Coal Transportation Issues and Opportunities
Benchmarking Study
April 2006
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I. Background

II. Detailed Findings

- Equipment Management
- Facility Management
- Transportation Management

III. Implications
Study Background

- Norbridge, Inc. is a management consulting firm that has considerable experience in both the energy and transportation industries.
- We 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.
Projected coal growth will put significant pressure on the coal transportation supply chain.

- The EIA projects 700 million more tons by 2030.

### Predicted Electricity Generation by Fuel Through 2030

<table>
<thead>
<tr>
<th>Year</th>
<th>Coal</th>
<th>Petroleum</th>
<th>Natural Gas</th>
<th>Nuclear</th>
<th>Renewable/Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>2010</td>
<td>5000</td>
<td>5000</td>
<td>5000</td>
<td>5000</td>
<td>5000</td>
</tr>
<tr>
<td>2015</td>
<td>6000</td>
<td>6000</td>
<td>6000</td>
<td>6000</td>
<td>6000</td>
</tr>
<tr>
<td>2020</td>
<td>7000</td>
<td>7000</td>
<td>7000</td>
<td>7000</td>
<td>7000</td>
</tr>
<tr>
<td>2025</td>
<td>8000</td>
<td>8000</td>
<td>8000</td>
<td>8000</td>
<td>8000</td>
</tr>
<tr>
<td>2030</td>
<td>9000</td>
<td>9000</td>
<td>9000</td>
<td>9000</td>
<td>9000</td>
</tr>
</tbody>
</table>

Source: Energy Information Administration, Annual Energy Outlook 2006
To better understand this challenge, Norbridge recently interviewed fuel procurement and transportation managers at sixteen utilities.

- We surveyed companies on three categories of issues: equipment, facility, and transportation management.
- Phone interviews were conducted during November 2005 to February 2006.

### Companies Interviewed

<table>
<thead>
<tr>
<th>AES</th>
<th>Consumers Energy</th>
<th>NIPSCO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alliant</td>
<td>DTE Energy</td>
<td>Progress Energy</td>
</tr>
<tr>
<td>Ameren</td>
<td>Entergy</td>
<td>Salt River Project</td>
</tr>
<tr>
<td>Arizona Public Service Company</td>
<td>First Energy</td>
<td>SCANA</td>
</tr>
<tr>
<td>Cinergy</td>
<td>LGE Energy</td>
<td>Xcel Energy</td>
</tr>
<tr>
<td></td>
<td>Midwest Generation</td>
<td></td>
</tr>
</tbody>
</table>
The survey focused on all coal transportation modes (e.g. rail, barge, truck, vessel), but many of the comments were rail-related.

<table>
<thead>
<tr>
<th>Equipment Management</th>
<th>Facility Management</th>
<th>Transportation Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment adequacy and availability</td>
<td>Maintenance</td>
<td>Process times and consistency</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Productivity</td>
<td>– Arrival at power plants to departure</td>
</tr>
<tr>
<td>Railcar readiness for loading</td>
<td>Facility availability and utilization</td>
<td>– Power plants to mines, and back to plants</td>
</tr>
<tr>
<td>Equipment quality and condition</td>
<td>Performance measures</td>
<td>– Coal mines – time from equipment arrival to departure</td>
</tr>
<tr>
<td>Equipment utilization and productivity</td>
<td>Days of supply</td>
<td>Communication and responsiveness</td>
</tr>
<tr>
<td>Performance measures</td>
<td>Outsourcing</td>
<td>Asset availability</td>
</tr>
</tbody>
</table>
I. Background

II. Detailed Findings

   ▪ Equipment Management
     ▪ Facility Management
     ▪ Transportation Management

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

**Equipment Management Activities**
(Ratings Based on 1-10 Scale with 1=Poor and 10=Excellent)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Range of Answers</th>
<th>Number of Respondents</th>
<th>% of Answers 5 or Less</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity</td>
<td>2-10</td>
<td>16</td>
<td>38%</td>
</tr>
<tr>
<td>Availability</td>
<td>3-10</td>
<td>16</td>
<td>25%</td>
</tr>
<tr>
<td>Maintenance</td>
<td>5-9</td>
<td>15</td>
<td>13%</td>
</tr>
<tr>
<td>Quality and Condition</td>
<td>5-10</td>
<td>16</td>
<td>13%</td>
</tr>
<tr>
<td>Empty Railcar Equipment Ready to Load</td>
<td>6-10</td>
<td>12</td>
<td>0%</td>
</tr>
<tr>
<td>Utilization</td>
<td>7-10</td>
<td>16</td>
<td>0%</td>
</tr>
</tbody>
</table>
More than half of the utilities surveyed indicate that they are facing railcar shortages.

Adequacy of Railcar Fleet to Meet Utility Needs
13 Utilities

- Car Shortages: 54% (7 of 13)
- No Car Shortages: 46% (6 of 13)

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.

* 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)

- **Internal Maintenance**
  - 5 Utilities

- **Third Parties** (Contractors or Outside Shops)
  - 6 Utilities

- **Full Service Leases***
  - 4 Utilities

* Utilities pay a premium to ensure that leasing companies maintain their equipment.
However, many utilities indicate that important equipment issues are not being addressed.

Key Equipment Issues That Could Limit Future Coal Tonnage

- **Slow process times**
  - 81% of utilities said that their process time at one or more of their plants was slower than they would like.
  - Of the 13 utilities with slow process times, 7 said that their process time had gotten worse in the last 3-5 years.

- **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 cars running.

- **Small cars**
  - Certain cars have limited load capacity (263,000 pounds).
  - Other cars are not able to handle the stress of heavy usage.
They also indicated concern with equipment maintenance, and identified few performance measures in place to track equipment.

Key Equipment Issues That Could Limit Future Coal Tonnage (continued)

- **Equipment repairs/maintenance**
  - Older cars tend to have more problems and need more maintenance.
  - For several utilities, maintenance is becoming too frequent and costly.
  - Several utilities that need railcar upgrades did not get them because the company decided that it was too expensive.

- **Performance measures**
  - 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.
I. Background

II. Detailed Findings
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   - Facility Management
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III. Implications
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)

No Improvements 10 Utilities

Some Improvements 6 Utilities

Examples
- More or longer tracks
- New or longer sidings
- Updated 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)

<table>
<thead>
<tr>
<th>Facility Management Activities</th>
<th>Average Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity</td>
<td>6.8</td>
</tr>
<tr>
<td>Maintenance</td>
<td>6.2</td>
</tr>
<tr>
<td>Availability</td>
<td>7.9</td>
</tr>
<tr>
<td>Utilization</td>
<td>8.0</td>
</tr>
</tbody>
</table>

Number of Respondents:
- Productivity: 14
- Maintenance: 15
- Availability: 15
- Utilization: 15

Range of Answers:
- Productivity: 3-9
- Maintenance: 2-9
- Availability: 3-9
- Utilization: 5-10

% of Answers 5 or Less:
- Productivity: 29%
- Maintenance: 33%
- Availability: 13%
- Utilization: 7%
Utilities indicate that important facility issues are not being addressed.

Key Facility Issues That Could Limit Future Coal Tonnage

- **Outdated facilities**
  - Eleven respondents commented that their unloading facilities are outdated, resulting in poor productivity.
  - Some facilities date back to World War II, without significant upgrades.

- **Limited maintenance**
  - Outdated facilities are resulting in more maintenance.
  - Many utilities indicate that they do not address problems until after they occur.

- **Capital shortages**
  - Outdated facilities are frequently not updated due to a lack of capital.
  - “The last thing on our company’s mind is putting money into coal operations.”

- **Performance measures** – few are in place to track facility performance.
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

- Down (4 of 11)
- Up (4 of 11)
- Same (3 of 11)
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III. Implications
Five utilities indicate that process times at their unloading facilities have improved, but others say they have stayed the same or gotten worse.

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

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

- Some Improvement: 5 Utilities
- Same or Worse: 11 Utilities

* Includes time from arrival of coal transportation equipment at power plant until departure.
There was a wide range of responses on transportation effectiveness, with particular concern about cycle times between mines and plants.

**Transportation Management Activities**
(Ratings Based on 1-10 Scale with 1=Poor and 10=Excellent)

| Process Time From Power Plants to Mines, and Back to Plants | 5.2 | 16  |
| Process Time From Train/Barge/Truck Arrival at Power Plants to Departure | 7.4 | 16  |
| Process Time at Coal Mines e.g. Time From Equipment Arrival to Departure | 7.3 | 16  |

Number of Respondents: 16
Range of Answers: 1-8
% of Answers 5 or Less: 44%
Number of Respondents: 16
Range of Answers: 3-10
% of Answers 5 or Less: 19%
Number of Respondents: 16
Range of Answers: 4-10
% of Answers 5 or Less: 19%
Utilities rated performance of different transportation modes in five areas. They were particularly concerned about rail performance.

### Performance Comparison Across Transportation Modes
(Ratings Based on 1-10 Scale with 1=Poor and 10=Excellent)

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

*Includes eight responses for barge and one for vessel. Responses have been combined for confidentiality purposes.
Utilities indicate that important transportation issues are not being addressed.

Key Transportation Issues That Could Limit Future Coal Tonnage

- **Rail cycle time**
  - Ten utilities indicated that cycle times increased in the last few years.
  - Nine utilities indicated concern with late or inconsistent rail deliveries.
  - Cycle times are considered unpredictable.

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

- **Railroad asset availability**
  - Utilities expressed concern about railroads’ lack of crews, power and cars.
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III. Implications
Some utilities are making improvements to prepare for future increases in coal traffic, but many are not.

- Utilities highlighted a wide range of problems impacting their performance.

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

<table>
<thead>
<tr>
<th>Equipment Management</th>
<th>Facility Management</th>
<th>Transportation Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slow process times</td>
<td>Outdated facilities</td>
<td>Slow process times from arrival at power plants to departure</td>
</tr>
<tr>
<td>Outdated equipment</td>
<td>Limited maintenance</td>
<td>Railroad performance</td>
</tr>
<tr>
<td>Small cars</td>
<td>Capital shortages</td>
<td>– Transit times</td>
</tr>
<tr>
<td>Increased repairs</td>
<td>Few performance measures</td>
<td>– Communication</td>
</tr>
<tr>
<td>Car shortages</td>
<td></td>
<td>– Asset availability</td>
</tr>
<tr>
<td>Few performance measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital shortages</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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.