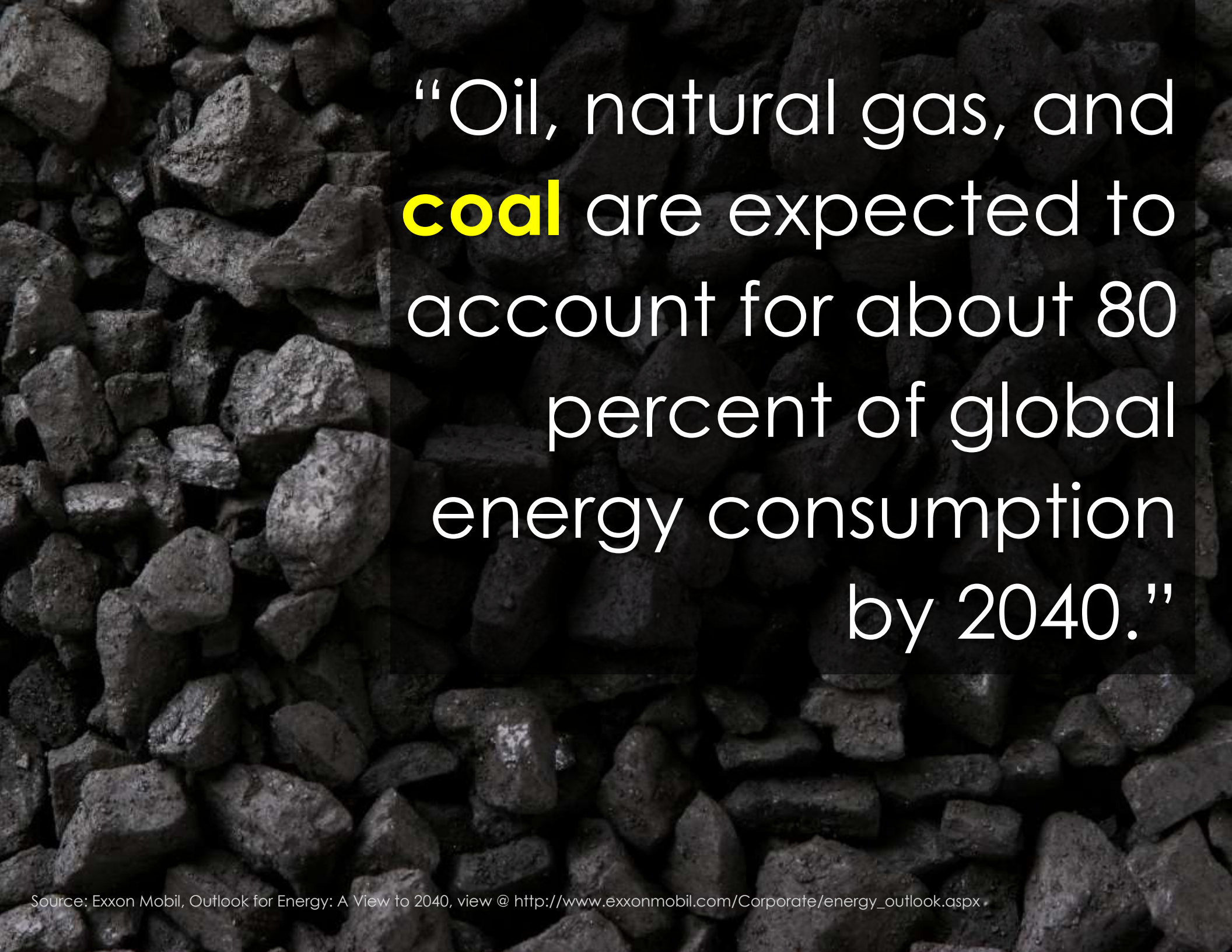


Coal:

Production Cost Outlook

Zpryme Smart Grid Insights Presents a Special Report Series (Part 1 of 3):



“Oil, natural gas, and **coal** are expected to account for about 80 percent of global energy consumption by 2040.”

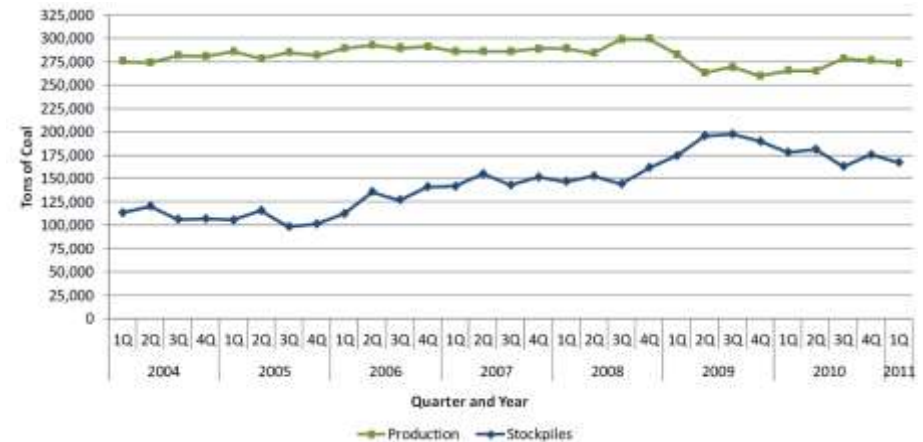
Coal: Generating Capacity & Projections in the US

Coal today accounts for half of US energy production. However, the NERC 2011 Long-Term Reliability Assessment, released in November, identified numerous threats to the reliability of the US electric system: resource adequacy/reserve margins, environmental regulations, gas-electric interdependency, variable generation, demand-side management and transmission.¹ Potential regulations have not yet been finalized and will be released this month, so uncertainty surrounds the actual impact these may have on the energy future. As a result, the capacity and cost of energy sources will change in the coming decades. IEA predicts that carbon capture and sequestration will begin to play a stronger role in the energy mix, particularly enhanced oil recovery (EOR), which pumps CO2 into oil fields to push out harder to reach oil.²

NERC finds that coal “amounted to approximately 326 GW (or 30 percent) of total generation in 2011 and is expected to fall by over 8 GW to 318 GW by 2021.”³ Coal stockpiles no longer exist to cover excess demand as demonstrated in energy shortages in 2004 and 2008. Mining conditions have also brought negative spotlight on the coal industry and have increased costs. The recent Massey, West Virginia mine settlement for the accident that killed 29 miners, totaled \$209 million.⁴ Research into providing a safer work environment and following safety regulations will also increase costs. Please see the below chart taken

from the 2011 NERC report on coal capacity projections (figure 1):

Figure 1: U.S. Coal Production & Electronic Power Stockpiles by Quarter
Source: NERC⁵



New EPA regulations could force dozens of coal plants to close and hundreds to retrofit and upgrade. Credit Suisse estimates that at least 30% of coal-fired plants in the US do not have any type of emissions control.⁶ Older coal plants in the US, particularly in Virginia, are closing, such as the Kanawha River Plant (Glasgow, VA) and Glen Lyn Plant (Glen Lyn, VA). Other plants, such as Appalachian Power Company, are beginning to invest in natural gas as well.⁷ Other plants are preparing for new pollution standards to be issued by the EPA in December on nitrogen oxide, mercury, arsenic, sulfur dioxide and other toxic chemicals by retrofitting their plants.⁸ American Electric Power and

¹ www.nerc.com/files/2011LTRA_Final.pdf

² www.nytimes.com/2011/12/12/business/global/12iht-green12.html

³ www.nerc.com/files/2011LTRA_Final.pdf

⁴ www.businessinsurance.com/article/20111211/NEWS08/312119980?tags=%7C84%7C304%7C92

⁵ www.zpryme.com | www.smartgridresearch.org

⁵ www.nerc.com/files/2011LTRA_Final.pdf

⁶ www.nytimes.com/2010/11/30/business/energy-environment/30utilities.html?adxnln=1&pagewanted=all&adxnlnx=1323629618-dsgGcEp7GUu7uUyUbpA6A

⁷ www.dailymail.com/Business/GeorgeHohmann/201112070251

⁸ www.dailymail.com/Business/GeorgeHohmann/201112070251

Southern Company are two of the major leaders in pushing for a delay in these regulations, which are set to take effect in 2015. As two of the largest producers of energy from coal, American Electric Power and Southern Company argue that the new regulations would force them to shut down plants, which would cause electricity shortages. American Electric Power claims the new regulations would cost them 600 jobs, shut down 11 plants and \$8 billion to upgrade.⁹ Country wide, experts argue the total industry wide cost to upgrade or replace coal plants could be as high as \$70 billion over the next ten years.¹⁰ Both American Electric Power and Southern Company argue at minimum, six years would be required to comply (rather than the three provided).

The current electricity network has been created largely around coal-fired plants and permitting, financing and creating new plants and then connecting to grid. The current system could create energy shortages should coal plants shut down. EIA predicts that coal energy generation will in fact increase by 25% by 2035.¹¹ Investors in the Prairie State Energy Campus are investing in a new \$4 billion coal plant in Illinois, betting that regulations will turn out to be lighter than expected and coal to remain cost-competitive with gas.¹²

In 2011, the US exported over 100 million tons of coal to Canada, Mexico, Europe and China, up from 60 million

tons in 2009.¹³ Over the next thirty years, energy demand in developing countries is predicted to grow by 60%.¹⁴ If the US could provide more coal to an international market, this could drive down worldwide prices, increasing coal domestically and internationally. However, more west coast shipping stations for coal would need to be created to meet potential demand from China and other East Asian countries.

The decline in coal due to increasing costs comes at the same time the US realizes decreasing natural gas costs, particularly with the discovery of many shale gas fields. Gas-fired plants emit less toxic chemicals than coal, thus more easily meet potential regulations. Siemens is now investing in gas turbine production, along with other manufacturers. Randy Zwim, Chief executive of the Energy Unit at Siemens predicts that one third of the US coal plants will be shut down in the next ten years to be replaced by natural gas. Investment in natural gas will be a cheaper, economically viable option than investing in a retrofit of an older coal plant.¹⁵ Progress Energy found that the cost to retro fit two coal plants in North Carolina would be \$2 billion compared to \$1.5 billion to build new gas-fired plants. Xcel Energy, Minnesota-based, is also closing five Colorado coal fired plants to replace them with two gas fired plants in order to reduce costs and meet regulations.¹⁶ Other companies are preemptively closing coal plants to open gas ones based purely on the lower cost of gas, such as Exelon Power in Pennsylvania. Exxon

⁹ www.bloomberg.com/news/2011-11-29/epa-proposal-said-to-give-power-companies-option-to-delay-pollution-rules.html

¹⁰ www.nytimes.com/2010/11/30/business/energy-environment/30utilities.html?adxnln=1&pagewanted=all&adxnlnx=1323629618-dsgGcEp7GUn7uUyUbpA6A

¹¹ www.marketwatch.com/story/universal-bioenergy-announces-expansion-into-coal-energy-market-with-deal-valued-at-264-million-2011-12-07

¹² www.nytimes.com/2010/11/17/business/energy-environment/17COAL.html?pagewanted=1

³ www.zpryme.com | www.smartgridresearch.org

¹³ e360.yale.edu/feature/as_coal_use_declines_in_us_coal_companies_focus_on_china/2474/

¹⁴ online.wsj.com/article/APdc7826baa55140c6b6823cc7ac1d4251.html

¹⁵ online.wsj.com/article/BT-CO-20111116-713367.html

¹⁶ www.nytimes.com/2010/11/30/business/energy-environment/30utilities.html?adxnln=1&pagewanted=all&adxnlnx=1323629618-dsgGcEp7GUn7uUyUbpA6A

Mobile, in an Energy Outlook report to be released in the coming weeks, predicts that 60% of energy will come from gas by 2040, while coal will be phased out.¹⁷

Coal: Bottom Line

It would seem the US is currently at a turning point in our energy future. Extensive studies by NERC and Exxon Mobile indicate that the costs of coal will continue to increase, especially relative to natural gas. The potential of increased environmental regulations will likely shut down many plants at least temporarily for retrofitting and many will close down permanently. The impact on the electricity mix in the US will remain uncertain for a time during a transition to refit the grid (ie. future 'smart grid') to handle other energy sources and new plants processing natural gas and to a lesser level, renewable sources.

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¹⁷ online.wsj.com/article/APdc7826baa55140c6b6823cc7ac1d4251.html

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