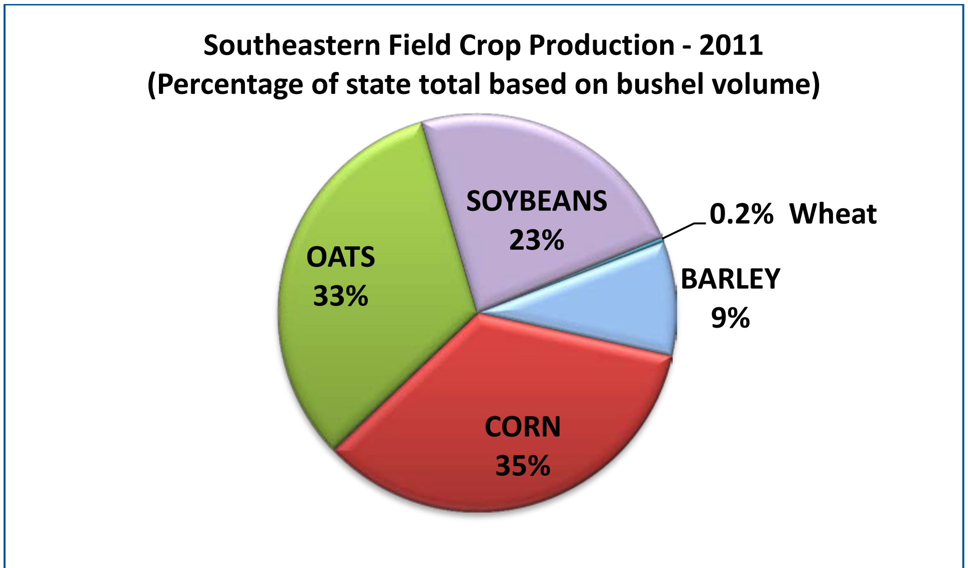
Southern Minnesota has several large wind farms, but the largest wind development in Minnesota completed in 2011 is the Bent Tree Wind Farm located in Freeborn County near Albert Lea. The Bent Tree Wind Farm, owned by Wisconsin Power and Light, has the capacity to generate 201 megawatts of power using 122 turbines. The development is spread out over an area of 32,500 acres and at peak power can supply electricity to approximately 50,000 homes.[30]

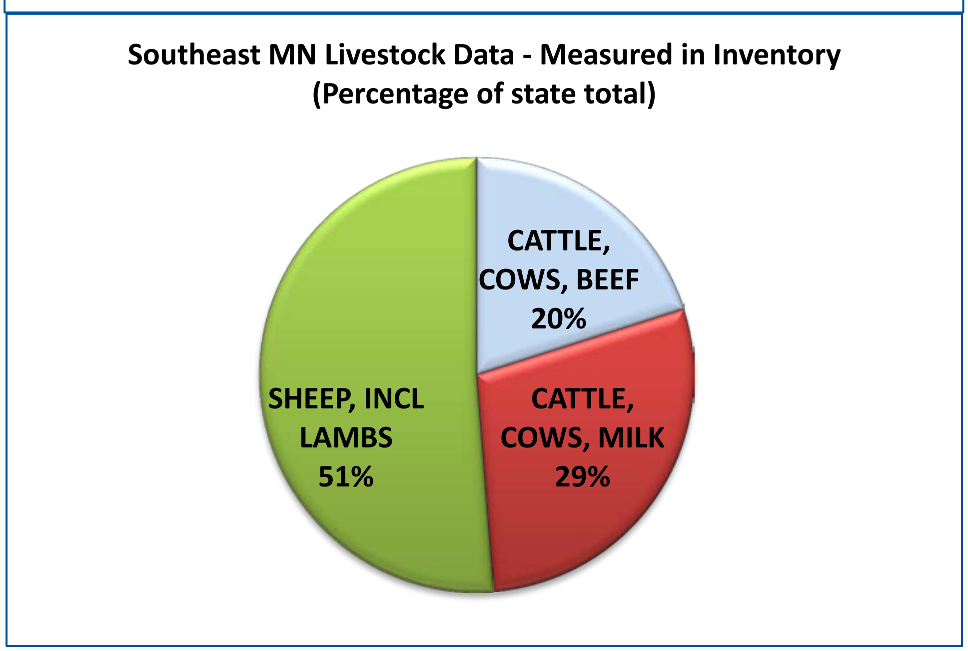
Changing Trade Patterns and the Panama Canal Expansion

[29] America Wind Energy Association. *Wind Energy Facts: Minnesota*. 4th Quarter, 2011.
[30] Milwaukee Journal Sentinel. *Bent Tree Wind Farm Up and Running*. February 14, 2011.

Agriculture and food products are important economic sectors for Minnesota, and especially so for the Southeastern portion of the state. Nationally, Minnesota ranks 6th among all states for agricultural exports with ag-exports totaling $5 billion in 2010. Between 2000 and 2010, Minnesota's top six agricultural export markets grew a combined average of 234 percent. Currently, Minnesota's top ag-export market is China followed by Japan and Mexico. Southeastern Minnesota is a significant contributor to Minnesota's agricultural products as shown in the pie charts of ***Exhibit 16***. The eleven counties in District 6 produce about a third of the state's corn and oats, and nearly a quarter of the state's soybeans. The region also produces half of the state's sheep and lambs, and nearly a third of the state's milk cows.

Exhibit 28: Southeastern Minnesota's Contribution to State Crop and Livestock Production

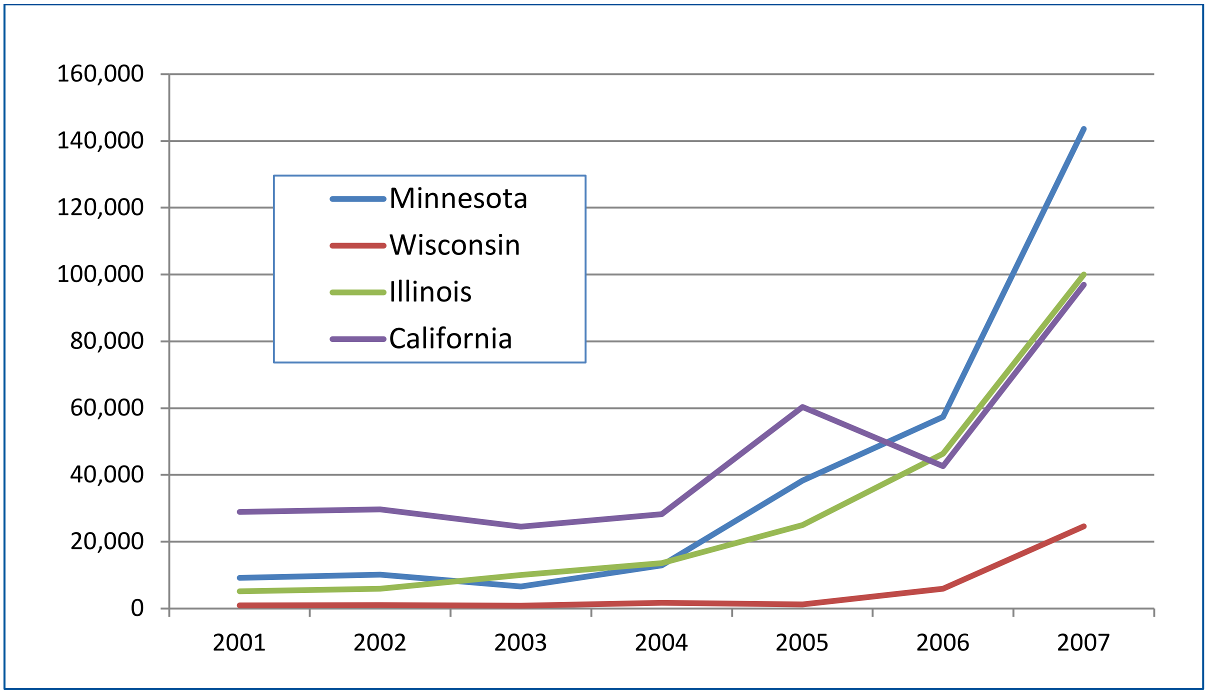




Source: USDA National Agricultural Statistics Service – Quick Stats

Historically, most agricultural exports of grain from the U.S. have moved as bulk commodities and have transited the ocean in break bulk vessels. However, growing foreign consumer demand for "identity preserved" (IP) grains, and the ample supply of empty containers heading from the Midwest back to Asia have resulted in more grains moving in intermodal containers. A study in 2008 by faculty from North Dakota State University found that in 2006 and 2007 Minnesota led the nation in grain exports via containerization (***Exhibit 17***).[31]

Exhibit 29: Grain Container Exports by Originating State



Containerized Intermodal Freight and the North American Landbridge

Supply chain management is very focused on how long it takes for goods to transit form origin to destination. While grain is less time sensitive and more price sensitive than consumer goods, the land side portion of intermodal transportation can be important in terms of making schedule ship loading and departure times. The vast majority of containerized freight moving between Asia and U.S. Midwestern markets passes through the West Coast ports of Los Angeles/Long Beach, referred to as San Pedro Bay Ports. For Minnesota, Seattle/Tacoma is also a principal gateway due to the direct rail connection as shown in ***Exhibit 18***.

Sailing time from Shanghai to San Pedro Bay is approximately 12 days, to Portland or Seattle/Tacoma is 13 days, and to Oakland is 16 days (container vessels usually stop in the Pacific Northwest or Southern California before stopping in Oakland). Those containers are loaded onto double-stack intermodal trains to be moved to inland distribution hubs such as Chicago, Kansas City, St. Louis, Dallas, and Minneapolis/St. Paul. Inland distribution hubs serve as gateways to hinterland markets, such as Southeastern Minnesota.

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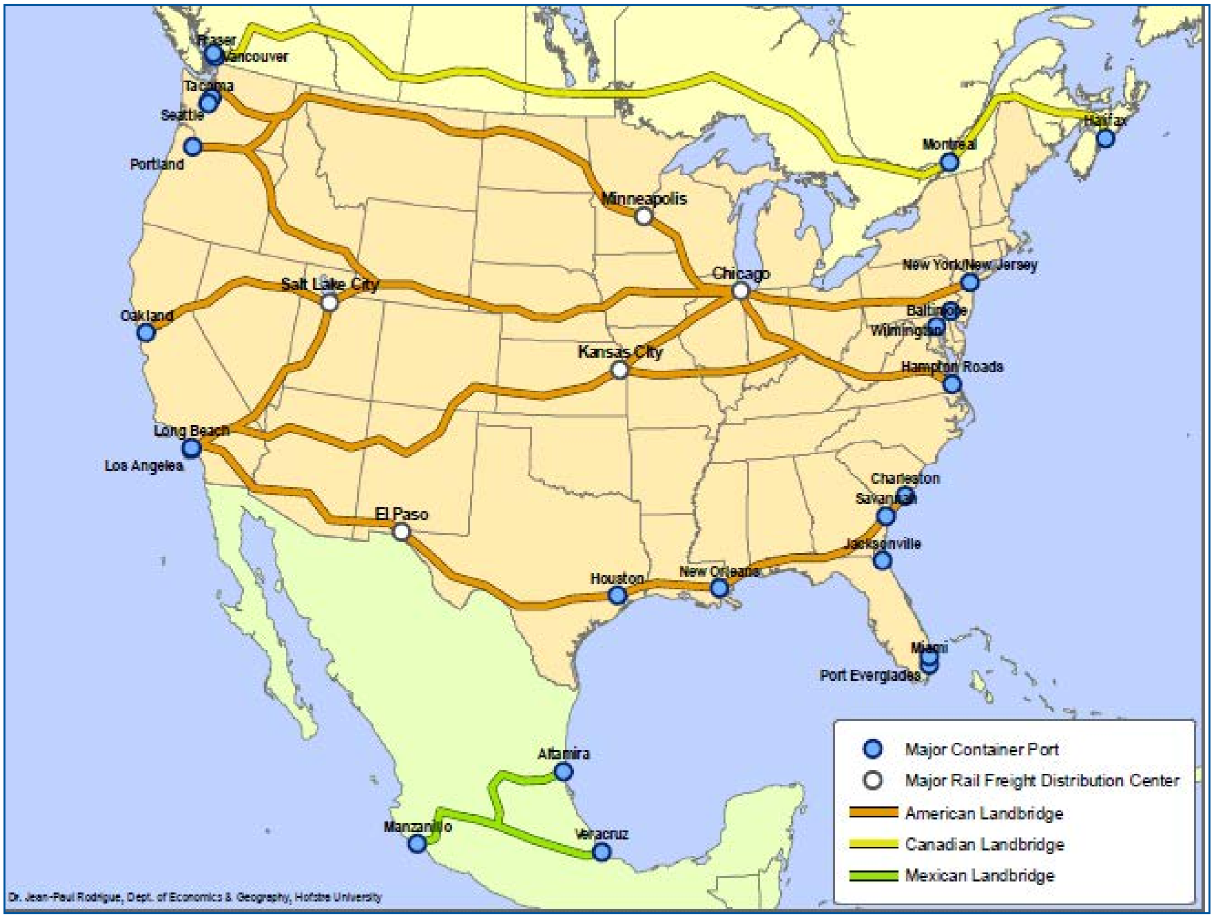
[31] Kimberly Vachal and Mark Berwick, *Exporting Local Grains via Container from an Illinois River Agricultural Hub*. Illinois Soybean Association. U.S. Soybean Export Council and Illinois Farm Bureau. May 2008.

Exhibit 30: North American Landbridge Routes from Coastal Gateways



Source: Dr. Jean-Paul Rodrigue, Department of Economics and Geography, Hofstra University

About 38 percent of containerized freight from Asia (mostly northern Asia) uses the Panama Canal to reach ports along the U.S. East Coast ports. Currently the service duration from Shanghai to Savannah, Georgia is 26 days (New York and Norfolk are prior ports-of-call). About 1 percent of containerized freight from Asia (usually southern and southeast Asia) uses the Suez Canal to reach the U.S. East Coast ports. Express service from Singapore to Savannah, Georgia is 25 days (New York is a prior port-of-call) if the containership does not stop at ports in the Mediterranean to off-load/load containers.

Durations for Inland Point Intermodal (IPI) deliveries vary depending on the length of haul and the mode employed from the West Coast ports to the inland distribution points (or hubs) and on to the final destinations. To begin the inland journey, containers must be off-loaded from the ocean vessels and loaded onto the intermodal trains or over-the-road trucks at or near the ports. Disembarking containers usually requires a day or two. Train service from the West Coast ports to the inland hubs typically requires five to seven days. Estimated intermodal transit time from the Port of Los Angeles to St. Paul is 160 hours (6.7 days) and from Seattle to St. Paul is 113 hours (4.7 days).[32] Truck service from the inland hubs to the consignee's location usually requires one or two days depending on the length of haul on the highway. In comparison, express truck service using team-drivers from any of

[32] BNSF Railway website. Transit and Routing Tool. *http://www.bnsf.com/bnsf.was6/siisweb/cntrl*

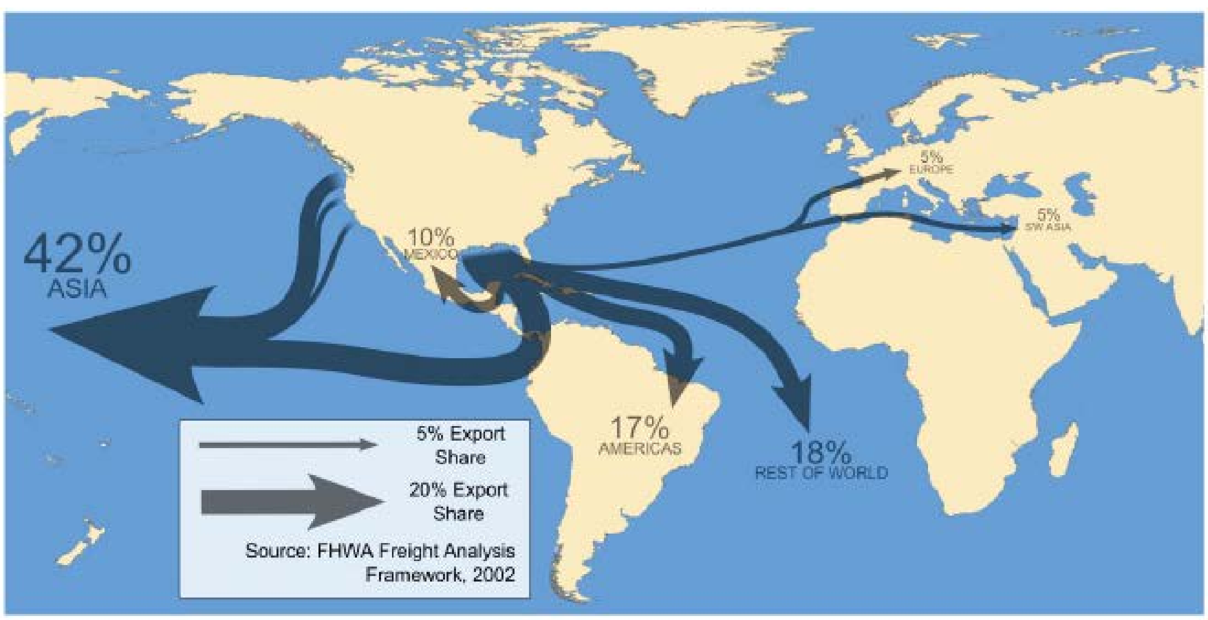
the West Coast ports to most consignee locations in the U.S., although expensive, can be achieved in four to five days.

A relatively recent addition to containerized services from northern Asia to the inland hub of Chicago has to be the introduction of vessel service calling at the Port of Prince Rupert in British Columbia, combined with express intermodal rail service provided by Canadian National Railroad (CN). (Note, this route is not shown on the map in Exhibit 16). Phase I of the service commenced in late 2007 and handled more than 180,000 twenty-foot equivalent units (TEUs) during its first year of operations. It is designed to handle more than 500,000 TEUs. Phase II will enable the port to handle more than 2 million containers per year. Service from Shanghai to Chicago is 18 days (water service from Shanghai to Prince Rupert is 9 ½ days, 1 day for off-loading, 5 ½ days rail duration to Chicago, 1 day rail terminal off-loading, 1 day delivery drayage).

The Impact of the Expanded Panama Canal on Southeastern Minnesota

Aside from some industrial products that trade between Minnesota and Europe, it is likely that only a small amount of container freight bound to or departing from Minnesota passes through port facilities on the East Coast. While some Asia trade passes through eastern ports via the Panama Canal, that routing for products moving to or from Minnesota would be very inefficient. East Coast port volumes have grown far slower than has been the case for West Coast ports. One reason for the slower volume growth in the east is that the locks in the Panama Canal limit ship size and the throughput of the canal is limited to approximately 40 vessels per day (14,000 per year). Canal Water Time (CWT), the duration it takes to transit from the Pacific to the Atlantic, averages 15 to 30 hours – including wait time at the locks. The Panama Canal, however, has been a significant gateway for bulk grain movements from the Midwest shipped on the Mississippi River to port facilities in the Gulf Coast (***Exhibit 19***).

Exhibit 31: U.S. Grain Exports



Source: Tim Baird, Jason Bittner, Robert Gollnik and Spencer Gardner[33]

The Panama Canal Authority is currently expanding the capacity of the Canal, with the completion of new locks scheduled by 2014. The expansion project includes construction of two new sets of locks, one each on the Atlantic and the Pacific sides, as well as the deepening and widening of existing navigation channels. When completed, the expansion will allow for the passage of larger, "post-Panamax" or "New Panamax" vessels. The new lock chambers and expanded channels will accommodate longer, wider and deeper vessels than at present. The container vessels able to transit the expanded Canal will have the capacity of up to approximately 12,000 TEUs, compared to the maximum capacity of about 4,500 TEUs for current Panamax container vessels.

The ability to move more containers or bulk cargo on a given vessel lowers the cost of shipping cargo per TEU (for container trade) or per ton (for bulk trade). The actual amount of cargo that may divert due to Panama Canal expansion will depend on the total cost of the shipment from origin to destination as well as the time sensitivity of the cargo:

"Although there is considerable uncertainty among grain transportation professionals and industry observers on the effects of the Panama Canal expansion, it is likely that the expansion project will result in faster transit times and lower waiting times, lowering the time costs of the all-water route for grain. Growth in grain export volumes from the Pacific Northwest and Gulf Coast is anticipated to outpace California's volumes, and increasing quantities of specialty grains will be moved in containerized modes. In the longer term, the ability of the new set of locks to move much larger vessels may prove significant to exporters' decisions to ship grain from Gulf Coast ports. However, limitations on the size of vessels that Gulf and East Coast ports can accommodate will, in the near term, limit opportunities for grain exporters to use post-Panamax bulk and container ships."[34]

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[33] Tim Baird, Jason Bittner, Robert Gollnik and Spencer Gardner. *Understanding the Consequences of the Panama Canal Expansion on Midwest Grain and Agricultural Exports*.
[34] Ibid. Baird, Bittner and Gollnik.