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Congressional Testimony of

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Chairman Murkowski, Ranking Member Cantwell and Members of the Committee, thank you for inviting me here today to provide testimony on the global oil market outlook and the changes sweeping through the U.S. and international oil industry, not just in the United States but also globally.

Due to an array of market, economic, technological, policy-related and geopolitical forces, the oil industry is in the midst of a profound transformation. The interplay of these factors is a focus of the work undertaken by the Center on Global Energy Policy, an independent academic center at Columbia University's School of International and Public Affairs, which I joined recently to launch a new research program on global oil markets. The analysis that I will present today is based on my work at the Center as well as research I conducted earlier as Head of the Oil Industry and Markets Division at the International Energy Agency. It is also shaped by my prior experience as Lead Industry Economist at the U.S. Energy Information Administration, head of Commodities Research at brokerage Newedge USA, Director of the Global Energy practice at Eurasia Group and Adjunct Professor of International and Public Affairs at Columbia University.

Last week, as I was preparing these remarks, futures prices of Brent and U.S. West Texas Intermediate, the main crude oil benchmarks, slipped below $30 per barrel, a 12-year low. That is a far cry from the highs of more than $100 per barrel averaged for the period from 2011 to mid-2014. Few had seen the crash coming; even fewer predicted its scope and duration. Eight years ago, when WTI markets rallied to an all-time high of $147/barrel, the prevailing narrative in oil markets was one of resource scarcity and runaway demand growth from China and other emerging economies. The specter of so-called 'resource wars' loomed large. Market participants were gripped by anxiety at the prospect of fierce international competition for dwindling resources. The idea that 'the age of easy oil is over' was the mantra of the day. The accepted wisdom was that prices have nowhere to go but up.

Since the beginning of the oil market selloff, roughly 18 months ago, early expectations of a rebound have been disappointed, and analysts have had repeatedly to push back their projections of a market recovery. Having failed to anticipate the price collapse and to predict its scope, market participants are now getting used to the idea that low oil prices have become the norm. "Lower for longer" is the new mantra. Automobile-industry executives, press reports tell us, are convinced that cheap oil is here to stay. At the time of writing, oil futures markets, admittedly a poor predictor of market conditions, were pricing crude oil for delivery in 2020 at less than $50 per barrel. For the oil industry, the fear of too little has been replaced by anxiety over too much. Faced with a revenue meltdown, companies have slashed their spending by a total estimated at nearly $400 billion. Tens of thousands of oil workers have been laid off, many of them in the United States. U.S. light oil imports, after a sustained period of decline, are rising again.

While it may be true that oil prices have yet to bottom out, expectations that cheap oil are the new norm are misguided. Predictions of long-term low oil prices will likely prove as wrong as the assumptions made just 18 months or two years ago of sustained, stubbornly high prices turned out to be. As in previous oil market cycles, a price correction is inevitable. Some of the very factors that have pushed prices down in the last 18 months will cause them to rebound in the next 18 months. And just as on the way down, the price swing upward may again surprise market participants by its speed, scope and duration.

Yet a rebound in prices, ineluctable as it may be, will not turn back the clock on the oil market. Nor will it mark a return to the status quo ante. The market that emerges from the current process of rebalancing will differ from the one that preceded it. The idea of a pendulum swing in oil markets is unexceptional; such swings have occurred in previous episodes of price correction. But this swing is different. When the dust settles, the market will have shifted, perhaps beyond recognition. The process of adjustment and restructuring ushered in by the price collapse marks the beginning of a new era in the history of oil and energy markets that will present both opportunities and daunting challenges for the industry.

What makes the current selloff and coming recovery different from previous market cycles is the advent of U.S. shale oil. The shale revolution has transformed oil market dynamics. It triggered the oil price collapse. It is now shaping the course of the recovery. It will eventually define the features of the energy landscape that will in due course emerge from the downturn.

Turning a glut into a bigger glut

The scope and duration of the selloff has defied expectations because of the surprising resilience of US shale oil production to remain high despite falling prices, but also because analysts had failed to anticipate that other producers would be incentivized to respond to a shale-induced supply glut by turning it into an even bigger glut. OPEC at its November 2014 meeting shocked the market by not cutting production in an attempt to balance the market and push prices higher. Since then, not only has the group refrained from reducing its output, but its two largest producers, Saudi Arabia and Iraq, have taken their production to new highs. So have other, non-OPEC, large producers like Russia and Brazil. This race to the top (or to the bottom in price terms) is a rational, predictable response to the new reality of shale production. But it is not sustainable.

Several factors account for the transformative impact of shale oil on supply dynamics. At roughly 4.5 million barrels per day today, U.S. shale oil makes up less than 5% of global oil supply. While that might not seem like much, just a few years U.S. shale production was zero. Shale oil alone accounts for the vast majority of the growth in non-OPEC oil production of the last few years. Advances in shale oil extraction technologies have caused ripple effects spanning the entire market and industry, both horizontally–throughout the oil-producing world–and vertically–across the supply chain. Shale oil in particular has led to a 'regime change' in oil pricing by forcing OPEC to throw away its playbook and put on hold the price-support policies that had defined it for the last 30 years.

Age of abundance?

There are at least three ways in which shale oil can be deemed revolutionary, each one of which has helped induce OPEC's policy reversal. First, by unlocking vast resources that had long been deemed uneconomical, shale technology has upended the previous narrative of resource scarcity and dispelled 'peak oil' worries just as rising support for climate policies has cast doubt on the outlook for oil demand growth. This has raised speculation that large amounts of oil would have to 'stay in the ground' and fuelled concern about stranded assets, in turn changing the revenue-optimization formula for large, low-cost producers like Saudi Arabia. Shale has given Riyadh an incentive to speed up, rather than slow down, oil extraction.

In recent months, Saudi Oil Minister Ali al-Naimi has repeatedly evoked the prospect of what he called a 'Black Swan,' the risk that oil demand might fail to grow as forecast and leave vast amounts of oil unwanted – driven by technology improvements, more aggressive climate policy and structural changes in the economies of emerging markets. It is impossible to tell to what extent such concerns actually inform Saudi production strategy today. But the Kingdom has clearly messaged to the oil market that they were on its radar screen. Although seemingly long-term, these considerations have real, short-term policy implications.

A shrinking oil map

Another way in which shale oil changes the oil picture is by shrinking the global oil trade map. Surging U.S. shale production has curtailed the crude import needs not just of the United States but also of Europe. European refiners, faced with steep declines in domestic demand over the last decade, have struggled to compete with their cost-advantaged US counterparts, and have thus been importing less crude. Shale has accelerated the eastward migration of the crude oil market, the shift in its center of gravity to the so-called 'East of Suez' region. By 2020, Asia alone will account for no less than 65% of the crude oil market, according to projections from the International Energy Agency, up dramatically from levels as recently as 2014. That leaves crude oil exporters competing with each other in an increasingly concentrated Asian market itself dominated by supergiant Chinese oil trading companies with growing market power. In the past, OPEC oil exports were able to spread oil export cuts across their various export markets. Increased competition for Asian market share makes it extraordinarily hard for them to implement production cuts today, and even more difficult in the future.

A two-speed industry

Last but not least, the advent of the shale oil industry has been challenging the very business model of the oil industry. Oil companies have traditionally been large, deep-pocketed and professionally conservative, and have usually operated under a price umbrella of one kind or another: Rockefeller's Standard Oil, the Seven Sisters, OPEC. Shale oil companies – small, nimble, highly leveraged, intensely adaptable – break that mold. Whereas conventional oil production requires large upfront investment and lead times measured in years if not decades, the shale business cycle is shorter: upfront shale costs are relatively low; decline rates are steep; lead times and payback times are measured in months rather than years. This shift to a two-speed industry – contrasting long-cycle conventional projects and short-cycle shale production – makes OPEC production cuts an impractical and inefficient way to support prices, as shale producers can swiftly respond to upward price movements by boosting investment and ramping up output in short order, thus defeating the purpose of the cuts. As long as shale production capacity is not durably degraded, any attempt by OPEC to retrench and lift prices runs the risk of effectively subsidizing shale producers and abandoning market share to them.

Producer-country budget needs

The socio-political context of the recent selloff – including unrest and conflict across parts of the oil-rich Middle East and North Africa – has compounded the impact of shale supply growth by boosting the budget needs of oil export-revenue-dependent producer countries. Falling oil prices are not a recipe for social stability in countries that depend on oil income for social spending. That has incentivized oil exporters to boost production against all odds and to respond to lower oil prices by maximizing production volumes to the extent possible.

The greater the odds faced by oil producers in the last 18 months, the higher their exports have been. In Iraq, low prices combined with the ISIS conflict have unlocked unprecedented supply growth, pushing Baghdad to resolve in a hurry above-ground bottlenecks that had held up production for years. In Russia, the dire needs

caused by the conjunction of low prices and international sanctions have sent supply on a tear. Faced with a currency collapse, falling oil revenues and a crippling corruption scandal at its national oil company, Brazil has outperformed and broken new supply records since the beginning of the market rout. Venezuela and Nigeria, with no financial buffers to cushion the impact of falling revenues, have both managed to maintain relatively high production.

Sluggish demand response

While supply has responded to low prices in a counter-intuitive way, demand – with the notable exceptions of the United States – has also surprised by failing to show any significant demand growth that cheaper supplies would normally stimulate. Several short-term factors account for this lack of consumer response: the general weakness of the global economy, the lack of wage growth, the weakening currencies of many consumer economies, deflationary pressures, shifts in consumer behavior, policy moves to reduce oil subsidies in emerging markets, environmental measures and efficiency improvements. In a deflationary or quasi-deflationary environment such as has been experienced in Europe and Japan, low prices may feed into expectations of deflation – thus delaying business and household spending – rather than act as economic stimulus. Currency depreciation has also offset oil price declines for many end-users, depriving them of the full economic benefit of the crude price drops.

Long-term demand uncertainty

Meanwhile, climate policy and inter-fuel competition are chipping away at the oil market's longer-term prospects, with natural gas maturing into a global market and seemingly poised to make inroads in the transportation sector that oil has long dominated, displacing diesel for trucks or residual fuel oil for bunkers. Oil's role in the global economy and its place in the energy mix are changing, driven by a combination of technological, demographic, economic, social and policy shifts. The oil intensity of the global economy is evolving. Oil efficiency is improving. Inter-fuel competition erodes oil's market share, as the natural gas market globalizes and renewable energy costs fall faster than expected. Environmental policy is gaining momentum, and could reach a tipping point leading to significant reductions in hydrocarbon demand. Technological advances, such as a potential breakthrough in energy storage that would lead to a precipitous decline in oil demand, no longer seem beyond reach. All this fans concerns over the demand sustainability and may be feeding into the policy decisions described earlier that maximize oil output today, even at a comparatively low price.

The flip side of today's high production

While many factors on both the current supply and demand situation conspire to create the market's massive imbalance and a consequent build up of global inventories, the resulting bearish pressures on oil prices are unsustainable. The flips side of the revenue maximization policies that helped exacerbate today's oversupply is the industry's new drive to minimize spending and cut costs. (Saudi Arabia and its Gulf Cooperation Council neighbors buck the trend here and have maintained relatively high spending despite the price decline.) This will inevitably lead to lower production tomorrow and may result into a supply shortfall.

The effects of project delays on future supply is well documented and broadly understood. Oversupply today is in part the result of short-cycle shale production as well as higher-cost, larger-scale projects for which investment was deployed years ago and which are only now coming to fruition. But the incremental impact of those legacy large scale or lagged projects is on the wane, and a lack of follow-up projects will soon cause production growth to flatten out and shift into reverse.

Less well understood is the impact of delayed field maintenance – another form of current cost savings – on decline rates and future production. Decline rates are, generally speaking, poorly measured, but it is virtually certain that costs savings achieved by companies by pushing back work on oil fields will cause production decline rates to steepen appreciably. The lack of new major projects will exacerbate the challenge of making up for that shortfall.

Steeper decline rates, spending cuts resulting in project delays and capital constraints in the shale oil industry due to low prices will likely more than make up for an expected increase in Iranian oil exports following the lifting of some US and European sanctions, and will likely lead to inventory draws – thus supporting oil prices – potentially as soon as the end of this year.

Political supply risk

Meanwhile, political risk to supply remains elevated in the wake of rising social unrest and weakening oil revenues in several producer countries. Iraq's ability to further grow production, which it needs to finance its military, may run into headwinds due to its failure to deliver payment to the international oil companies active in the country. The risks of social disruptions in oil producing countries that have little protection against downswings in oil prices, chief among them Venezuela, cannot be ignored.

Shale oil as swing producer?

Shale oil's response to the rebalancing is a wild card. Due to its shorter cycle and low initial fixed costs, the shale oil industry has in theory the capacity to respond quickly to price signals and to ramp up production early in a rebound. After a period of resilience, shale oil has been the first respondent to the price decline, with production losses projected for 2016 estimated at around 700,000 barrels per day year-on-year. It may again be the first respondent on the way up. Certainly that prospect has the potential to act as a deterrent against longer-cycle investments into conventional high-cost production.

Whether the shale oil industry will in fact retain its full capacity to rebound through the downturn is highly uncertain, however. Shale oil companies face two major constraints: access to capital – which may be degraded, especially in the event of interest-rate hikes – and access to labor markets – which will suffer from the current round of layoffs. Restructuring and consolidation in the shale oil patch may also lead to changes in the management of shale oil assets if they are acquired by larger companies with more diversified portfolios and different interests than the current owners. Finally, while the industry has achieved impressive costs savings since the beginning of the price drop, some of these costs reductions may be cyclical and subject to reverse as soon as rising prices rekindle demand for oil services.

Conclusion: A new era of heightened volatility?

In summary, the oil market is facing unprecedented headwinds, which have resulted in steep and, for the industry, highly challenging price declines. While supply growth is already slowing in the face of shale oil setbacks, oversupply and inventory builds continue amid relatively sluggish demand growth. Downward pressures on oil prices will persist until the market reaches an inflection point and inventories decline.

But the factors that today incentivize producers to boost output at the expense of longer-term investment will inevitably undermine future production. The very rise of the shale oil industry, with its unique cost structure and short business cycle, undermines longer-term investment in high-cost conventional supply. The ability of the shale industry to ramp back production in a rebound is untested, however, and the market might find out when prices finally recover that its capacity has been durably degraded. In a best-case scenario, the market ought to brace itself for a period of heightened volatility, albeit perhaps in a relatively narrow band, if the

shale oil industry manages to function as an effective swing producer. Alternatively, low prices today may set the stage for significant supply shortfalls tomorrow.

This concludes my testimony, Madam Chairman and Members of the Committee. I would be happy to answer any questions you may have.