Coal-Natural Gas Competition: Coal and Rail Industry Impacts

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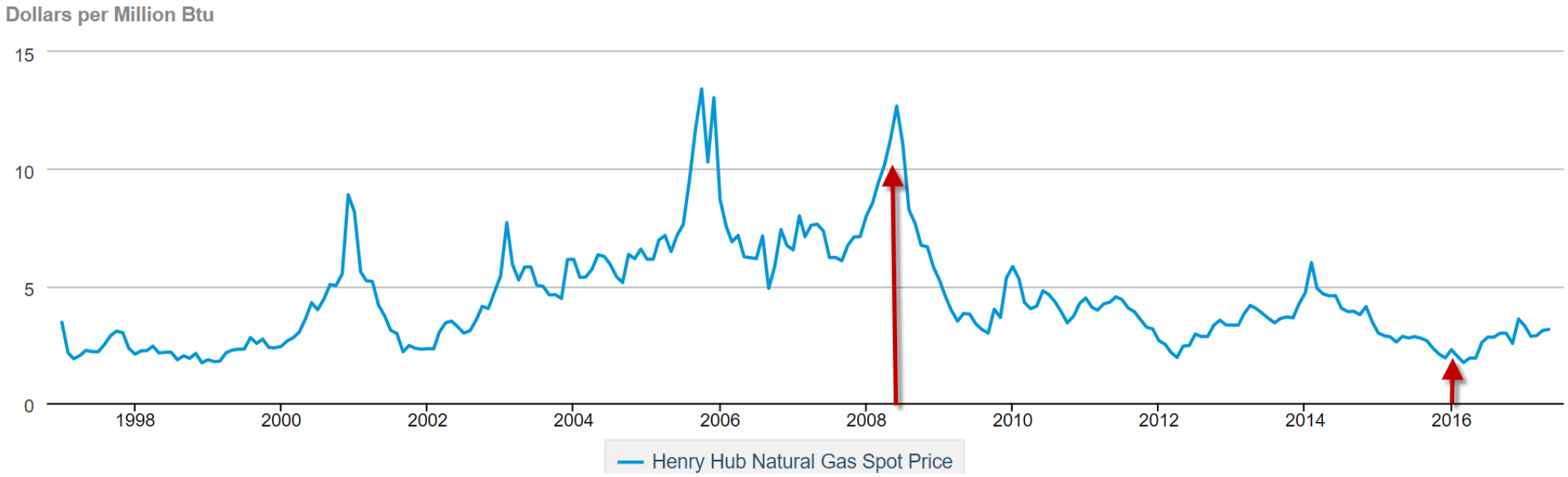
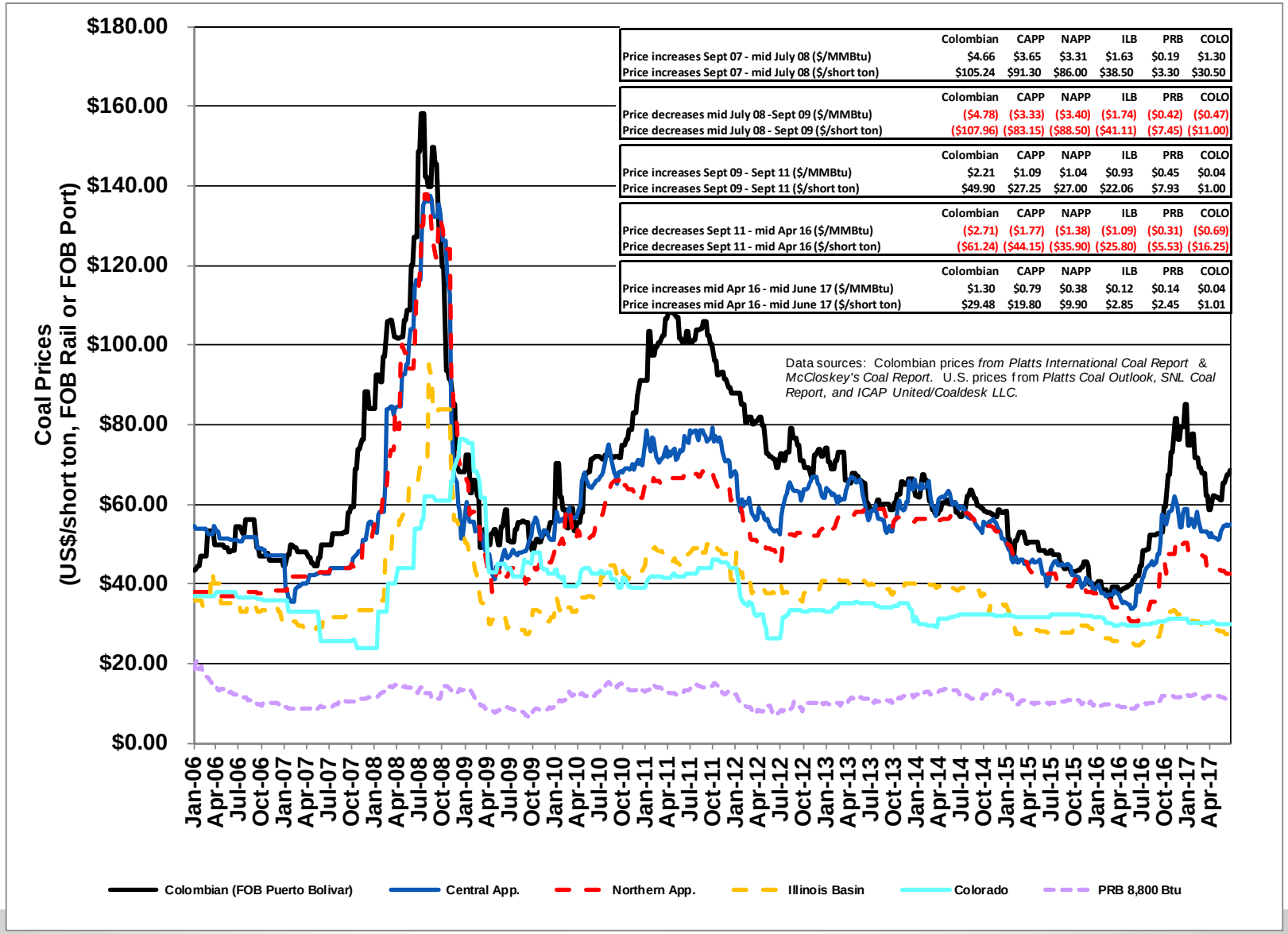
US Coal Equities Market Value

Source: Dow Jones U.S. Coal Total Stock Market Index (INDEX)

Henry Hub Gas Prices



Representative FOB Mine Steam Coal Prices



	Colombian	CAPP	NAPP	ILB	PRB	COLO
Price increases Sept 07 - mid July 08 ($/MMBtu)	$4.66	$3.65	$3.31	$1.63	$0.19	$1.30
Price increases Sept 07 - mid July 08 ($/short ton)	$105.24	$91.30	$86.00	$38.50	$3.30	$30.50

	Colombian	CAPP	NAPP	ILB	PRB	COLO
Price decreases mid July 08 -Sept 09 ($/MMBtu)	($4.78)	($3.33)	($3.40)	($1.74)	($0.42)	($0.47)
Price decreases mid July 08 - Sept 09 ($/short ton)	($107.96)	($83.15)	($88.50)	($41.11)	($7.45)	($11.00)

	Colombian	CAPP	NAPP	ILB	PRB	COLO
Price increases Sept 09 - Sept 11 ($/MMBtu)	$2.21	$1.09	$1.04	$0.93	$0.45	$0.04
Price increases Sept 09 - Sept 11 ($/short ton)	$49.90	$27.25	$27.00	$22.06	$7.93	$1.00

	Colombian	CAPP	NAPP	ILB	PRB	COLO
Price decreases Sept 11 - mid Apr 16 ($/MMBtu)	($2.71)	($1.77)	($1.38)	($1.09)	($0.31)	($0.69)
Price decreases Sept 11 - mid Apr 16 ($/short ton)	($61.24)	($44.15)	($35.90)	($25.80)	($5.53)	($16.25)

	Colombian	CAPP	NAPP	ILB	PRB	COLO
Price increases mid Apr 16 - mid June 17 ($/MMBtu)	$1.30	$0.79	$0.38	$0.12	$0.14	$0.04
Price increases mid Apr 16 - mid June 17 ($/short ton)	$29.48	$19.80	$9.90	$2.85	$2.45	$1.01

Data sources: Colombian prices *from Platts International Coal Report & McCloskey's Coal Report.* U.S. prices from *Platts Coal Outlook, SNL Coal Report, and ICAP United/Coaldesk LLC.*

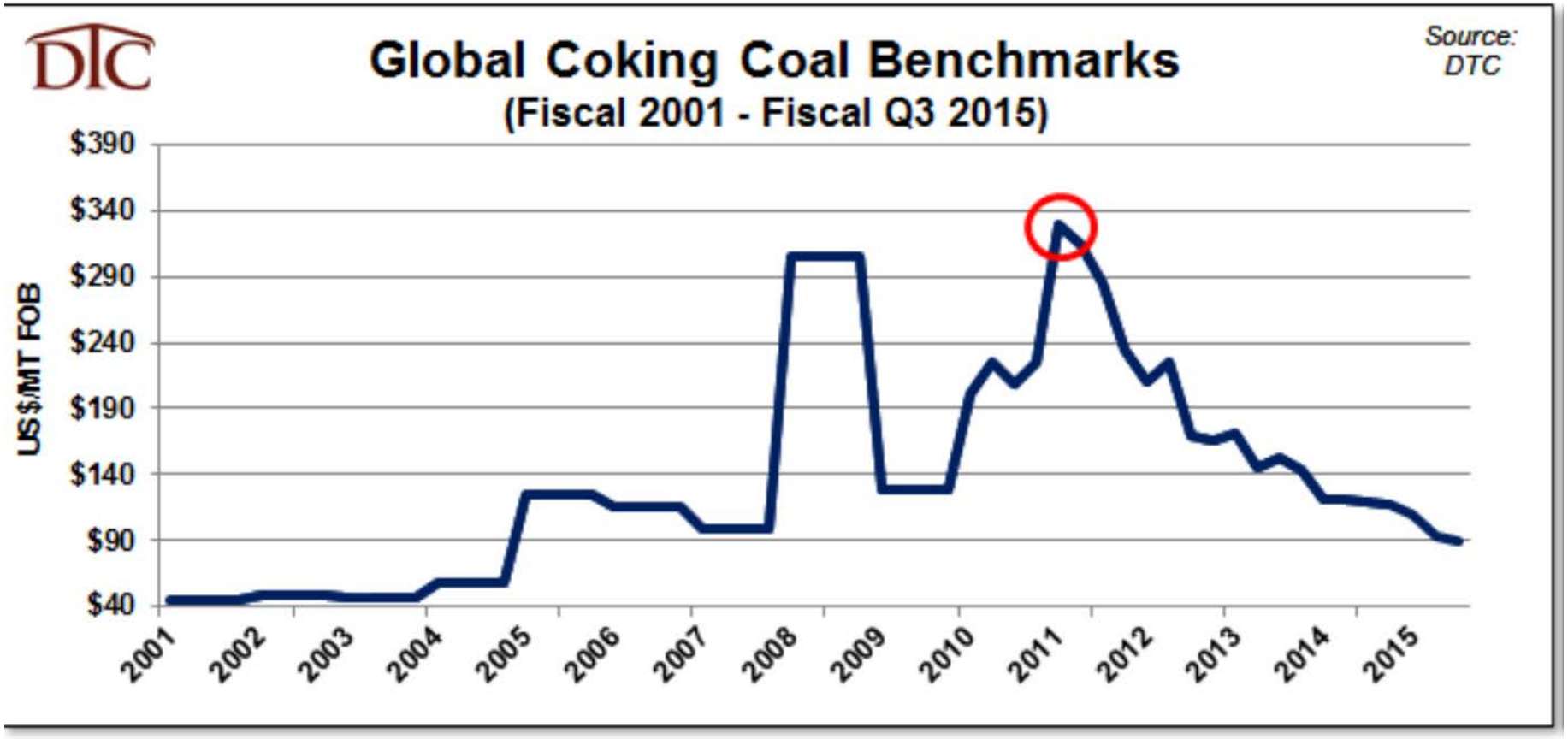
Coal v. Gas Competition

	Coal - Illinois Basin with SO_2 Removal	Gas Combined Cycle
Delivered Cost of Fuel ($/MMBtu)	2.54	3.25
Fuel use per MWh, "heat rate" (MMBtu/MWh)	10.5	7.0
Fuel cost per MWh ($/MWh)	27.0	23.0
Non-Fuel Variable O&M ($/MWh)	3.5	2.5
Total Variable Cost ($/MWh)	30.0	25.0

Exhibit 1 – Coal vs. Gas Genrating Cost Comparison, Southeastern US Fall 2016

Source: "The future of coal versus gas competition" /

Coking Coal Price History



Bankruptcies

Company	Bankruptcy	Acquisition		
Peabody Energy	April 2016	MacArthur	$5.2B	8/11
Arch Coal	January 2016	ICG	$3.4B	6/11
Alpha Natural Resources	August 2015	Massey	$7B	12/10
Walter Energy, Inc.	July 2015	Western Cdn	$3B	12/10
Patriot Coal Corp.	May 2015			
Xinergy Corp.	April 2015			

Environmental Regulations

Environmental regulations (MACT and CPP) accelerated shutdown of coal units further reducing coal volumes. But these were responsible for only about a third of lost coal generation volume.

National Total Coal GWh	A	B	C	D	Total
2008 Generation of Plants	18.112	201,907	51,217	1,440,726	1,711,962
2015 Generation of Plants	0	34,014	30,107	1,091,619	1,155,741
Change 2008–2015	(18,112)	(167,892)	(21,110)	(349,107)	(556,221)
Net Loss from Shutdowns					(186,005)
Net Loss from Shutdowns as % of 2008 GWh					-11

Exhibit 8 – Analysis of Effect of Closures on Coal Generation Since 2008

Coal Industry: Conclusions

- **Surviving coal producers will normalize to new lower levels of production. Further consolidation likely among remaining producers.**

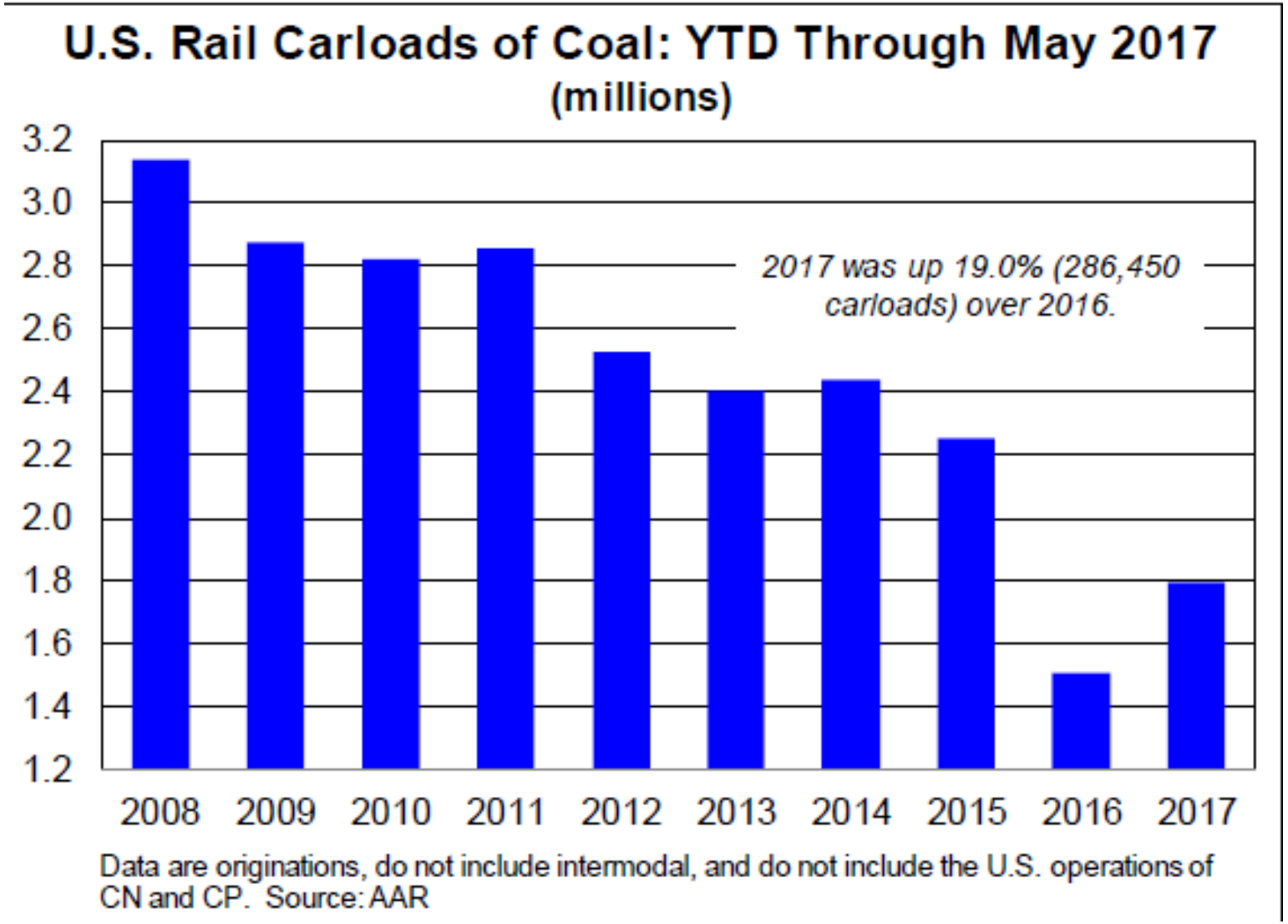
- **Difficulty will be adjusting production volumes to match volatile coal demand as gas prices fluctuate.**

- ***Between $2.50 and $4/MMBtu gas prices, coal demand for power could* swing a maximum of 315 million tons[1].**

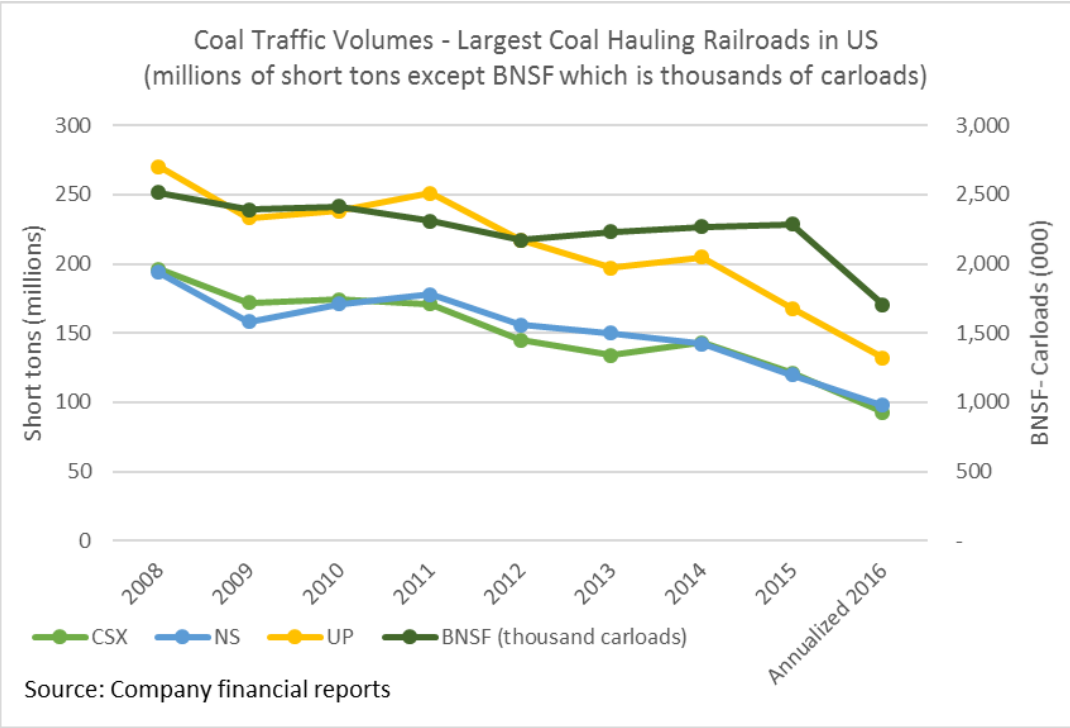
1. Source: “The future of coal versus gas competition”

Railroads

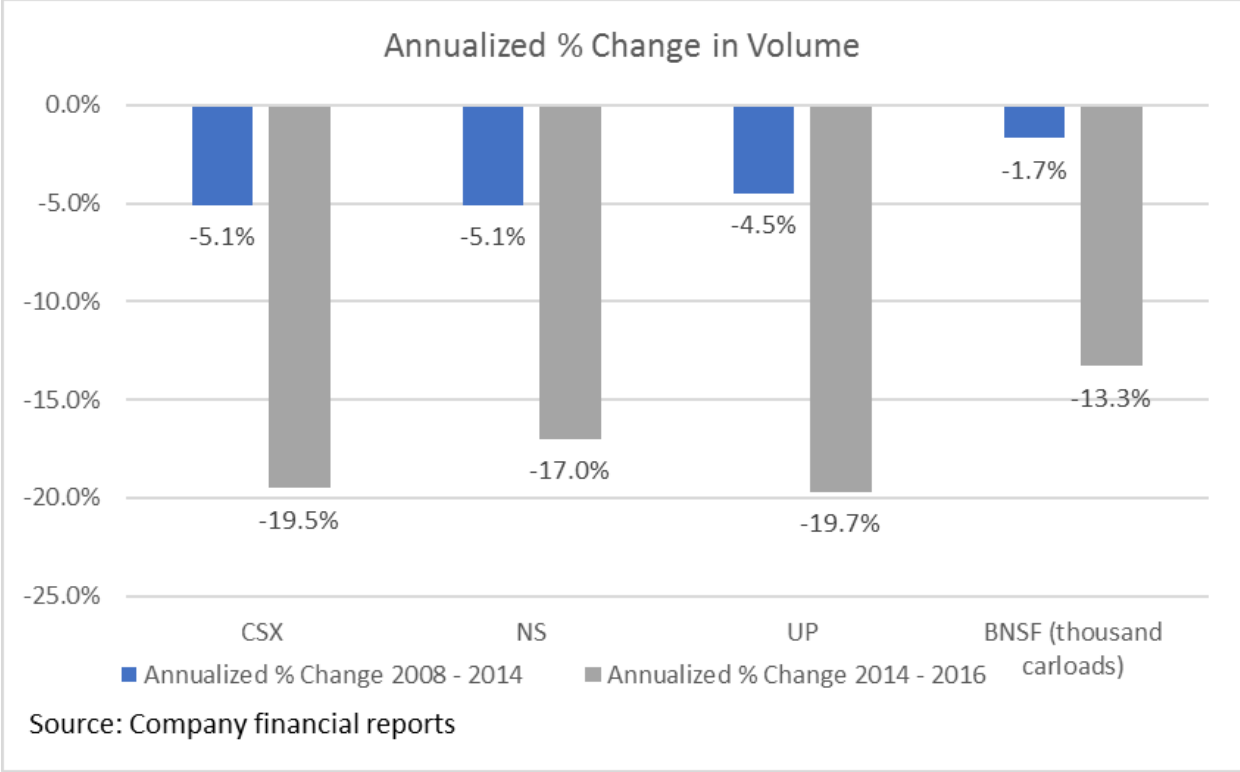
Rail Shipments of Coal Declining



Rails Lost Major Tons from Peak

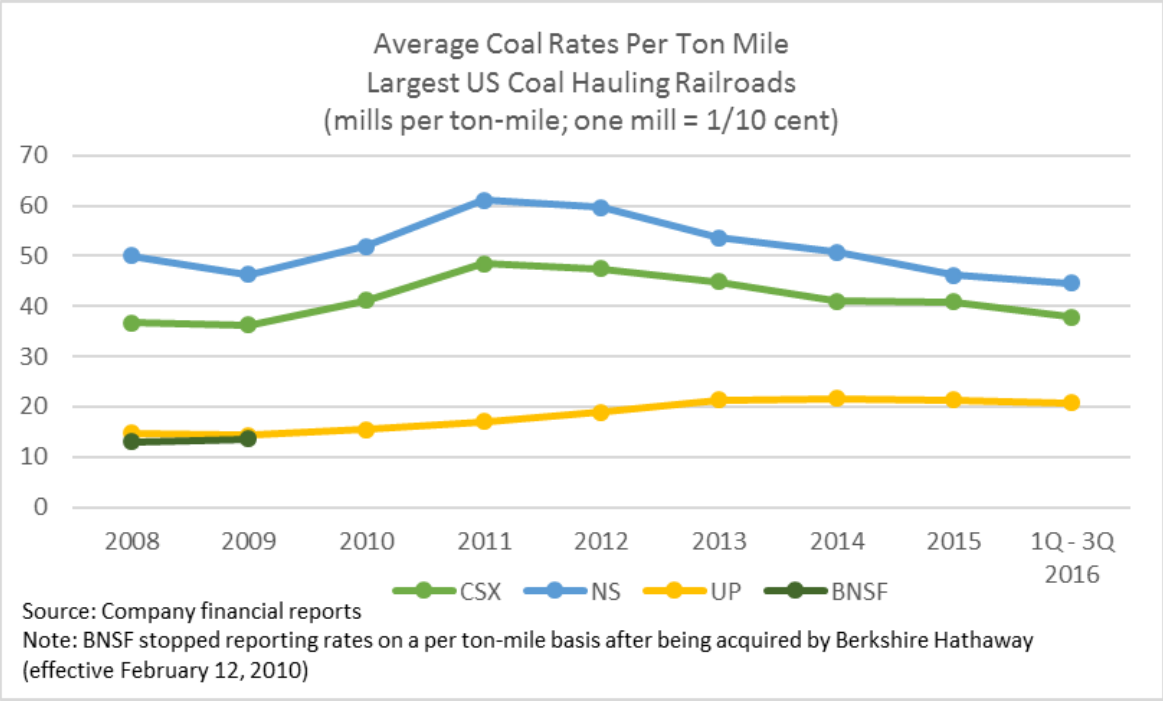


Source: Company financial reports

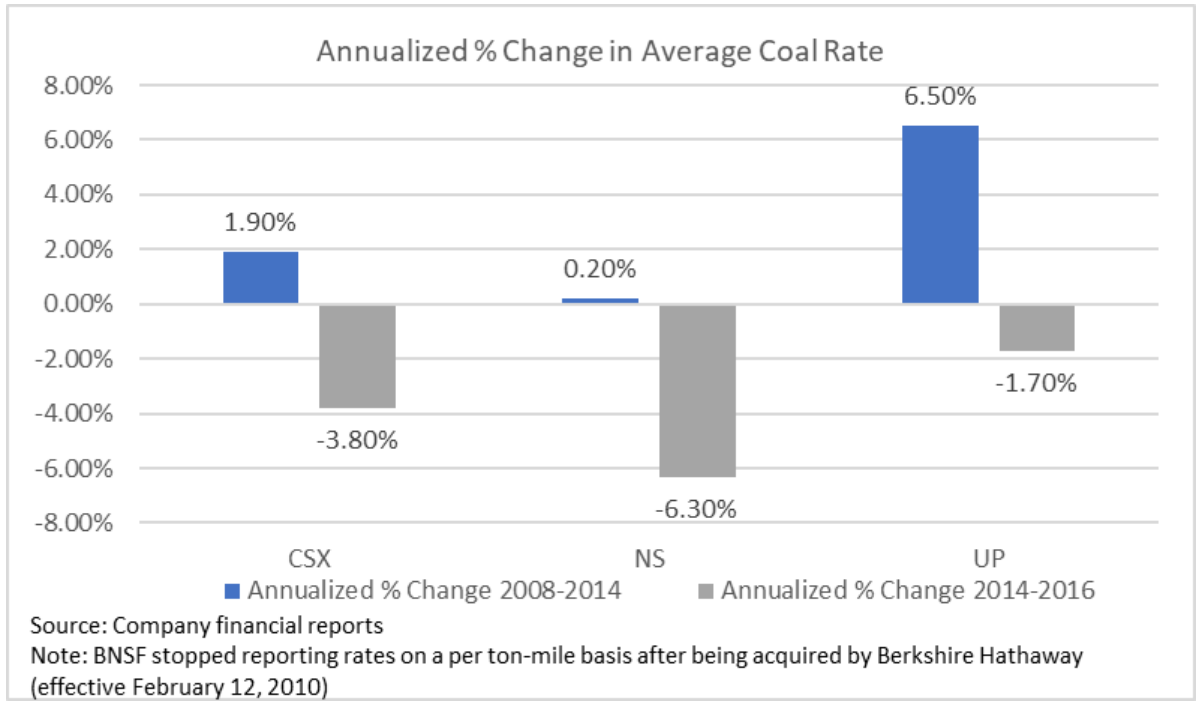


Source: Company financial reports

Modest Rail Rate Declines



Source: Company financial reports
Note: BNSF stopped reporting rates on a per ton-mile basis after being acquired by Berkshire Hathaway (effective February 12, 2010)



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Note: BNSF stopped reporting rates on a per ton-mile basis after being acquired by Berkshire Hathaway (effective February 12, 2010)

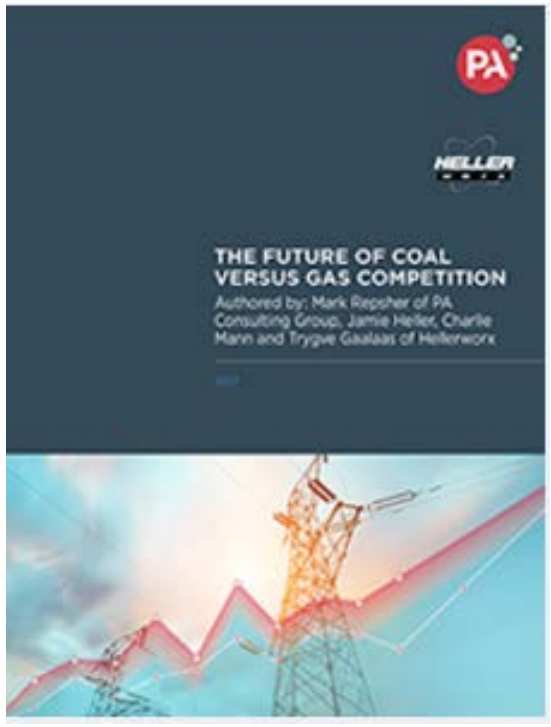
Rail Response

- **Domestic steam coal: Hold rates and accept volume declines. (Rails maintain high margins)**
- **Export steam coal: Reduced rates and tried to mitigate volume declines.**
- **CSX created fixed and variable pricing mechanism to improve perceived dispatch economics of coal units.**
- **Reduced rates on short term basis to allow specific coal power units to use greater volumes.**

Railroad Industry: Conclusions

- Railroads are “right sizing” their systems for new lower coal shipment levels.
  - CSX: Erwin, Corbin yards closure
  - NS: Closing WV Secondary, combine Virginia and Pocahontas Divisions, idle Ashtabula Dock
  - BNSF: Reduce operating regions and divisions
- Railroads have also stored hundreds of locomotives and reduced train crews
- Railroads are focusing on intermodal, chemicals and growth commodity sectors.
- Rapid, unexpected increases in rail volume will cause congestion
- Railroads may experiment with gas/power sensitive rail pricing to mitigate volume losses. Working on this approach now.

Coal v Gas Study



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http://www.paconsulting.com/insights/the-future-of-coal-versus-gas-competition/