Pet Coke
Consulting, LLC

Vancouver 9 May 2014

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Conferences

Outlook for North American Fuel Grade Pet Coke Exports

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1. Coal vs. Pet Coke as a Fuel Choice

2. Current US and Canada Production, Exports and Imports

3. Challenges and Opportunities: the Keystone XL Pipeline

1. Coal vs. FG Pet Coke as a Fuel Choice

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Coal vs. FG Pet Coke Properties

Type	Moisture, %	Volatiles, %	Ash, %	GHV, 1000 BTU /#	Sulfur, %
FG Coke	8-11	8-12	<0.5	14.2- 15.2	1 -7+
Anthracite	2-3	3	7	13.5	<1
Semi anthracite	2	12	18	12.3	<1
Bituminous	3-12	18-35	4-10	11.5-14	<2
Subbituminous	16-25	25-40	4-11	8.5-10	<2
Lignite	35	40+	6	7	

Coal vs. FG Pet Coke Properties

- USWC makes mostly under 4% sulfur FG coke,
- USGC makes mostly 4%+ FG sulfur coke
- Very low metals and low sulfur coke is a higher valued grade ("calcineable")

Steam Coal vs. FG Pet Coke Usage

FG Coke– Higher heating value (lower ash and volatiles), but higher sulfur than coal

Best end uses for FG pet coke-

- Cement plants (limestone in the feedstock absorbs the sulfur)
- Circulating Fluidized Bed Boiler Power Plants (CFBB)- limestone is injected

FAQ's Coal vs. Pet Coke

FAQ 1. Can conventional steam coal fired power plants switch to FG pet coke?

FAQ’s Coal vs. Pet Coke

FAQ 1. Can conventional steam coal fired power plants switch to FG pet coke

A: Only to the degree the plant sulfur removal capacity can handle a coal/coke blend, and plant storage can handle 2 piles.

Also, the lower coke Voltiles will result in some LOI and ash discoloration.

FAQ’s Coal vs. Pet Coke

FAQ 2. What is the cost to make pet coke?

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FAQ 2. What is the cost toa refinery to make pet coke?

A: Pet coke is a byproduct from a processing unit ("Coker") that contributes a high margin from the gasoline, jet fuel and diesel the Coker also produces. Coke prices could go negative and the coke would likely still be produced.

2. 2013 FG Coke Production, Exports and Imports in MM MT/ yr.

2013 FG Coke MM ST/yr.

	Production	Exports	Imports
US	47	38-39 est	0.5
Canada	10	1.5	1.5
Total	52	39.5-40.5	2.0

- Expect another 2- 3 MM ST/yr of US coke prodution and exports in next 5 years

US Coal MM ST/yr (EIA)

	Production	Exports	Imports
2012 Coal (steam +met)	1,016	126	9
2013 Coal (steam + met)	996	118	9

US Coal Vs. Coke MM ST/yr

	Production	Exports	Imports
2013 Coal (steam)	936	52	8
2013 FG Coke	47	38-39 est	0.5 est

US steam coal production is still the elephant in the room for solid fuel production

However FG coke exports are in same league as steam coal exports and catching up

Top 15 US Export Countries Steam Coal 9 mos 2013 (US EIA)

	Coal MM ST	share of total	Coal Rank
United Kingdom	6.8	17.1%	1
Netherlands	6.4	16.2%	2
Italy	3.7	9.2%	3
South Korea	3.2	8.2%	4
Canada	2.5	6.4%	5
Germany	2.3	5.7%	6
Morocco	2.0	5.1%	7
Chile	1.8	4.5%	8
Mexico	1.7	4.3%	9
China	1.5	3.8%	10
Switzerland	1.2	3.0%	11
Japan	1.2	2.9%	12
France	1.1	2.8%	13
India	0.8	1.9%	14
Belgium	0.7	1.9%	15
Total	36.9	93.2%	
Rest of world	2.7	6.8%	
Total world	39.6	100.0%	

Top 15 US Export Countries Coal vs Coke 9 mos 2013

	Coal MM ST	share of world	Coal Rank	Coke Rank
United Kingdom	6.8	17.1%	1	30
Netherlands	6.4	16.2%	2	11
Italy	3.7	9.2%	3	7
South Korea	3.2	8.2%	4	16
Canada	2.5	6.4%	5	9
Germany	2.3	5.7%	6	19
Morocco	2.0	5.1%	7	8
Chile	1.8	4.5%	8	20
Mexico	1.7	4.3%	9	3
China	1.5	3.8%	10	1
Switzerland	1.2	3.0%	11	-
Japan	1.2	2.9%	12	2
France	1.1	2.8%	13	13
India	0.8	1.9%	14	4
Belgium	0.7	1.9%	15	17
Total	36.9	93.2%		17-18 MM ST
Rest of world	2.7	6.8%		7-8 MM ST
Total world	39.6	100.0%		24-26 MM ST

US Coal vs. Coke Exports – Observations 1

7 of top 10 FG coke import countries are in top 10 steam coal import countries

- China and India lag in sulfur emmissions regs, making high sulfur coke attractive
- Japan imports low sulfur coke from USWC for steel industry
- Mexico receives by rail and ship from US: logistic advantage vs. coal

US Coal vs. Coke Exports – Observations 2

Turkey

- # 5 in FG coke exports but #16 in steam coal
- Has learned how to meet the Turkish 4% sulfur restriction with coke
- Well established relationships with coke industry

US Coal vs. Coke Exports – Observations 3

Brazil

- # 6 in FG coke exports but #18 in steam coal
- Brazil exports the better grades of coke and has learned to import FG coke; US coal imports compete with So Africa
- Well established relationships with coke industry

US Coal vs. Coke Exports – Observations 4

Spain

- # 10 in FG coke exports but #34 in steam coal
- Small ceramics/brick industries have learned how to blend coke for sulfur
- Well established relationships with coke industry

3. Keystone XL P/L Effects on FG Pet coke

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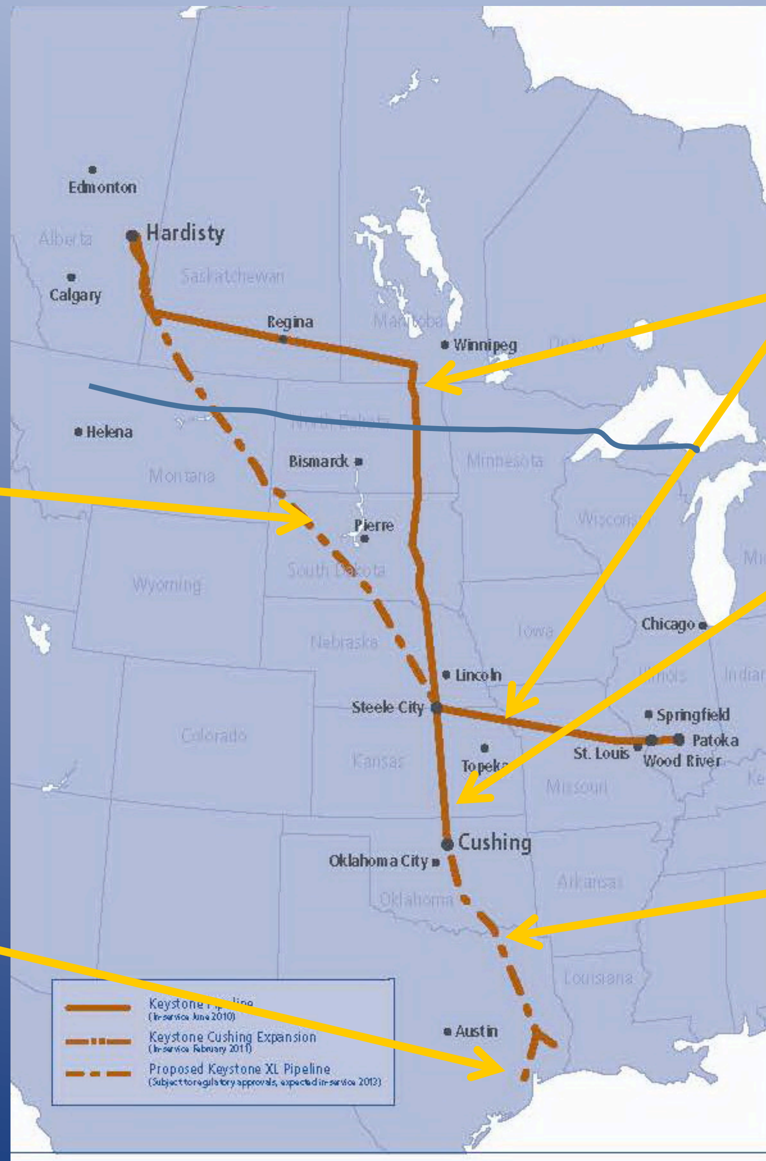

Ø1 Hardesty AB
to Patoka IL
590 k bbls/d
2147 mi
36 in Dia

Ø4 Keystone XL P/L
Hardesty AB to
Steele City, OK
1179 miles
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510 K bbls/ day

Ø2 Steele City to
Cushing, OK
390 mi
30 in Dia

Ø 3b Houston Lateral
48 miles
36 in Dia
COD 4q14

Ø 3a Cushing OK
to Nederlander. TX
298 miles
36 in Dia

Keystone P/L Status:

- Phases 1, 2, 3a and 3b operational
- Phase 4 (X/L) just approved by US State Department, but hurdles lie ahead (environmental, public pressure)

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Still in plan stage
Ø4 Keystone XL P/L
Hardesty AB to
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510 K bbls/ day

Done
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Keystone XL (Ø4) Pipeline- Crude Effects

- Brings in an additonal 510 K bbls/day of heavy crude to USGC
- XL crude to be priced below US crude imports to assure displacement of same crude import quantity

What imported crudes to be displaced, and what is effect on FG coke?

US Imports of Crude Oil and Products- k bbls/day

	2011	2012	2013	Change 2011 to 2013
Canada	2377	2530	2586	209
Saudi Arabia	1193	1364	1326	133
Venezuela	919	875	713	-206
Russia	624	477	458	-166
Mexico	637	470	391	-246
Iraq	459	476	341	-118
Kuwait	191	305	328	137
Colombia	371	358	271	-100
Nigeria	803	419	235	-568
Ecuador	1047	117	155	-130
Rest of world	386	-232	-817	-1203
Total	8453	7392	6203	-2250

What imported crudes to be displaced?

- Drop from 2011 to 2013 of 2.250 MM bbls/day spread among many countries
- Further declines should be spread among longest routes first, but that’s not how it works in real world

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What are coke market effects from XL?

- Most US crude imports are heavy crude with more or less same coke yield and properties as XL crude, so coke production won't change much

- Only property standout is that the XL crude has 100% "shot" (small hard beebees), but this is a very small decrease in value

What are coke market effects from XL?

- Coke buyers may require small discount for the higher shot with Canadian coke

- Otherwise-coke buyers won't see much difference

Other issues related to US coke production:

- Tight Light Oil (TLO) crude from US (Bakken, Eagle Ford) will displace a lot more crude imports than XL

- TLO will will decrease US coke production, unless refineries find other ways to fill out their cokers (e.g., buy imported heavy components)

Summary:

- **Pet coke will remain a small share of US solid fuel production compared to coal, but is catching up on exports**

- **If/when XL starts, it will likely not greatly affect US coke production, exports or markets**

- **However, the dramatic expansion of TLO may reduce US coke production unless refineries find other wys to fill out cokers**

Thank You!!!!!