  

Coal Transportation Issues and Opportunities

Benchmarking Study

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Prepared by Norbridge

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Contents

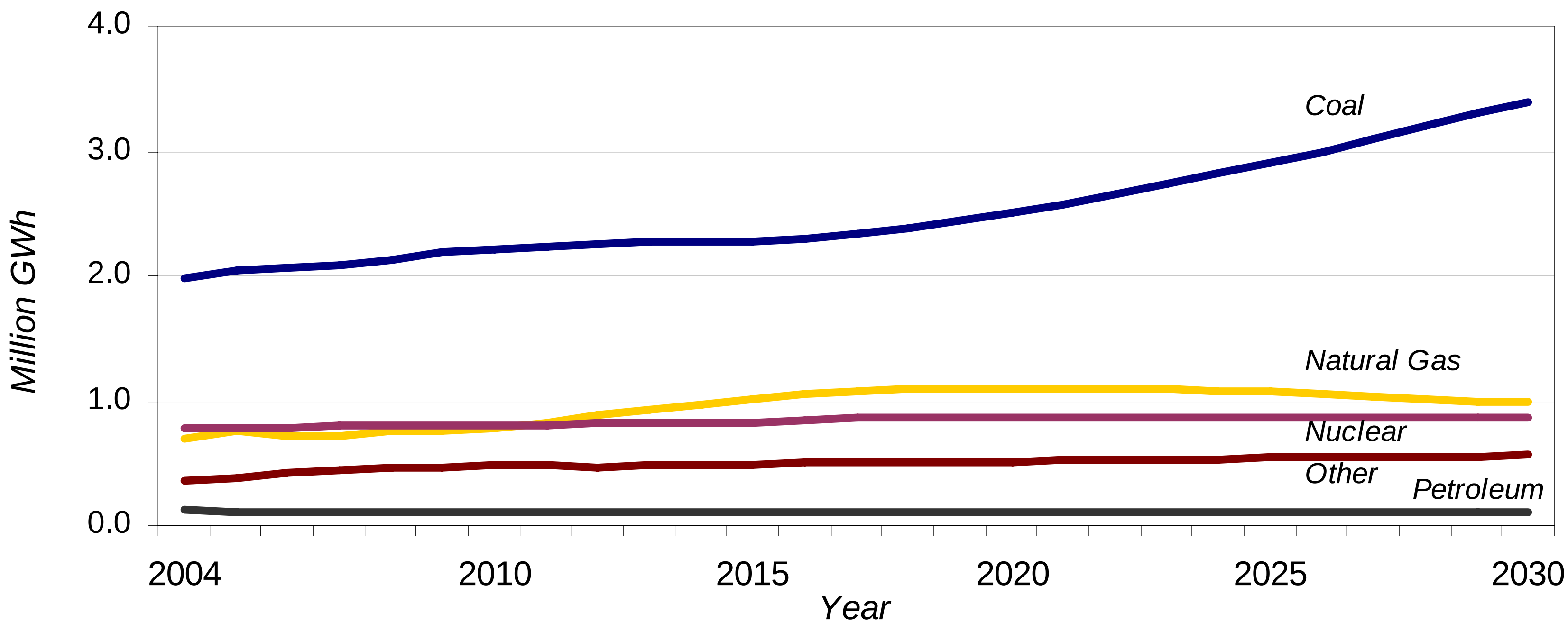
Study Background

- Norbridge, Inc. is a management consulting firm that focuses on helping clients make better business decisions, and improve their performance.
- We have considerable experience in both the energy and transportation industries, and have assisted utilities, coal companies, railroads, trucking companies and barge lines in both their planning and operations processes.
- We conducted this study because we wanted to better understand how utilities are preparing to manage the impending growth in coal volumes.
- The objective of this study is to bring issues and opportunities into focus while there is time to consider options and plan responses.

Norbridge believes that the growth in coal demand will challenge North America's transportation infrastructure, and its performance.

- Coal consumption and transportation requirements are expected to increase by over 700 million tons through 2030.

Projected Electricity Generation by Fuel Through 2030



Source: Energy Information Administration, Annual Energy Outlook 2006

To better understand these challenges, Norbridge interviewed fuel procurement and transportation managers at sixteen utilities.

Interview Approach

- Phone interviews were conducted from November 2005 through February 2006.
- The study was done confidentially – comments from discussions are not attributed to specific companies to maintain confidentiality for participants.

Companies Interviewed

AES	Consumers Energy	NIPSCO
Alliant	DTE Energy	Progress Energy
Ameren	Entergy	Salt River Project
Arizona Public Service Company	First Energy	SCANA
Cinergy	LGE Energy	Xcel Energy
	Midwest Generation	

We surveyed companies on three categories of issues: equipment, facility, and transportation management.

- The survey focused on all coal transportation modes (e.g. rail, barge, truck, vessel), but many of the comments were rail-related.
- Results are summarized in the following three sections.

Survey Topics by Category

Equipment Management	Facility Management	Transportation Management
■ Equipment adequacy and availability ■ Maintenance ■ Railcar readiness for loading ■ Equipment quality and condition ■ Equipment utilization and productivity ■ Performance measures	■ Maintenance ■ Productivity ■ Facility availability and utilization ■ Performance measures ■ Days of supply ■ Outsourcing	■ Process times and consistency – Arrival at power plants to departure – Power plants to mines, and back to plants – Coal mines – time from equipment arrival to departure ■ Communication and responsiveness ■ Asset availability

Contents

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Some utilities are making improvements to prepare for future increases in coal traffic, but many are not.

- Utilities are adding new train sets, updating their unloading facilities, and improving process times to increase their coal handling capacity.
- However, utilities cited a wide range of problems that hamper their performance.

Examples of Coal Transportation Issues and Problems Impacting Productivity (Based on 16 Utilities Surveyed)

Equipment Management	Facility Management	Transportation Management
■ Slow process times ■ Outdated equipment ■ Small cars ■ Increased repairs and maintenance ■ Car shortages ■ Limited performance measures ■ Capital shortages	■ Poor productivity due to outdated facilities ■ Limited facility maintenance ■ Capital shortages ■ Limited performance measures	■ Slow process times – Arrival at power plants to departure – Railroad cycle times ■ Rail performance – Time in transit – Transit time consistency – Communication – Asset availability

Implications for Utilities and Other Coal Supply Chain Participants

Implications

- ***Many Are Not Prepared -*** Many power plants and transportation providers are not prepared to handle significant increases in coal traffic.
- ***The Time for Change is Now -*** In fact, many companies are facing problems even at current traffic levels.
- ***Equipment Reinvestment is a Necessity -*** Transportation equipment needs to be updated, maintained and managed more efficiently.
- ***Facility Modernization is a Necessity -*** Unloading facilities need to be modernized, maintained and more productive.
- ***Significant Need for Process Improvement -*** Process times need to improve significantly and become more consistent.
- ***Need for Operational Cooperation -*** All participants in the coal supply chain need to work closely and proactively to ensure that the transportation network can handle projected increases in coal volumes.

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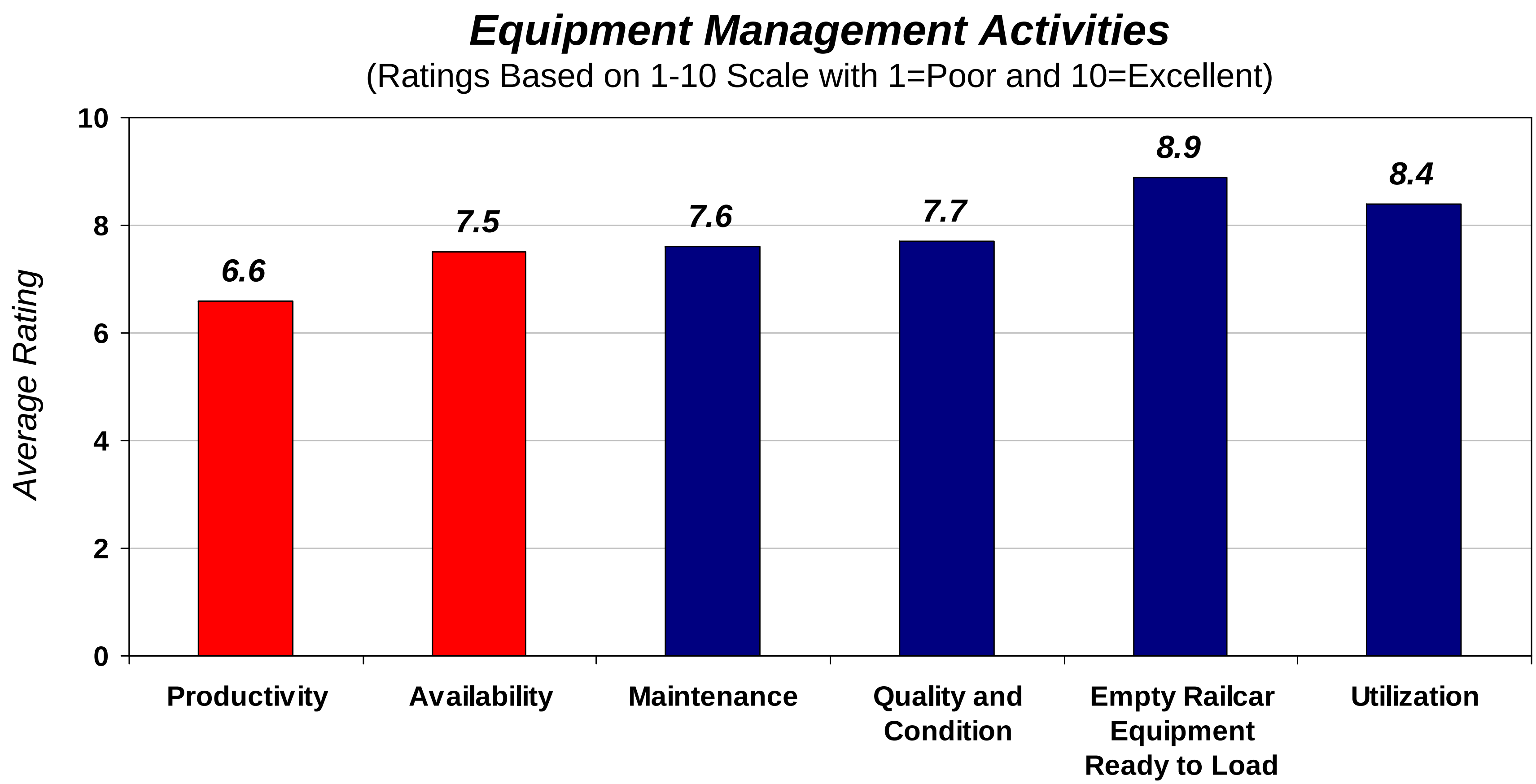
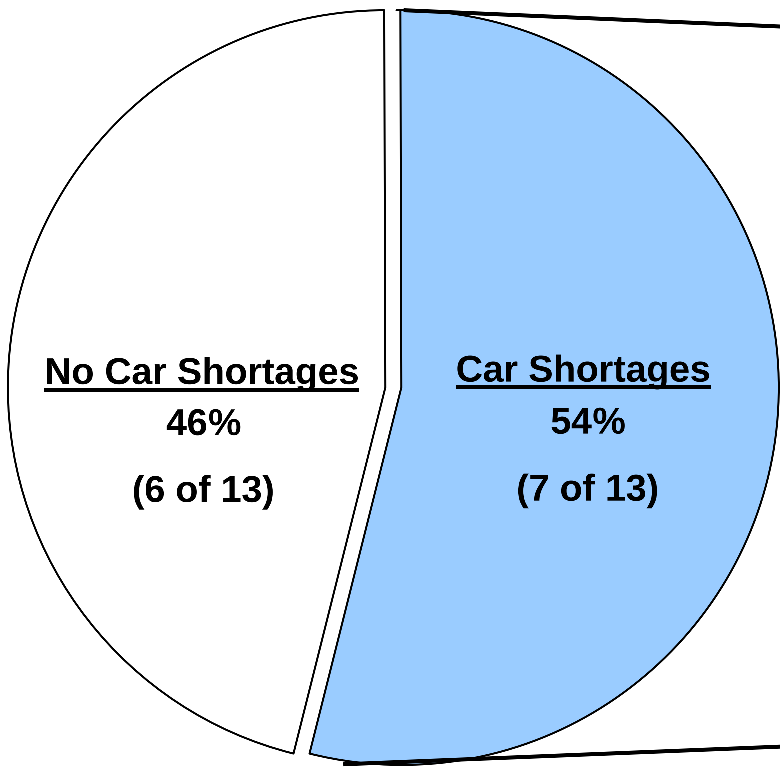
Productivity and availability were the equipment management issues of greatest concern to the utilities surveyed.



	Productivity	Availability	Maintenance	Quality and Condition	Empty Railcar Equipment Ready to Load	Utilization
Number of Respondents:	16	16	15	16	12	16
Range of Answers:	2-10	3-10	5-9	5-10	6-10	7-10
% of Answers 5 or Less:	38%	25%	13%	13%	0%	0%

More than half of the utilities surveyed indicate that they are facing railcar shortages.

Adequacy of Railcar Fleet to Meet Utility Needs
13 Utilities



Reasons for Car Shortages

- Outdated equipment
- Smaller cars
- Maximum capacity reached
- Inadequate capital to replace old cars
- Frequent maintenance for ongoing problems
- According to several utilities, railroads indicate that they do not want to be in the car service business, and want utilities to lease/own their own cars.

Some utilities are adding new train sets, while others are ensuring that empty cars are "ready to load", but many are not adding equipment.

Equipment Additions

- Eight utilities surveyed have increased the number of railcars they either own or lease in the last 3-5 years (one by three train sets), while six utilities plan on increasing their fleet in the next 3-5 years.
- However, eight utilities did not add equipment in the last 3-5 years, and ten utilities have no plans to add new cars in the next few years.

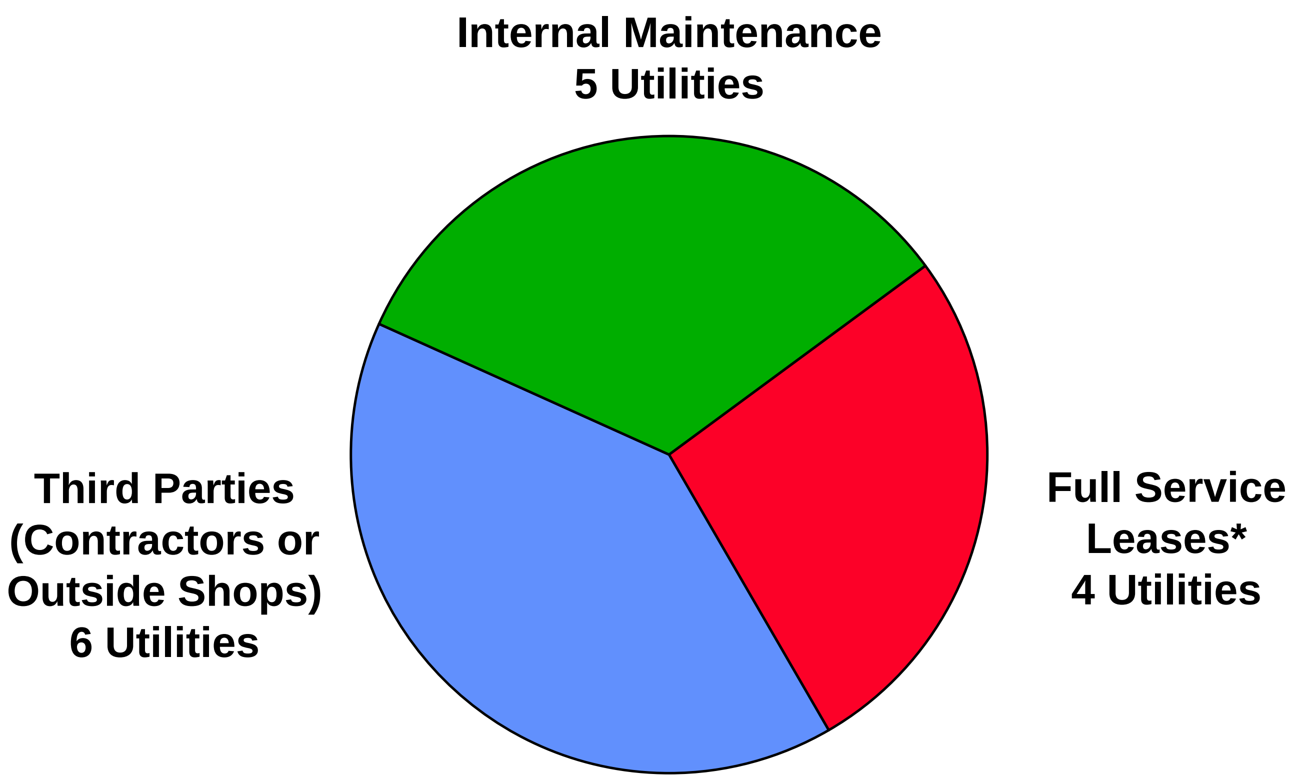
Equipment Ready to Load*

- Nine utilities with bottom dump cars indicate that they are focused on making sure that car doors are closed and equipment is ready to load.
  - "We have cameras that videotape the unloading process, and someone is monitoring the video feed at all times."
  - "We have workers who check the doors to ensure that they are ready to load."
  - "They are not allowed to go anywhere until they are visually inspected."
  - "We use unloading contractors who inspect the cars and make sure that the doors are closed and locked."

* Several of the utilities surveyed operate gondolas which do not require railcar doors to be closed.

Utilities are using three distinct strategies to maintain their equipment.

Equipment Maintenance Strategies (Based on 15 Utilities Surveyed)



* Utilities pay a premium to ensure that leasing companies maintain their equipment.

However, many utilities indicate that important equipment issues are not being addressed.

- Each of these issues is addressed in the following pages.

Key Issues That Could Limit Future Coal Tonnage

- Slow Process Times
- Outdated Equipment
- Small Cars
- Increased Repairs/Maintenance
- Limited Performance Measures

While utilities are making improvements, few are analyzing ways to improve process times to get equipment in and out of plants faster.

Slow Process Times

- Eighty-one percent of utilities (13 of 16 utilities surveyed) said that their process time at one or more of their plants was slower than they would like.
- Of the thirteen utilities with slow process times, seven said that their process time had gotten worse in the last 3-5 years.
- Several said that they had little or no focus on improving process times.
  - Ten utilities feel that process times are controlled by transportation providers and they have no control over it.
  - Five utilities indicated that improving process times would require significant investment and that they are facing ongoing capital shortages.
  - Two respondents stated that improving process times is very low on their utility's priority list.

Utilities identified concerns with equipment age and size.

Examples of Issues with Outdated Equipment

- Utilities are frequently “locked” into long term leases with aging cars, often due to shortages of capital for buying or leasing new train sets.
- This requires more maintenance and shop time to keep older cars running.
- Added maintenance times keep cars off-line longer.

Examples of Issues with Small Cars

- Certain cars have limited load capacity e.g. are only capable of carrying 263,000 pounds rather than the current standard of 286,000 pounds gross weight on rail.
- Some cars are not able to handle the stress of heavy usage.
- Some smaller cars also tend to get over-loaded more frequently than larger cars, which can cause safety or dust problems.

They also indicated concern with equipment maintenance and state of repair.

Examples of Issues with Repairs/Maintenance

- Older cars tend to have more problems and require additional maintenance.
- For several utilities, maintenance is becoming too frequent and too costly.
- Several utilities that need railcar upgrades did not get them because the company decided that it was too expensive.
- “Our leasing company does a poor job maintaining rail cars under the full-service lease agreements.”
- “The side seals are breaking on the bottom dump cars. We are not fixing them, but we should.”

Few have a robust set of performance indicators in place for managing coal transportation equipment.

- Most utilities track equipment cycle times (loading, unloading, empty dwell times, time in transit).
- However, eleven utilities surveyed do not have any key performance indicators for their equipment, aside from measuring cycle times.
  - "We do not have time to track the performance of our railcar equipment."
  - "We leave it up to our third party contractor to deal with performance issues."
- Examples of other equipment performance measures used by some utilities include:
  - Cost of railcar maintenance on a cents per mile basis
  - Hours spent shopping each car
  - Results of wheel impact load detectors
  - Cleanliness of cars
  - Average train speed
  - Progress of trains versus schedule

Contents

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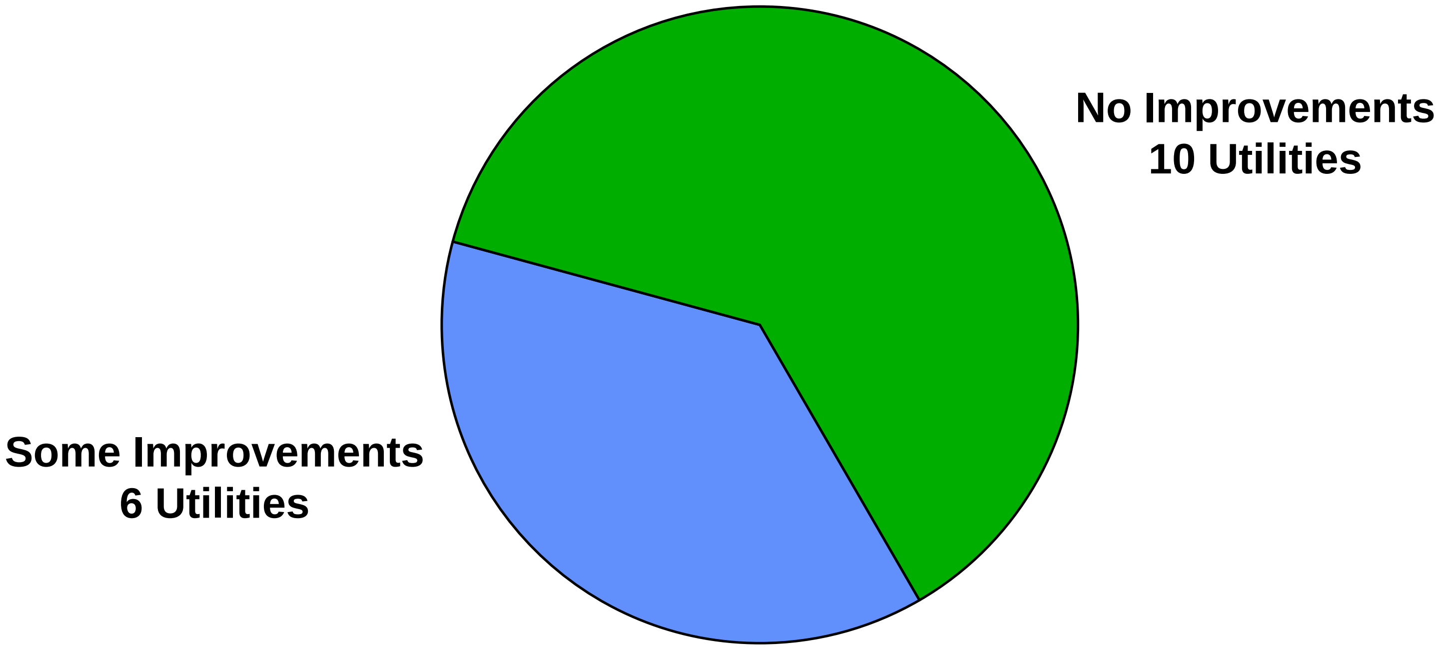
Fewer than half of the utilities surveyed have taken action to update their facilities to handle the expected increases in coal volume.

Utility Improvements at Coal Unloading Facilities in Recent Years (Based on 16 Utilities Surveyed)



Those who have made improvements have implemented a wide range of initiatives.

Examples of Comments on Facility Improvements

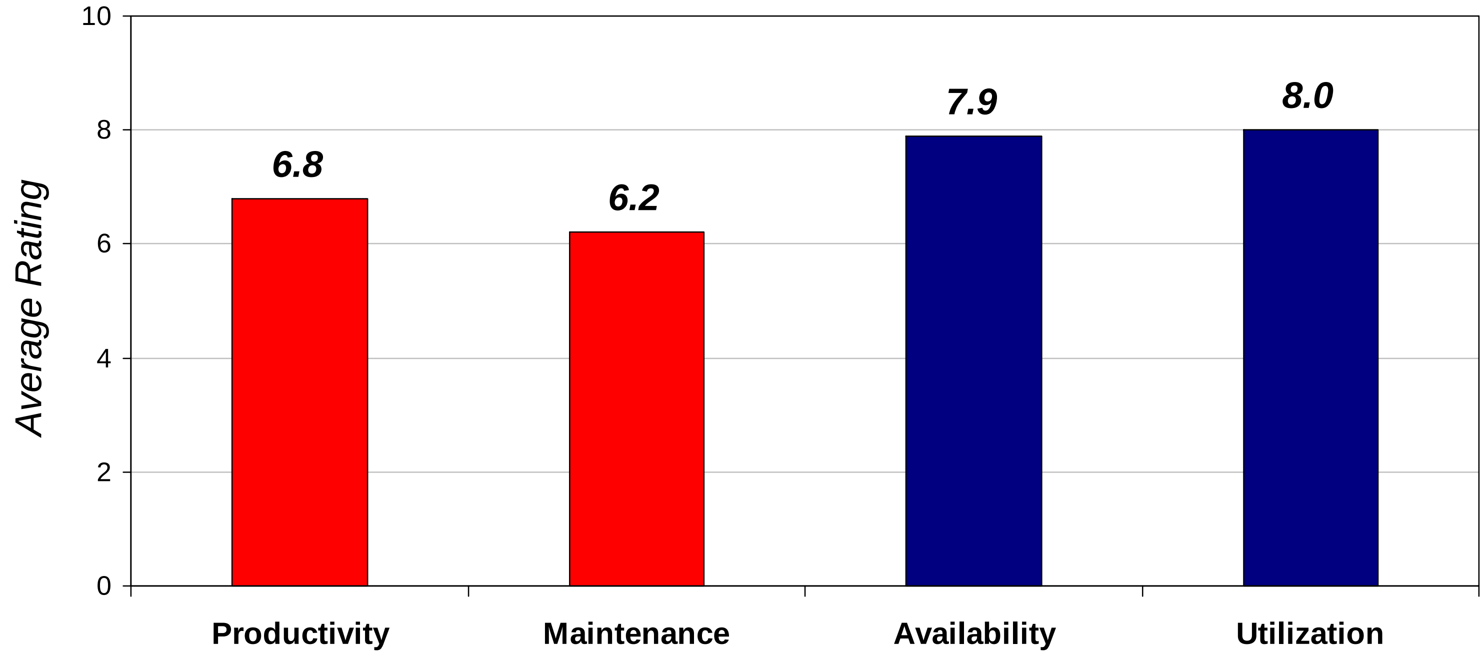
- "We have increased ladder tracks so that they can hold 140-car trains."
- "One of our plants is undergoing major renovations; we are upgrading the plant structurally, as well as updating equipment and capacity."
- "We are building more tracks, and improving accessibility for trains to move in and out quickly and effectively."
- "We are planning on making some changes at our facilities. We are going to update tracking, sidings, and unloading facilities."
- "We are spending plenty of money on our unloading facilities. Two-thirds of our unloading facilities are state-of-the-art. For the other one-third of our facilities, we are going to add newer technology and make sure that it is maintained as best as it can be. We are also discussing a new idea to track forced outages at our unloading facilities."

Many utilities indicate concern with facility management issues, particularly productivity and maintenance.

- Capital shortages are a key driver of productivity and maintenance problems.

Facility Management Activities

(Ratings Based on 1-10 Scale with 1=Poor and 10=Excellent)



	Productivity	Maintenance	Availability	Utilization
Number of Respondents:	**14**	**15**	**15**	**15**
Range of Answers:	**3-9**	**2-9**	**3-9**	**5-10**
% of Answers 5 or Less:	**29%**	**33%**	**13%**	**7%**

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Eleven respondents commented that their unloading facilities are outdated, resulting in poor productivity.

Examples of Poor Productivity Due to Outdated Facilities

- Facilities dating back to post-World War II, without any significant upgrades
- Outdated dumpers
- Original belts are not long enough to keep up with increasing number of railcars per trainset and increasing amounts of coal.
- Process times are slowing and plants are experiencing outages from aging and outdated equipment.
- “We need to upgrade all of our systems so that we can dump trains more efficiently.”
- “Our dumping location is not large enough to accommodate all of the doors of the new train sets that have 140 rail cars. Our facilities are not being kept up-to-date.”

Outdated facilities are resulting in more maintenance – many utilities indicate that they do not address problems until after they occur.

Examples of Limited Facility Maintenance

- “We do patchwork fixing. If something goes wrong, then we try to fix it as best we can.”
- “We have two unplanned dumper outages a year, and heavy maintenance is required to fix the problem. We should have scheduled outages of the dumpers at more convenient times. Instead we wait until there is a problem before we fix it.”
- “Our feeders are always breaking down and working slowly. We have done nothing to fix these problems. We wait until they break down before we fix them.”
- “The only time we ever make repairs is when something breaks down. We need to be more proactive.”

Outdated facilities are frequently not updated due to a lack of capital.

Examples of Capital Shortages at Facilities

- "The last thing on our company's mind is putting money into coal operations."
- "We have a lot of unloading and process issues at one of our plants, but our company does not want to put any money into it."
- "Forty percent of our plants are old bottom drops that are forty years old. Right now we do not have the capital to upgrade those plants."
- "Two of our plants are not up-to-date. Our company has decided that it is not worth the money to upgrade."
- "Our feeders are always breaking down and working slowly, but we have done nothing to fix them. We have put very little money into our plants lately."
- "It is hard getting capital for coal handling."
- "We have constrained budgets so we won't spend money to improve processes."

Utilities identified few performance measures to track facility performance.

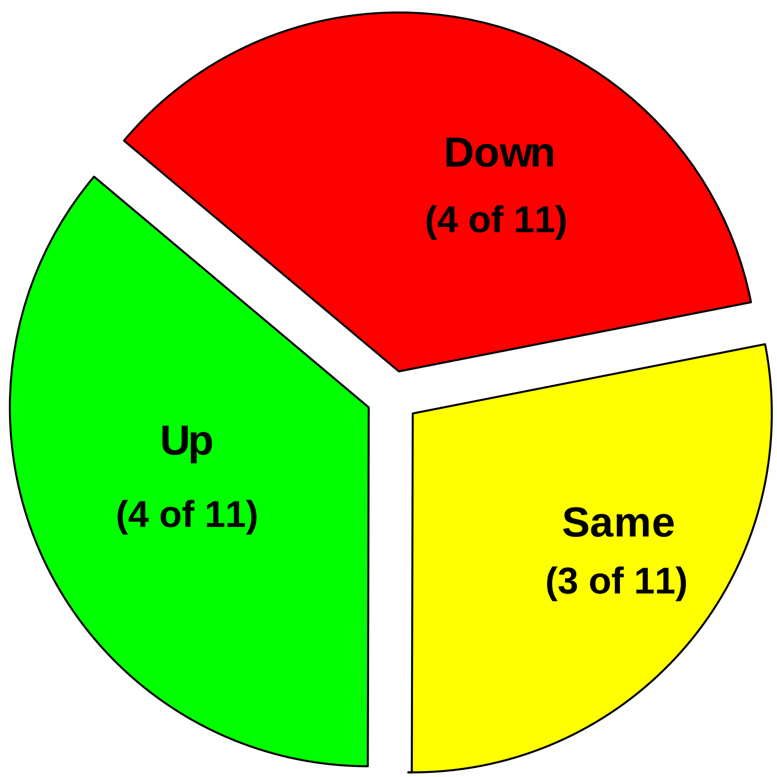
Examples of Facility Performance Indicators

- Inventory levels
- Tons unloaded per day
- Actual deliveries versus projections (daily, weekly, monthly) or "nominations"
- "We have what we call a 'train book'. We keep track of tons delivered daily, monthly and yearly, compare them to our predictions, and react accordingly."
- "We set out goals at the beginning of each year on how many trains we expect to get delivered. Then we monitor what we actually get on a weekly basis."

Over two thirds of the utilities have changed their coal inventory levels (days of supply) over the last few years.

- 36% of utilities have increased their inventory levels in the last 3-5 years.
- 36% of utilities have decreased their inventory in the last 3-5 years.
- 27% of utilities have not changed their inventory levels.

Changes in Coal Inventory Levels During Past 3-5 Years
11 Utilities



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Eight utilities would consider outsourcing coal supply to a third party and having coal delivered to facility specs at a defined cost per million BTU.

Example Responses of Utilities that Would Consider Outsourcing Coal Supply

- "We would consider it if we found there were economic benefits."
- "We would have someone supply the coal, unload it, and maintain the piles, but we would want to be in charge of buying it."
- "We would consider it, but union issues would have to be addressed and we would have to be assured of the coal quality."
- "At one-third of our plants we outsource our coal supply, but so far we are not happy with how it is working. Someone would have to be very persuasive to get us to do it again, but we would consider it."

However, the other eight utilities would not consider outsourcing their coal supply.

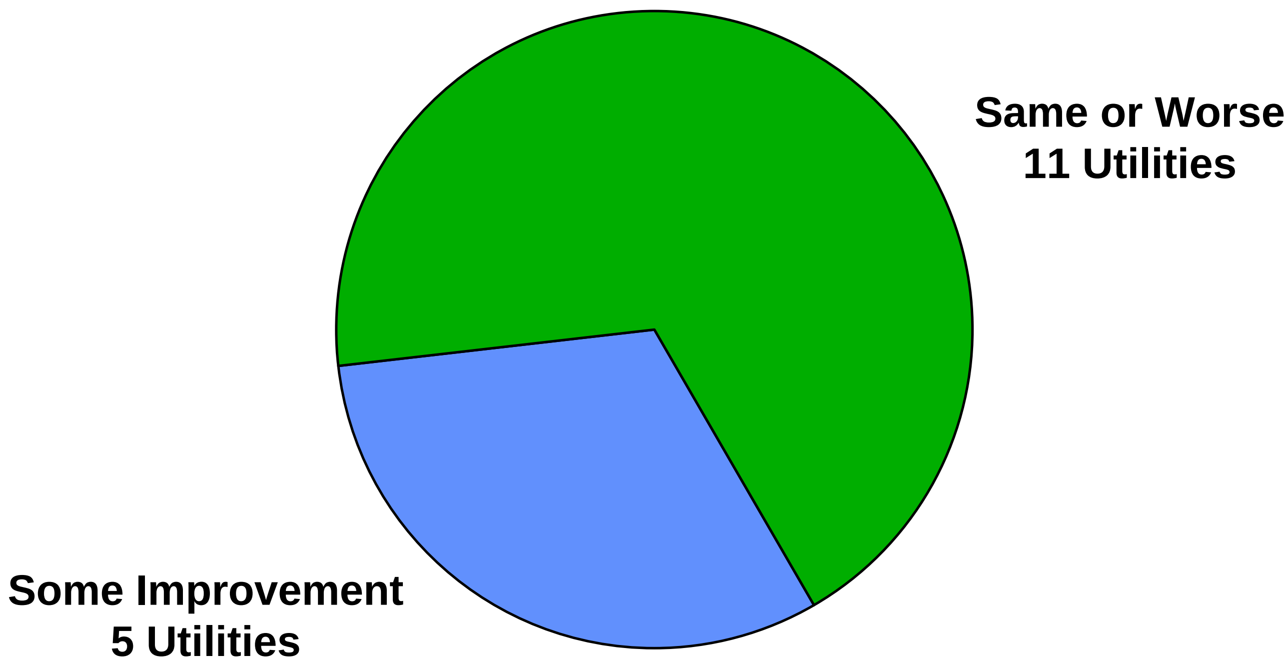
Example Responses of Utilities that Would Not Consider Outsourcing Coal Supply

- "We would not use a third party and outsource our coal supply because of various union issues."
- "Our utility feels we do a good enough job of fuel procurement and handling cars ourselves."
- "I personally would not consider outsourcing our coal supply to a third party because that would put me out of a job."
- "We have various types of coal and various criteria, and we just feel more comfortable doing it internally."

Contents

Five utilities indicate that process times at their unloading facilities have improved, but others say they have stayed the same or gotten worse.

Process Times at Power Plant Unloading Facilities in Recent Years* (Based on 16 Utilities Surveyed)



* Includes time from arrival of coal transportation equipment at power plant until departure.

Utilities cited a wide range of examples of how process times have improved or deteriorated.

- Utilities attribute poor process times to maintenance problems, older equipment, and railroad inefficiencies.

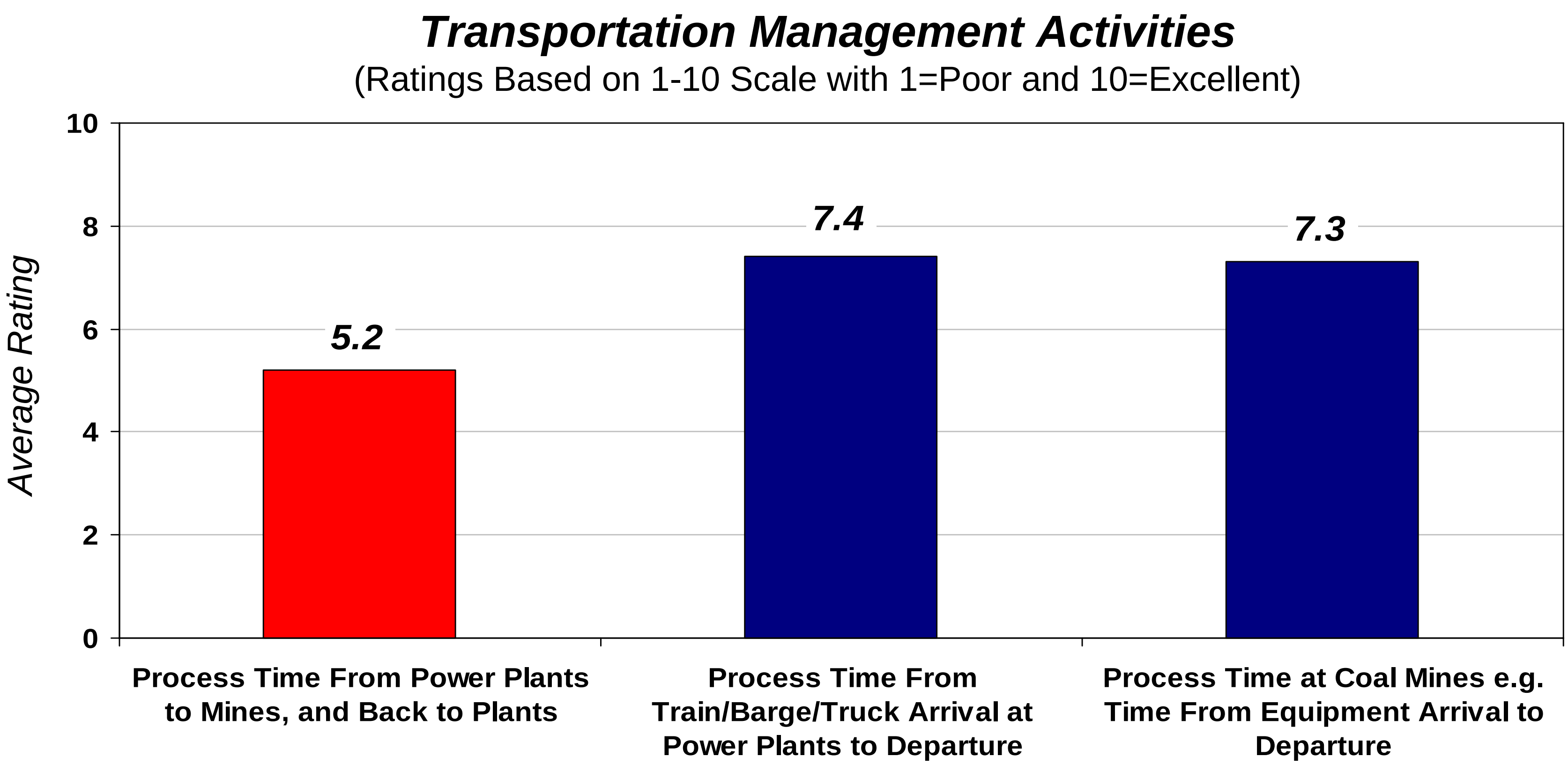
Strong/Improved Process Times

- "We have sped up our unloading times so we have no issues. We have made our transportation process very simple by using two short line railroads."
- "Two-thirds of our plants I would give a ten on unloading processes. The facilities are state of the art and at some of them we can unload a train in an hour and a half."
- "We have not gotten hit with any late fees from the railroads, so I would say our process times are pretty good."

Poor/Deteriorating Process Times

- "We only dump on one shift, so the coal just sits around."
- "We need another facility to keep up with the increase in coal. Our process times are slowing."
- "Process times are getting slower as our equipment gets older."
- "Our process times are slow because the railroads pull the cars too slowly."
- "Our process time can be anywhere from 6 hours to 3-4 days. It will just keep getting worse unless we upgrade all of our equipment and replace our dozers."

There was a wide range of responses on transportation effectiveness, with particular concern about cycle times between mines and plants.



Number of Respondents:	16	16	16
Range of Answers:	1-8	3-10	4-10
% of Answers 5 or Less:	44%	19%	19%

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Utilities rated performance of different transportation modes in five areas. They were particularly concerned about rail performance.

- Comments on four issues (time in transit, transit time consistency, communication, and responsiveness to issues/problems) are highlighted in the following pages.

Performance Comparison Across Transportation Modes

(Ratings Based on 1-10 Scale with 1=Poor and 10=Excellent)

Issue	Number of Responses	Average	Range of Answers	% of Answers 5 or Less
1. Time in Transit				
Railroad	16	**5.0**	**1-7.5**	**50%**
Barge/Vessel*	9	8.3	6-10	0%
Truck	8	8.8	8-10	0%
2. Transit Time Consistency				
Railroad	16	**4.8**	**2-8**	**56%**
Barge/Vessel*	9	8.2	6-10	0%
Truck	8	8.6	7-10	0%
3. Communication				
Railroad	16	**6.1**	**1-9**	**31%**
Barge/Vessel*	9	8.4	6-10	0%
Truck	8	7.6	5-10	13%
4. Responsiveness to Issues/Problems				
Railroad	16	**5.8**	**1-9**	**38%**
Barge/Vessel*	9	8.3	6-9	0%
Truck	8	8.0	5-10	13%
5. Information on Shipment Status				
Railroad	16	7.2	**3-10**	**31%**
Barge/Vessel*	9	8.7	5-10	6%
Truck	8	7.1	**3-9**	13%

*Includes eight responses for barge and one for vessel. Responses have been combined for confidentiality purposes.

Ten utilities indicated that rail cycle times have increased in the last few years.

Examples of Comments on Rail Cycle Time Issues

- Cycle times are very unpredictable.
- Cars often sit at unloading facilities after the utilities have unloaded them.
- "We have been tracking the average speeds of the railroad during coal transportation. We have found that it is 13-16 miles per hour. That could possibly explain why cycle times are so bad."
- "The railroads seem to have a lot of downtime, when they should be out delivering coal. Many utilities are experiencing shortages of coal, so there should be less downtime and more being done to get us more coal."

Nine utilities indicated concern with late or inconsistent rail deliveries.

Examples of Comments on Rail Transit Time Consistency

- "Our coal deliveries last year were unpredictable. Sometimes our train sets would be parked by the railroads and remain idle. We did not know when we were going to receive our coal."
- "During the last eighteen months, the railroads have been terrible. There have been so many delays that we have not been receiving our coal quota. It is difficult to make up coal shortages with such inconsistent coal deliveries."
- "Our coal deliveries can be days late. It is hard to forecast how much supply to keep on hand when we have no idea when our coal will be coming in."
- "Railroads do a very poor job spacing train arrivals. They seem to be on their own time, not realizing other people have schedules to keep."

Over one-third of utilities indicated frustration with railroad communication and responsiveness to issues and problems.

Examples of Comments on Railroad Communication and Responsiveness

- “We discuss our issues with railroads on a daily basis. In my opinion, they may listen to our complaints, but they just put the issues off and do not address our concerns.”
- “We have meetings with the railroads. We even have meetings with their senior executives. Everything we say goes in one ear and out the other.”
- “We feel like we are small potatoes to them. They have bigger clients that they are more concerned about so we are their last worry.”
- “Some of the railroad companies are okay. But one railroad in particular does not even return our phone calls. They just do not stay in touch with us at all.”
- “The railroads are trying to run our business. They are telling us how much inventory we should keep. They do not listen to our complaints because they think that they have all the answers.”

Utilities also expressed concern about railroads' lack of crews, power and cars.

Examples of Comments on Railroad Asset Availability

- "Occasionally a railroad crew will 'die'. Couldn't they do a better job of making sure that there is a crew to take over the train once the other crew's maximum time has been reached? They often don't have enough crews to handle the demand."
- "The railroads always seem to have a shortage of crews. It's even worse around the holidays."
- "We feel that the railroads always have a lack of crews and power."
- "We have asked for additional train sets. The railroads just don't seem to have them. It is as if they are maxed out."
- "The railroads give us incentives to lease our own cars. They do not have enough to go around."

Contents

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Norbridge has energy and transportation consulting practices, with expertise in operations improvement.

Norbridge Industry and Functional Focus

Core Industries

- Electric utilities
- Transportation
- Mining
- Maritime and ports
- Pharmaceutical and medical products

Functional Services

- Operations improvement
- Process improvement
- Corporate and business unit strategy
- Supply chain and logistics management
- Procurement
- Business modeling
- Market, product, and sales strategies
- Organization development

We are actively involved in a range of initiatives to improve performance in the coal industry.

- Since 2001, we have conducted over a dozen operations improvement projects in the coal industry. These initiatives improved performance of:
  - Transportation loadouts
  - Mines
  - Processing plants
  - Facility safety
- We co-chair an annual conference, with the Penn State Mining Engineering Department, on performance improvement in the coal and mining industries.
- We have a database of mining best practices, built from our performance improvement benchmarking study.
  - Contains data from seventeen leading North American mining companies
  - Contains insights on various performance improvement challenges, opportunities and performance metrics

We also have significant experience working with all modes in the transportation industry.

- Extensive work for freight railroads in a wide range of areas, such as:
  - Operations and cost improvements, network rationalization, purchasing leverage and best practices
  - Strategic planning and acquisitions
  - Marketing, pricing and capital expenditure strategies
  - Business targeting
- Port, vessel and inland waterway expertise
  - Leading port practice
  - Long-term volume forecasts to support capital investments and shifts in world-wide ocean freight flows
  - Inland barge strategic planning and fleet rationalization, pricing and preparation for business cycles
- Truck strategic planning, marketing and pricing, in TL, LTL and parcel
- Strategic planning for railroad suppliers

Our transportation loadout projects have leveraged our experience in both the energy and transportation industries.

- Projects have generally focused on how to increase efficiency and capacity to meet growing coal demand.
- Projects have delivered significant benefits for both mines and transportation providers, while limiting capital investment.

Typical Project Objectives for Transportation Loadout Projects

- Increase loadout capacity by 25-50%
- Improve loadout procedures, practices and processes
- Reduce time to load trains
- Develop internal and external performance measures to track performance
- Improve communication and teamwork between coal company and railroad employees
- Improve resource utilization – staffing, equipment