RHODIUM GROUP

ENERGY & NATURAL RESOURCES

Tracking America's Energy Bill

Energy costs are a key variable in US economic performance. Yet available data on how much Americans spend fueling their cars, heating their homes and lighting their offices either lags by a couple years or is incomplete. This month, we are introducing the RHG Energy Meter, a more timely and inclusive estimate of US energy expenditures. This note provides an overview of the indicator and discusses how America's energy bill has changed over the past couple years.

March 27, 2013

Trevor Houser
+1.212.532.1158
tghouser@rhg.com

Improving energy expenditure data: Monthly energy cost estimates are available from the Commerce and Labor Departments, but exclude business energy expenditures. The Energy Information Administration (EIA) publishes annual economy-wide energy cost data, but with a two-year lag. The RHG Energy Meter provides monthly estimates of energy expenditures by fuel in the residential, commercial, industrial and transportation sectors, including how much of that spending went to imports vs. domestic production.

America's energy bill has started to fall: We estimate economy-wide energy costs fell by 4.9% in 2012 following an 11% increase in 2011. The $1.32 trillion US households and businesses spent on electricity, petroleum, natural gas, coal and renewables last year amounts to 8.4% of GDP, down from 9.1% in 2011 but still high by recent historical standards. Weaker demand accounted for just under half the decline, with the rest coming from lower energy prices. Delivered natural gas prices were down 19% in 2012, which helped lower industrial energy costs in particular. But petroleum and electricity prices were only off by 1.5% and 2.0% respectively. And as they account for more than 90% of delivered energy by value, the overall reduction in energy expenditures was relatively modest.

More of what Americans spend is staying at home: US crude oil and natural gas imports declined last year while refined product and coal exports rose. On net, Americans spent $284 billion on energy imports in 2012, down 13.6% from the year prior. Of that, $4 billion was for natural gas, down 51% from 2011 and less than one-fifth of what was spent in 2007. And the US ran an $18 billion trade surplus in refined petroleum products, a dramatic turn -around from the $54 billion trade deficit in 2008.

Not out of the woods yet: The US spent $313 billion on imported crude in 2012, the third highest year in American history (adjusted for inflation). Net crude imports declined by $22 billion in 2012, a welcome improvement after the $77 billion increase in 2011. And growth in domestic crude production prevented what would have otherwise been considerably higher oil prices. Total energy expenditures are unlikely to fall much if at all this year, but the share of energy spending that stays at home will continue to increase. Switching from imported to domestically produced energy only partially mitigates the energy-related risks to the US economic recovery, however. An oil price spike could still derail the train.

IMPROVING ENERGY EXPENDITURE DATA

Energy can have a significant impact on the structure and rate of growth of the US economy. Energy expenses impact household spending, business investment, international competitiveness and overall inflation. And energy imports are a major component of the US trade deficit. Energy price data is available from myriad sources,

often on a daily (or even hourly) basis. Complete and timely energy expenditure data (price x quantity), however, is much harder to come by. The Commerce Department's Bureau of Economic Analysis publishes quarterly estimates of consumer energy expenditures as part of the National Income Product Accounts, which includes residential electricity and natural gas spending and the cost of fuel for private vehicles. The Labor Department's Bureau of Labor Statistics tracks the same through its Consumer Expenditure Survey. But neither includes energy expenditures by government and business, which account for more than half the national total. The EIA publishes economy-wide energy expenditure estimates as part of its Annual Energy Review (AER), but these estimates lag by close to two years.

To provide a more timely measure of economy-wide energy costs, we created the RHG Energy Meter. The Energy Meter uses demand and price data from the EIA to estimate overall monthly energy expenditures by sector and fuel (Table 1).[1] Like EIA's energy expenditure data, the Energy Meter tracks the price paid and quantity consumed by the ultimate user of an energy product. So we exclude energy consumed as an intermediate input in producing that energy product. For example, we track how much drivers spend on gasoline and diesel but not how much refineries spend on crude to produce those refined products. Likewise, we track how much homes and businesses spend on electricity, but not how much power plants spend on coal to produce it.

Table I: RHG Energy Meter Coverage

Fuel	Residential	Commercial	Industrial	Transportation
Petroleum	X	X	X	X
*Motor Gasoline**		X	X	X
*Distillate Fuel Oil**	X	X	X	X
Kerosene	X	X	X	
LPG	X	X	X	X
Jet Fuel				X
Aviation Gasoline				X
Residual Fuel Oil		X	X	X
Petroleum Coke		X	X	
Lubricants			X	X
Asphalt			X	
Naphtha			X	
Natural Gas	X	X	X	X
Coal and Coke	X	X	X	
Electricity	X	X	X	X
Biomass	X	X	X	

* includes ethanol and biodiesel blended into the transportation fuel supply.

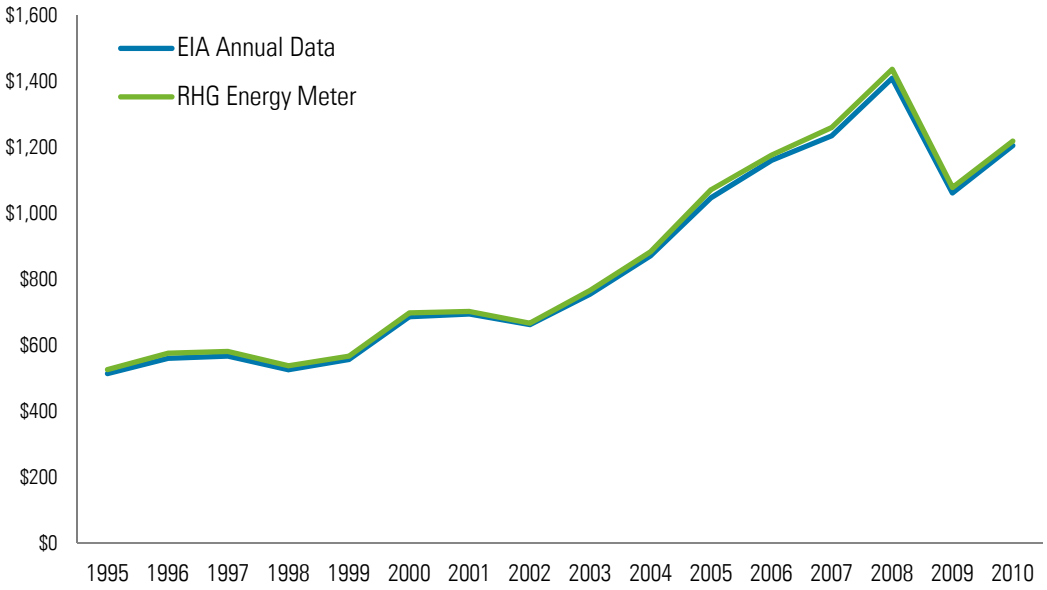
Our methodology provides a very close fit to the energy expenditure estimates published in the AER, as shown in Figure 1. We compliment this expenditure data with energy trade data from the US Census Bureau, which is more up-to-date than the AER energy

[1] The EIA publishes delivered prices by sector for natural gas, electricity and most petroleum products. For those petroleum products without EIA price data (such as coke and lubricants), we estimate prices based on the cost of crude and other refined products. Fuel ethanol and biodiesel blended in the transportation fuel supply are captured in the gasoline and distillate data respectively. For coal, the only monthly delivered price series available is for electric power, which we use for industry, commercial and residential consumption, making adjustments to account for the higher cost of metallurgical coal relative to thermal coal in sectors where metallurgical coal is consumed. We use EIA's delivered coal price series to estimate biomass costs as well as the two fuels are often substitutes in industrial boilers. And we do not include non-combustible distributed renewables like roof-top solar because of the absence of reliable equipment cost data. As these sources accounted for less than one-half of one percent of total delivered energy in 2012, we do not believe the exclusion significantly impacts our estimates.

trade estimates, and available on a monthly as well as annual basis. This provides a timely estimate of both how much Americans are spending on energy and how much of that money leaves the US.

Figure 1: Nominal Energy Expenditures

Billion USD



Source: EIA and RHG Energy Meter

In this note, we update the currently available AER data using the RHG Energy Meter and highlight key changes in America's energy cost landscape over the past couple years. We will flag important monthly developments going forward and will provide a complete monthly historical data series to clients upon request.

AMERICA'S ENERGY BILL STARTS TO FALL

In 2010, the last year for which economy-wide energy expenditure data is available from the EIA, Americans spent $1,205 billion on electricity, natural gas, petroleum products, coal and biomass that year, a 12% inflation-adjusted increase from 2009 (Figure 2). We estimate energy costs increased by another 11% in 2011. With the exception of 2008, that's the most the US has spent on energy in recorded history. As a share of GDP it's significantly below levels seen in the 1970s and early 1980s, but still higher than any time between 1986 and 2008. Last year, however, energy costs began to ease. Economy-wide energy expenditures fell 4.8% in real terms to $1,323 billion, or 8.4% of GDP.

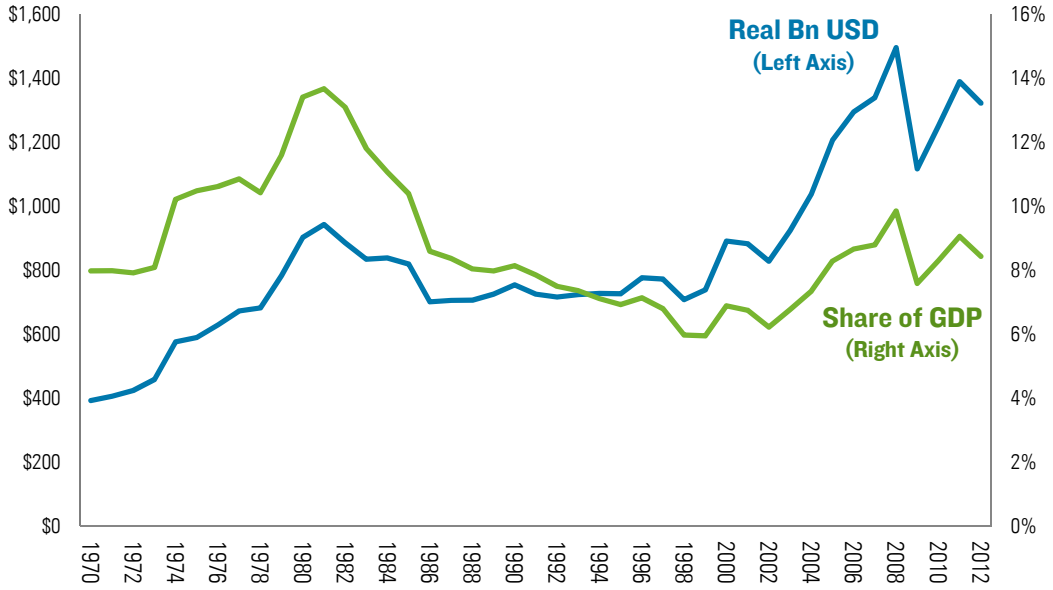
Given the scale of the domestic oil and gas boom, this relatively modest decline might come as a bit of a surprise. Indeed US natural gas production was 16% higher in 2012 than in 2008, and wellhead natural gas prices were 69% lower (adjusted for inflation). Real delivered natural gas prices were down 47% relative to 2008 levels, and fell by 16% in 2012 alone (Figure 3). The US crude oil production has grown by 1.5 million barrels per day (bbl/d) since 2008. Add in 600,000 bbl/d of additional natural gas liquids supply (also classified as petroleum) and the US has added nearly as much oil production in over the past four years as total Iranian oil exports before sanctions were put in place. Shouldn't we be seeing more of drop in America's energy bill?

While natural gas prices have fallen sharply, natural gas plays a relatively small role in determining overall household and business energy expenses (Figure 4). Natural gas accounted for 13% of energy expenditures in the residential, commercial, industrial and

transportation sectors in 2008 and only 8% in 2012. Natural gas plays a much more important role in determining the cost of power generation, and electricity accounted for 27% of economy-wide energy expenditures last year. Yet power prices were only off by 2% in 2012 in inflation-adjusted terms. Oil prices play the greatest role in shaping overall energy costs as petroleum accounts for nearly two-thirds of energy expenditures economy wide. And the real weighted-average price of petroleum products (which accounts for nearly two-thirds of America's overall energy bill) fell by only 1.5% last year.[2]

Figure 2: US Energy Expenditures

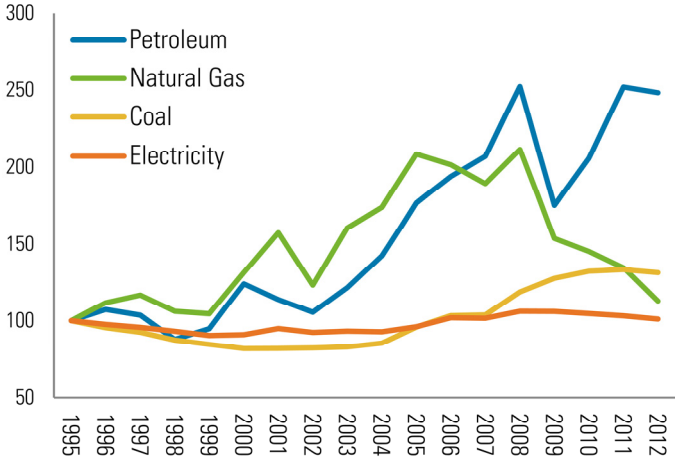
Billion 2012 USD (left axis) and share of GDP (right axis)



Source: EIA, RHG Energy Meter and BEA economic data

Figure 3: Real Delivered Energy Prices

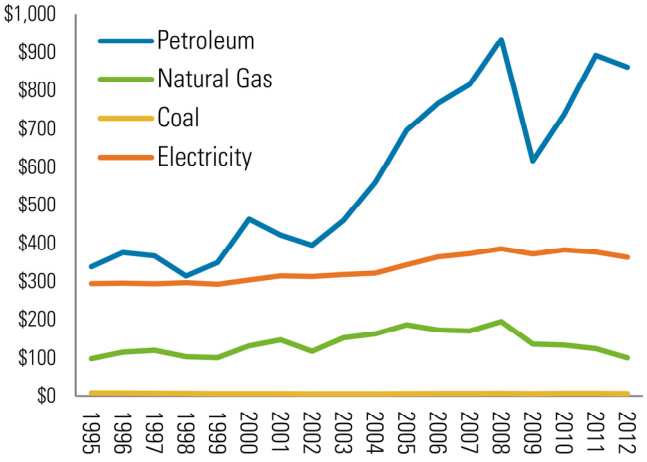
Index, 1995=100, weighted average of the residential, commercial, industrial and transportation sectors



Source: RHG Energy Meter

Figure 4: Real Delivered Energy Expenditures

Billion 2012 USD, includes the residential, commercial, industrial and transportation sectors



Source: RHG Energy Meter

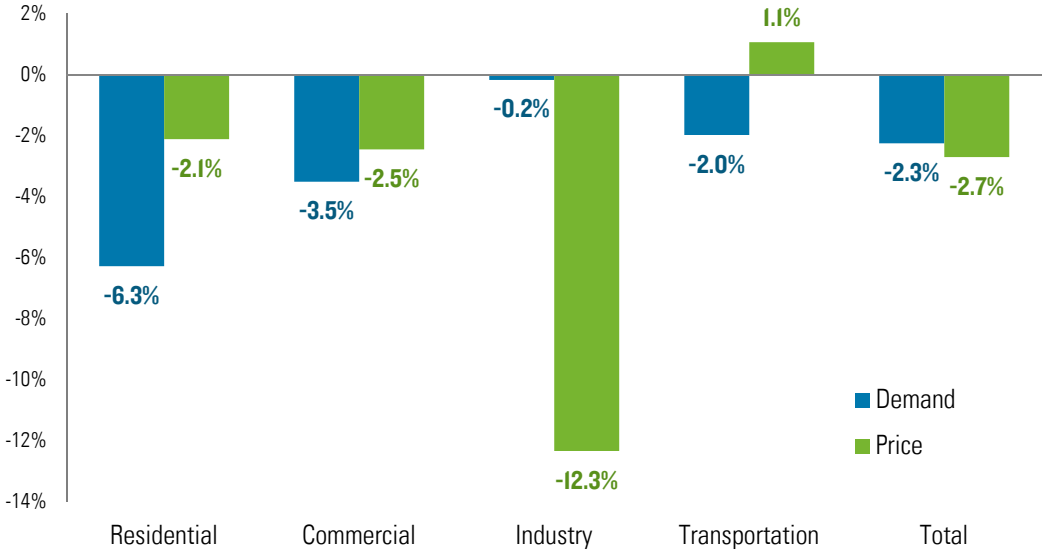
[2] Coal prices also fell but coal is a small share of delivered energy consumption, used primarily for power generation.

Year-on-year comparisons like those above undercount the impact the domestic oil and gas boom has had on US energy expenditures. A more appropriate measure is to compare energy costs in 2012 with what they would have been had the boom not occurred. Electricity prices would have risen in 2012 had natural gas prices not fallen so sharply. And if American crude and natural gas liquids production had stayed constant, oil prices could have been considerably higher in light of the host of supply disruptions that occurred around the world last year.

Rising oil and gas production also had a greater impact on energy costs in some sectors than in others. Economy-wide, lower energy prices accounted for a little more than half the 4.9% decline in energy costs in 2012, with the rest coming from reduced demand (Figure 5).In the industrial sector, however, delivered energy prices dropped by 12% thanks to cheaper natural gas and the natural gas liquids used in petrochemical production, while demand only fell by 0.2%. In the residential and commercial sectors lower demand played a more important role than lower prices as an unseasonably warm winter curbed heating-related energy consumption.

Figure 5: Decomposing the Change in 2012 Energy Costs

Year-on-year change in real delivered energy prices and delivered energy consumption by sector



Source: EIA and Rhodium Group estimates

MORE OF WHAT AMERICANS SPEND STAYS AT HOME

While drop in overall energy expenditures last year was modest, more of that money stayed at home. US crude oil and natural gas imports declined in 2012 while refined petroleum product and coal exports rose. Net imports accounted for only 6% of US natural gas production in 2012, down from 8% in 2011 and 16% in 2007. Declining import quantities combined with lower prices cut the natural gas trade deficit in half in 2012 to $4 billion (Figure 6), less than one fifth of what it was in 2007.

Net coal exports grew by 24% in 2012 to 117 million short tons – a new record. That's 11% of US production last year. But a drop in export prices more than offset the increase in export quantity so the overall coal trade balance remained relatively unchanged at $13.8 billion.

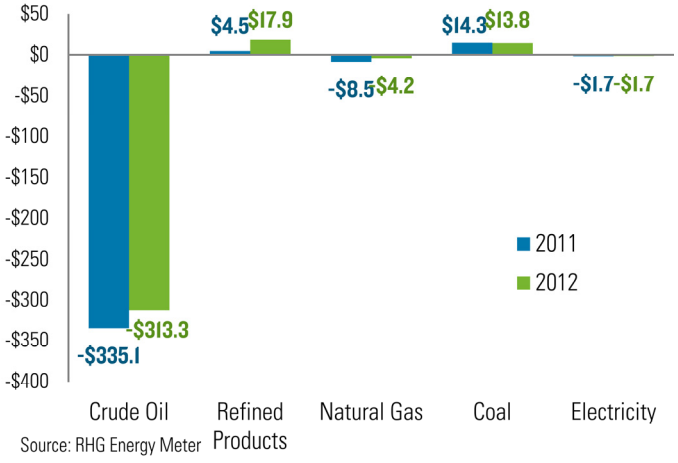
The biggest shift was in refined petroleum products. The US imported 2.2 million bbl/d of product on net in 2007. By 2011 that was down to 200,000 bbl/d and last year the US exported 880,000 bbl/d on net. In value terms, The US ran an $18 billion trade surplus in 2012, a dramatic turn -around from the $54 billion trade deficit in 2007.

Crude imports fell by roughly 400,000 bbl/d in 2012, or 5%, and the average price fell by$2 per barrel. The total crude import bill dropped by $22 billion year-on-year, a welcome improvement following the $77 billion increase in 2011 (Figure 7). But the US still spent $313 billion on imported crude, the third highest level in American history (adjusted for inflation).

All told, Americans spent $284 billion on energy imports in 2012, down 13.6% year-on-year. The energy trade deficit still remains far above historical levels in real terms and as a share of overall energy spending (Figure 8). But the energy trade deficit as a share of GDP has fallen by more than a third since 2008 and is now well below the worst levels experienced in the late 1970s and early 1980s (Figure 9).

Figure 6: US Energy Trade Balance by Fuel

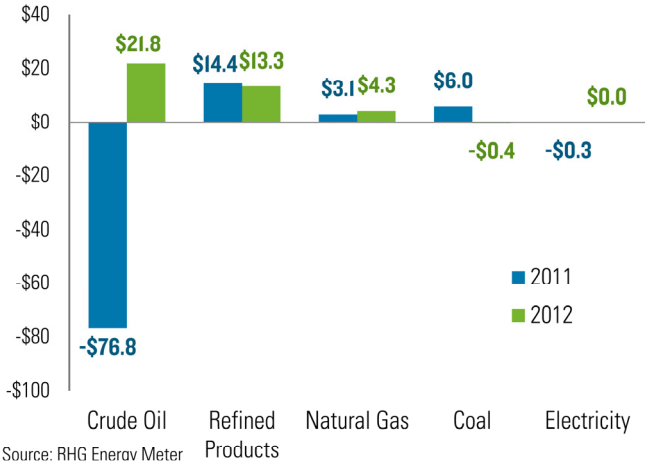
Billion 2012 USD, 2011 vs. 2012



Source: RHG Energy Meter

Figure 7: Change in US Energy Trade Balance by Fuel

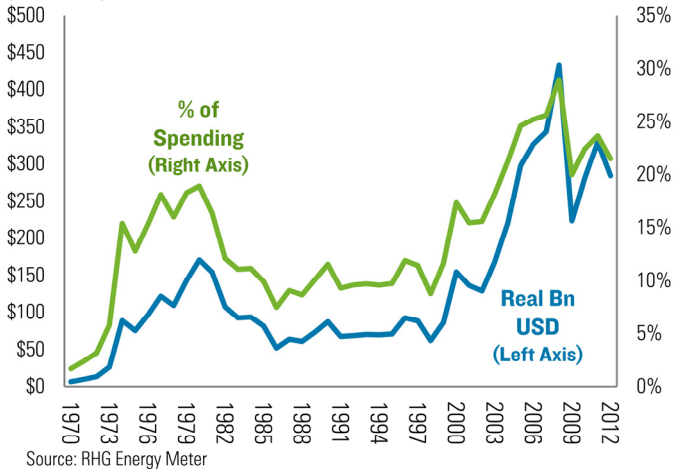
Billion 2012 USD, year-on-year



Source: RHG Energy Meter

Figure 8: Net Energy Imports – Value and Share of Spending

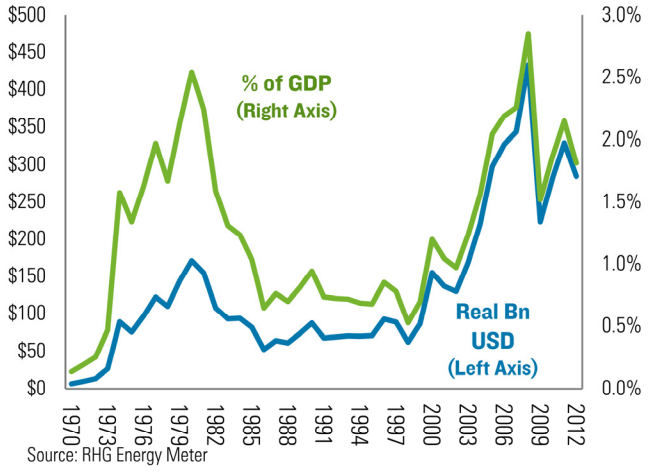
Billion 2012 USD (left axis) and share of overall energy expenditures (right axis)



Source: RHG Energy Meter

Figure 9: Net Energy Imports – Value and Share of GDP

Billion 2012 USD (left axis) and share of overall energy expenditures (right axis)



Source: RHG Energy Meter

NOT OUT OF THE WOODS YET

As discussed at length in our November 20, 2012 report, the domestic oil and gas boom is providing much-need economic stimulus and is improving America's terms of trade. And you can make a pretty strong case that real energy costs will fall in the years ahead given growing US supply, weak US demand and the structural adjustment in China (see our July 2012 China Point of View). But in the short term we don't anticipate much of a decline. Indeed the modest reduction in energy expenditures booked in 2012 will be tougher to replicate this year. Given the fragility of the recovery and the fact that real energy expenditures are still running historically high levels, energy-related economic risks continue to warrant attention.

Much of the drop in energy costs last year is attributable to cheaper natural has. It's hard to imagine prices getting any lower than they were in 2012. Indeed, prices are up so far this year. That means electricity costs will likely rise going forward as well. Weaker demand could offset higher prices, but demand is currently running higher than in 2012 thanks to a colder winter. In their most recent Short-Term Energy Outlook, the EIA projects modest growth in both electricity and natural gas consumption in 2013 and 2014. So for economy-wide energy expenditures to decline further in the short term, oil prices, oil demand, or both, will have to fall.

The recent increase in US crude production has helped keep global oil prices in check despite supply disruptions elsewhere in the world. Indeed, this may be the boom's most important economic contribution to date as a significant increase in oil prices last year could well have been too much for the recovery to handle. But higher US output hasn't yet translated into a meaningful absolute reduction in oil prices. The average US refinery acquisition cost of crude was $102 a barrel in 2011, up from $77 a barrel in 2010 and higher than the $95 per barrel average in 2008. Last year the average cost was $101. Spot prices for WTI and Brent are down a bit this year relative to the same period in 2012 (8% and 4% respectively) but gasoline and diesel prices are running pretty close to their 2012 levels. Both the WTI and Brent forward curves are in backwardation, suggesting oil prices could moderate later in the year. But at current futures prices, the average annual cost of both crudes in 2013 would be right about where they were in 2013. Same goes for current consensus forecasts as reported by Bloomberg. There are plenty of reasons why the consensus might prove wrong, but they exist on the upside and downside alike.

On the demand side, there are good reasons to think that future growth will be weaker than previously expected globally and negative in the US. The IEA projects US oil demand will stay flat this year, and the EIA expects a very small increase. Improved vehicle efficiency and oil-gas substitution will continue to put downward pressure on US demand, and we think there are downside risks to both the EIA and IEA short-term forecasts. But the odds are low demand will fall enough to match even last year's modest energy cost decline.

Domestic oil production will continue to grow this year, and the share of US petroleum costs that leave country will continue to fall. That improves US terms of trade and provides some economic protection should global oil prices move higher. The economic benefit of increased revenue to domestic oil companies (whether paid out in dividends to shareholders, royalties to landowners or retained for new investments) would offset some of the economic harm of reduced household and business spending because of higher energy expenditures. But the consumer costs of rising energy prices fall largely on the middle class, while the dividend benefits tend to favor the more affluent. And higher-income households save more and spend less than their middle and lower-income counterparts. So an oil price spike would still have a negative short-term effect on domestic consumption and overall economic growth even if the US were to eliminate its energy trade deficit. And with net imports running close to 40% of US oil demand, that's still a ways off.

DISCLOSURE APPENDIX

This research is for our clients only. This research is based on current public information that we consider reliable, but we do not represent it is accurate or complete, and it should not be relied on as such. Our reports are published at irregular intervals as appropriate in the analyst's judgment.

This research is not an offer to sell or the solicitation of an offer to buy any security in any jurisdiction where such an offer or solicitation would be illegal. It does not constitute a personal recommendation or take into account the particular investment objectives, financial situations, or needs of individual clients.

Clients should consider whether any advice or recommendation in this research is suitable for their particular circumstances and, if appropriate, seek professional advice, including tax advice. Past performance is not a guide to future performance, future returns are not guaranteed, and a loss of original capital may occur.