

Dave Christianson Bio

Dave Christianson is an associate with SRF consulting group. During the past 33 years, David has led and implemented numerous initiatives targeted at improving operational practices in freight and transit operations. Many of these initiatives involved terminal layout, freight handling, and labor practices and resulted in significant improvements in truck-throughput, reduced waiting times, improved operating efficiency, and profitability.

Dave has also worked extensively with regional transportation plans, freight planning, transit authorities, distribution, and federal grant programs. Prior to joining SRF, David was the manager of Regional Transportation Services for the Metropolitan Council.

Written Testimony of
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To the
National Surface Transportation Policy and Revenue Commission
on the
Role of Rural Areas and Local Governments in a New National Transportation Policy:
Trends and Future Needs for Freight Movement in the Rural Midwest and their
Importance to National Policy

April 19, 2007
Minneapolis, Minnesota

To the Chairman and Members of the Commission:

My remarks will center on the developing trends in freight movements in the rural Midwest, with particular emphasis on the agricultural areas of southwestern Minnesota as illustration. The information I will be sharing today derives from a current freight study commissioned by the Minnesota Department of Transportation to cover detailed and local activity in District 7. While generated from a 13-county area in Minnesota, it is representative of a much larger area including Iowa, Nebraska, Illinois, and other states in the Corn Belt of the Midwest.

Our study team approached this effort with both extensive public sector experience and several decades worth of private sector transportation practice. This allowed us to approach private businesses in the area with a perspective that recognized their foremost desire to earn a living and turn a profit in the most productive manner possible. These businesses included farmers, manufacturers, cooperatives, food processors, and biofuels producers. Their responses to our investigations were consistently open, wide-ranging, and informative, covering not only their own business but also their industries and their communities.

Background and Overview:

In this District, farm and agricultural-related products account for over half of all the commodities that originate in the area. Farm production centers on corn, soybeans, and hogs, in that order of importance. These products account for three times the tonnage moved compared to the next largest category, non-metallic minerals that include aggregate, silica sand, and high-grade clays.

The economy of the area has always been farm-based since its settlement in the mid-nineteenth century. It remains so to this day, with businesses and local government fully aware of their dependence on their neighbors and each other. In particular, local business is marked by the presence of numerous farmer-owned cooperatives that provide a wide

range of services. Many other aspects of their livelihoods also depend on local business arrangements, from informal to contractual.

Government programs and policies have been as much a part of life in agriculture as the weather. Local government has had the role of building and maintaining the local and county roads, ensuring a means to get supplies to the farm and products to market. State government has supplied the trunk highway network as well as technical assistance, licensing, and coordination. The federal government covers the national highway network, railroad regulation, waterway operation and maintenance, and a wide range of market support programs that have maintained the rural economy through many extreme market fluctuations. Planning, safety, and enforcement are provided at all levels.

Farmers and local business have also progressed steadily over the last several decades in response to market pressures. Reflecting national trends, farms have consolidated, and have realized steady increases in the size and efficiency of equipment, better management, and higher yields and output. Without any increases in local cultivated acreage, the production of corn and soybeans has almost doubled since 1970, and hog production in this area has virtually tripled. Through contracts and cooperatives, farmers have moved toward vertical integration of their businesses, taking on interests in transportation, storage facilities, fuel and fertilizer supplies, and processing plants. Farm businesses now regularly rely on electronic communications, computers, GPS, and the futures markets. These growth trends include the adoption of five-axle semi-tractor trailers as standard farm equipment, as well as large tractors, combines, and tillage implements. In Minnesota, half of all privately registered heavy commercial vehicles are owned by farm or agriculture-related businesses. **This translates into a trend toward, as well as the need for, more 10-ton capacity roads at the local level.**

Another evolution in these industry operations is the development of the shuttle train. Just as farms got bigger while lowering costs, the railroads have increased market share while reducing rates, lowering costs, and increasing performance by offering dedicated unit trains for grain shipments. This concept also required the services of larger elevators which could store volumes to load 110 car trains, and do it at a fast rate, which opened new domestic markets for Midwest farmers, but concentrated work for elevators into fewer, larger facilities.

Ethanol and the Growth in Agricultural Production:

Above and beyond these historic trends are the effects of the rapidly expanding biofuels industry, producing biodiesel from soybeans and ethanol from corn. This industry has seen accelerated growth with the rise in world oil prices and the advent of \$2-3 dollar per gallon gasoline. In the U.S., Minnesota is the third largest state in ethanol production, and half of that production capacity is in District 7. Total capacity in the District is being doubled to almost 400 million gallons per year, processed by seven, mostly farmer-owned plants. In 2005, these local plants consumed the equivalent of 19 percent of the corn grown in District 7. With the expansions, a third of corn production will flow to these plants.

As corn consumption has increased for ethanol production, and the demand for corn in other markets for livestock feed, food products, and export have remained relatively stable, the historic surplus of corn stocks has dwindled and prices per bushel of corn have almost doubled. A similar situation has developed with soybeans. As long as prices for corn remain at or above these historic highs, approximately \$4.00 per bushel, total production will soon experience large increases.

Farmers have several options to respond to this demand for increased production. More acreage can be planted, although this is not a significant option in southern Minnesota where most tillable land is already under cultivation. More intensive management in genetic selection, plant spacing, fertilization, and irrigation is possible, and in particular crop rotations can be modified. Instead of alternating soybeans with corn in succeeding years to minimize nutrient loss, corn-on-corn planting cycles are possible with dramatic increases in tonnage per acre, although at some increased costs. In crop yield per acre, these techniques could combine to double per-acre production.

The Impact on Transportation:

In terms of transportation, this means that an average square mile of land in southern Minnesota that now generates the equivalent of 80 loaded semis per year would soon produce 160 loads of grain per year. Increased farm supplies and equipment transport will add to that count.

Ethanol production contributes several other factors that place new demands on the transportation network. The District has always depended on a good network of roads and railroad lines for freight transportation, with proximity to the Upper Mississippi elevators and barge terminals of equal importance for large bulk and export movements. High corn prices may cut into that waterborne shipping volume, but the total grain volumes themselves will still move around and through the District. Ethanol plants are sited with access to both railroad service and on trunk highways where possible. Corn, as feedstock, is collected from an average of a thirty-mile radius by truck, but with much longer hauls in some instances. The finished ethanol then moves by both tank truck and tank car to a destinations throughout the country. As national use grows, the long distance rail moves will account for a larger percentage of this finished product. Another distinction of ethanol plants is that they often require secondary grain storage arrangements in order to maintain continuous processing, sometimes utilizing small elevators that had been idled by shuttle train operations. This adds to the number of truck trips during the process of feeding the plant.

The major byproduct of ethanol production is Distillers Dried Grains or DDGS, useful for livestock feed in place of, or as a supplement to, corn or soybean meal. A quarter of this commodity now enters the export market, transported by intermodal container. The moves of ethanol, stored grains, and DDGS all represent secondary freight shipments that did not necessarily exist under historic farm-to-market shipment patterns, adding further to traffic levels on both the roads and the rails as the renewable fuels program grows.

The accumulated effect of these emerging trends could see truck trips essentially double over the next twenty years compared to established growth projections. This is expected

to occur throughout the network of roads, from local and County to the National Highway Network, due in large part to the dispersed nature of the agricultural industry.

The railroad network will experience some offsets between grain and ethanol shipments, but is still expected to grow significantly, including higher value commodities and intermodal traffic. For cost, efficiency, and energy conservation, it will remain the primary overland mode for long-distance transportation.

A footnote to this freight study is the future of the ethanol industry and the anticipated switch to cellulosic feedstocks, hopefully over the next five years. Even as corn is displaced or supplemented, the location of these plants in the agricultural regions, their established transportation facilities, and the ability to retrofit the plants to process larger volumes of cheaper, locally produced fiber will mean that the freight transportation needs of the rural areas could increase even more over the next fifty years..

Issues with the Existing Infrastructure:

The local significance of these points is a distinct need for more highway investment to sustain this business growth. The entire roadway network is carrying more trips with heavier weight than it was designed for, damaging structural integrity and decreasing life expectancy. Many of the local collectors, despite efforts to reinforce them for heavier loads, retain cross sections and design geometry set in the 1950's and 1960's. Larger trucks, more traffic, and oversize farm implements all impact highway safety under these circumstances. These restricted design characteristics will also slow traffic speeds and develop bottlenecks in the face of increased commercial traffic, costing time, money, and equipment.

Past local and state investment in preserving rail lines and rail service options are currently paying off, but more investment in the rail infrastructure is required as both car sizes, up to 315,000 pounds gross weight, and traffic volumes increase. Again, safety is an additional concern with ethanol shipments, a hazardous material classed as a flammable liquid. While railroads have proven to be the safest way to ship this commodity, substandard track on short lines and industrial sidings still pose a definite risk. Finally, more trucks and more trains emphasize the need to maintain and improve grade crossing safety.

Local and National Significance:

History has proven repeatedly that the rural economy and its local and statewide impacts cannot be ignored. Agricultural areas have suffered for years through low income levels, higher than normal unemployment, and an aging population due to lack of opportunities for young people. Higher agricultural prices and profits and the value-added effects of ethanol are already answering these problems. In the last year alone, these changes are estimated to have contributed an extra \$1 billion to the District, and an extra \$3 billion to the state economy in Minnesota.

The national significance of these changes include less dependence on imported oil and a better balance of trade; reduction in the cost of agricultural price supports, a revitalized rural economy, a cleaner environment.; and a successful Renewable Fuels Policy.

In rural areas, freight transportation is truly the lifeblood of their economy. The efficiency, dependability, and safety of the road, rail, and waterway networks is essential to the viability not only of our rural business and agricultural sectors, but also of our energy sector and our national health and independence.

Finally, we recognize that energy independence is a primary national goal and ethanol production is a significant part of that effort. The agricultural community in the heartland of America is working hard to not only continue to feed America but to provide an ever increasing supply of fuel. These efforts are straining our rural transportation infrastructure at the same time resources are ever more scarce. A national transportation policy cannot forget the needs of rural and agricultural transportation and the important role played by agriculture.

Proposals:

- Resources and Investment Need to be Channeled into Rebuilding the Rural Highway Infrastructure: Highways that are substandard in load carrying capacity and design geometry are already strained, and will prove a severe detriment to the agricultural and renewable energy sectors over the next fifty years. Local sources of funds are inadequate to properly deliver an upgraded system that will satisfy national demand.
- Public Investment for the Infrastructure of the Railroad Network is Appropriate: Industrial trackage and short lines unable to handle 315,000 pound cars and maintained at only Class 1 FRA standards will not be able to handle near-term traffic increases, and will represent lost freight capacity in the system over the long term when it will be most needed.
- Agricultural Collector Roads Should be Upgraded to and Maintained at a Minimum Ten Ton Axle Loading Standard: Five-axle, 80,000 pound semi tractor trailers are already a reality in many farming operations. High-capacity, four season roads at the local and County level will be a necessity over the next fifty years, and should be prioritized accordingly.



National & Local Significance of Rural Freight Transportation

Testimony to the National Transportation Policy and Revenue Commission

David Christianson, SRF Consulting Group, Inc.

Minneapolis, MN

April 18, 2007

What are the trends?

- Energy costs and Biofuels
- Public/Private Network
- Market Economy
- Globalization of Markets
- Industry Consolidation
- Labor/Technology
- Truck Size & Weight
- Unit & Shuttle Trains
- Intermodalism

Star Tribune
March 8, 2004

HEARTLAND TO HEARTLAND: COST COMPETITIVENESS

The cost of producing soybeans in Mato Grosso is significantly lower than in the U.S. heartland. But Brazil's transportation challenges—an inadequate road network and distance from major markets in Europe and China—largely offset its advantages. Brazil is rapidly modernizing its internal transportation systems.

Soybeans dangle from plants in a field at the Girassol farm in Mato Grosso, Brazil.

Cost per acre of soybeans . . .

	... in the U.S. heartland*	... in Mato Grosso
Variable costs		
• Seed	\$19.77	\$11.23
• Fertilizers	8.22	44.95
• Chemicals	27.31	39.97
• Machinery	20.19	18.22
• Labor	1.29	5.58
• Other	1.81	12.11
Total variable costs	\$78.59	\$132.06
Fixed costs		
• Depreciation (on equipment)	\$47.99	\$8.97
• Land costs (rental rate)	87.96	5.84
• Taxes and insurance	6.97	0.55
• Farm overhead	13.40	n/a
Total fixed costs	\$156.32	\$15.36
Total production costs	\$234.91	\$147.42
Average yield (bushels/acre)		
	46	41.65
• Variable costs per bushel	\$1.71	\$3.17
• Fixed costs per bushel	\$3.40	\$0.37
Total costs per bushel	\$5.11	\$3.54

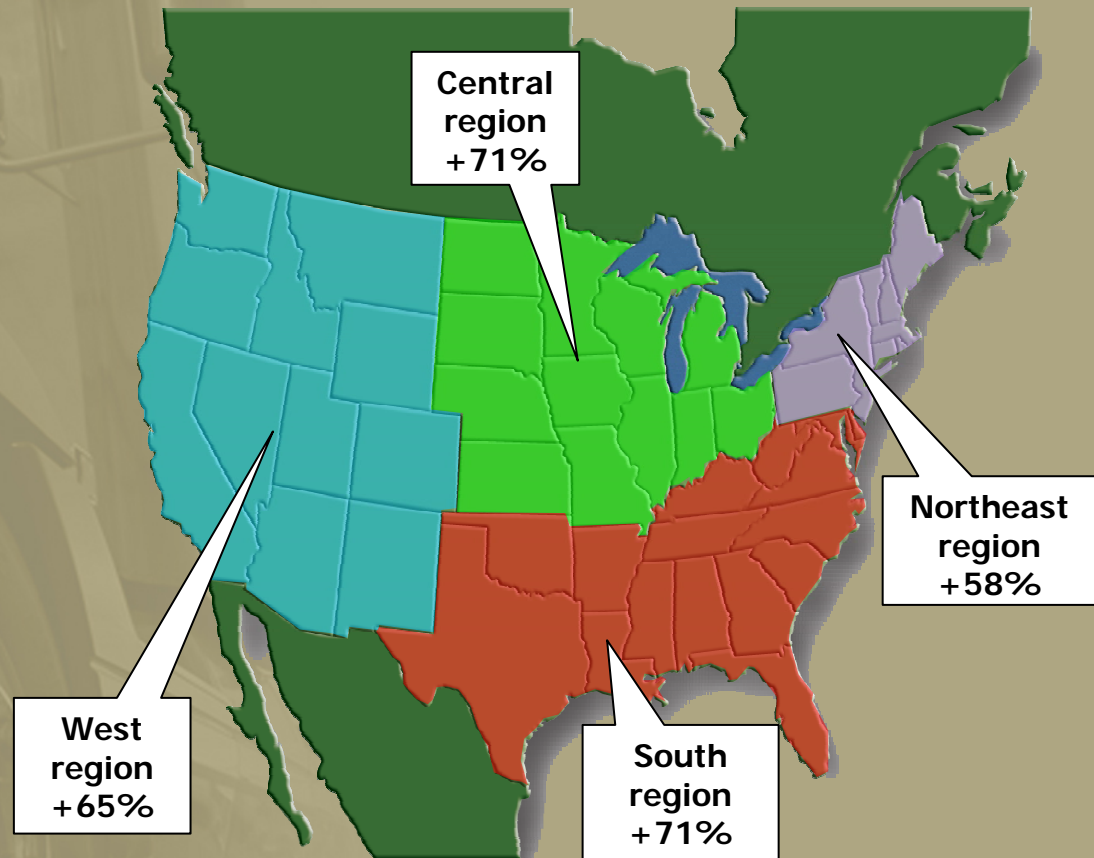
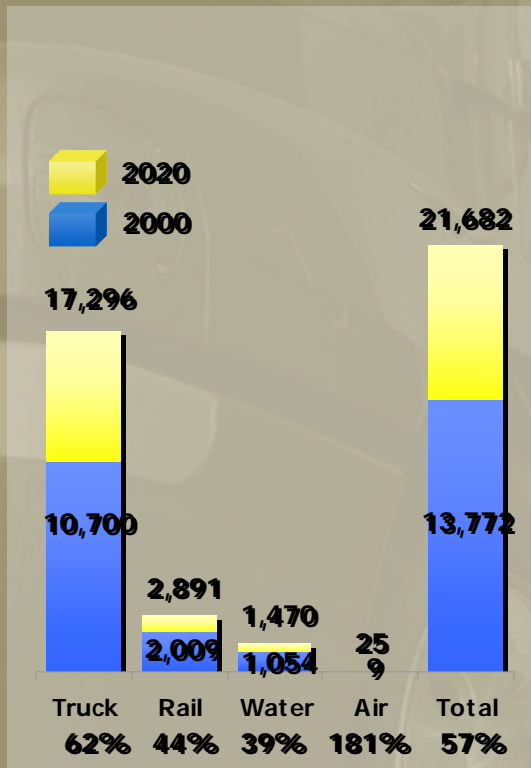
*NOTE: The U.S. heartland is defined as Minnesota, Iowa, South Dakota, Indiana, Illinois and parts of Ohio, Missouri, Nebraska and Kentucky.

Sources: Economic Research Service,
U.S. Department of Agriculture

Mark Boswell/Star Tribune

Growth in Freight Traffic

U.S. domestic freight tonnage growth forecast, 2000-2020



The Role of Rural Freight – A Case Study in Minnesota

- Mn/DOT District 7; 13 Southwestern Counties
- Minnesota's Corn Belt – Representative of the Central Midwest
- Steady and Significant Growth
- Responsive Management & Productivity
- Technology: Genetics, Communications
- Central to Established Economy & Renewable Energy Initiatives

Trends Driving Transportation Demands

- Ethanol Expansion & Economics
- Cellulosic Ethanol
- International Markets – Corn, Soy, DDGS
- Shuttle Train Elevators
- Inland Waterways
- Oil & Natural Gas Supplies and Prices

District 7 Commodity Exports

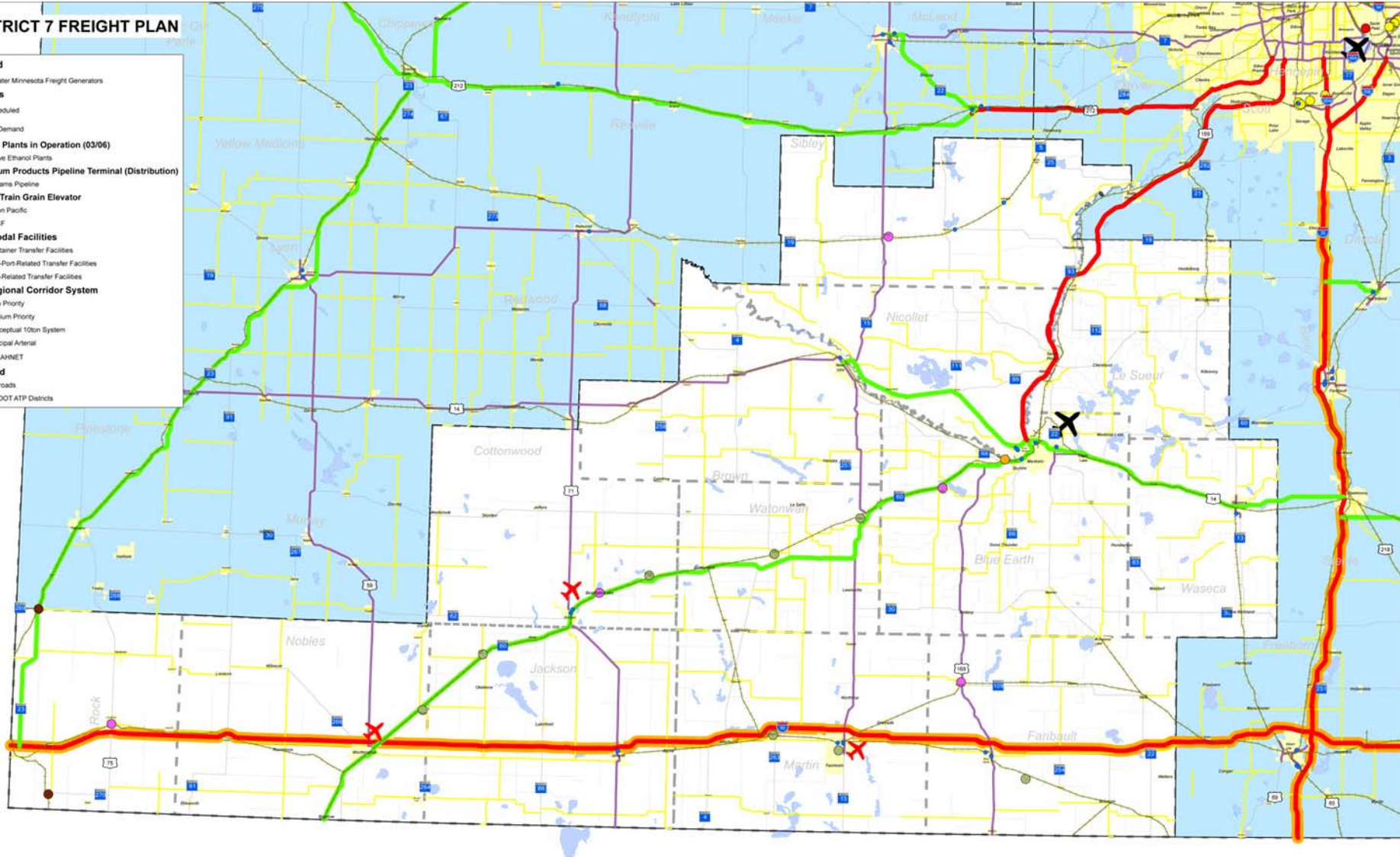
Export Rank	Commodity Category	Tonnage
1	Farm Products	14,446,158
2	Nonmetallic Minerals	5,666,323
3	Secondary Traffic	2,955,870
4	Food Or Kindred Products	1,497,484
5	Clay, Concrete, Glass Or Stone	822,684
6	Petroleum Or Coal Products	796,987
7	Chemicals Or Allied Products	327,723
8	Pulp, Paper Or Allied Products	145,037
9	Lumber Or Wood Products	124,960
10	Transportation Equipment	77,910
	All other	269,487
	Total Commodity Exports	27,130,623

District 7 Study Area

Freight Network and Generators

DISTRICT 7 FREIGHT PLAN

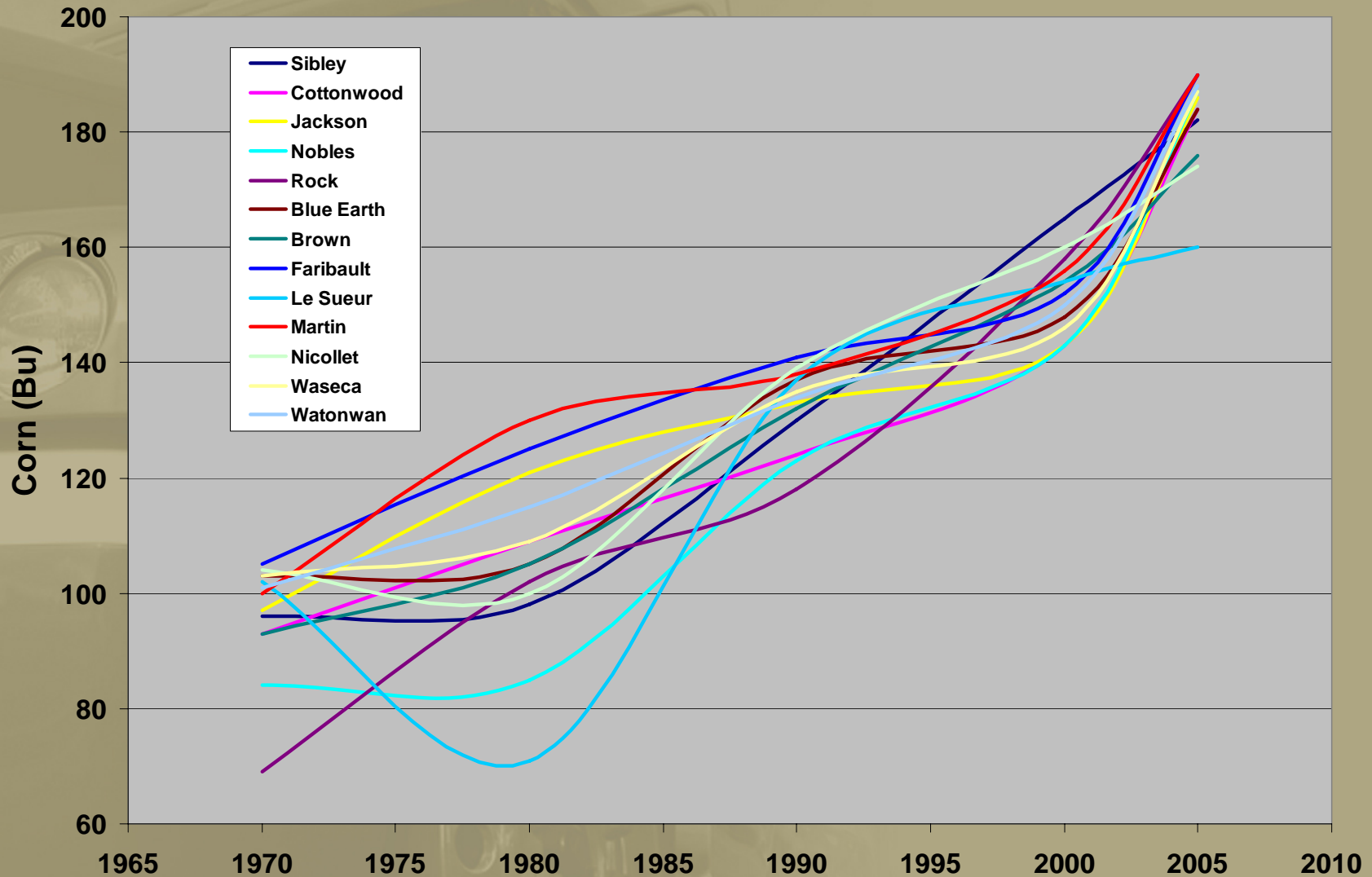
- Greater Minnesota Freight Generators
- Airports
 - Scheduled
 - On Demand
- Ethanol Plants in Operation (03/06)
 - Active Ethanol Plants
- Petroleum Products Pipeline Terminal (Distribution)
 - Williams Pipeline
- Shuttle Train Grain Elevator
 - Union Pacific
 - BNSF
- Intermodal Facilities
 - Container Transfer Facilities
 - Non-Port-Related Transfer Facilities
 - Port-Related Transfer Facilities
- Interregional Corridor System
 - High Priority
 - Medium Priority
 - Conceptual 10ton System
 - Principal Arterial
 - STRAHNET
- Railroad
 - Railroads
 - MnDOT ATP Districts



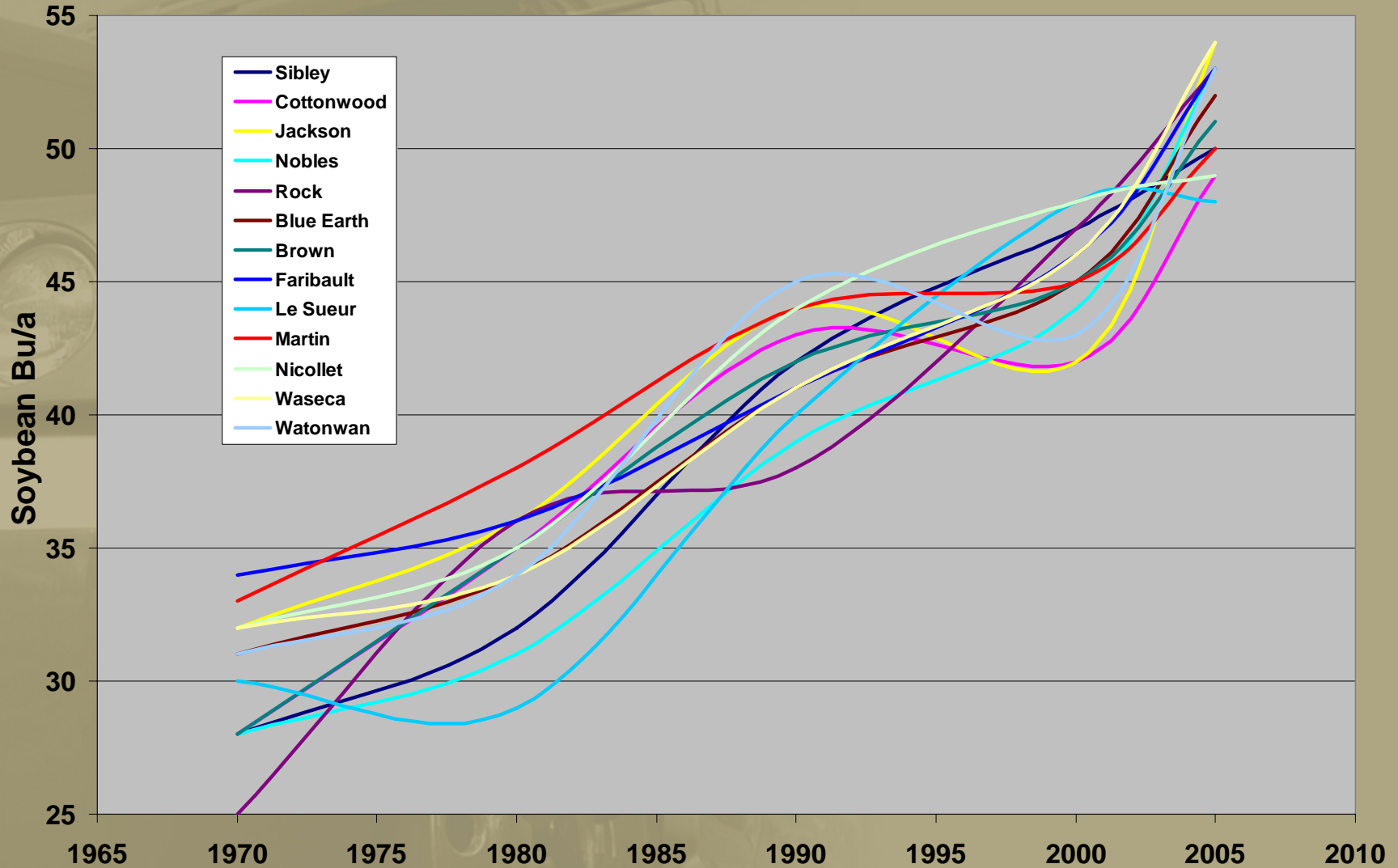
Key Commodities – In Order of Importance (2005)

- Corn Production 358M Bushels (1/3 of Mn.)
- Soybeans 72M Bushels (1/3 of Mn.)
- Hogs – 5 million head (1/2 of Mn.)
- Ethanol – 186 million Gallons (1/2 of Mn.)
(Minnesota third largest producing state)
- Non-Metallic Minerals – Silica, Kaolin
Clay, Aggregate
- Manufactured Goods

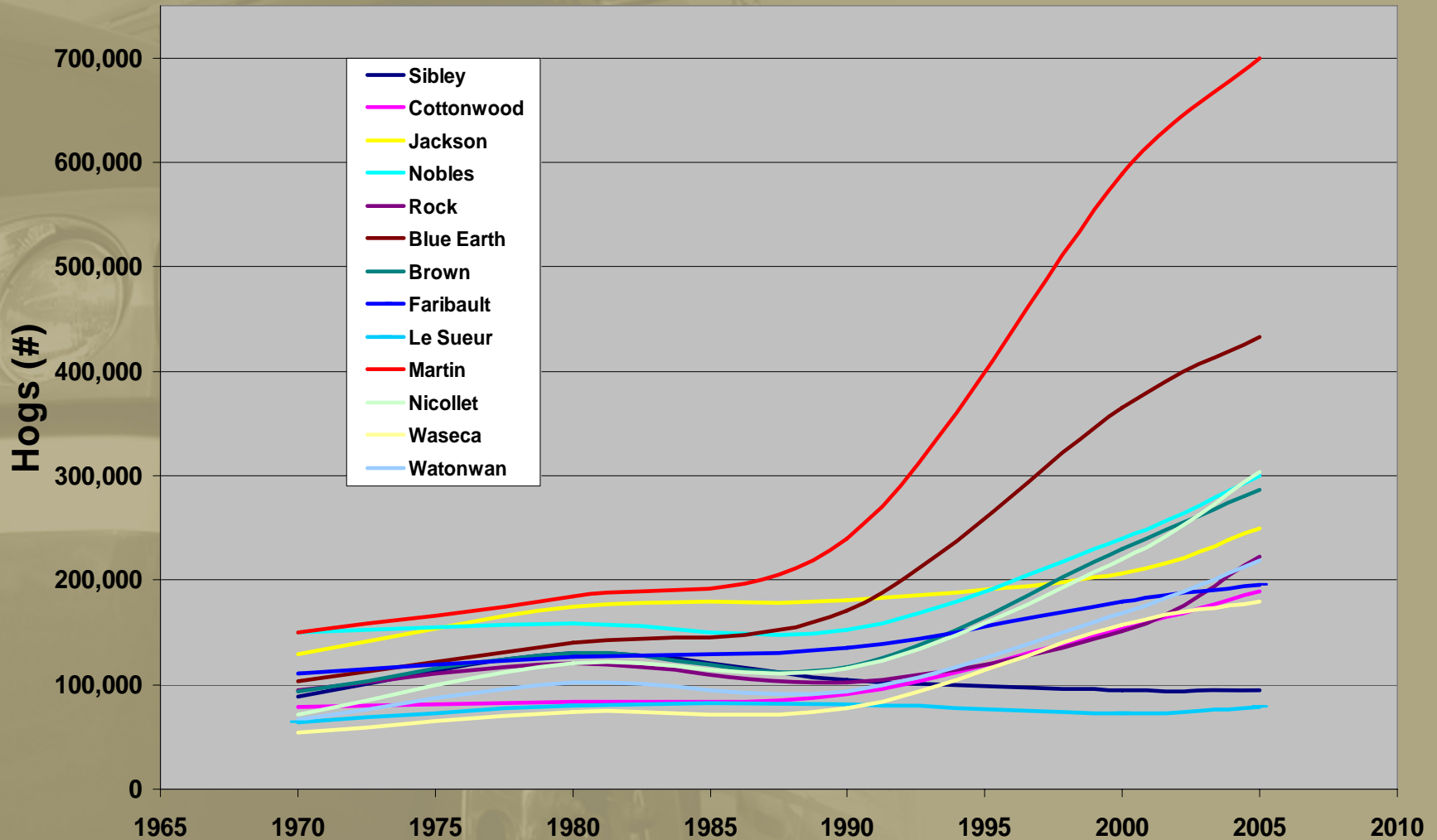
Corn Yield – Bushels per Acre



Soybeans -Bushels Per Acre



Agricultural Growth: Hogs



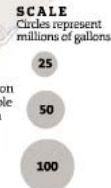
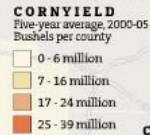
Ethanol Growth

CORN OIL

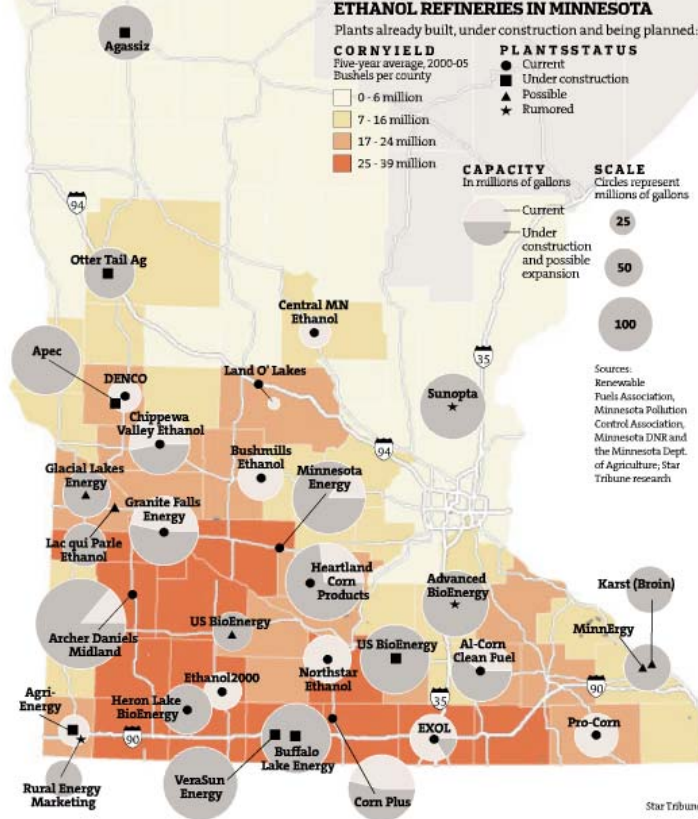
The ethanol boom relies on surplus corn, convenient rail or barge lines, an ample water supply and access to natural gas or coal as a heat source. Investors and farming cooperatives are racing to lock up the best spots in Minnesota.

ETHANOL REFINERIES IN MINNESOTA

Plants already built, under construction and being planned:



Sources:
Renewable Fuels Association, Minnesota Pollution Control Association, Minnesota DNR and the Minnesota Dept. of Agriculture, Star Tribune research



Star Tribune

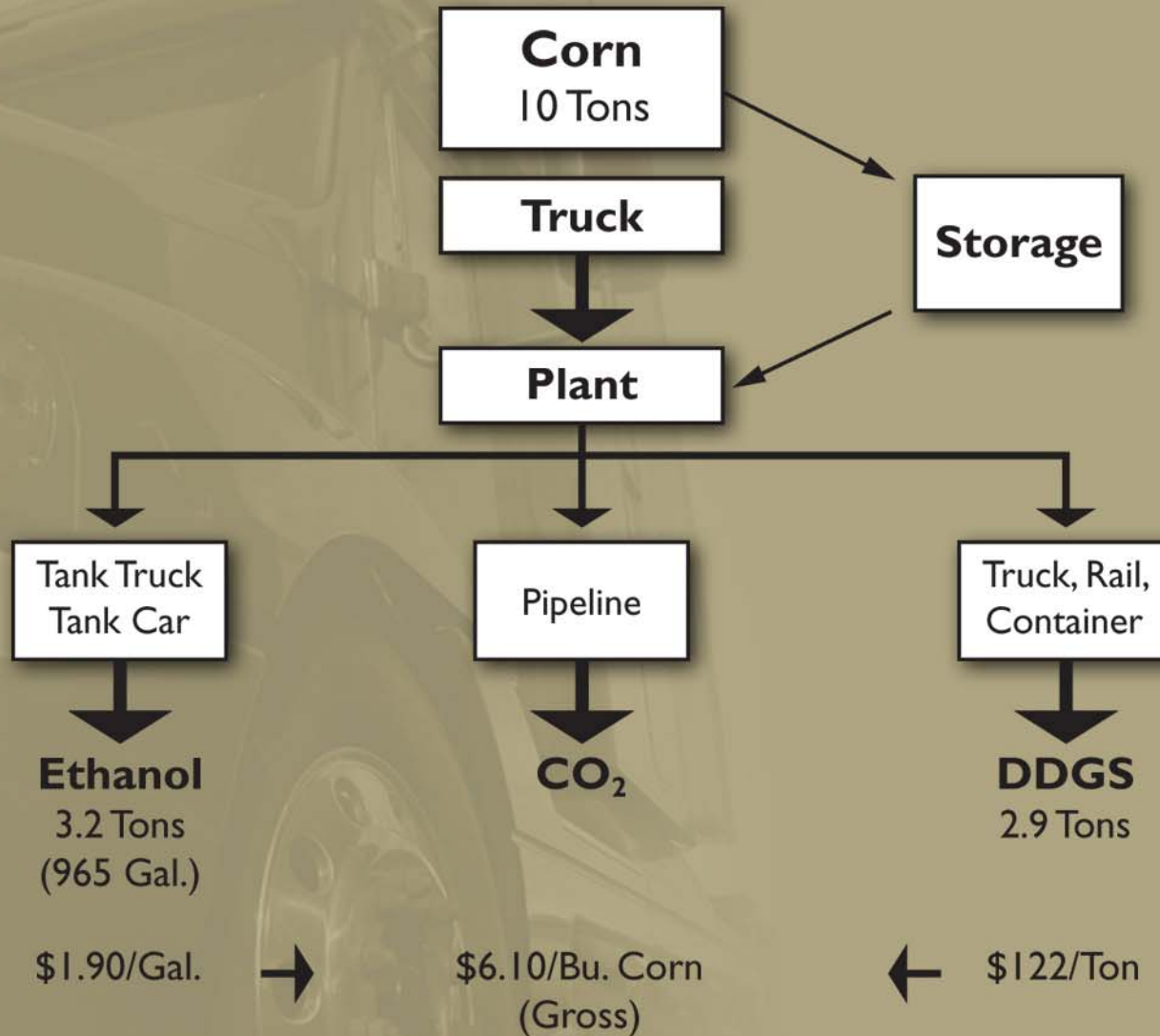
Ethanol Plant Expansion Vs. Corn Consumption

YEAR	PLANT CAPACITY	% OF D-7 CROP YIELD
	(Million Gals./Year)	
2005	186	19%
2006	252	25%
2007	380	33%

Economic & Market Effects

YEAR(Planting Price)	CORN	SOYBEANS
2000	2.22	4.83
2001	2.44	5.23
2002	2.29	4.44
2003	2.42	5.34
2004	2.53	6.95
2005	2.27	5.53
2006	2.38	6.25
2007	3.96	7.01
(Market Low of	\$1.78/Bu., 2000)	

Ethanol Freight Flows

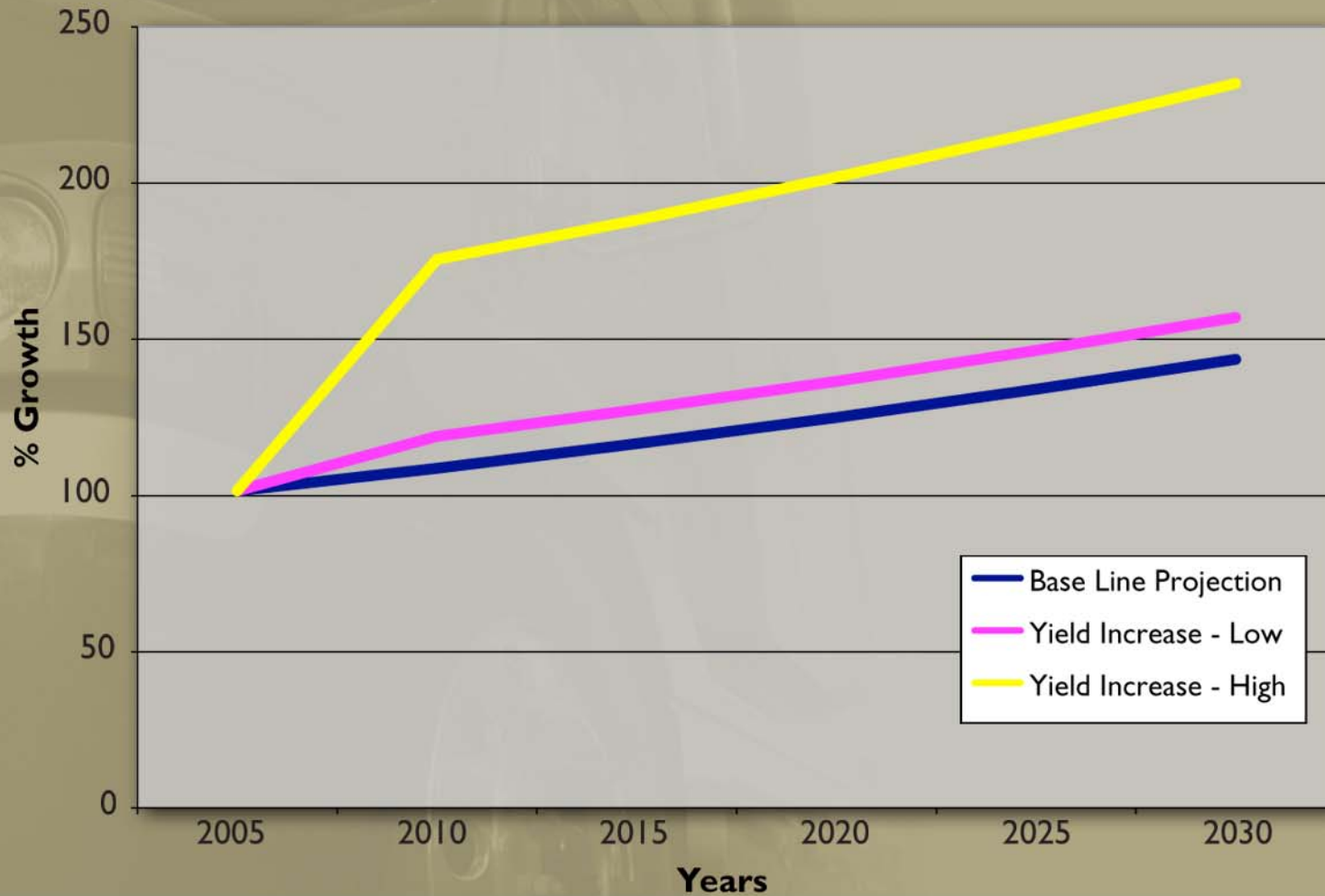


Agricultural Response To Ethanol Growth & Transportation Impacts

- Corn-on-Corn Crop Rotation: up to **55% growth** in production over next 5 years
- Genetics & Management: **15-35% growth** in yield over next 5 years
- Projected Heavy Commercial Truck Trips **grow 155-230%** by 2030
- Farm-to-Market grain delivery grows from 80 to 160 Semis per square mile annually
- Cellulosic Ethanol Feedstocks could increase tonnage 2-5X (>five years)

Agricultural Growth & Trucking

Trends in HCADT Growth (Market Price-Driven Grain Yields)



Agricultural Equipment-Size & Weight



Vehicle and Shipment Sizes

- Grain Shuttle Trains
- Ethanol Unit Trains
- Railcar Size & Weight; 263K>286K>315K
- Truck Size & Weight; 80K>89K, axle loads
- Farm Equipment: Mega-combines, 5-axle
Semis common (65% of farm delivery)
- Infrastructure Limits: Bridges, Local roads,
Rail branches & sidings
- Barge Tows: Upper Mississippi Structures

Opportunities - & Challenges

- Preserve Rail Capacity
(Minnesota Prairie Line)
- Efficient Trucking
(Farm-own, 5-axle Semis)
- Safety & Security
(Rail Transport - Ethanol)
- Intermodal Growth
- Accident Reduction
- Energy Efficiency
- Private Infrastructure
(Public road, Waterways)
- Local Road Condition
(1950's design, 3-season)
- Dispersed Network
(Low Funding, Awareness)
- Local Access Points
- Grade Crossing Safety
- Maintain Mix of Modes

National & Local Significance

- Energy & Agriculture – Growing National Significance (ethanol, wind, solar)
- Integrated Freight Network Needed at Both Local & National Level
- Rural Infrastructure & Resources Falling Behind Accelerating Transportation Needs
- Safety, Energy Conservation, Environment all served by Rural Freight Network
Investment and Policy Support

