

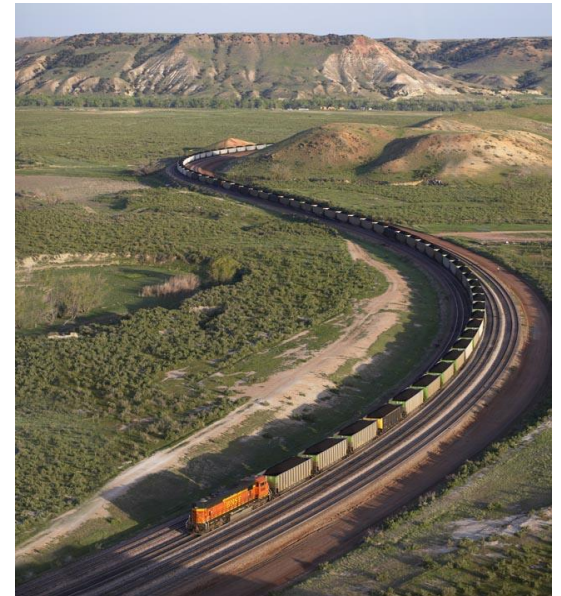
# Energy Opportunities Conference

**“The Future of Coal in a Gas Abundant World”**



**November 4, 2010  
Barton Creek  
Austin, TX**

**Pearce W. Hammond, Jr., C.F.A.  
Director, Institutional Research  
Simmons & Company International**



# Agenda

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- Coal's current and projected usage
  - Globally
  - U.S.
- Key trends in coal
- Potential threats to the future of coal
  - Age of the U.S. coal fleet
  - Carbon policy
  - Alternative energy
  - Natural gas
- What is the future of coal in a more gas abundant world?
- For the investor: what to look for in a coal company.

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# Current and Projected Usage: Globally

# Coal Facts

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- According to the BP Statistical Review of World Energy, coal's share of world energy consumption was 29.4% in '09—the highest level since 1970. Thanks to China!
- Global coal consumption was flat in 2009, the weakest annual change since 1999.
- The OECD (-10.4%) and the FSU (-13.3%) experienced the steepest consumption declines on record, due to the combination of recession and competitively priced natural gas.
- Elsewhere, consumption grew by 7.4%, near the historical average, with China accounting for 95% of the increase. Consumption fell in all regions except Asia-Pacific and the Middle East.
- Top 5 coal reserve holders:
  1. U.S.
  2. Russia
  3. China
  4. Australia
  5. India

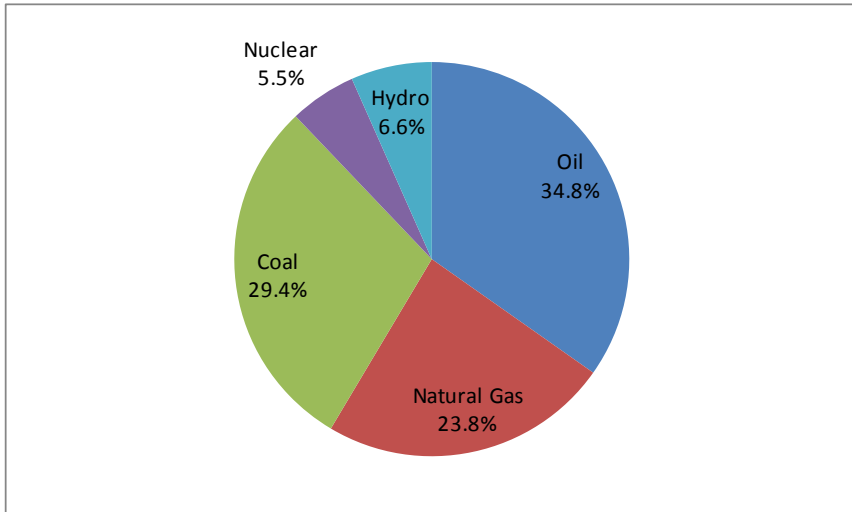
# Coal Facts

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- 41% of global electricity generation is provided by coal. This compares to 20% for natural gas, 16% for hydro, 15% for nuclear, 6% for oil and 2% for renewables.
- In the U.S., coal provides 45% of U.S. electricity as compared to 23% for natural gas, 20% for nuclear, 7% for hydro, 3% for renewables and 2% other.
- Coal provides over 80% of the electricity in China.
- Approximately, 15% of total hard coal production is currently used by the steel industry and about 70% of total global steel production is dependent on coal.
- The largest coal producer in the world is China.
- The largest coal exporter in the world is Australia.
- The largest thermal coal exporter in the world is Indonesia.
- The largest metallurgical coal exporter in the world is Australia.

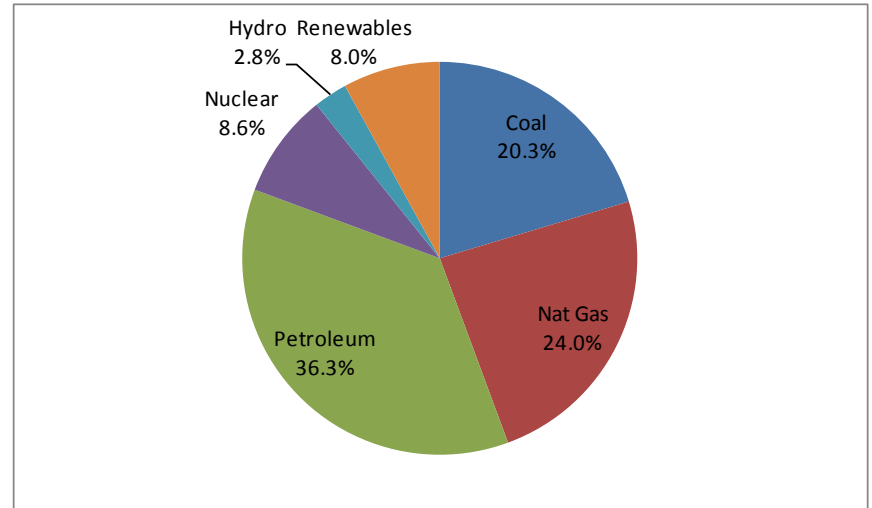
# Global and U.S. Primary Energy Consumption

## Global Primary Energy Consumption by Fuel



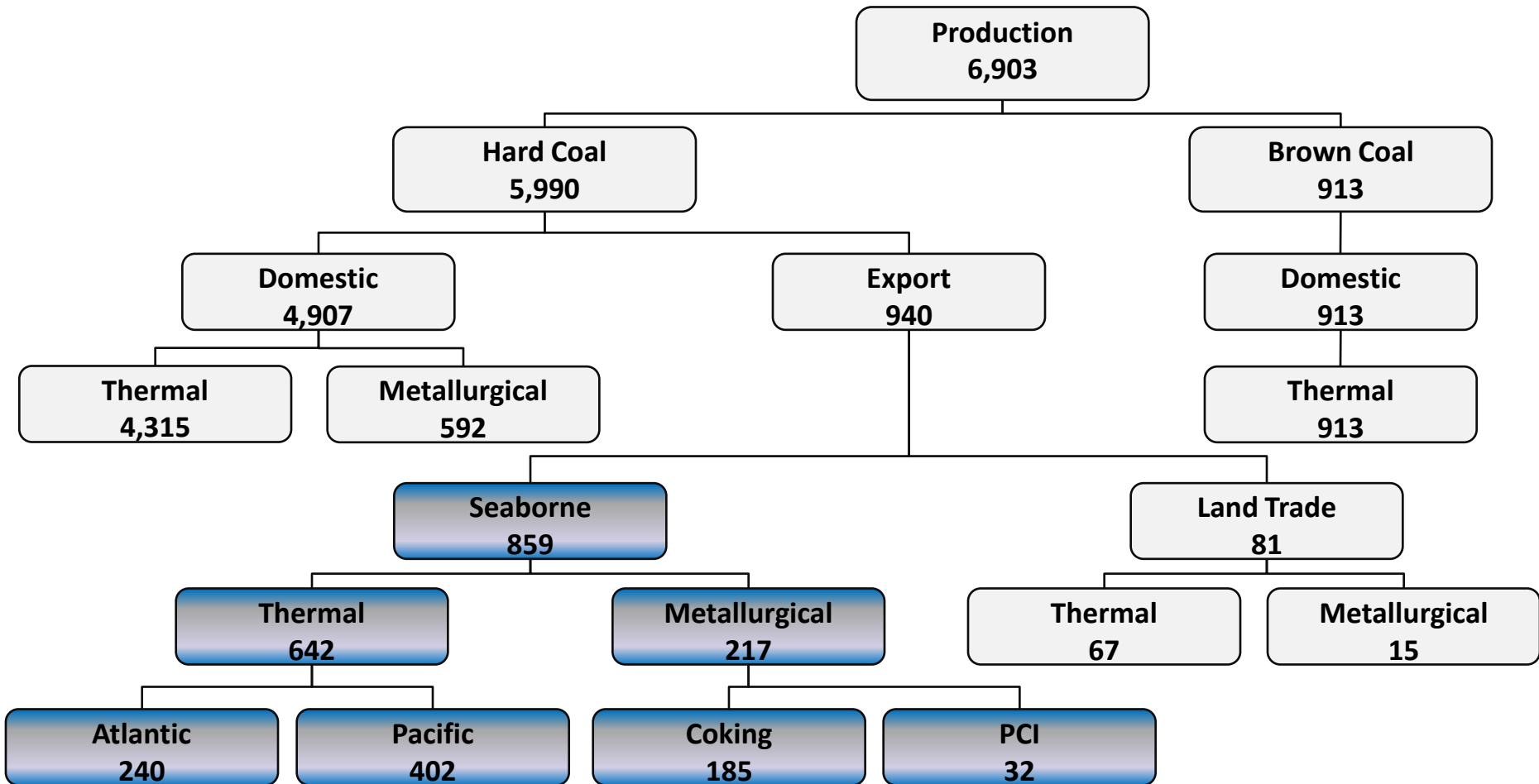
Source: BP Statistical Review of Energy.

## U.S. Primary Energy Consumption by Fuel



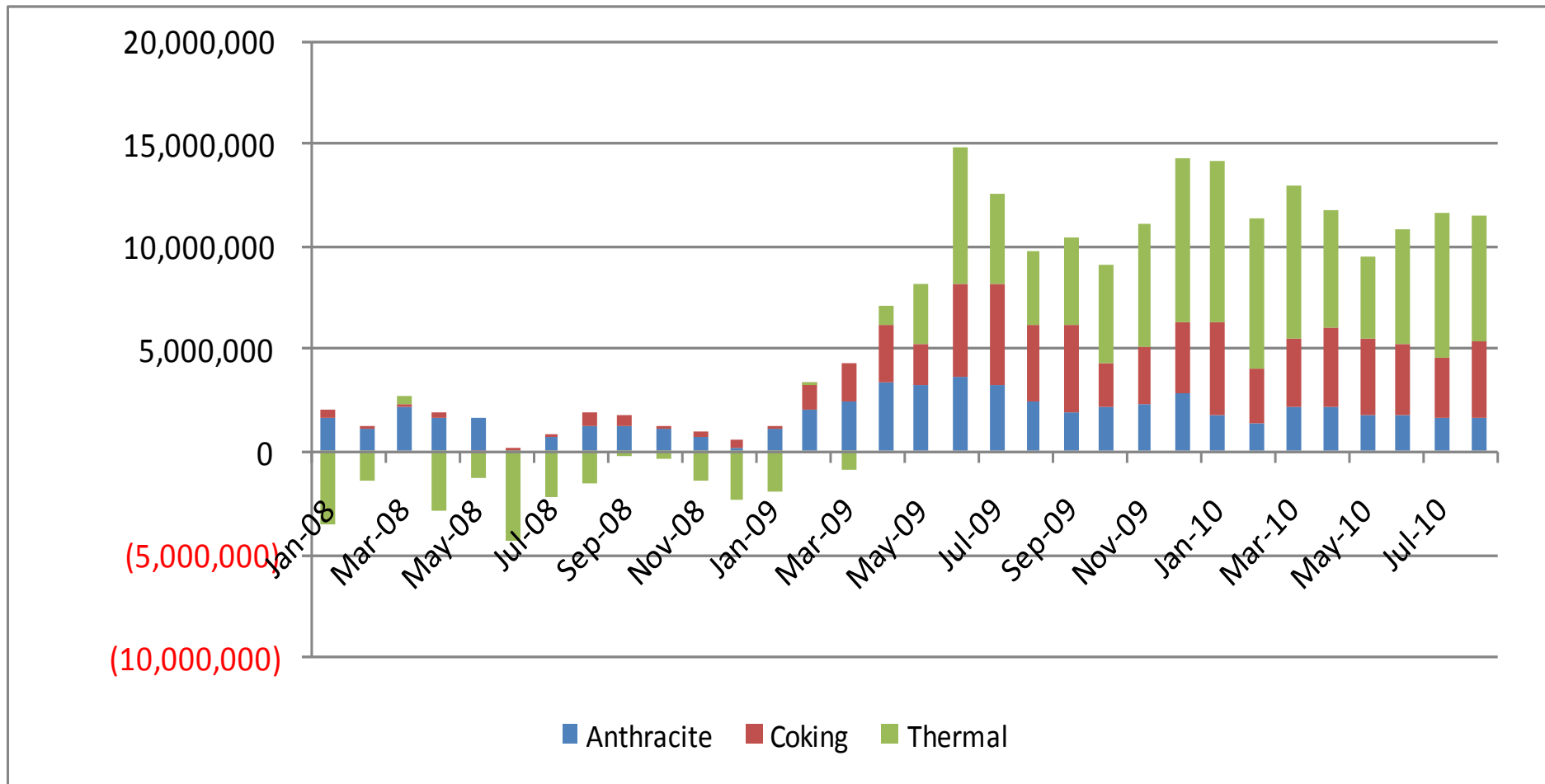
Source: EIA.

# 2009 Global Coal Market (in MM tonnes)



Source: IEA.

# China Update: Net Imports (Graph)



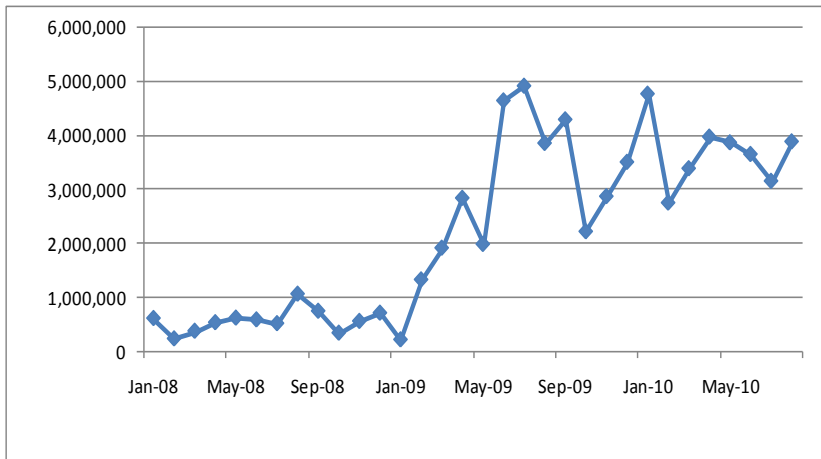
Source: McCloskey.

# Chinese Met Coal Stats

## Chinese Met Coal Imports:

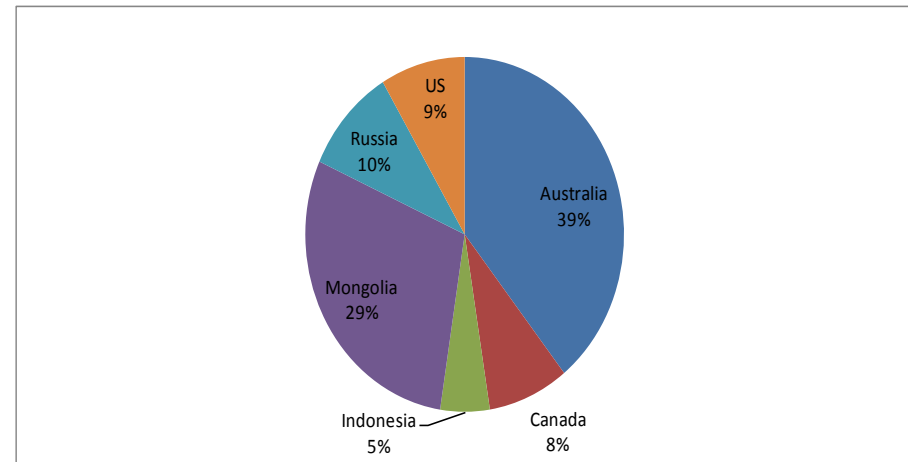
- Aug '10 imports of 3.875 MM tonnes—3<sup>rd</sup> highest level YTD.
- Jan-Aug'10 China imported 29.4 MM tonnes of met coal (run rate of 44.0 MM tonnes). In '09, China imported 34.5 MM tonnes of met coal.

Chinese Met Coal Imports



Source: McCloskey's.

Sources for Chinese met coal imports



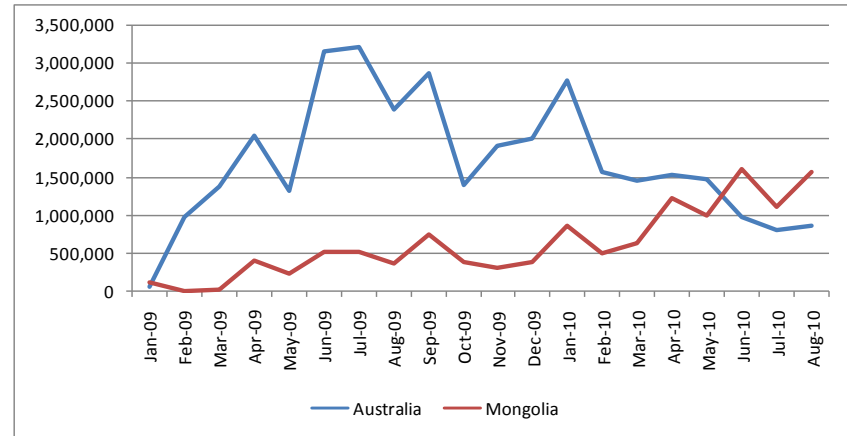
Source: McCloskey's.

# Mongolia Increasing Met Share to China

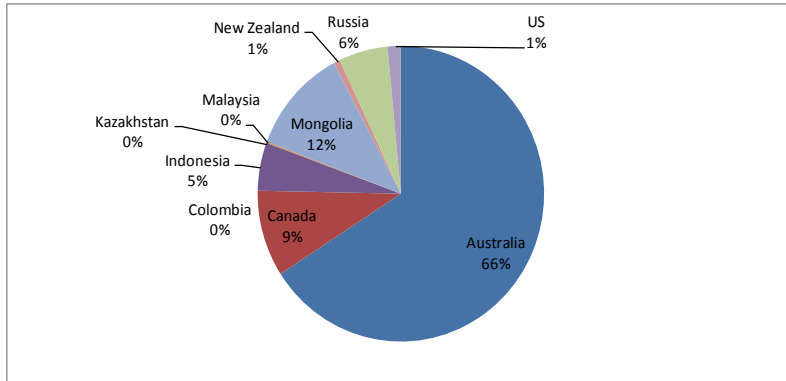
## Mongolian Met Coal Exports to China:

- YTD through Aug= 8.5 MM tonnes.
- Jan-Aug '09= 2.2 MM tonnes
- +286% y/y

## Australian/Mongolian Met Exports to China (in tonnes)

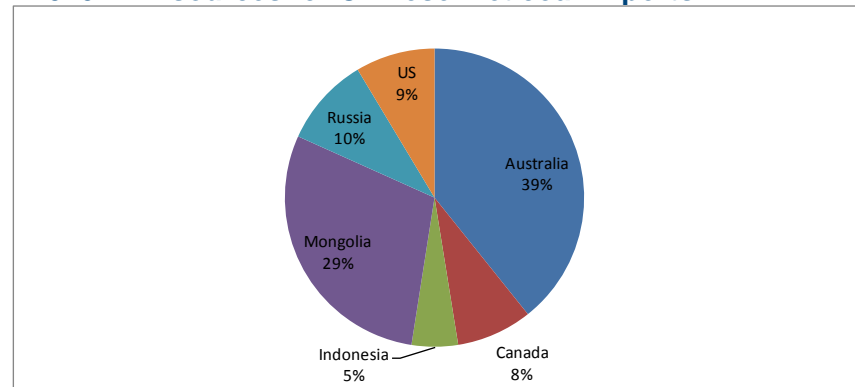


## 2009 source for Chinese met coal imports



Source: McCloskey's.

## 2010 YTD sources for Chinese met coal imports



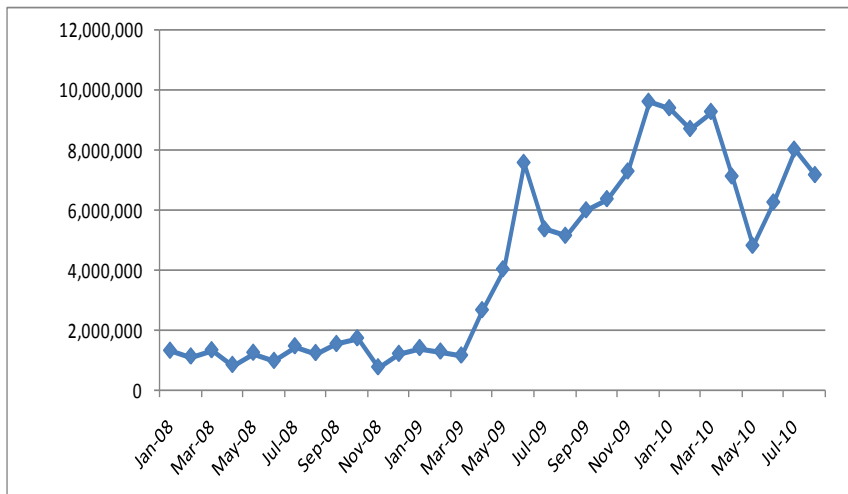
Source: McCloskey's.

# Chinese Thermal Coal Stats

## Chinese Thermal Coal Imports:

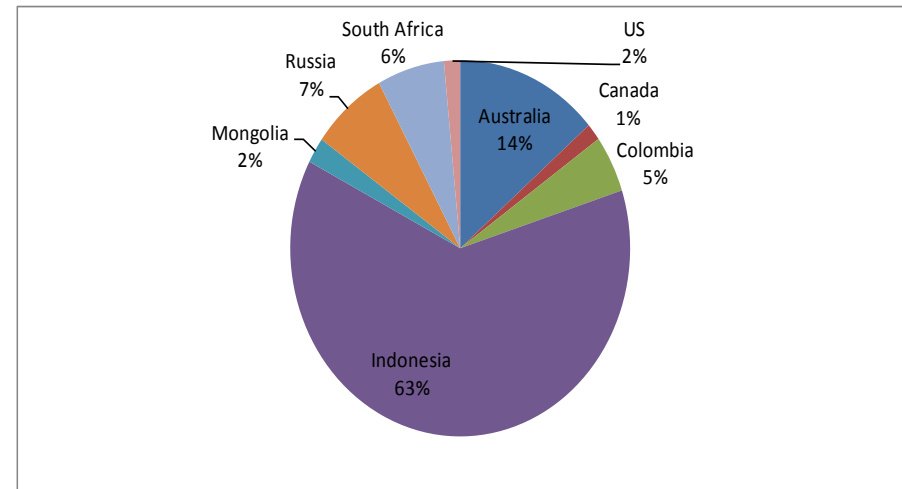
- Aug '10: 7.2 MM tonnes (record this year set in Jan '10 at 9.4 MM tonnes)
- Jan-Aug '10 China imported 60.7 MM tonnes of thermal coal (run rate of 91.1 MM tonnes). In '09, China imported 57.8 MM tonnes of thermal coal.

Chinese Thermal Coal Imports



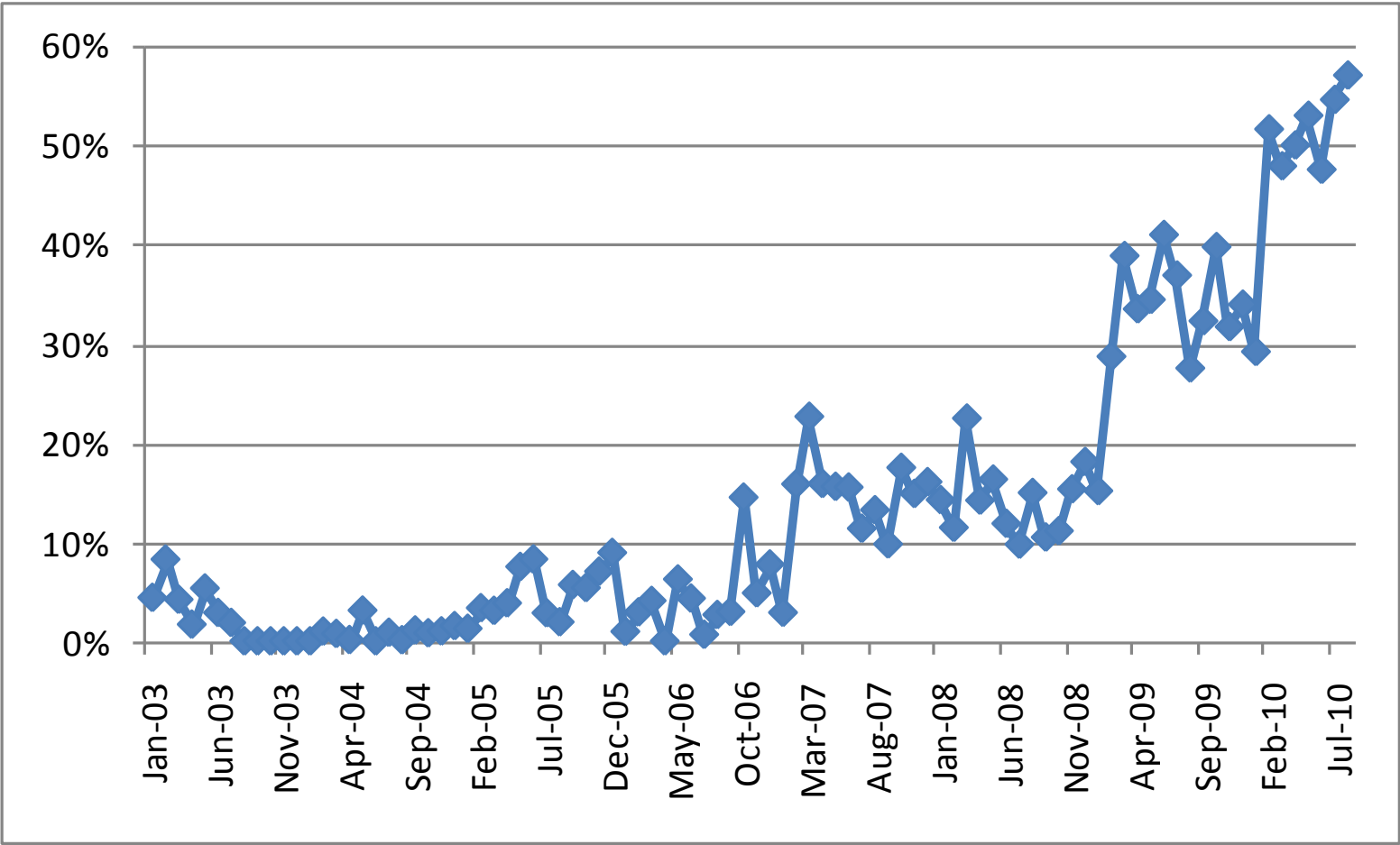
Source: McCloskey's.

Sources for Chinese thermal coal imports



Source: McCloskey's.

# % of South African Coal Moving to Asia



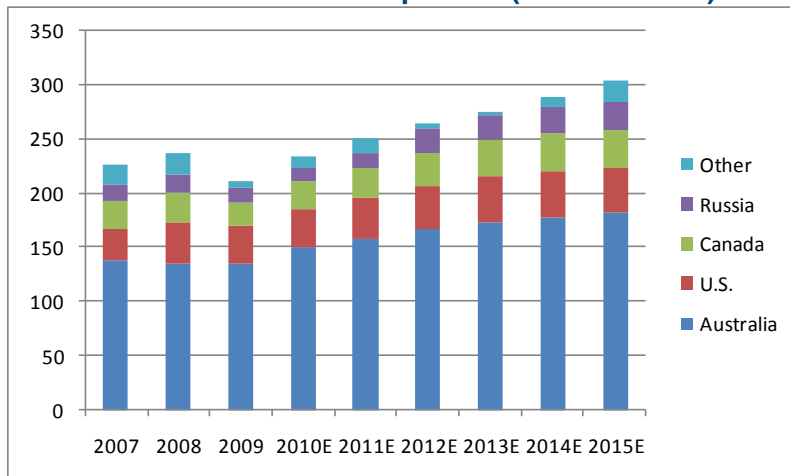
Source: McCloskey.

# Seaborne Met Coal Outlook

## Seaborne Met Coal Outlook:

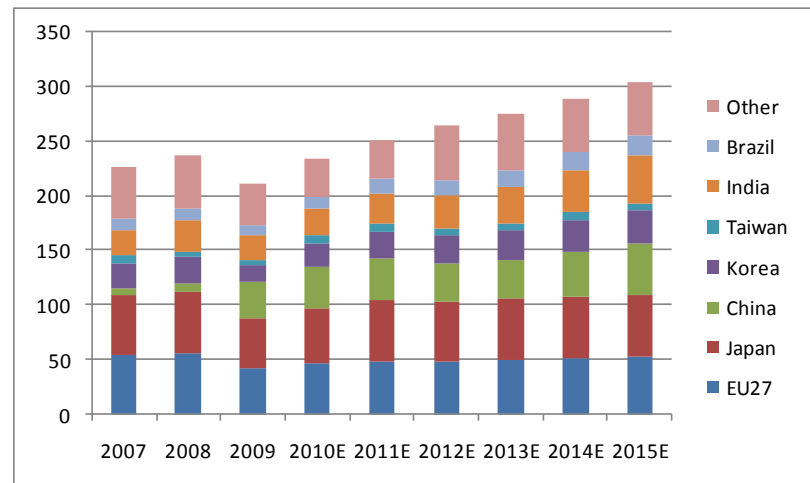
- The seaborne met coal market will increase from 234 MM tonnes in '10 to 304 MM tonnes in '15.
- The two biggest drivers of this growth will be China (+10 MM tonnes) and India (+20 MM tonnes).
- This forecast from ABARE might be too conservative.
- China will grow imports given the location of new steel plants along the coast as well as large scale blast furnaces needing higher quality hard coking coal.
- India will grow because the country lacks much metallurgical coal.
- Met coal should be a tight commodity—limited current supply basins.

Seaborne Met Coal Exporters (in MM tonnes)



Source: ABARE.

Seaborne Met Coal Importers (in MM tonnes)



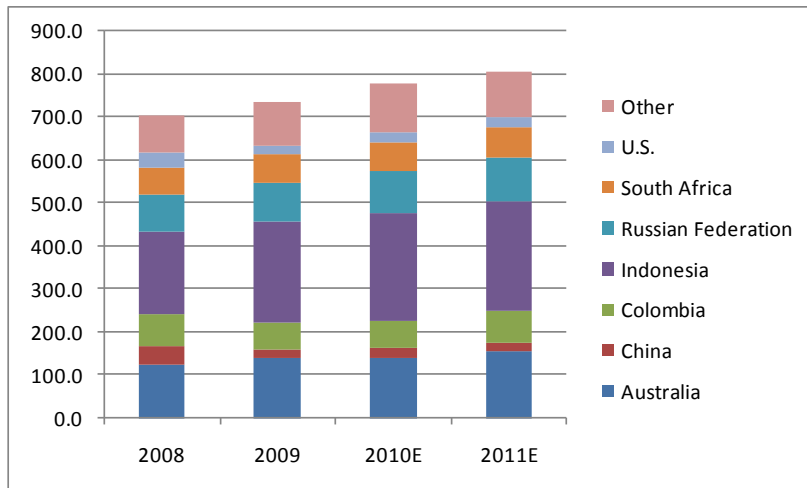
Source: ABARE.

# Seaborne Thermal Coal Outlook

## Seaborne Thermal Coal Outlook:

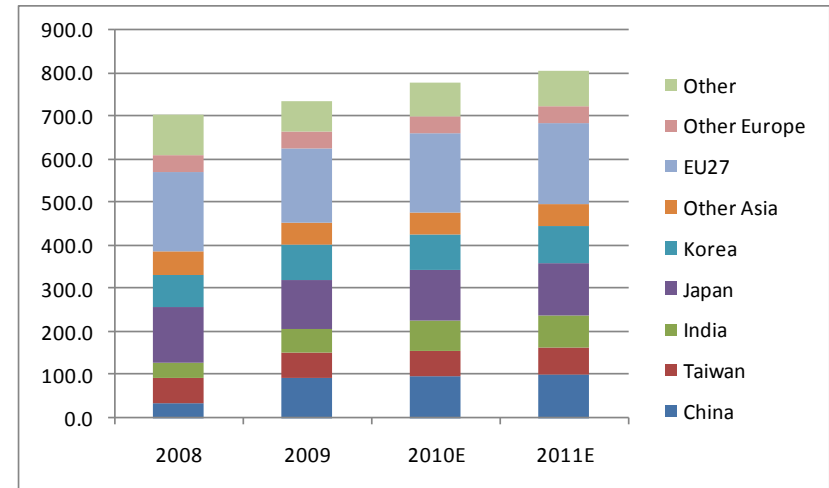
- The seaborne thermal coal market will increase from 778 MM tonnes in '10 to 871 MM tonnes in '15.
- This forecast from ABARE might be too conservative.
- The biggest driver of this growth will be India (+30 MM tonnes).
- The EU27 will essentially be flat from 183 MM tonnes in '10 to 182 MM tonnes in '11.
- Indonesia wants to keep more coal in the country to meet domestic demand.

Seaborne Thermal Coal Exporters (in MM tonnes)



Source: ABARE.

Seaborne Thermal Coal Importers (in MM tonnes)

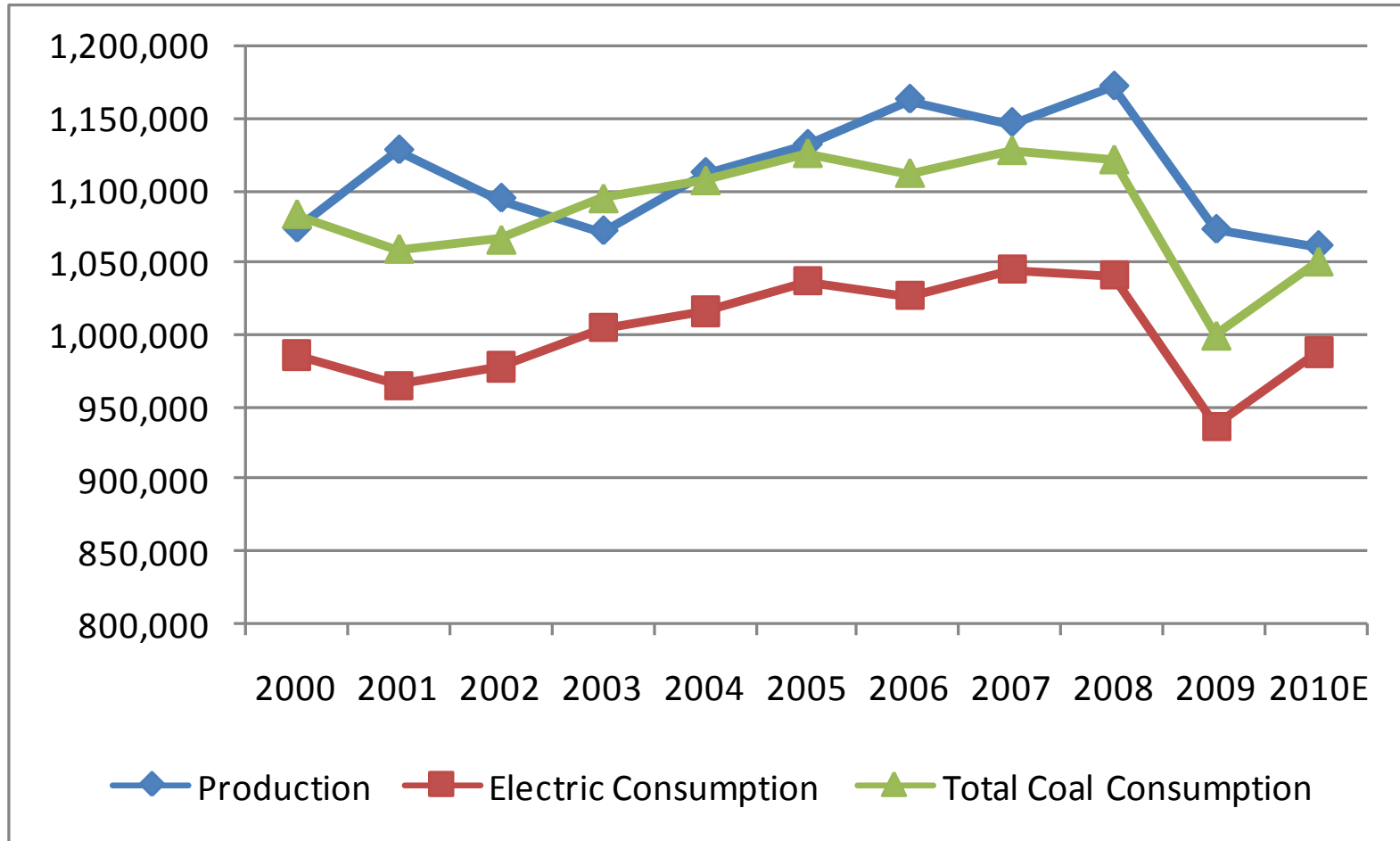


Source: ABARE.

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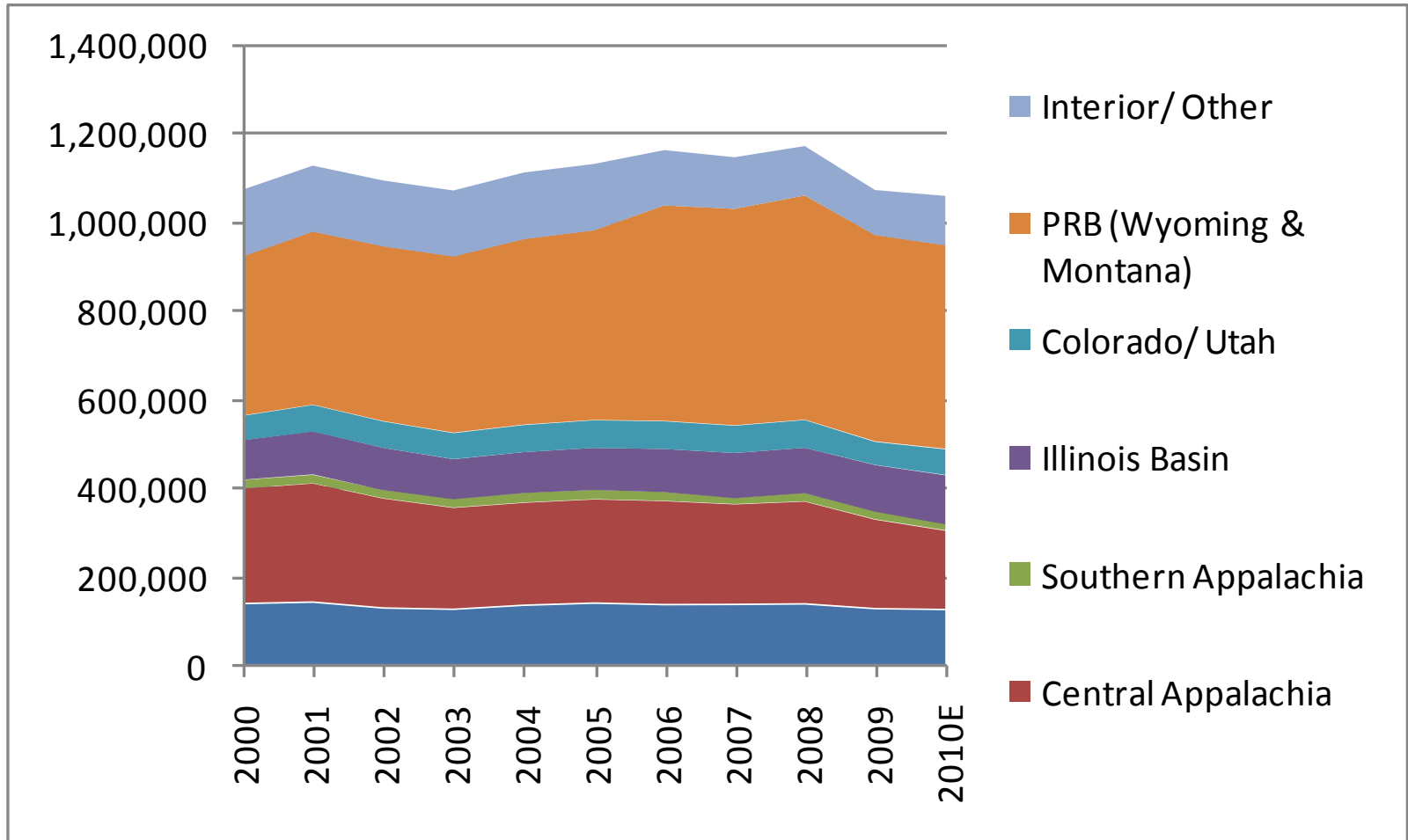
# Current and Projected Usage: U.S.

# U.S. Coal Production/Consumption(in 000's tons)



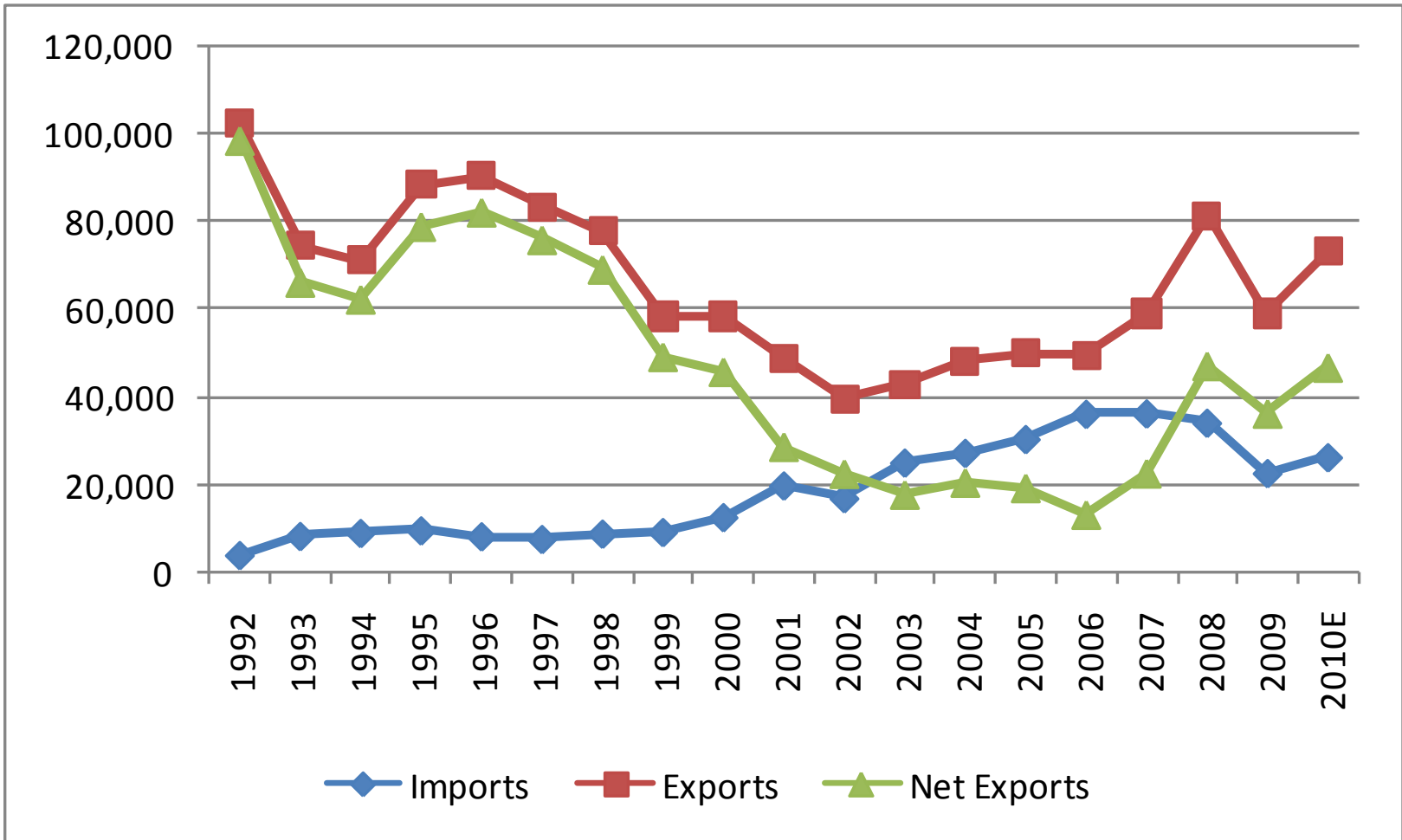
Source: EIA and Simmons & Company International.

# U.S. Coal Production by Basin (in 000's tons)



Source: EIA and Simmons & Company International.

# U.S. Coal Imports/Exports (in 000's tons)



Source: EIA and Simmons & Company International.

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# Key Trends to Watch

# Key Trends to Watch

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- Increased Chinese and Indian imports.
- More South African coal moving to Asia.
- Can Indonesia keep it up?
- Australian transportation bottlenecks.
- Tight metallurgical coal market.
- Increased U.S. coal exports.
- Declining U.S. thermal market.

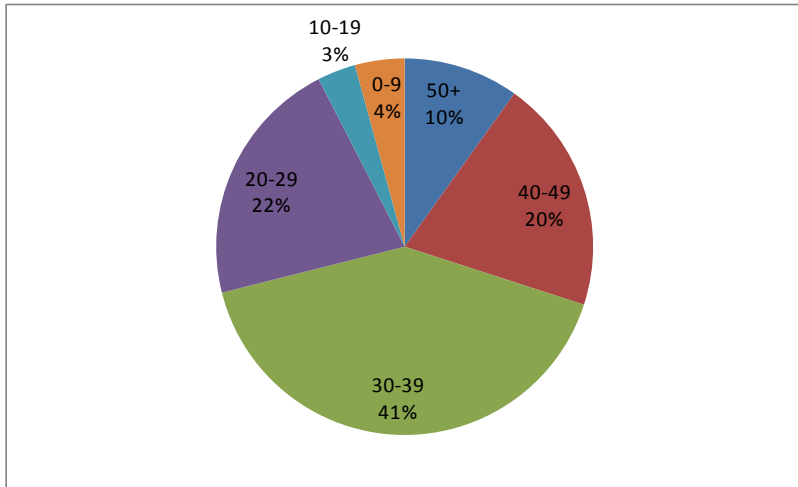
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# Potential Threat to Coal: Age of the U.S. Fleet

# U.S. Coal Fleet Stats

- 53 GW of the U.S. coal fleet is over 40 years old and is not scrubbed.
- 43 GW of these units ran in 2009.
- These units consumed ~100 MM tons of coal in '09.
- These units are likely to retire over the next 10 years.
- U.S. utilities believe ~50-60 GW of coal plants will retire over the next 10 years due to age of plant and lack of economic rationale to add pollution control technology.

**U.S. Coal Generation (MWhs) Capacity by Age**



Source: SNL Energy.

**U.S. Coal Capacity (MW) by Age**

Age of Unit	Capacity (in MWs)	%
50+	49,061	15.5%
40-49	67,488	21.3%
30-39	116,882	36.9%
20-29	63,359	20.0%
10-19	10,255	3.2%
0-9	9,482	3.0%
<b>Total</b>	<b>316,528</b>	<b>100.0%</b>

**U.S. Coal Capacity by NERC Region**

NERC Region	Coal Capacity (MWs)	% of Total
RFC	107,634	34.0%
SERC	98,100	31.0%
WECC	32,416	10.2%
MRO	25,474	8.0%
SPP	20,445	6.5%
ERCOT	17,070	5.4%
FRCC	9,498	3.0%
NPCC	5,598	1.8%
HI	187	0.1%
ASCC	105	0.0%
<b>Total</b>	<b>316,528</b>	<b>100.0%</b>

Source: SNL Energy.

# U.S. Coal Thermal Coal Usage Should Decline

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- Given the age of the U.S. coal fleet, we believe U.S. coal consumption for electricity generation should decline over the next 10 years.
- Yes, there are new plants coming on line.
- U.S. New Builds: Arch Coal believes that ~5 GW (16 plants) have come online in '08 and '09, with an additional 5 GW (8 plants) scheduled to be in operation by the end of 2010. A build out of 12 GW through 2012 equates to 40 Mtpa of annual coal demand.

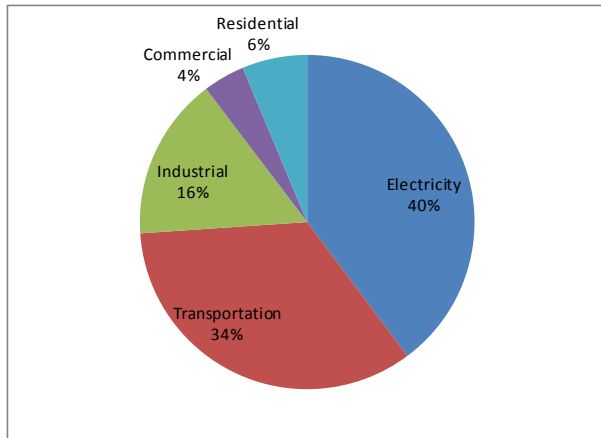
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# Potential Threat to Coal: Carbon Policy

# Proposed Climate Legislation: U.S. CO<sub>2</sub> Emissions

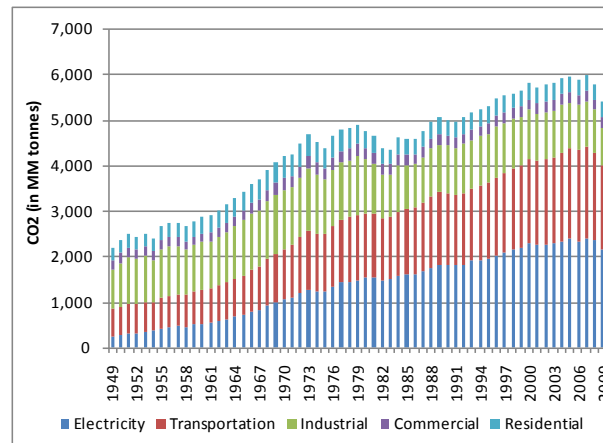
- Both the Waxman-Markey and Kerry-Liebermann bills call for a 17% reduction of greenhouse gases (GHG) from '05 levels by 2020.
- In 2005, U.S. energy-related CO<sub>2</sub> emissions were 5,973 MM tonnes. Therefore, these bills are calling for energy-related CO<sub>2</sub> emissions to reach 4,958 MM tonnes by 2020 (-1.2% CAGR).
- Total emissions of U.S. GHG were 7,053 MM tonnes in 2008. Energy-related CO<sub>2</sub> emissions accounted for 83% of that total.
- Between 1990 and 2009, U.S. CO<sub>2</sub> emissions increased to 5,405 MM tonnes from 5,020 MM tonnes (0.39% CAGR).
- Electricity accounts for 40% of U.S. CO<sub>2</sub> emissions with coal 81% of total electricity-related CO<sub>2</sub> emissions.

2007 U.S. CO<sub>2</sub> Emissions by End Use



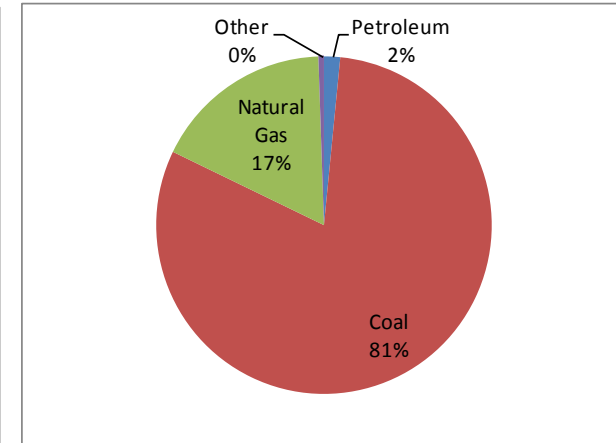
Source: EIA.

U.S. Energy-Related CO<sub>2</sub> Emissions



Source: EIA.

U.S. Electricity CO<sub>2</sub> Emissions



Source: EIA.

# How are We Doing on Reducing Carbon?

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- **The irony on pushing for climate provisions in an energy bill is that U.S. CO2 emissions are already coming down, but for the wrong reason.** U.S. CO2 emissions were 5,405 MM tonnes in '09 (down 6.9% y/y). The peak in U.S. CO2 emissions occurred in 2007 at 5,990 MM tonnes. Since most CO2 reduction plans use 2005 as the base year, how far are we below the '05 emissions? We are 10% below '05 levels without a carbon bill (due no doubt to the recession). Keep in mind the recent Kerry-Liebermann bill is targeting a 17% reduction by 2020. So, we are 60% of the way to complying with Kerry-Lieberman even without a carbon bill.

# Proposed Climate Legislation: Carbon Intensity

- Is the Waxman or Kerry Bills GHG reduction target achievable? Yes, but it will not be easy.
- Assuming 2% GDP growth per annum from 2010-2020, U.S. GDP will reach \$16.1 trillion in '05 dollars.
- If energy-related CO2 emissions are reduced by 17% from '05 levels by 2020, then U.S. energy-related CO2 emissions will need to be 4,958 MM tonnes. This implies a CO2 intensity of 0.31 or a 3.0% per annum reduction.
- This reduction rate in CO2 intensity would exceed historical declines.

## CAGR (GDP, CO2 Emissions & CO2 Intensity)

Time Period	GDP CAGR	Energy Related CO <sub>2</sub> Emissions (MM tonnes)	CO <sub>2</sub> /GDP (tonnes CO <sub>2</sub> /\$000 GDP)
2005-2009	0.91%	-2.47%	-3.13%
2003-2009	1.55%	-1.27%	-2.78%
1999-2009	1.88%	-0.47%	-2.31%
1989-2009	2.53%	0.32%	-2.15%
<b>2009-2020E</b>	<b>2.00%</b>	<b>-0.78%</b>	<b>-2.73%</b>

Source: EIA and Simmons and Company International.

## CO<sub>2</sub>/GDP Needed to Meet 2020 CO<sub>2</sub> Goals at Various GDP Levels

	GDP Growth Per Annum (2010-2020)								
	1.00%	1.50%	2.00%	2.50%	3.00%	3.50%	4.00%	4.50%	5.00%
CO <sub>2</sub> /GDP (in 2020) necessary to meet Waxman goal	0.34	0.32	0.31	0.29	0.28	0.26	0.25	0.24	0.22
CO <sub>2</sub> /GDP (in 2020) @3.00% decline	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
<b>Difference</b>	<b>0.03</b>	<b>0.01</b>	<b>(0.00)</b>	<b>(0.02)</b>	<b>(0.03)</b>	<b>(0.05)</b>	<b>(0.06)</b>	<b>(0.07)</b>	<b>(0.09)</b>

Source: EIA and Simmons and Company International.

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# Potential Threat to Coal: Alternative Energy

# Technology Cost Comparison

## Non-Subsidized Levelized Cost of Electricity

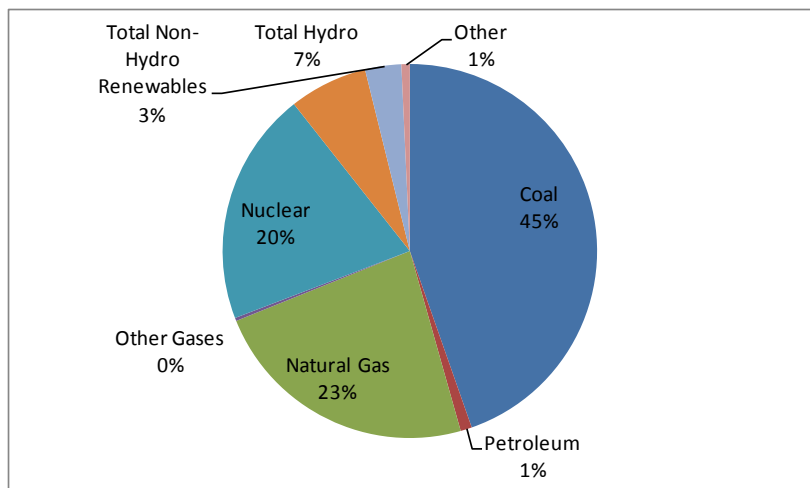
	Technology	Capital Cost (\$/kw)	Delivered Fuel Cost (\$/mmbtu)	Levelized Cost (cents/kwh)	Levelized Cost with \$15/ton CO2 (cents/kwh)	Levelized Cost with \$25/ton CO2 (cents/kwh)	Energy Consumption to Produce 1 kw
Traditional Energy	Coal	\$2,000-\$2,500	3.13	5.0-6.0	7.0-7.5	8.0-8.5	~1lb of coal
	Natural Gas--Combined Cycle	\$800-\$1,000	6.00	5.6-5.8	6.2-6.4	6.7-6.9	7,000 btu
	Natural Gas--Peaker	\$500-\$800	6.00	12.2-14.5	12.8-15.2	13.2-15.6	12,000 btu
	Hydro	\$4,000+	Free	4.00	4.00	4.00	Free
	Nuclear	\$5,000-\$6,000	0.67	8.400	8.400	8.400	<1g of uranium
	Oil	\$700-\$1,000	8.93	12.5-13.0	13.5-14.0	14.5-15.0	10,000 btu
Alternative Energy	Solar PV	\$4,000-\$6,000	Free	21-32	21-32	21-32	Free
	Wind--Onshore	\$1,800 - \$2,000	Free	6.0-9.0	6.0-9.0	6.0-9.0	Free
	Wind--Offshore	\$4,000+	Free	10-12	10-12	10-12	Free

Sources: EIA, IEA, Simmons and Company International.

# Current U.S. Generation Mix

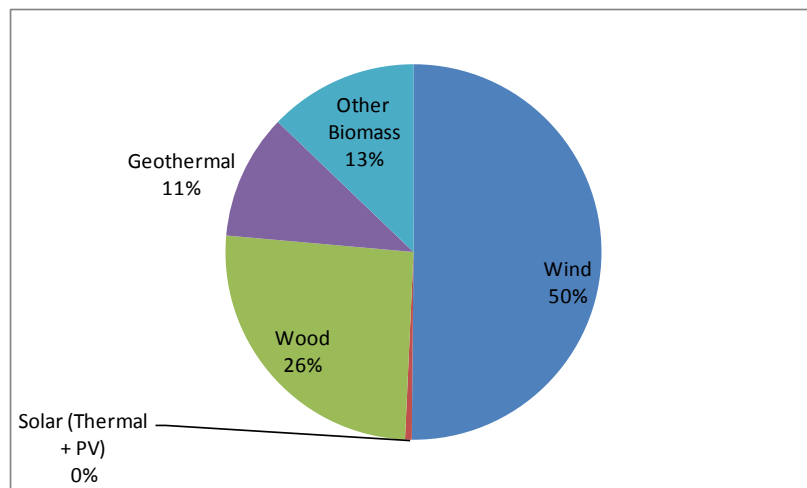
- Waxman Bill has Nationwide Renewable Electricity Standard (RES) that calls for 20% of U.S. electricity to come from non-hydro renewable sources by 2020. However, 5 percentage points can be met through energy efficiency leaving an effective RES of 15%.
- In 2009, just 3% of U.S. electricity was from non-hydro renewable sources.

2009 U.S. Generation by Fuel



Source: IEA

2009 U.S. Net Renewable (Non-Hydro) Electrical Generation



Source: IEA

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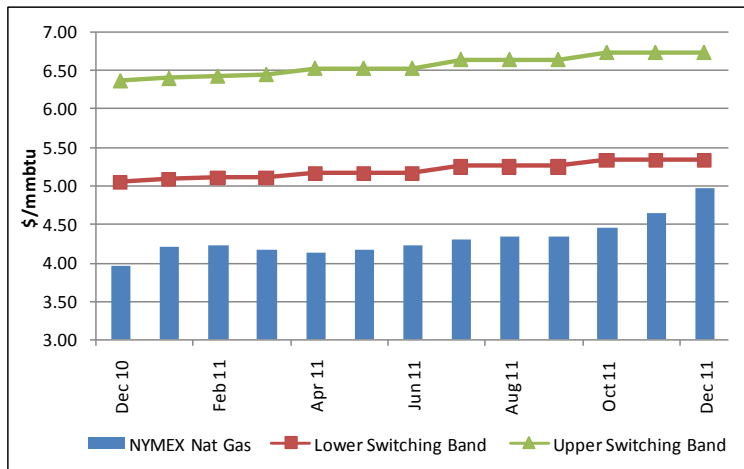
# Biggest Potential Threat to Coal: Natural Gas

# Natural gas is a problem for coal in the U.S.

## Natural gas is a problem for coal:

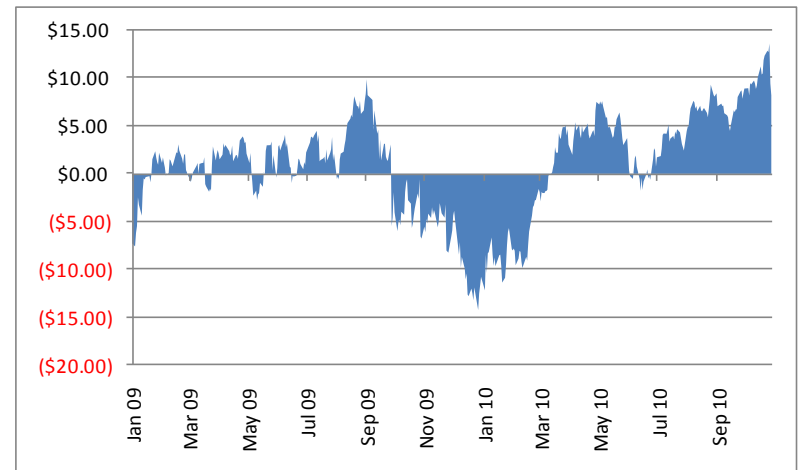
- \$4.00/mmbtu natural gas in the U.S. is a problem for thermal coal demand.
- Coal-to-gas switching economics have deteriorated here recently due to higher natural gas prices.
- Current gas prices might be hitting a coal ceiling as prices much higher will stimulate a move back to coal and away from gas.

2010 Coal-Gas Switching Bands



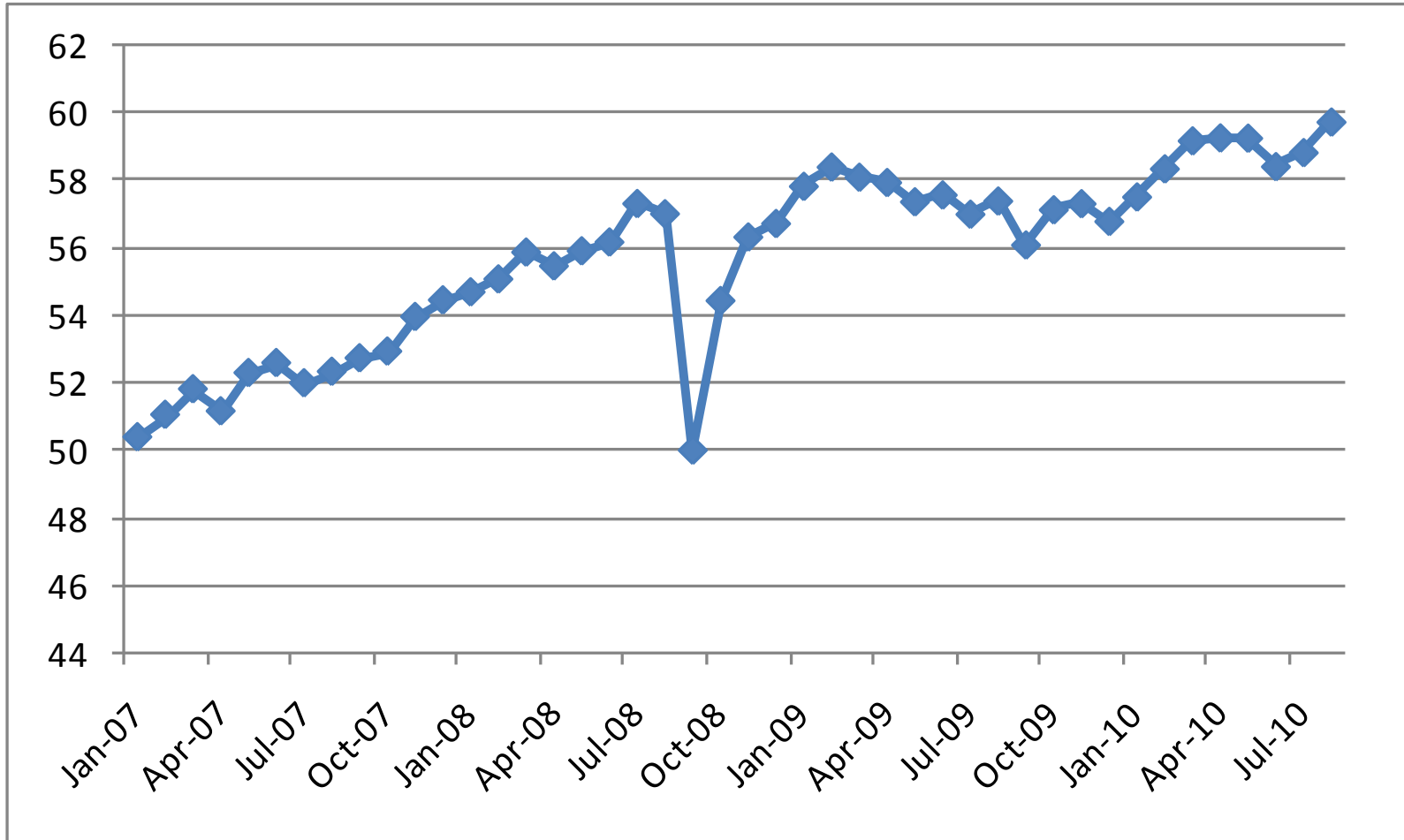
Source: SCI Estimates.

Coal vs. Gas (>\$0=Gas in the money)

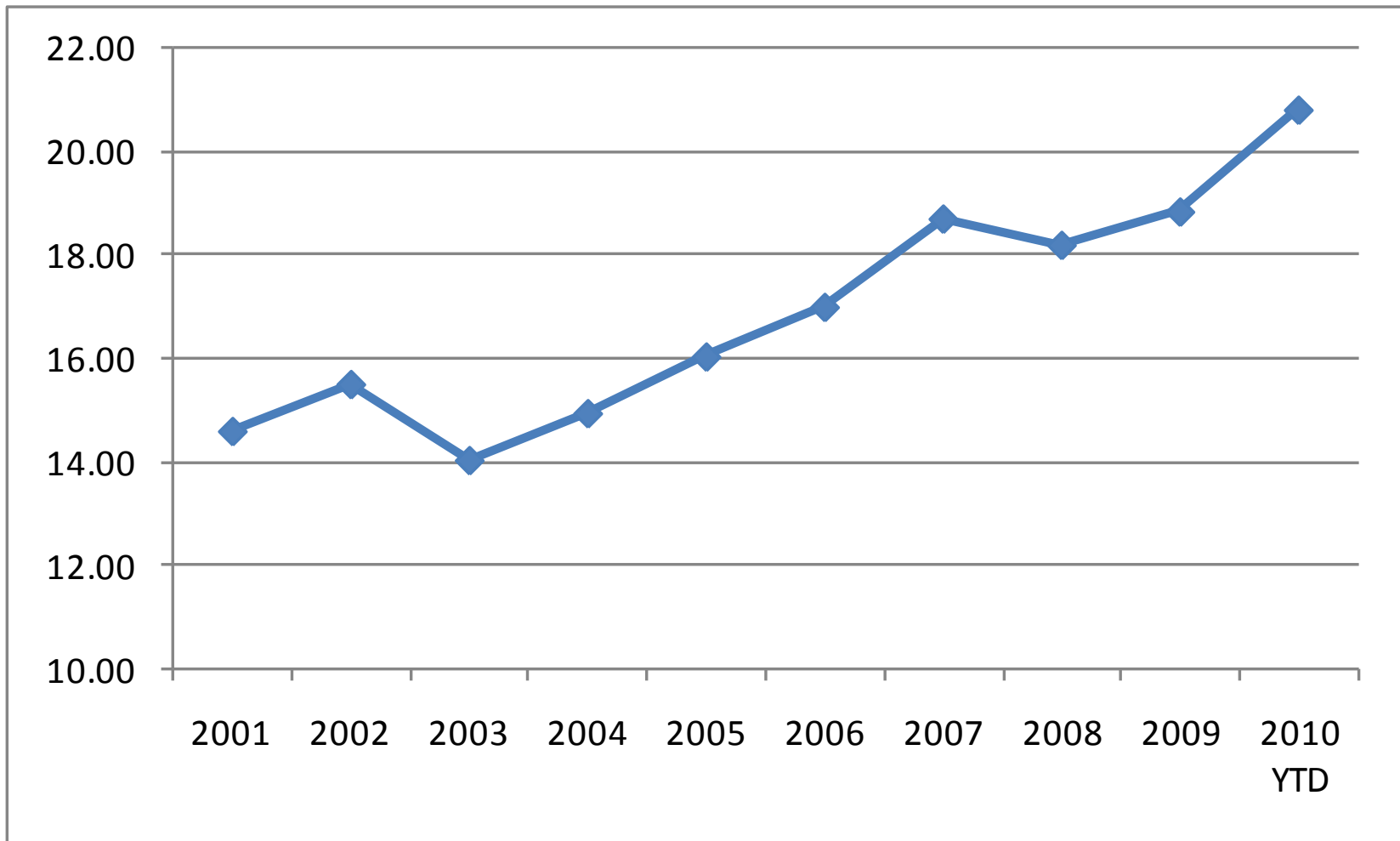


Source: SCI Estimates.

# U.S. Dry Gas Production (in bcf/d)



# U.S. Power Generation Gas Demand (in bcf/d)



# What is the future of coal?

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- Greatest long term threat is from natural gas—especially if China increases gas usage (shales, LNG, etc.).
- Better future for coal in the developing world than in the developed world.
- Outlook in the developed world depends on natural gas and carbon capture and storage (CCS).
- Excellent future for metallurgical coal due to tight supply.
- Coal is not going away—too large and important a source of energy.
- Alternative energy will grow, but cannot grow fast enough now to replace coal anytime soon.

# For the investor: what to look for in a coal company

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- Diversified production base by mining type (surface, underground), method (longwall, continuous miner, etc.) and basin (PRB, ILB, App, etc.).
- International exposure preferred.
- Met and thermal business.
- Low risk companies: large scale, low cost mines at the bottom of the cost curve.
- High risk companies: smaller scale, high cost mines at the top of the cost curve.
- Reserves matter more than management.
- Well fortified balance sheet.
- Very volatile business both from an operational and financial standpoint.

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# Questions and Answers

# Appendix D

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## **Analyst Certification:**

I, Pearce Hammond, hereby certify that the views expressed in this research report to the best of my knowledge, accurately reflect my personal views about the subject compan(ies) and its (their) securities; and that, I have not been, am not, and will not be receiving direct or indirect compensation in exchange for expressing the specific recommendation(s) or views in this research report.

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