

ASSOCIATION  
OF AMERICAN  
RAILROADS

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September 5, 2017

The Honorable Cynthia T. Brown  
Chief, Section of Administration  
Office of Proceedings  
Surface Transportation Board  
395 E Street, SW  
Washington, DC 20423-0001

Dear Ms. Brown:

This submission is the AAR forecast of the fourth quarter 2017 All-Inclusive Index and Rail Cost Adjustment Factor, filed in Ex Parte No. 290 (Sub-No. 5) (2017-4) *Quarterly Rail Cost Adjustment Factor*. The versions of RCAF-related indices covered in this filing are: the All-Inclusive Index (initiated in the second quarter of 1985), the Unadjusted RCAF (produced since October 1982), the Adjusted RCAF (first published in the second quarter of 1989), and the RCAF-5 (created by the STB in its Ex Parte No. 290 (Sub-No. 7) decision served October 3, 1996). The table below summarizes the fourth quarter 2017 results on the fourth quarter 2012 base, and shows the percentage changes from the previous quarter.

	<u>2017Q3</u>	<u>2017Q4</u>	<u>% Change</u>
All-Inclusive Index	90.3	89.8	-0.6
Preliminary RCAF	0.903	0.898	-0.6
Forecast Error Adjustment	0.000	-0.009	
RCAF (Unadjusted)	0.903	0.889	-1.6
Productivity Adjustment Factor	2.4072	2.4192	
RCAF (Adjusted)	0.375	0.367	-2.1
PAF-5	2.5323	2.5412	
RCAF-5	0.357	0.350	-2.0

In its October 3, 1996 decision in Ex Parte No. 290 (Sub-No. 7), *Productivity Adjustment - Implementation*, the STB noted its intent to publish, in addition to the RCAF (Unadjusted) and RCAF (Adjusted), an RCAF-5 (i.e., a calculation of the productivity adjusted RCAF values as if the agency had always used a 5-year rolling average to calculate the productivity adjustment). In response to a request by STB staff, the AAR is including a calculation of the RCAF-5 in its quarterly RCAF filing. The AAR and its members, however, do not believe the publication of a third RCAF index is required or permitted by the applicable statute (49 U.S.C. § 10708) and do not endorse its publication.

Our quarterly non-proprietary work papers underlying this submission are e-filed herewith, in accordance with the ICC's order in Ex Parte No. 290 (Sub-No. 2), *Railroad Cost Recovery Procedures*, served February 8, 1990. We have notified Pedro Ramirez, in the STB office handling this proceeding, of our plan to e-file the submission and non-proprietary work papers. A second copy of the submission and non-proprietary work papers, plus selected highly confidential work papers, will be hand-delivered to Mr. Ramirez's Data Collection and Auditing Team. All work papers are available for STB inspection. Questions should be directed to me or Clyde Crimmel (202 639-2309) of this office.

Sincerely,



John T. Gray

Attachments

**Fourth Quarter 2017  
All-Inclusive Index**

**Ex Parte No. 290 (Sub-No. 5) (2017-4)**

**Quarterly Rail Cost Adjustment Factor  
Surface Transportation Board**

**Policy and Economics Department  
Association of American Railroads**

**September 5, 2017**

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## Introduction

On January 2, 1985, the Interstate Commerce Commission (ICC) adopted the All-Inclusive Index as the basis for the Rail Cost Adjustment Factor (RCAF). The quarterly projection of railroad costs, as documented herein, employs the All-Inclusive Index as required by the regulations. Also presented in this submission is the RCAF, both Adjusted and Unadjusted, as required by the ICC in its decision in Ex Parte No. 290 (Sub-No. 4), Rail Cost Recovery Procedures - Productivity Adjustment, served March 24, 1989. In addition, the AAR has included the RCAF-5, which was instituted by a Surface Transportation Board decision served October 3, 1996 in Ex Parte No. 290 (Sub-No. 7), *Productivity Adjustment - Implementation*. The AAR and its members do not believe the additional productivity-adjusted index is required or permitted by the applicable statute, and do not endorse its publication.

This quarter's projection of railroad costs is for the fourth quarter 2017. The All-Inclusive Index utilizes new weights (see page 2), which are based on 2016 Annual Report Form R-1 data. New annual report and wage statistics data have also been utilized to rebenchmark labor (see Appendix A), and the annual report data have also been used to update the Interest Index (see Appendix F).

Calculations for the Productivity Adjustment Factor (page 5) utilize the Surface Transportation Board's latest Productivity Adjustment decision, which was served on February 24, 2017. That decision said that the Board is "tentatively adopting 1.020 (2.0% per year) as the measure of average (geometric mean) change in railroad productivity for the 2011-2015 (five-year) period." The STB expressed concern that a "change in the way distances are measured" in the 2015 Waybill Sample would inappropriately skew the Output Index used in the productivity change calculation. Because of this concern, the STB developed a linking factor with the stated goal of eliminating changes to its Output Index caused by the methodology change. The Board also held a technical conference with interested parties on February 28. Comments on the Productivity Adjustment decision were due by March 16, and replies were due by April 5. In a decision served March 16, the deadline for comments was suspended pending further order of the Board. On April 11, the Board announced that issues involving the mileage portion of the Carload Waybill Sample were not resolved, causing delays for related products that rely on that data source.

At the time of this September 5 RCAF filing, there remain questions about the Board's new mileage methodology, its linking process, and the resulting Output Index and Productivity Change. Although the tentative productivity adjustment adopted in the Productivity decision became effective on March 1, the Board has not yet taken any further action to determine if its decision is final or requires modification. For the purposes of this filing, the RCAF (Adjusted) is affected by the Productivity decision, and the AAR has made its calculations as if the decision is final. The second productivity-adjusted RCAF, the RCAF-5, will not be affected by this decision until the beginning of 2018. Should the Productivity Change be adjusted by further Board action, the calculations in this filing would necessarily need to be adjusted also.

## Index Weights

In the Ex Parte No. 290 (Sub-No. 2) final rules, issued in April 1981, the Interstate Commerce Commission mandated that the weights of each major cost component be updated annually. These "external" weights are calculated using data from Schedules 410 and 210 of the R-1 annual report filed with the Surface Transportation Board by the Class I railroads. The weights are typically updated with the fourth quarter projection.

The 2016 (current) and 2015 (previous) weights are shown below. Weights calculated from 2015 data were used for the fourth quarter of 2016 through the third quarter of 2017. Beginning with the fourth quarter of 2017, weights calculated using 2016 data are used.

Traffic and fuel prices were down again in 2016, causing expenses for most categories to decline. The Fuel and Materials & Supplies categories had double-digit percentage decreases in expenses, and this caused them to be the two categories that had decreases in weights. Depreciation and Interest, the two categories with increased expenses in 2016, had increases in their weights. While Labor, Equipment Rents, and Other all had 5 to 6 percent decreases in expenses, their weights increased because of the larger drops for Fuel and Materials & Supplies. Weights for Labor and Other are the highest they have been since 2004, while Fuel's weight is the lowest it has been since 2003. Depreciation's weight, perhaps pushed by recent spending for Positive Train Control, is the highest it has ever been.

<b>Weights for RCAF's All-Inclusive Index</b>		
	<b>2016</b>	<b>2015</b>
Labor	35.6 %	35.0 %
Fuel	10.7	13.4
Materials & Supplies	5.0	5.4
Equipment Rents	5.9	5.8
Depreciation	15.6	13.9
Interest	2.2	1.9
Other	25.0	24.6
Total	100.0	100.0

Reweightings of the index is accomplished by calculating both the current quarter (normally the fourth) and prior (normally the third) quarter indexes with the new weights. The relative change between the two quarters is then multiplied times the prior quarter (usually the third) *linked* index. Use of this method ensures that the weight change, by itself, does not cause a change in the level of the All-Inclusive Index.

Internal weights in the labor and equipment rents components are updated at the same time as the external weights. When these weights are changed, they are also linked using the procedure described above in order to eliminate the effect of the change in weighting.

## All-Inclusive Index Fourth Quarter 2017

The components and values of the current and previous All-Inclusive Indexes are shown below. Details of the construction of each component of the index are contained in the Appendices.

	2016 Weights	Forecast		Percent Change
		Previous 2017Q3	Current 2017Q4	
1. Labor	35.6%	422.8	415.1	-1.8 %
2. Fuel	10.7%	202.3	215.5	6.5
3. M&S	5.0%	252.6	254.8	0.9
4. Equipment Rents	5.9%	223.8	223.9	0.0
5. Depreciation	15.6%	225.1	226.3	0.5
6. Interest	2.2%	60.6	60.5	-0.2
7. Other	25.0%	224.3	221.4	-1.3
8. Weighted Average				
a. 1980 = 100		290.5	288.8	
b. 1980 = 100 (linked)		268.7	267.1 <sup>1</sup>	
c. 4Q12 = 100		90.3	89.8 <sup>2</sup>	-0.6

Note: New weights are utilized. The linked index is always unchanged in this linking procedure. However, the 290.5 weighted average for 2017Q3 has been recalculated with 2016 weights to eliminate any changes in the fourth quarter index that would be caused by changing weights. The original Q3 weighted average with 2015 weights is 289.3.

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$$\begin{aligned}
 {}^1 \text{ Index80} &= (\text{Current Index} / \text{Previous Index}) * \text{the Previous Quarter Linked Index} \\
 &= (288.8 / 290.5) \times 268.7 \\
 &= 267.1
 \end{aligned}$$

$$\begin{aligned}
 {}^2 \text{ To calculate the 4Q12 = 100 index:} \\
 \text{Index4Q12} &= (\text{Current Linked Index} / \text{4Q12 Basing Factor}) * 100 \\
 &= 267.1 \text{ divided by } 297.6 \text{ times } 100 \\
 &= 89.8
 \end{aligned}$$

Indexes based on other periods:

- 4Q07 based index = 267.1 / 245.9 x 100 = 108.6
- 4Q02 based index = 267.1 / 192.1 x 100 = 139.0
- 4Q97 based index = 267.1 / 173.2 x 100 = 154.2
- 4Q92 based index = 267.1 / 156.9 x 100 = 170.2
- 4Q87 based index = 267.1 / 132.2 x 100 = 202.0

## Forecast vs. Actual All-Inclusive Index Second Quarter 2017

Because of data availability, the forecast error adjustment has a two-quarter lag from each filing. As shown below, the second quarter actual index of 89.9 is 0.9 index points below the forecast value of 90.8. Therefore, the forecast error adjustment for fourth quarter 2017 is -0.9 index points.

	2015 Weights	Second Quarter 2017		Amt Difference
		Forecast	Actual	
1. Labor	35.0%	421.4	421.4	
2. Fuel	13.4%	218.2	205.7	
3. M&S	5.4%	264.8	264.8	
4. Equipment Rents <sup>1</sup>	5.8%	222.6	223.8	
5. Depreciation	13.9%	223.2	225.1	
6. Interest	1.9%	60.6	60.6	
7. Other	24.6%	222.3	223.5	
8. Weighted Average				
a. 1980 = 100		290.8	289.8	
b. 1980 = 100 (linked)		270.1	267.4 <sup>2</sup>	
c. 4Q12 = 100 <sup>3</sup>		90.8	89.9	-0.9

**Forecast error** —————> **-0.9 index points**

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1	2015 Weights	Second Quarter 2017	
		Forecast	Actual
Car-Hire	58.2%	204.1	204.5
Lease Rentals	41.8%	222.3	223.5
Weighted Average		211.7	212.4
Weighted Average (linked)		222.6	223.8

<sup>2</sup> Linked actual index = (actual index / previous actual index) x previous linked actual index.  

$$267.4 = 289.8 / 289.9 \times 267.5$$

<sup>3</sup> The 4Q12 based indexes are 1980 based indexes divided by the 4Q12 basing factor (297.6/100).  
 Other basing factors are: 4Q07 = 245.9; 4Q02 = 192.1; 4Q97 = 173.2; 4Q92 = 156.9; and 4Q87 = 132.2.



# Productivity

On February 24, 2017, the Surface Transportation Board (STB) served a decision in Ex Parte 290 (Sub-No. 4) which tentatively adopted 2.0 percent as the geometric average productivity change for the five most recent years available. Their calculation added the year 2015 and removed the year 2010. In addition, it should be noted that the Board was concerned enough with its decision to calculate a tentative value, sponsor a technical conference, solicit public comment, and to state that it would "take further action, as appropriate, to determine whether the tentative productivity adjustment is final or requires modification". At the time (September 5) of this filing, there are still questions about the 2015 Output Index, and it is possible that the Productivity Adjustment Factors used with the RCAF could change.

The components of this average annual value are shown on the following table in ratio format – therefore, 1.020 is the same as an increase of 2.0 percent. Productivity changes are calculated by multiplying each of the five productivity changes together and taking the result to the one-fifth power. The productivity adjustment factors (PAF) for each quarter are calculated by increasing the previous quarter's PAF by quarterly versions of the annual rate, which are the fourth root of the geometric average annual growth rate. The difference between the PAF and the PAF-5 is the timing of the five-year productivity trend.

<b>Comparison of Output, Input, &amp; Productivity</b>			
<b>2011 - 2015</b>			
Year	Output Index (1)	Input Index (2)	Productivity Changes (3)
2011	1.041	1.039	1.001
2012	1.007	0.999	1.008
2013	1.022	1.018	1.003 *
2014	1.055	1.036	1.018
2015	1.041	0.972	1.070
<b>Average</b>			<b>1.020</b>
Previous Average (2010-2014)			1.014

\* The STB revised this number in its February 24, 2017, corrected decision.

<b>Calculation of PAF and PAF-5</b>			
For 2011-2015, use fourth root of avg. productivity change = 1.0050			
For 2010-2014, use fourth root of avg. productivity change = 1.0035			
Quarter	Year	PAF	PAF-5
Q1	2017	2.3833	2.5147
Q2	2017	2.3952	2.5235
Q3	2017	2.4072	2.5323
Q4	2017	2.4192	2.5412
Q1	2018	2.4313	2.5539

## Rail Cost Adjustment Factor Fourth Quarter 2017

Four RCAF values are presented in this filing. Two are not modified for productivity (Preliminary RCAF and RCAF Unadjusted), and two incorporate a productivity calculation (RCAF Adjusted and RCAF-5). The All-Inclusive Index and all four RCAF values, plus the percent change for each, are shown below. Note that, beginning with 2013Q1, the All-Inclusive Index is on a 2012Q4=100 basis.

	Previous 2017Q3	Current 2017Q4	Percent Change
All-Inclusive Index <sup>1</sup>	90.3	89.8	-0.6
Preliminary RCAF <sup>2</sup>	0.903	0.898	-0.6
Forecast Error Adjustment <sup>3</sup>	0.000	-0.009	
RCAF (Unadjusted) <sup>4</sup>	<u>0.903</u>	<u>0.889</u>	-1.6
Productivity Adjustment Factor <sup>5</sup>	<u>2.4072</u>	<u>2.4192</u>	
RCAF (Adjusted) <sup>6</sup>	0.375	0.367	-2.1
PAF-5 <sup>7</sup>	2.5323	2.5412	
RCAF-5 <sup>8</sup>	0.357	0.350	-2.0

<sup>1</sup> See All-Inclusive Index on page 3.

<sup>2</sup> All-Inclusive Index divided by the All-Inclusive Index in the base period (100.0).

<sup>3</sup> The current figure is from Forecast vs. Actual All-Inclusive Index in this filing (page 4). The previous quarter figure is shown in a similar section of the previous quarter's filing.

<sup>4</sup> Preliminary RCAF plus the forecast error adjustment.

<sup>5</sup> See Productivity on page 5.

<sup>6</sup> RCAF (Unadjusted) divided by the Productivity Adjustment Factor (PAF).

<sup>7</sup> See Productivity on page 5.

<sup>8</sup> RCAF (Unadjusted) divided by the PAF-5.

# Appendixes

## Labor

### Fourth Quarter 2017

The fourth quarter 2017 Labor Index decreased 1.8 percent from the previous quarter. Rebenchmarking was the biggest contributor to the change.

**Rebenchmarking and Reweighting:** Rebenchmarking, as well as updating the internal weights (i.e., the proportion of labor costs represented by wages and supplements, respectively), is reflected each year in the fourth quarter filing. The Labor rate is basically a group of benchmarks from annual data that are updated each quarter using additional information such as labor agreements, payroll tax rates, health & welfare rates, and other data. By rebenchmarking to newer annual data, the number of quarterly updates (the "distance") from the benchmark year to the current quarter becomes smaller – increasing the probability that the updated values match reality. Therefore, the impact of rebenchmarking is captured in the Labor Index, and by itself can cause a change in the index.

The new benchmark year is 2016, and data for that year replaces data for 2015. One of the major data sources underlying the fourth quarter rebenchmarking is the Annual Report Form R-1 submitted to the Surface Transportation Board (STB) by each Class I railroad. The other major data source is the 112-Class Wage Statistics report received by the Association of American Railroads (AAR) from each Class I railroad. This report matches the totals in the less-detailed Wage Form A&B submitted to the STB. The extra detail allows the AAR to divide the wage statistics by labor union, which enables wage rate updates to be more accurate. Data from the two major sources are used for labor benchmarks, and the annual report data are also used to calculate index weights.

The source for the wage and supplements internal weights, like the external weights, is the Annual Report Form R-1 Summary. Unlike rebenchmarking, reweighting by itself is prevented from causing a change in the index. A linking process, where the previous quarter unlinked index is recalculated using the new weights, eliminates changes that would be caused solely by changing weights.

### Wage Rate Index

The Wage Rate Index portion of the Labor Index declined 1.5 percent. Almost all of the change was caused by rebenchmarking to 2016 wage statistics. Lower non-union bonuses in 2016 (compared to 2015) were the significant contributor to a lower wage rate benchmark. Other possible contributors to the lower benchmark are changes in employee mix and age distribution.

**Wage Increases:** No wage increases are currently scheduled for the fourth quarter.

**Lump Sums:** The fourth quarter Lump Sum rate is 2.8 cents higher from the prior quarter. Most of the change (2.7 of 2.8 cents) was caused by rebenchmarking. One quarterly amount from last year became fully amortized and removed from the index.<sup>1</sup> A new quarterly bonus amount was added for a bonus paid in the third quarter 2017. This amount was slightly larger than the amount removed, which caused an increase of 0.1 cents.

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<sup>1</sup> Index procedure, decided in 1988, is to amortize lump sums and back pay over four quarters using the rates for 13-week (a.k.a. 3-month) Treasury bills.

## Labor

### Fourth Quarter 2017

**Back Pay:** The Back Pay rate increased by 0.1 cents. The entire change was caused by rebenchmarking. No new back pay amounts were added, and none became fully amortized and removed from the index.

**Other:** In wages, "Other" contains the amortization of incentive payments that a railroad makes each year to its dispatchers, yardmasters, and engineers. Rebenchmarking caused this rate to increase 1.1 cents. An increase of an additional 0.1 cents was caused by a higher Treasury bill rate used for amortization.

### Supplements Index

The Supplements Index decreased 2.2 percent. The change was the net result of rebenchmarking, lower taxable earnings, and fewer 401(k) matches.

**Health & Welfare:** The Health & Welfare rate decreased 0.7 percent. This change was caused entirely by rebenchmarking.

**Railroad Retirement:** The Railroad Retirement rate decreased 2.4 percent because of a combination of rebenchmarking and lower taxable earnings.

**Unemployment Insurance:** The Unemployment Insurance tax rate increased by 0.2 cents because of rebenchmarking.

**Other:** The "Other" category is a reflection of all other fringe benefits, and currently contains known employer contributions to employee 401(k) accounts and employer contributions to employee stock plans that are recorded as fringe benefits. The fourth quarter rate dropped 13.9 cents. The lower rate was the net result of rebenchmarking and fewer employer contributions for stock and 401(k) accounts.

### Labor Index Calculation

As shown in Table A-1 on the next page, the 1.5 percent decrease in the Wage Rate Index and the 2.2 percent decline in the Supplements Index combined to cause the Labor Index to fall 1.8 percent from the previous quarter. The linked fourth quarter 2017 Labor Index is 415.1, which is 2.5 percent higher than one year ago. The linked fourth quarter 2017 index of 415.1 is determined by multiplying the third quarter linked index of 422.8 times the change between the fourth quarter Labor Index (435.4) and the original third quarter Labor Index recalculated (443.5) using the original third quarter Wage Rate and Supplements indexes weighted with the new 2016 weights. This method eliminates changes caused by the new weights, but captures changes caused by rebenchmarking. The purpose of the center "Updated to Reflect..." column in Table A-1 is only to enable the reader to discern the impact of rebenchmarking.

**Labor**  
**Fourth Quarter 2017**  
**Table A-1 Labor Index**

	2017Q3		2017Q4	
	Used in Previous Index Filing	Updated to Reflect New Benchmarks	Based on 2016 Data	Pct Chg From Prev. Filing
<u>Base Wage</u> – Straight Time & Pay For Time Not Worked	\$40.721	\$40.058	\$40.058	-1.6%
Adjustments:				
Lump Sum	0.284	0.311	0.312	9.9%
Back Pay	0.010	0.011	0.011	10.0%
Other	0.124	0.135	0.136	9.7%
<b>Total Wages</b>	41.139	\$40.515	40.517	-1.5%
Health & Welfare Benefits	8.851	8.793	8.793	-0.7%
RR Retirement & Medicare	8.554	8.344	8.345	-2.4%
Unemployment Insurance	0.321	0.323	0.323	0.6%
Other	0.275	0.301	0.136	-50.5%
<b>Total Supplements</b>	\$18.001	\$17.761	\$17.597	-2.2%
Total Labor (a check sum only)	\$59.140	\$58.276	\$58.114	
<b>Wage Rate Index<sup>1</sup></b>	352.1	346.7	346.7	-1.5%
<b>Supplements Index<sup>2</sup></b>	665.2	656.4	650.3	-2.2%
Total labor Index, 2015 Weights <sup>3</sup>	441.3			
Total labor Index, 2016 Weights <sup>4</sup>	443.5	437.1	435.4	
<b>Labor Index (linked)<sup>5</sup></b>	422.8		<b>415.1</b>	-1.8%

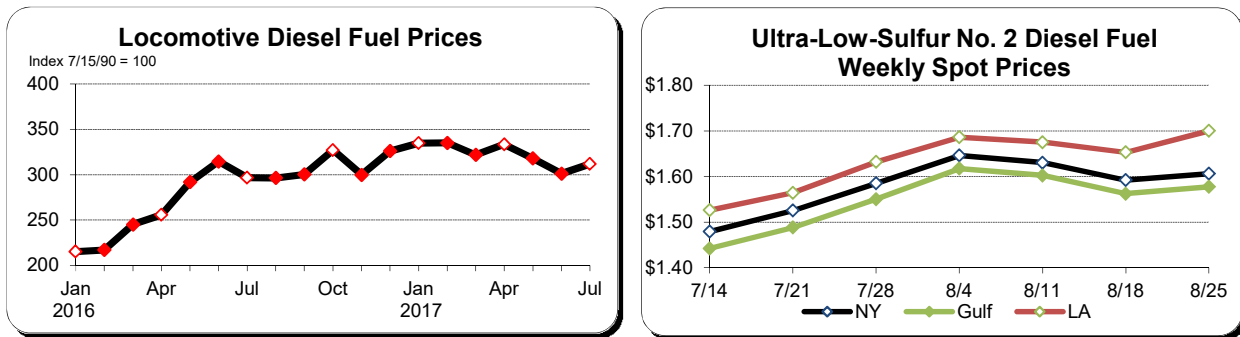
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<sup>1</sup> 1980 wage rate \$11.685  
<sup>2</sup> 1980 supplements rate \$2.706  
<sup>3</sup> 2015 weights: wages, supplements 71.5% 28.5%  
<sup>4</sup> 2016 weights: wages, supplements 70.8% 29.2%  
<sup>5</sup> 2017Q4 linked Index = 2017Q3<sub>linked</sub> x (2017Q4<sub>WT2016</sub> / 2016Q3<sub>WT2016</sub>)  
= 422.8 x 435.4 / 443.5

## Fuel Fourth Quarter 2017

The forecast for fuel is based on: (1) a survey of railroad fuel purchasing officers concerning current price and volume levels, (2) expectations of railroad purchasing officers based on their own forecast models and discussions with their major suppliers, and (3) a consensus of petroleum industry experts and general business publications. Fuel purchases are assumed to remain in inventory for 30 days before the fuel is consumed (and therefore expensed). Therefore, prices *paid* in the first month of each quarter are for fuel *expensed* in the second (or middle) month of the quarter, and the middle month expensed is used to represent each quarter.

The average locomotive diesel fuel price for January 2016 was the lowest in over 10 years. Since that time, prices have trended upward. While average prices for locomotive diesel fuel are available only through July 2017, data through four weeks of August are available for related fuel types. According to the Energy Information Administration, weekly spot prices for Ultra-Low-Sulfur Diesel Fuel\* increased for the week ended August 25, and are higher than they were in mid-July. The chart below (on left) shows the AAR's Monthly Locomotive Diesel Fuel Price Index from January 2016 through July 2017. The second chart (on right) shows recent spot prices for Ultra-Low-Sulfur No. 2 Diesel Fuel as reported by the Energy Information Administration.



On August 25, a Category 4 hurricane made landfall northeast of Corpus Christi, Texas. The slow-moving storm caused considerable flooding in the Corpus Christi-Houston area, affecting numerous refineries representing more than 30 percent of U.S. refining capacity. Area ports and a major pipeline that delivers fuel to the east coast were also affected, and the availability of their workforce is an unknown. As of August 28, daily spot prices for Ultra-Low-Sulfur No. 2 diesel fuel were already 8 to 12 percent higher than their July average. Railroads expect higher prices for fuel, and also have immediate concerns about fuel availability in the east. Locomotive diesel fuel prices for Q4 (October) are expected to be 6.5 percent higher than their forecast for Q3 (July). Because the July forecast was too high, the Q4 forecast is 11.9 percent higher than the average price railroads actually paid in July.

Forecast Fuel Index (1980 = 100)	215.5
Change from previous quarter forecast	6.5%
Change from previous quarter actual	11.9%

\* Heating oil, Ultra-Low-Sulfur No. 2 Diesel Fuel, and locomotive diesel fuel are part of a group of closely related products, commonly labeled as distillates, that differ mostly by their sulfur content. Because of these similarities, these fuels are produced together and have similar pricing trends.

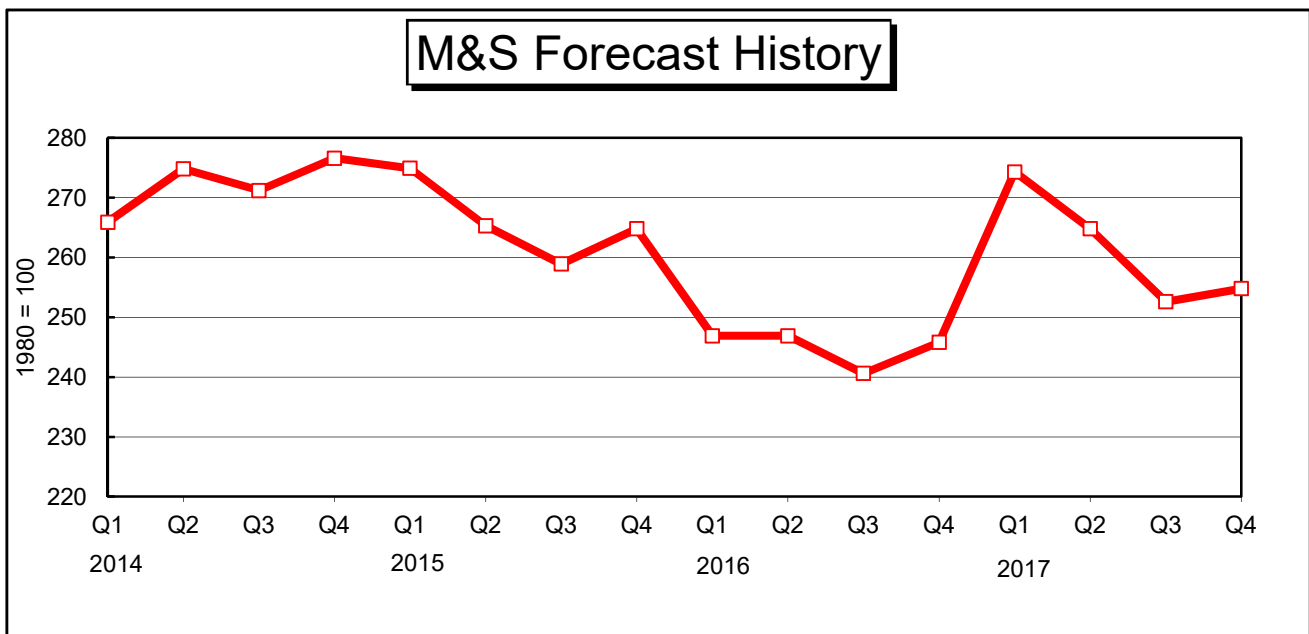
## Materials & Supplies Fourth Quarter 2017

The fourth quarter 2017 Materials & Supplies Index is up 0.9 percent. The Index for Miscellaneous Products rose 3.2 percent, while the other two major components decreased. The Index for Forest Products fell 1.3 percent, while Metal Products dropped 0.7 percent. The Materials & Supplies Index continues to be lower than its values for all of 2014.

2017Q4 Materials & Supplies Index = 254.8

2017Q3 Materials & Supplies Index = 252.6

Difference	2.2 basis points
	or
	0.9 %





## Equipment Rents Fourth Quarter 2017

The Equipment Rents Index consists of two components – car hire and lease rentals. The methodology used to create these two components and the final Equipment Rents Index are explained below.

### Car Hire

The car hire component is indexed using data from the Car Hire Accounting Rate Master (CHARM) file. Car hire rates for the forecast quarter are estimated based on data for active freight cars using the most recent data available. For the first quarter, December 1 of the previous year is typically used. For the second, third and fourth quarters; March 1, June 1, and September 1 are usually used, respectively. Using data retrieved from the latest CHARM file, an average rate per car is developed. Next, those average rates are grouped into four car type categories to create an overall summary of car hire rates. The summary rates are then compared from quarter to quarter, and weighted, to determine the Car Hire Index. In each fourth quarter filing, new weights for the four categories are used based on annual report data. The standard linking procedure is used to eliminate any changes to the Car Hire Index that would be caused solely by changing weights.

### Lease Rentals

The lease rentals portion of the Equipment Rents Index uses the Producer Price Index for Industrial Commodities less Fuel and Related Products and Power (PPI-LF). The Commission adopted this surrogate in its decision served March 13, 1987. The AAR uses six years of historical data to derive its forecast for the PPI-LF. The forecast is used not only for lease rentals, but also for the "Other" component of the All-Inclusive Index. Appendix G discusses the forecast in more detail.

### Equipment Rents Index Calculation

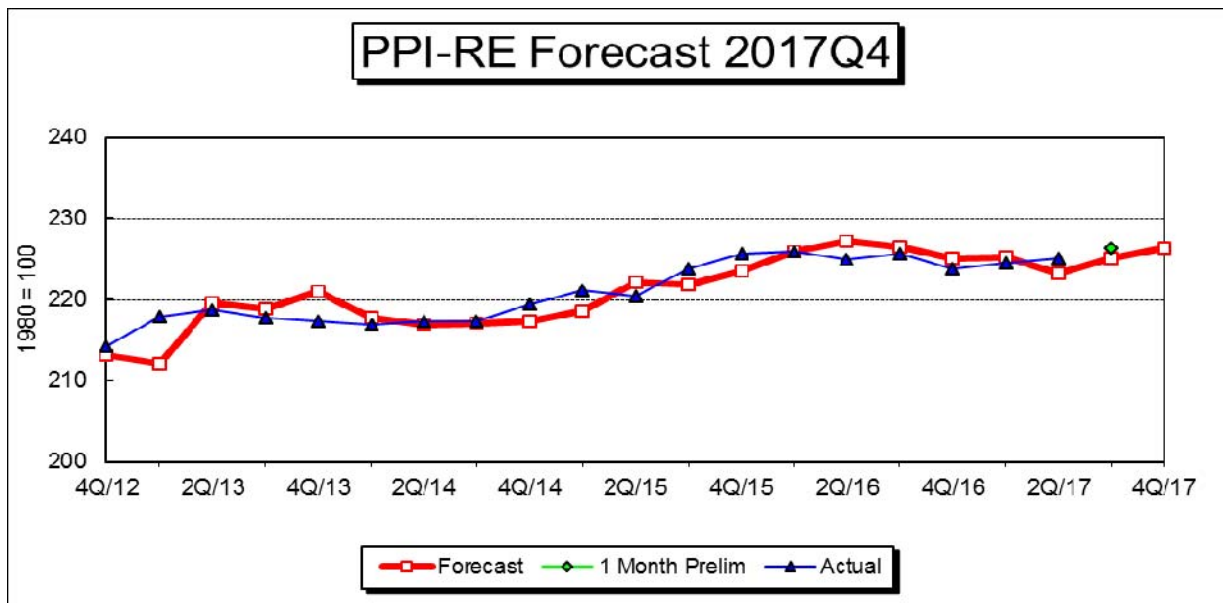
The table below calculates the Equipment Rent Index, and features new weights based on 2016. To eliminate any changes caused by the new weights, the third quarter weighted average (but not the linked value) has been recalculated using the new weights. However, because the weights changed by only 0.1 percentage points, the third quarter weighted average rounds to the same number using 2015 and 2016 weights. The fourth quarter Car Hire portion of the Index rose 1.2 percent because of higher rates for privately-owned cars. Tank car rates had the biggest impact on the higher average. Auto rack rates were also higher. A 1.3 percent decrease for the projected PPI-LF (See Appendix G) used as a proxy for Lease Rentals, combined with the 1.2 percent increase for Car Hire, caused the Equipment Rents Index to increase by 0.1 index points. On a percentage basis, the increase is less than 0.05 percent, which rounds to 0.0 percent in the table below.

	2016 Weight	2017Q3	2017Q4	Percent Change
Car Hire	58.3%	204.5	206.9	1.2 %
Lease Rentals	41.7%	224.3	221.4	-1.3
Weighted Average		212.8	212.9	0.0
Weighted Average (Linked)		223.8	223.9	0.0

## Depreciation Fourth Quarter 2017

The Producer Price Index for Railroad Equipment (PPI-RE) is used to index depreciation expense. The PPI-RE is forecast using an ARIMA (Auto-Regressive Integrated Moving Average) process where a statistical package picks the model that best fits the historical data set (see next page), and that model is then used for the forecast. The historical data set contains 6 years of monthly data (a sample size of 72), where the most recent available data point is the first month of the quarter prior to the forecast quarter. For a first quarter forecast, the most recent month of data available would be for October of the prior year. For a second quarter forecast, January would normally be the most recent period available. April and July would be the most recent months available for third and fourth quarter forecasts, respectively. The output from the forecast model is shown on page 2 of this appendix on a 1982=100 basis. The figure forecast by the model is a 0.5 percent increase from the previous quarter's forecast, and matches the value for the most recent month available.

Forecast of Depreciation Index (1982=100)	204.6
Forecast of Depreciation Index (1980=100)	226.3
Change from previous quarter forecast	0.5%
Change from actual first month of previous quarter	0.0%
Change from same quarter of prior year (actual)	1.1%



## Depreciation Fourth Quarter 2017

### PPI RAILROAD EQUIPMENT

Using rule-based logic, the program narrowed down the choice to exponential smoothing or Box-Jenkins. The program performed an out-of-sample test to select between these two approaches. The rolling out-of-sample test used a maximum horizon of 12 and generated 78 forecasts for each method. The cumulative MAD for Exponential smoothing was 1.55, and for Box-Jenkins was 1.08.

Based on the lower Mean Absolute Deviation, Box-Jenkins was selected

#### Forecast Model for PPIRE

Box-Jenkins ARIMA(0, 1, 0)

#### Within-Sample Statistics

Sample size	72	No. parameters	0
Mean	197.92	Std. deviation	5.13
R-square	0.96	Adj. R-square	0.96
Durbin-Watson	2.44	Ljung-Box(18)	18.8 P=0.59
Forecast error	1.05	BIC	1.05
MAPE	0.38	SMAPE	0.38
RMSE	1.05	MAD	0.74
MAD/Mean Ratio	0		

#### Actual Values for the Most Recent 6 Periods:

Date	Actual
2017-Feb	204.1
2017-Mar	203.3
2017-Apr	203.5
2017-May	203.4
2017-Jun	203.5
2017-Jul	204.6

#### Forecasted Values

Date	2.5 Lower	Forecast	97.5 Upper
2017-Aug	202.524	204.600	206.676
2017-Sep	201.664	204.600	207.536
2017-Oct	201.004	204.600	208.196
2017-Nov	200.447	204.600	208.753
2017-Dec	199.957	204.600	209.243
QTR AVG	200.469	204.600	208.731

## Interest Fourth Quarter 2017

The Interstate Commerce Commission, in its decision served February 28, 1989, revised the All-Inclusive Index methodology to include a specific interest component, which is to track changes in the average interest rate from year to year. The interest rate is essentially the embedded cost of debt, i.e., total interest expense divided by average total long term debt.

*The interest rate is calculated for the most recent year and used until the next year's figures are finalized.* The source data are from a summary of the annual reports (Form R-1) submitted by each of the Class I railroads. Although the data set is received at the end of March, it is not used until the September filing. This enables data to be entered into a database and reviewed – and any revisions made, if necessary, before the data are used in the Index. The current Interest Index is based on 2016 data, and was updated in the Q4 filing submitted on September 5, 2017. The Interest Index based on 2016 is at an all-time low. Although the index is based on embedded rates instead of entirely on current market conditions, it is no coincidence that rates for U.S. 20-year bonds are also at their lowest over the last 25 years.

The R-1 source for interest expense is Schedule 210, column b. The lines currently used are listed below. The source for average total debt is Schedule 200. The sums of data from columns b and c (ending and beginning balances) are combined and divided by 2 to compute an average balance. Line numbers listed below will have some differences from previous years because the Surface Transportation Board changed some of the line numbers and account definitions.

### Interest Expense (Schedule 210)

Line	
42	Total Fixed Charges
44	Contingent Interest
less	
22	Release of Premium on Funded Debt

### Average Total Debt (Schedule 200)

Line	
29	Current Liabilities, Loans and Notes Payable
38	Equipment Obligations and Other Long Term Debt Due Within One Year
40	Non-Current Liabilities: Funded Debt Unmatured
41	Non-Current Liabilities: Equipment Obligations
42	Non-Current Liabilities: Capitalized Lease Obligations
43	Non-Current Liabilities: Debt in Default
44	Non-Current Liabilities: Accounts Payable: Affiliated Companies
45	Non-Current Liabilities: Unamortized Debt Premium

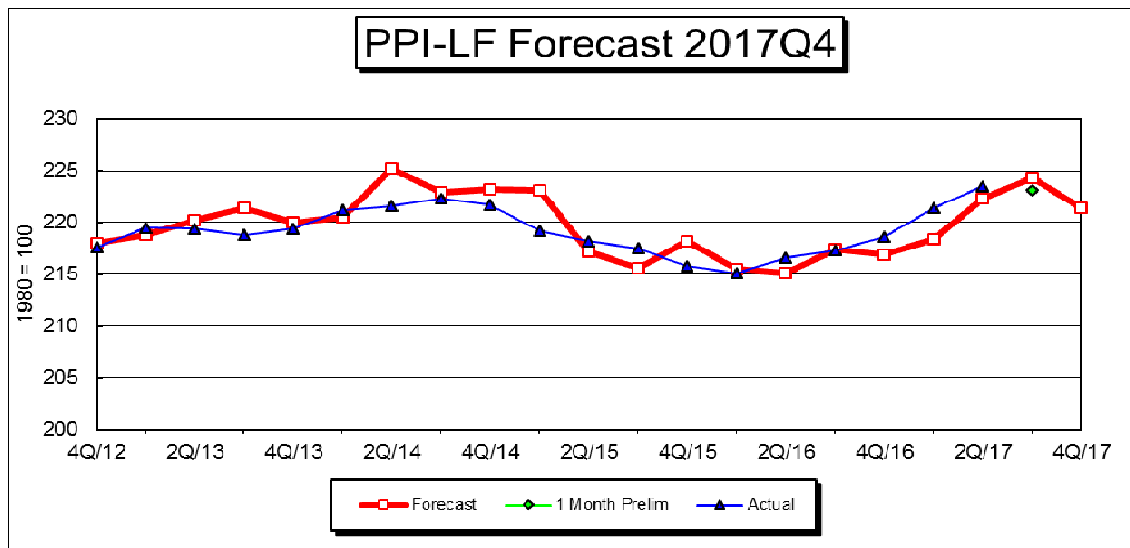
2016	Interest Rate	4.75%
1980	Interest Rate	7.85%
<b>2017Q4</b>	<b>Interest Index</b>	<b>60.5</b>
2017Q3	Interest Index	60.6
	Percent Change	-0.2%

## Other Expenses Fourth Quarter 2017

The Producer Price Index for Industrial Commodities less Fuels and Related Products and Power (PPI-LF) is used to index purchased services, casualties and insurance, loss and damage, taxes (other than income and payroll), general and administrative expenses, and lease rentals. These expenses, when grouped together, are usually called "Other" expenses.

Like the PPI-RE, the PPI-LF is forecast using an ARIMA process on 6 years of monthly data (a sample size of 72) with the most recent available monthly data being the first month of the quarter prior to the forecast quarter. For a first quarter forecast, the most recent month of data available would be for October of the prior year. For a second quarter forecast, January would normally be the most recent month available. April and July would be the most recent months available for third and fourth quarter forecasts respectively. The output from the forecast model is shown on page 2 of this appendix for 1982=100. Monthly PPI-LF figures had been trending upward since February 2016 after mostly decreasing since August 2014. They decreased in June and July. The forecast for 2017Q4 is 1.3 percent below the previous quarter forecast, which may have been too high.

Forecast of Other Expense Index (1982=100)	197.5
Forecast of Other Expense Index (1980=100)	221.4
Change from previous quarter forecast	-1.3%
Change from actual first month of previous quarter	-0.8%
Change from same quarter of prior year (actual)	1.3%



## Other Expenses Fourth Quarter 2017

### PPI INDUSTRIAL COMMODITIES LESS FUELS AND RELATED PRODUCTS AND POWER

Using rule-based logic, the program narrowed down the choice to exponential smoothing or Box-Jenkins. An out-of-sample test was used to select between these two approaches.

A rolling out-of-sample test used a maximum horizon of 12 and generated 78 forecasts for each method.

Cumulative MAD: Exponential smoothing = 2.36; Box-Jenkins = 1.98.

Based on the lower Mean Absolute Deviation, Exponential Smoothing was selected.

#### Forecast Model for PPILF

Holt exponential smoothing: Linear trend, No seasonality

LN(1.000, 0.931)

#### Model Details

Component	Smoothing Wgt	Final Value
Level	1.0000	199
Trend	0.9306	-0.3772

#### Within-Sample Statistics

Sample size	72	No. parameters	2
Mean	195.31	Std. deviation	1.99
R-square	0.94	Adj. R-square	0.94
Durbin-Watson	1.97	Ljung-Box(18)	29.6 P=0.96
Forecast error	0.5	BIC	0.53
MAPE	0.2	SMAPE	0.2
RMSE	0.5	MAD	0.38
MAD/Mean Ratio	0		

#### Actual Values for the Most Recent 6 Periods:

Date	Actual
2017-Feb	197.8
2017-Mar	198.7
2017-Apr	199.2
2017-May	199.5
2017-Jun	199.4
2017-Jul	199.0

#### Forecasted Values

Date	2.5 Lower	Forecast	97.5 Upper
2017-Aug	197.591	198.623	199.655
2017-Sep	196.002	198.246	200.489
2017-Oct	194.868	197.868	200.869
2017-Nov	193.890	197.491	201.093
2017-Dec	192.998	197.114	201.230
QTR AVG	193.919	197.491	201.064

## Railroad and Union Abbreviations

### Fourth Quarter 2017

#### ***Railroads***

BLE	Bessemer & Lake Erie Railroad (Part of CN's Grand Trunk Corp.)
BNSF	BNSF Railway Company
CC	Chicago, Central & Pacific (Part of CN's Grand Trunk Corp. Sometimes noted as CC&P.)
CN	Canadian National Railway (Commonly known as CN, owns Grand Trunk Corporation.)
CNGT	AAR's abbreviation for Grand Trunk Corporation (Almost all of CN's U.S. operations.)
CP	Canadian Pacific (Also noted as CPR. Owns the U.S. Class I railroad Soo Line.)
CPSL	AAR's abbreviation for Soo Line Corporation (CP's U.S. operations including SOO, D&H, and DME.)
CSX	CSX Transportation
D&H	Delaware & Hudson (Part of Canadian Pacific's U.S. operations, included beginning 2011Q4.)
DME	Dakota, Minnesota & Eastern (Part of Canadian Pacific's U.S. operations, included beginning 2011Q4.)
GTW	Grand Trunk Western Railroad (Part of CN's Grand Trunk Corp.)
IC	Illinois Central Railroad (Part of CN's Grand Trunk Corp.)
KCS	Kansas City Southern Railway
NS	Norfolk Southern Combined Railroad Subsidiaries (a.k.a. Norfolk Southern Railway or NS Rail)
SOO	Soo Line Railroad (The largest part of Canadian Pacific's U.S. operations.)
UP	Union Pacific Railroad
WC	Wisconsin Central and subsidiaries (Part of CN's Grand Trunk Corp.)

Note: A portion of the DM&E was sold during 2014.

Note: The sale of the southern portion of the D&H received regulatory approval on May 15, 2015.

#### ***Major Unions Involved with Railroads***

ATDA	American Train Dispatchers Association
BLET	Brotherhood of Locomotive Engineers and Trainmen Div. of the International Brotherhood of Teamsters
BMWED	Brotherhood of Maintenance of Way Employees Division of the International Brotherhood of Teamsters
BRS	Brotherhood of Railroad Signalmen
IAM	International Association of Machinists and Aerospace Workers
IBBM	International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers & Helpers
IBEW	International Brotherhood of Electrical Workers
NCFO	National Conference of Firemen and Oilers
SMART-TD	Sheet Metal Air Rail Transportation - Transportation Division*
SMW	Sheet Metal Workers' International Association
TCU	Transportation Communication International Union
TCU-Carmen	Brotherhood of Railway Carmen Division of the Transportation Communications International Union
UTU-Yard	United Transportation Union Yardmaster Department (also noted as UTU-YMD)

#### ***Predecessor Unions (Some AAR databases use these old abbreviations.)***

BLE	Brotherhood of Locomotive Engineers (predecessor to BLET)
BMWE	Brotherhood of Maintenance of Way Employees (predecessor to BMWED)
BRC	Brotherhood of Railway Carmen (predecessor to TCU-Carmen)
IBFO	International Brotherhood of Firemen and Oilers (predecessor to NCFO)
UTU	United Transportation Union (merged into SMART)

\* Typically represents employees formerly represented by the UTU (conductors and brakemen).