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Energy Market Dissonance

The energy markets are in the early stages of grappling with a sea change of demand and supply forces. In particular, weakening global demand and rising supply are shifting the energy market focus from the long-term direction of crude oil prices to the nature of the price relationships between different sources of energy, especially natural gas and crude oil.

The poster child for the challenges facing the energy markets is the price pattern in the United States of natural gas, crude oil, and coal expressed in terms of how many BTU's of energy one US dollar can purchase. (See Figure 1.) Currently, one US dollar can buy about 440,000 BTU's if spent on coal, 365,000 BTU's if spent on natural gas, and only 60,000 BTU's if spent on WTI crude oil. How markets resolve this large energy content disparity between natural gas and crude oil will be one of the major challenges of the coming 5 to 10 years.

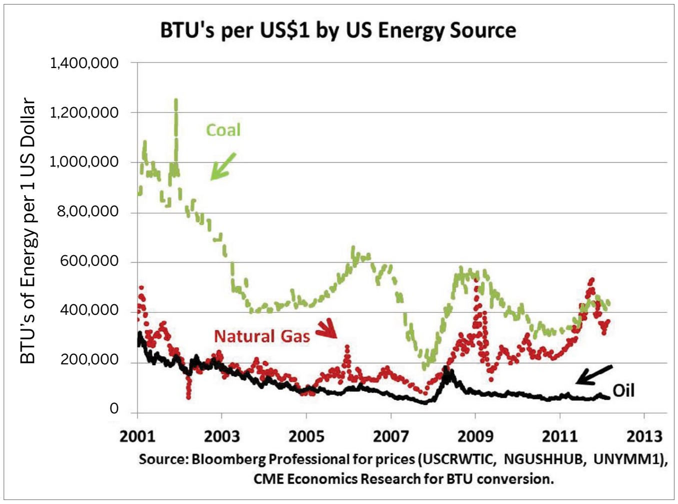

Figure 1

To frame the issues regarding the energy markets, this report will first provide a perspective on the demand for energy globally, which is slowing due to decelerating economic growth in the emerging market countries as well as the stagnation in Europe. Turning to the supply side, we see increases in crude oil production in the US and Canada due to enhanced extraction techniques, and a more rapid return of production from Libya and Iraq due to the relative political calm in those countries. Natural gas supply has grown in leaps and bounds in the US, and promises similar increases in many other countries around the world as fracking techniques are employed. The contemporaneous confluence of decelerating demand and rising supply puts the focus on the infrastructure challenges associated with the energy content price disparities between different types of fuel. And, the resolution of the energy content pricing gap has significantly different implications for Europe relative to the US, because of the varying ways natural gas has been priced in these regions.

To anticipate our conclusions, we see the following patterns having the potential to emerge:

- Decelerating global energy demand will take the upward price pressure off crude oil, excepting temporary periods of heightened geo-political tensions associated with the Middle East.
- The incentives surrounding relatively inexpensive and cleaner natural gas will drive both demand and supply infrastructure changes. These infrastructure

changes will be slow to occur due to their substantial costs, risks, and extended time horizons, but they will happen over the coming decade just the same.

- Globally, the natural gas revolution will gain speed over the coming years, which will add to new supply and put in place market forces likely to eventually de-link natural gas from crude oil pricing in Europe and other parts of the world. We also note that losing the price linkage to natural gas has the potential to damage the usefulness of Brent crude oil as a pricing benchmark.
- Finally, one of the positive aspects of heightened supplies of energy resources is the economic benefits that will accrue to the countries in which the new supplies are located, such as the United States. Over 5 to 10 years, for example, the US economy could see 1% to 1.5% increases in real GDP above what would otherwise occur if the infrastructure challenges are met.

Decelerating Global Energy Demand

The key to understanding the driving force behind higher crude oil prices in the 2000-2010 decade was the enormous growth in the emerging market countries, led by China. Just as important, going forward a critical factor in future energy demand is the rapid slowing of economic growth in the emerging market world, coupled with the stagnation in Europe.

Cumulatively, over the period from the end of year 2000 through the end of 2010, the decade long real GDP expansion in China was 171% (about 10% annually, compounded), India was up 105% (7% annually), and Brazil was up 43% (just less than 4% annually). By comparison, the US, UK, and Euro-Zone were all under 20% cumulative real GDP growth for the decade and Japan was under 10%. BRIC nations' (Brazil, Russia, India, and China) share of world GDP rose from 8% in 2000 to about 25% in 2010. Moreover, when it comes to energy demand, emerging market countries typically see much more rapid energy demand growth for each one percent of GDP growth than mature industrial countries. In short, the rapid increases in economic activity in the emerging market world were far and away the most important driver of higher crude oil prices during the 2000-2010 decade. See Figure 2.

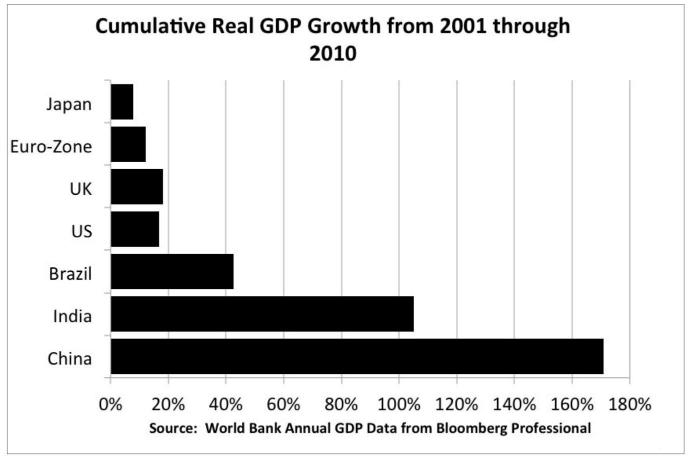

Figure 2

By contrast, we are now seeing economic activity in all the BRIC nations, as well as other, smaller emerging market countries, decelerate quite dramatically. (Please see our report on BRIC nations, from 25 July 2012, "BRIC Country Update: Slowing growth in the face of internal and external challenges".) The approximately 10% annual real GDP growth rate of China over the last decade appears to be slowing into the 6.5% range for the coming ten years. Brazil hit a wall in 2011, and virtually stopped growing, although a mild rebound in 2013 is likely. India has seen its growth rate cut in half compared to its historical longer-term average.

The economic deceleration in the emerging market countries is due to many complex domestic factors specific to each country, although the stagnation in Europe has been a key factor for all countries. For example, Europe accounts for about 20% of Chinese exports, and they are now falling. To different degrees, other emerging market countries are feeling the pressure from falling exports to Europe. Setting Europe aside, many of the growth challenges in emerging market countries are simply related to the normal maturation process, in which growth rates will naturally slow over time to more sustainable levels. Thus, we have a short-term period, 2012-2013, in which economic activity and thus energy demand is slowing quite abruptly, and then we will more than likely enter into a longer-term growth path in which emerging market countries will resume economic growth, but not at nearly the pace of the past decade. These observations point to rising energy demand over the long term, but not necessarily of the magnitude that would exceed the large supply increases expected to materialize over the coming ten years. That is, both the short-term and the long-term energy demand picture are strikingly different from the 2000-2010 decade that propelled crude oil prices from $20 per barrel as 2001 started to the $100 per barrel territory at the end of the decade.

Rising Energy Supply

At the same time as global energy demand is decelerating, energy supply is increasing rapidly. The medium and longer-term theme of increasing supply is due to a variety of sources. In North Dakota and Montana, the Bakken Formation is now considered the largest source of oil in the United States, with production climbing from next to nothing in 2000 to about 665,000 barrels per day from the region by the end of 2011. Canadian tar sands reserves are also booming with expanded production, from 600,000 barrels per day in 2000 to 1.6 million barrels per day in 2011. Libyan oil is coming back on-line faster than many thought was feasible given the political instability in the country, and Iraq is also pumping increasing amounts of oil.

And, of course, it is not all about crude oil. Benefitting from new fracking technologies and sideways drilling, natural gas production is increasing as well in the US, with production up about 25% over the last 5 to 7 years, and with the rate of growth still increasing. Other countries and regions, from China to Europe, will be ramping up their energy production, especially where fracking can be utilized.

In short, it is quite possible that the coming 5-7 years or more will be dominated by rising energy supply outpacing energy demand, the exact opposite condition of the previous decade. This possibility shifts the focus of the energy markets toward price spread relationships among different sources of energy.

Infrastructure Challenges

All of the actions by the production, distribution, refining, and consumption segments of the energy complex that would work toward pushing the market prices in the direction of energy equivalence involve billions of dollars of investment, huge time horizon price risks, and substantial regulatory challenges. Given these real world constraints, it would be almost pure luck for market prices to stabilize around energy equivalence even for a short period of time. Nevertheless, we can analyze fundamental developments as well as futures prices and their behavior to gain an understanding of whether market prices are moving in the direction of energy equivalence or moving further away.

In the distribution sector, we are seeing a number of key developments. Regarding crude oil, the Seaway pipeline from Oklahoma to the Gulf of Mexico has been reversed and will provide a faster and cheaper way of getting inland excess crude oil to refineries on the Gulf coast. The Enbridge Line 9 pipeline in Canada is expected to be reversed in early 2013. There is a rapid expansion (and probably under-appreciation) of expanding rail delivery capability that will allow North Dakota and Canadian crude oil to move more easily to east or west coast refineries. Rail capacity at the end of 2011 was estimated at approximately 200 thousand barrels per day, but rail expansion may more than double to over 550 thousand barrels per day by the end 2012.

With regard to natural gas, the difficulties in being able to export natural gas are the key driver of the price to energy content differential with respect to crude oil. Some coastline facilities built originally for importing natural gas will be converting to export facilities. But all this takes time and money, and probably some delays related to regulatory issues that may arise in the process.

In the refining sector, there are plants being readied or expanded to convert natural gas to diesel fuel. We would note that the ability of refiners to take the risk that billions spent building a natural gas to diesel conversion plant will be profitable depends either on their confidence that a sufficient price spread will remain in place for 5 to 10 years after the plant is built or on their ability to hedge some of these risks in long-dated swaps or futures contracts. The existence of futures markets to price the time horizon risks are integral to the ability of the actors in the energy sector to close the BTU pricing gap over time.

And in the consumption sector, more electrical power plants are switching from coal to natural gas and more intra-city transit fleets are acquiring buses that can use natural gas. Both of these substitutions also involve time risks, although not necessarily quite so large as those in the refinery conversion arena, hence the coal and natural gas energy content prices are no longer far apart in the US.

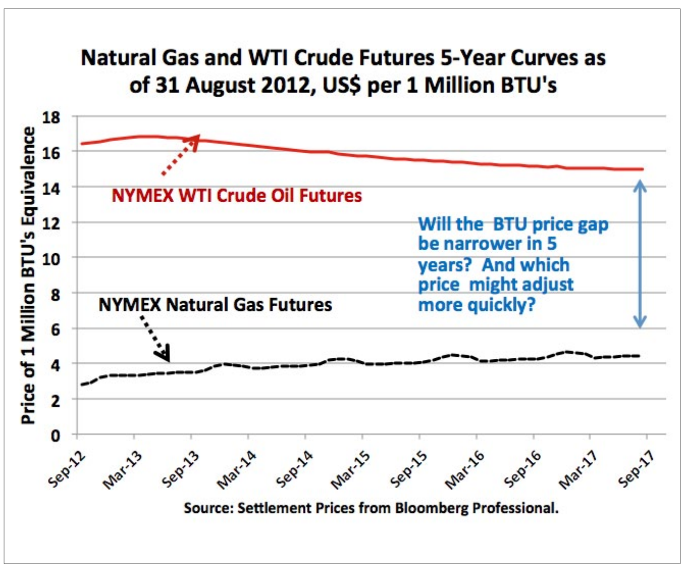

Figure 3

With all of these developments involving enormous time horizon risk, the pricing of long-dated futures contracts provides considerable information about how the market views these trends and which sectors will bear more of the burden of convergence toward energy content equivalence, if such convergence even occurs. Figure 3 shows the current spread between the five-year out futures price and the nearby month futures price in the United States for natural gas and WTI crude oil, converted to US$ per million BTU prices. The futures market indicates that the current large price gap of roughly over $13 per million BTU between WTI crude oil and natural gas only narrows toward $10.50 over the next five years. If anything, the long-term futures maturity curve is a warning of just how difficult and risky are the investments that seek to take advantage of the energy price discrepancy. Our perspective is that so many long-term projects are now in development, that there is a reasonable possibility for the energy pricing gap to narrow more rapidly. We caution, however, that the price gap may only narrow as these new infrastructure projects actually come online and start impacting spot prices.

Global Pricing and Growth Implications

As with any sea change in supply and demand, there are winners and losers. On the winning side is global growth, especially in those countries with expanded domestic supply. Calculations of the impact on real GDP are fraught with complications. Nevertheless, a country such as the US, seeing huge increases in both crude oil and natural gas productions may have the possibility of seeing its real GDP annual average growth rates raised by 1% to 1.5% over the next 5-7 years, assuming (a big if) that many of the current infrastructure challenges are resolved.

On the losing side, the potential for losses points to those who currently benefit from natural gas prices being tied to crude oil prices, such as is the case in Europe. Russian natural gas is typically sold with pricing contracts linked to Brent crude oil. As natural gas production increases in Europe and as Middle Eastern countries expand their ability to liquefy and ship natural gas to distant consumers, there will be increasing pressure to price natural gas independently of crude oil, as is done in the United States. A change in how natural gas is priced in Europe would negatively impact the Russian economy and its government which gets about 40% of its revenue from energy taxes and fees. Also, there is potential that a de-linking of natural gas pricing from Brent crude oil would weaken Brent as a benchmark, given that the European natural gas sector would start to price and hedge independently. None of this will occur quickly, but the pace of change appears to be accelerating in the energy sector.

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