Rail Coal Transportation Rates to the Electric Power Sector

Data for: 2008
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Introduction

The U.S. Energy Information Administration (EIA) is releasing a series of estimated data based on the confidential, carload waybill sample obtained from the U.S. Surface Transportation Board (Carload Waybill Sample). These estimated data represent a continuation of EIA's data and analysis products related to coal rail transportation. These estimated data also address a need expressed by EIA's customers for more detailed coal transportation rate data.

Having accurate coal rail transportation rate data is important to understanding the price of electricity for two main reasons. First, coal-burning electric power plants receive approximately 72 percent of their coal by rail. Second, rail transportation costs account for a sizable share of total delivered costs. While, on average, transportation costs account for approximately 20 percent of total costs, they can reach as high as 59 percent on shipments of coal originating in the Powder River Basin. Because of these two factors, changes to rail transportation costs can have a significant impact on the delivered price of coal and indirectly on electricity prices charged to consumers.

Unlike EIA's prior Coal Transportation Rate Database, which contains transportation data reported by non-jurisdictional utilities on the Federal Energy Regulatory Commission's Form 580 for the years 1979 to 2001, the updated version, known as the Coal Waybill Database, is based primarily on waybills submitted by rail carriers. Also, while the prior Coal Transportation Rate Database includes a variety of transportation modes, the Coal Waybill Database is based only on rail shipments. Due to the different nature of the data sources, users should exercise caution when attempting to combine the two data sets into a single time series.

A "waybill" is an official document created by rail carriers from shipping instructions provided by the shipper. A waybill shows the origin and destination stations, car name and number, consignor and consignee, routing, description and weight of the commodity, cost of transport as well as other details about the shipment. A waybill can include one or more cars and a train can include one or more waybills.

Unlike most other reports with coal transportation rate data – which are based on defined mileage blocks or on national averages – EIA's new Coal Waybill Database and resulting tables allow users to disaggregate the national level data and determine the revenue charged by rail carriers for specific distribution routes. EIA plans to update the coal transportation database on an annual basis after obtaining the most recent Waybill Sample available from the STB.

Nonetheless, the ability of EIA's Coal Waybill Database to accurately estimate coal transportation rates on a State-to-State (or Coal Basin-to-State) basis is related in large part to the number of waybills used to calculate an average rate along a particular route (i.e., the sample size for that particular origin and destination). This means that users should exercise caution when interpreting the significance of State-to-State (or Basin-to-State) rates when the rate was calculated using a relatively small sample. In addition, when examining rate trends over a multiple year period, users typically can be more confident of results when there are large sample sizes for each of the years studied. The same caution should be exercised when comparing the results of one origin-destination pair to another, whether it is on a State-to-State or Coal Basin-to-State basis.

Coal Waybill Database	State to State	Coal Basin to State
Estimated Annual U.S. Rail Transportation Rates for Coal, 2001	xls	xls
Estimated Annual U.S. Rail Transportation Rates for Coal, 2002	xls	xls
Estimated Annual U.S. Rail Transportation Rates for Coal, 2003	xls	xls
Estimated Annual U.S. Rail Transportation Rates for Coal, 2004	xls	xls
Estimated Annual U.S. Rail Transportation Rates for Coal, 2005	xls	xls
Estimated Annual U.S. Rail Transportation Rates for Coal, 2006	xls	xls
Estimated Annual U.S. Rail Transportation Rates for Coal, 2007	xls	xls
Estimated Annual U.S. Rail Transportation Rates for Coal, 2008	xls	xls
Estimated U.S. Rail Transportation Rates for Coal, 2001 - 2008 (1999 real dollars per ton mile)	xls	xls

Additional Information

Earlier Coal Transportation Data (1979 – 2001)
Coal Transportation: Rates and Trends (2004)

Trends in Coal Transportation Rates, 2001 – 2008

Table 1 shows estimated average annual coal transportation rates between coal mines and coal-burning electricity generating plants, as calculated using the Coal Waybill Database. It shows nominal rates increasing by 40 percent between 2001 and 2008 and real rates increasing by almost 11 percent during that same time (although almost all of the increase to real rates occurred between 2007 and 2008). As discussed above, EIA considers these National averages and trends to be an accurate reflection of the market given the relatively large sample of all coal transported to electric power plants.

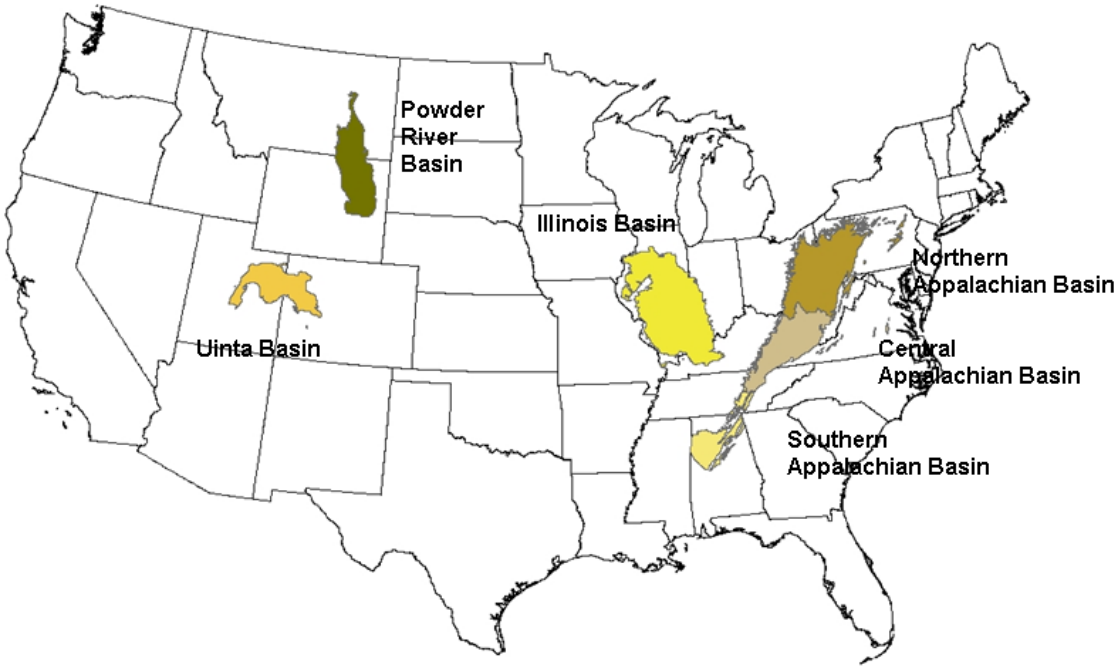
Table 1. U.S. Average Estimated Coal Transportation Rates Between Mines and Power Plants

	2001	2002	2003	2004	2005	2006	2007	2008
Revenue Per Ton Mile (Nominal dollars)	$0.0139	$0.0140	$0.0141	$0.0135	$0.0149	$0.0155	$0.0163	$0.0194
Revenue Per Ton Mile (Real 1999 dollars)1	$0.0131	$0.0131	$0.0128	$0.0119	$0.0125	$0.0126	$0.0129	$0.0145

When the national data is further broken down, it shows a variety of different trends and indicates that different parts of the country experienced different

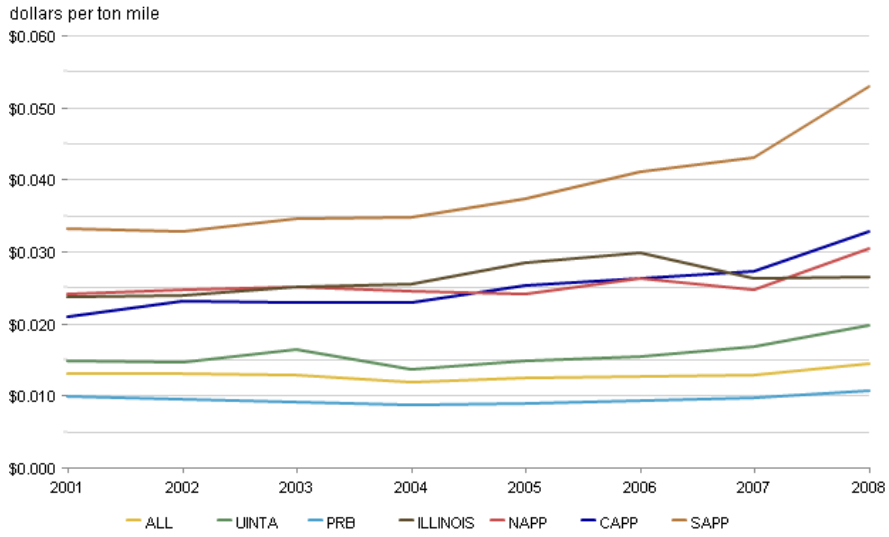
changes to their rates over the period. Whether due to the average lengths of haul, the level of competition, fuel surcharges, or other reasons, the State-to-State and Coal Basin-to-State tables show that waybill rates can vary a great deal depending on the origin-destination pair.

Figure 1: U.S. Primary Coal Basins



In 2001, for example, rail carriers received $0.0105 per ton mile (equivalent to a ton of freight moved one mile) for coal originating in the Powder River Basin (PRB) whereas they received $0.0223 per ton mile (or $0.0099 and $0.0210, respectively, in real terms) for coal originating in Central Appalachia (CAPP). Figure 2 (below) shows these trends in estimated, real average rates for shipments originating in different coal basins in the U.S. as well as the trend for all coal shipments (including those shipments which did not originate in a designated coal basin as defined by EIA). In order to calculate real rates, EIA relied on the Producer Price Index Industry Data for Line-Haul Railroads.

Figure 2. Estimated U.S. Real Rail Transportation Rates for Coal Shipments Originating in Basins

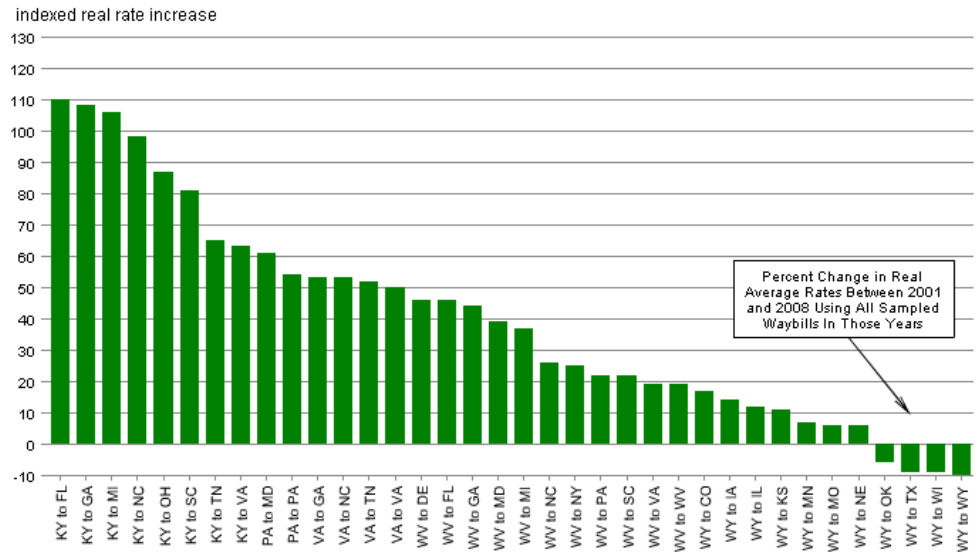


Source: The Surface Transportation Board's "900-Byte" Carload Waybill Sample
Note: The average number of waybills sampled for each origin coal basin between 2001 and 2008 was as follows: Uinta Basin (UINTA): 826; Powder River Basin (PRB): 10,016; Illinois Basin (ILLINOIS): 976; Northern Appalachia (NAPP): 1,463; Central Appalachia (CAPP): 4,551; and Southern Appalachia (SAPP): 252.

Average rates for coal shipments originating in five of the nation's six basins were higher than the average rate for all coal shipments (Figure 2), but so many shipments originated in the Powder River Basin that they significantly pulled down the national average rate.

Similarly, while the average real rate for shipping coal from a mine to a coal-burning electricity generating plant increased by 10.7 percent nation-wide between 2001 and 2008, average rates between specific States varied widely. Figure 3 below shows the percent change in average real rates for those State-to-State routes for which data has been published for both 2001 and 2008. The figure shows that some routes such as Colorado to Colorado, and Kentucky to Florida, Georgia, and Michigan saw average real rates more than double between 2001 and 2008. Other routes such as Wyoming to Oklahoma, Texas, Wisconsin and Wyoming decreased in real terms during that same period. Users should be aware that the number of waybills included in each route varies considerably and impacts how accurately the estimated percent change in rates reflects the actual average change.

Figure 3. Percent Change in Average Real Rates, 2001 to 2008



Source: The Surface Transportation Board's 900-Byte Carload Waybill Sample

EIA also examined the relationship between length of haul and cost. EIA determined that, in general, freight revenue per ton mile decreased as length of haul increased for shipments originating in all parts of the country. However, for the particularly long shipments (those exceeding 1,000 miles), this relationship did not hold and the revenues per ton mile were slightly higher relative to the shorter hauls.

Data Sources and Methodology

The Carload Waybill Sample is a stratified sample (i.e. classified by sub-categories) of select waybills submitted to the Surface Transportation Board (STB) by those rail carriers which terminate at least 4,500 revenue carloads per year. The sampling methodology is based exclusively on the number of carloads in the shipment. The sample is stratified in that each class of trains – characterized by the number of carloads contained in each train set – is sampled at a different rate. For shipments of 101 or more carloads, rail carriers must submit every other waybill for a given year, thereby generating a sample of 50 percent. As the number of carloads in a shipment decreases, rail carriers must submit a lower percentage of waybills. For instance, for shipments of 1 or 2 carloads, rail carriers must submit one out of every 40 waybills, thereby generating a sample of 2.5 percent of the population.

Unlike the public use version of the waybill data, which STB makes available on its website, EIA obtained the confidential version (referred to as "900-byte" by the STB) which includes greater detail such as rail carrier name; and Freight Station Accounting Codes for origin, destination and intermediary stations (the public use file groups shipments by region); and associated revenue, all of which are deleted or "masked" in the public use file. Caution must be used when relying on the revenue field. While that data includes actual contract revenues for each shipment, it also includes (where applicable) an amount of revenue associated with fuel surcharges. Recently, the STB ordered that fuel surcharges be shown as a separate revenue field in future waybill reporting, and EIA expects separate reporting of revenue and fuel surcharges for the 2009 dataset. In addition, contract revenues on the waybills do not necessarily represent the actual amount paid to the rail carrier due to possible rebates and other discounts that are settled periodically. Nonetheless, the revenues reported here through 2008 reflect EIA's best estimate of a shipment's transportation rate.

The purpose of the Carload Waybill Sample is to analyze shipments across the entire country as a whole and not along any particular route. However, EIA determined that it could use the Coal Waybill Database to reasonably approximate average coal transportation rates in the U.S. and on a State-to-State (and Coal Basin-to-State) basis for two reasons:

- Coal is most often shipped in trains of at least 100 carloads and thus subject to a 50 percent sampling rate (according to the Association of American Railroads (AAR), around 95 percent of coal transported by rail moves in such trains); and
- Coal is shipped by rail in such volume that the sampled waybills produce a particularly large number of shipments (on average, more than 35,000 waybills were sampled annually between 2001 and 2008, representing almost half of all coal shipped by rail in the United States).

While EIA's new Coal Transportation Rata Database is based primarily on the confidential Carload Waybill Sample obtained from the STB, the published results are also the result of additional adjustments and improvements. The biggest improvement entailed mapping rail carrier stations with actual mines and coal-burning electricity generating plants so that EIA could differentiate (and isolate) those coal shipments pertaining to electric generators from those going to/from various ports, junction stations, and coal-fired manufacturing facilities. EIA accomplished this by manually reviewing a variety of industry publications, reference books, and websites. While EIA was not able to identify all of the stations appearing in the Carload Waybill Sample (especially the smaller ones, which handle a small number of carloads per year), those stations that EIA did identify handle approximately 95 percent of all coal shipments by volume included in the Carload Waybill Sample. Moreover, EIA was able to successfully identify 187 of the 200 largest coal shippers and 194 of the 200 largest coal receivers by volume.

By limiting its analysis to only those shipments that originated at a known coal mine and terminated at a known coal-burning electricity generating plant, EIA was able to achieve two key results. First, EIA was able to isolate those shipments that directly affect the U.S. electricity industry; second, EIA was able to eliminate waybills terminating at interchange points or ports rather than at a coal-burning electricity generating plant. (Those shipments typically billed by one railroad for their "leg" of a through movement are known as the Association of American Railroads' Accounting Rule 11 shipments). By excluding such waybills from its analysis, EIA was able to ensure that its results were not influenced by those intermediate shipments that could skew results for a State with numerous such junction points, for example, Illinois (Chicago Gateway) or Missouri (St Louis). As the majority of shipments billed under Rule 11 originated in the Powder River Basin and terminated in the eastern United States, users should exercise caution when drawing conclusions about these shipments because the new Coal Waybill Database only captures waybills billed as "through rates" (i.e. the costs of both legs were combined in a single invoice rather than being billed separately under Rule 11).

EIA also strengthened the database by including additional data such as price deflators and coal basin definitions. EIA also adjusted the Carload Waybill Sample for changes which might have occurred since the record was submitted (e.g. changes to county names or sales of short-line rail carriers) and for errors such as duplicate waybills and obviously incorrect data.

In addition to strengthening the database itself, EIA also needed to determine whether it accurately represented coal transportation by rail in the United States. EIA conducted an extensive analysis by comparing the database to data it collects on EIA surveys and to publicly-available industry reports. EIA concluded that, subject to the limitations explained above, the database is a reliable estimation of rail transportation of coal in the United States for the years 2001 to 2008. Note that EIA also received from the U.S. Surface Transportation Board carload waybill samples for the year 2000 but determined that it did not accurately represent coal movements due to a significantly smaller sample size relative to the data received for the other years.

Once EIA had completed the Coal Waybill Database, EIA applied the suppression methodology stipulated by STB pursuant to its codified regulation to ensure that no confidential data was released. The STB has reviewed our results and has agreed to the release of the data in EIA's Coal Waybill Database. The methodology states that data can only be published for those aggregations where there are at least three different freight stations at the points of origin and destination as identified by the Freight Station Accounting Code (FSAC) on one railroad or there must be at least two or more FSACs than there are railroads present in the waybill data being aggregated at both the points of origin and destination.

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