
MUSINGS FROM THE OIL PATCH

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Note: *Musings from the Oil Patch* reflects an eclectic collection of stories and analyses dealing with issues and developments within the energy industry that I feel have potentially significant implications for executives operating and planning for the future. The newsletter is published every two weeks, but periodically events and travel may alter that schedule. As always, I welcome your comments and observations. Allen Brooks

EVs Aren't Catching On In Europe: Power Market Needs Fixing

More interesting has been the absence of EVs in the various cities we have visited on our trip this summer from Budapest, Hungary, through Austria, Slovenia and Germany, and on to Amsterdam in the Netherlands

After we wrote about the struggles to sell electric vehicles (EVs) in the United States in our last issue of the *Musings*, a friend emailed us to say she was seeing lots of EVs in Sweden and Denmark – primarily Teslas (TSLA-Nasdaq). She pointed out that there were numerous electric charging stations mixed in with parking meters along the streets of Copenhagen and Stockholm. When we were in those cities last summer, we didn't see many EVs, if any, on the streets and certainly no charging stations. We would suggest that the proliferation of EVs in these cities is tied to the successful marketing by Tesla and the introduction of other EVs. More interesting has been the absence of EVs in the various cities we have visited on our trip this summer from Budapest, Hungary, through Austria, Slovenia and Germany, and on to Amsterdam in the Netherlands. Not only have we not seen any EVs (and we have been looking), we can't seem to find any public charging stations in the cities on the trip. Our observations are not intended to be definitive about the lack of EVs, but it seems that the citizens drive either small cars with conventionally-powered engines (gasoline or diesel) or they ride bikes and take public transit. In several of the cities, it appeared bicyclists had the right-of-way over both walkers and motor vehicles, or at least they claimed that right.

A proposal by Poland's Prime Minister Donald Tusk is to form a European energy union

About the same time we received our friend's email about EVs in Scandinavian cities, we read an article discussing the proposal by Poland's Prime Minister Donald Tusk to form a European energy union to address the most glaring weakness of the continent – that it imports more than half its energy. One need only remember that the origin of the European Union (EU) arose from efforts to control the output of steel and iron on the continent. The timing of Mr. Tusk's proposal is fortunate as the events in Crimea and the Ukraine have highlighted the issue of the inefficiencies from the fragmented

The premise behind the energy collaboration is that the EU might eliminate the need for Russian natural gas supplies

energy networks across the EU. According to Strategy& (formerly Booz & Co.), if these energy networks were fully integrated Europe could save an estimated €40 (\$54.4) billion per year by 2030.

Mr. Tusk's proposal calls for a single internal energy market for gas and electricity. It would require EU nations to band together and jointly negotiate gas supply deals with Russia's OAO Gazprom (OGZPY-Nasdaq), the principle supplier of natural gas to the nation's on the continent. There are numerous questions being asked by Germany and the European Commission about whether this structure would even be allowed given international competition laws, such as those under the World Trade Organization (WTO), as well as the internal laws of the EU. The premise behind the energy collaboration is that the EU might eliminate the need for Russian natural gas supplies, which would give Europe greater political leverage against Russia.

A more competitive market would import gas supply from new sources such as Azerbaijan and the eastern Mediterranean, as well as constructing more liquefied natural gas (LNG) receiving terminals

An internal energy market would bind all the EU members together with infrastructure such as cross-border gas and electric interconnectors. This, in theory, would bring greater competition and convergence in the continent's electricity prices. How this would work is that market-based prices would be established at trading hubs. Contracts would use those prices as a transparent reference point. A more competitive market would import gas supply from new sources such as Azerbaijan and the eastern Mediterranean, as well as constructing more liquefied natural gas (LNG) receiving terminals. For the continent's electricity market, these interconnections would allow the better integration of renewables into the supply mix.

Denmark had the most expensive household power with Sweden in seventh place

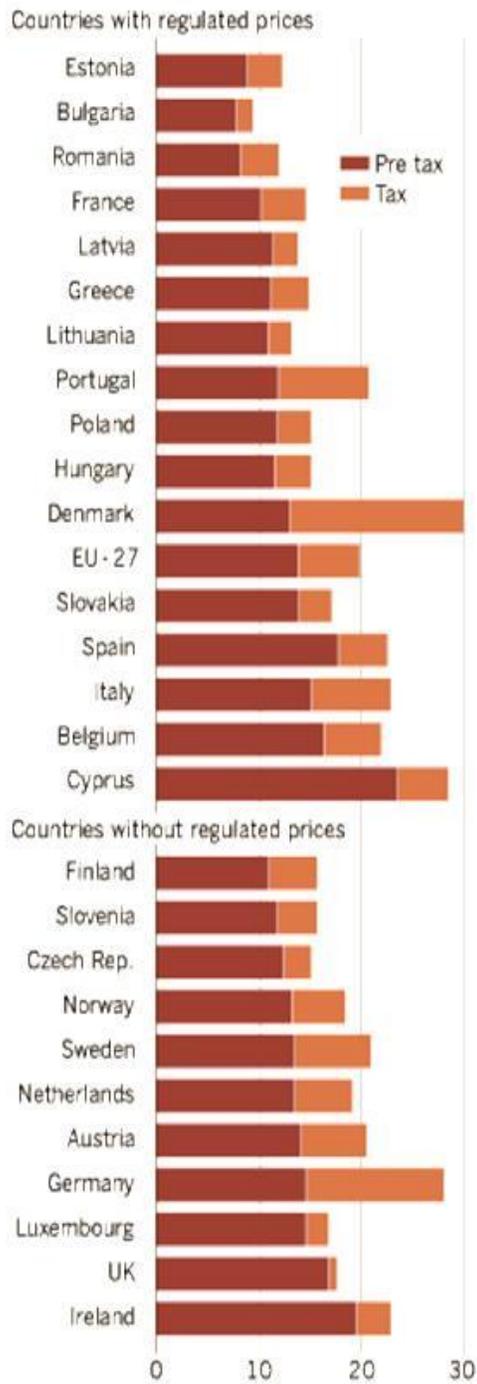
It is interesting how widely household electricity prices vary. A chart of how average household electricity prices vary by country within the EU-27 is shown in Exhibit 1 on the next page. The EU-27's average price per kilowatt-hour (KWh) for 2013 was slightly under €20 cents (\$0.27). The range of national prices was from the highest in Denmark of almost €30 cents/kWh (\$0.41) to a low of about €9.5 cents/kWh (\$0.13) in Bulgaria. From the point of view of our friend's comments about EVs in Copenhagen and Stockholm, notice that Denmark had the most expensive household power with Sweden in seventh place. Germany had the third most expensive power just barely behind that of the island economy of Cyprus.

Germany's power cost is split nearly 50/50 between output costs and taxes

The other most interesting point about household power costs was the impact of taxes on the cost to residents. For the EU-27 average price, taxes represented about 30% of the cost, while in Denmark it accounted for over 50%. Likewise, Germany's power cost is split nearly 50/50 between output costs and taxes. Both of these countries have made significant pushes into promoting renewable energy sources with mixed results. Denmark has been more successful because it is closely aligned with Sweden. Denmark is able to push surplus renewable energy generated from wind and solar to Sweden and then draw power from its neighbor when the

Exhibit 1. EU Electricity Prices

Household electricity prices
2013 (€ cents per kWh)



Source: Eurostat

Source: *Financial Times*

The greatest unintended consequence of Germany's power market regulation has been the need for its utilities to build new coal-fired power plants

Danes need it. Without that arrangement, Denmark's power would be much more expensive and inefficient.

With respect to Germany, we have written in past *Musings* about the problems the country's residents are having in dealing with the government's program for shutting down all the nation's nuclear power plants and replacing the output with power from heavily subsidized renewables. Not only has this policy led to a 44% increase in household power costs over the past three years, but it has pushed a substantial number of citizens into electricity poverty, meaning that they most spend 20% or more of their income on electricity and gas. The surge in renewable power has created serious problems for the operators of the electricity grid and the neighboring countries who share the grid with Germany, along with creating economic challenges for many businesses who have not been granted exemptions from having to pay the high electricity prices and the associated taxes to fund the renewable energy subsidies. This is why the Germany government is proposing a restructuring of the regulations dealing with renewable energy and its subsidies as citizens can no longer support the existing structure. The greatest unintended consequence of Germany's power market regulation has been the need for its utilities to build new coal-fired power plants, to import much more coal, most of which is coming from the depressed coal market of the United States. This has resulted in higher carbon emissions that have derailed the nation's progress in reducing its greenhouse gas emissions.

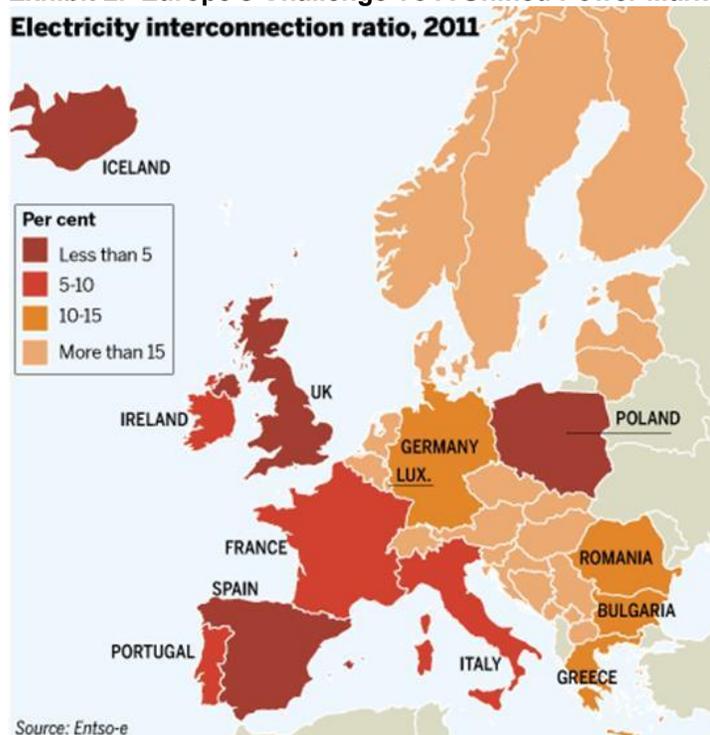
The traffic jam on the bridge we were watching was a result of Austrian gasoline-shoppers heading to Hungary where petrol was 20% cheaper

Membership in the EU allows for free trade and movement among its members. We were lectured by one Austrian about the traffic going over one bridge across the Danube River. He told us that the traffic jam on the bridge we were watching was a result of Austrian gasoline-shoppers heading to Hungary where petrol was 20% cheaper than at home. He admitted to routinely making this same trek. He also pointed out that Hungarians were likely to come across the border into Austria to buy alcohol where it was considerably cheaper.

The European Commission has identified 248 crucial infrastructure projects necessary to facilitate the linking of the continent's energy networks and to unblock bottlenecks

The European Commission has identified 248 crucial infrastructure projects necessary to facilitate the linking of the continent's energy networks and to unblock bottlenecks. Getting these projects done will not only be expensive but will take time. The EU has supposedly allocated €5.8 (\$7.9) billion to fund these projects during 2014-2020. According to reports, this funding amounts to barely 3% of what is needed. With respect to the time issue in linking energy markets, a newspaper article pointed to the effort to build a power line interconnector from Spain into France. The last one built between these countries was completed in the 1980s. Plans to build pylons across the Pyrenees Mountains angered protestors who said it would be an eyesore. France's nuclear power industry, a significant supplier of the nation's power, was concerned about the impact of substantial volumes of intermittent renewable power

Exhibit 2. Europe's Challenge To A Unified Power Market Electricity interconnection ratio, 2011



Source: *Financial Times*

coming from Spain and disrupting the operation of their plants. After years of negotiations, the interconnector will open in 2015. The compromise cost €700 (\$952) million, as two boring machines were necessary to tunnel through the Pyrenees enabling the cable to pass through rather than over. Spain still needs more interconnectors, so it is considering building an 850-kilometer (528-mile) long submarine cable to the United Kingdom at a cost of €2.5 (\$3.4) billion.

The route to greater interconnection of energy and power markets in Europe probably means that the commitment to reducing greenhouse gas emissions will need to be suspended for some time

We suspect the EU will continue to struggle with making the continent more energy-secure as a result of the Ukraine situation and the significant dependency of most European countries on Russian natural gas. More renewables may not be the answer as it will take years to upgrade interconnectors and the various power grids. At the same time, European governments are struggling with how to affect these energy market shifts while not strangling their economies and citizens with tax burdens they cannot afford while trying to compete in a more competitive global economy. The route to greater interconnection of energy and power markets in Europe probably means that the commitment to reducing greenhouse gas emissions will need to be suspended for some time. This will generate a huge outcry from the environmental movement, but politics dictates that economic and social policies will need to be assigned a higher priority than the environment, if the fabric of these countries is to be sustained. Just how will that fly?

Alternate Survival Strategies For Oil Industry's Era Of Austerity

Shareholder demands for companies to continue to build asset value through finding and developing more oil and gas, yet at the same time return more capital to the owners is generating increased stress for managements

When earlier this year we characterized 2014 as the Era of Austerity for the petroleum industry, a degree of skepticism was expressed. We believe the actions of oil companies – primarily the major international integrated oil companies – since then have confirmed our characterization. These steps, along with the mid-year results from a Wall Street investment firm's survey of revised 2014 capital spending plans, point to industry challenges. The announcement of an agreement to merge two Bakken-focused exploration and production (E&P) companies suggests the financial strains of the American shale revolution, in the face of demands from shareholders for improved financial performance and increased investment returns, is forcing managements to seek alternative paths to create shareholder value. While optimism is high about the petroleum industry's future, shareholder demands for companies to continue to build asset value through finding and developing more oil and gas, yet at the same time return more capital to the owners is generating increased stress for managements.

These upward revisions to North American E&P spending estimates is particularly welcomed news for the North American oilfield service industry

In a recent mid-year update to its annual year-end survey of hundreds of oil and gas companies, Cowen and Company reported that oil and gas E&P spending in 2014 will only increase by 3.3% versus its earlier estimate of a 4.7% advance. The spending decline is primarily concentrated on reduced international spending, which is projected to only grow by 1.3% instead of the 2013 year-end estimate of a 3.8% increase. E&P spending in North America is expected to climb much higher than estimated in the December 2013 survey. At that time, U.S. E&P spending was projected to rise by 5% in 2014, which has now been revised to reflect a 9% increase. Canada is benefiting from improved commodity prices, helped by changes in the U.S./Canadian dollar relationship that improved Canadian oil and gas company realizations. Canadian E&P spending is now projected to rise by 7% versus an earlier view of barely a 1% gain. These upward revisions to North American E&P spending estimates are particularly welcomed news for the North American oilfield service industry that had expanded rapidly during the prior three years, only to have its capacity additions stand idle as activity growth slowed, or even fell, resulting in operating margins for service companies collapsing last year.

The companies have reported slightly better than previously projected North American revenues, but more importantly, significantly better operating margins

The early financial results of the second quarter of 2014 for oilfield service companies appear to reflect this strengthening in North American activity. The companies have reported slightly better than previously projected North American revenues, but more importantly, significantly better operating margins. The margin improvement comes as greater revenues are supporting the same, or smaller, operating costs, partially due to asset contractions engineered during the activity downturn. With greater E&P spending projected for the balance of 2014, it is likely company managements and Wall Street analysts will project even higher earnings for 2014

In the mid-year update, international spending was reduced largely because of cutbacks in spending in three geographic regions – Latin America, Europe and Russia

The North Sea outlook reflects its aging state, which is forcing companies to spend more merely to sustain output, or slow the rate of decline

and certainly greater earnings momentum as companies head into 2015. In fact, Cowen asked operators it surveyed about their preliminary spending thoughts for 2015. The preponderance of companies signaled they are planning to increase spending in 2015, which the Cowen analysts pegged at 6% growth with international spending increasing 4% and North American spending rising by 10%. It will be interesting to see what the companies say about 2015 spending when they get into their budgeting cycle this fall and report their plans to the financial community. Will their spending plans reach, exceed or fall short of the Cowen estimate?

In the mid-year update, international spending was reduced largely because of cutbacks in spending in three geographic regions – Latin America, Europe and Russia. In Latin America, where the forecasted spending now reflects a 7% decline rather than the earlier 1% increase, the continued operational and financial struggles of Petrobras (PBR-NYSE) have resulted in delays in projects coupled with some poor drilling results. In fact, one European oil and gas company, Maersk Oil & Gas, a subsidiary of the Danish shipping company, A.P. Moeller-Maersk A/S (AMKAF-PNK), took a \$1.7 billion write-down in asset value for its holdings in Brazil. Venezuela's financial problems have led to it delaying payment to service companies along with slow-paying operators. The irony of such an oil-rich country having massive shortages of consumer necessities and resorting to new taxes – the \$20 per airline ticket charge for ozone treatment at the airport – suggests that E&P operations there are not likely to increase anytime soon.

The North Sea outlook reflects its aging state, which is forcing companies to spend more merely to sustain output, or slow the rate of decline. As a result, North Sea spending will only increase by 3% this year rather than the prior forecast for a 14% increase. To some degree, part of the spending reduction also reflects continued delays in company drilling plans for the Arctic region, and there are few indications this condition will improve soon. We have witnessed several major players adjusting their drilling, production and workover plans due to the North Sea's maturity and falling output, and putting their money elsewhere. Statoil ASA (STO-NYSE), the Norwegian national oil company, has cut back its activity in the North Sea and is redirecting its spending to the shale plays of North America and to E&P operations in other parts of the world with more attractive economic returns. U.S.-major Chevron (CVX-NYSE) recently announced plans to reduce its North Sea workforce by 225.

Anticipated Russian spending for 2014 has been reduced to a 5% gain versus the earlier estimate for a 9% increase. Some of the decline in the spending increase relates to fallout from the sanctions by Western nations against Russia, certain of its leading business, finance and energy executives, and energy companies due to the government's actions in the take-over of Crimea and the continued militancy toward the Ukraine. Whether these sanctions work to

As western powers continue ratcheting up sanctions, it is likely there will be further E&P spending dislocations

resolve the diplomatic squabble remains to be seen, but as western powers continue ratcheting up sanctions, it is likely there will be further E&P spending dislocations. How much and when they will happen is impossible to forecast. For example, there are questions about whether the ExxonMobil (XOM-NYSE) venture to undertake a \$700 million Arctic drilling program with Rosneft (RNFTF-PNK) in the near future and the company's plan to expand its involvement with the Sakhalin Island project will go forward. With regards to the rest of the world, Africa spending is now projected to rise by 8% rather than the earlier 1% increase projection, while Middle East spending should increase 15% compared to the 14% gain before.

Virtually every one of these major oil company actions can be tied to managements reassessing the financial return prospects against the risks

Around the world, oil and gas companies are adjusting their planned activity to reflect operational and financial risks as managements now perceive them. Due to a lack of success in its shale exploration in Lithuania, Chevron has sold its interest in the joint venture and is bowing out. The company is also facing fierce resistance from environmentalists over its Romanian shale exploration effort, even though Chevron has agreed not to use hydraulic fracturing in this project during its five-year life. Royal Dutch Shell (RDS.A-NYSE), which has been going through a significant re-examination of its long-term corporate growth strategy in light of poor financial performance in recent years, announced it would end its Saudi Arabian natural gas development efforts. Virtually every one of these major oil company actions can be tied to managements reassessing the financial return prospects against the risks when compared to other E&P projects in their oil and gas portfolios.

While many of the companies were successful in sweeping up thousands of prospective oil and gas shale acres, the cost for drilling and completing wells in order to both hold the acreage and develop a stream of cash flow has proven financially challenging

In North America, we continue to see the maturation of the shale revolution with significant structural changes being undertaken. We have discussed in the past the financial pressures on the smaller, independent oil and gas companies, many of whom were early movers in this revolution. While many of the companies were successful in sweeping up thousands of prospective oil and gas shale acres, the cost for drilling and completing wells in order to both hold the acreage and develop a stream of cash flow has proven financially challenging. In fact, collectively, a universe of 46 E&P companies still is only generating cash flow equal to about two-thirds of its annual capital investment program. This situation is occurring during a period when natural gas prices have begun to recover and crude oil prices remain high. Should either or both of these commodity prices weaken, the producers could quickly fall into financial distress. Their inability to continue to regularly tap Wall Street for funds, which is now demanding greater capital discipline and increased financial returns from companies, has placed increased pressure on managements to improve their operational performance, which has translated into a greater need to control costs. The recent announcement of the merger of Whiting Petroleum Corp. (WLL-NYSE) with Kodiak Oil & Gas Corp. (KOG-NYSE) may reflect another variation of how the Era of Austerity will translate into the restructuring of the domestic oil and gas business.

Whiting will have a grand total of over 850,000 acres in inventory, but it will still rank second behind Continental Resources' 1.2 million acres

The merger of the two companies will create the largest oil producer in the Bakken and Three Forks formations of North Dakota and Montana, with first quarter 2014 combined production of roughly 107,000 barrels per day. The reserves of the new company will total approximately 606 million barrels, roughly 80% of which is oil. With Kodiak's 170,000 acres, Whiting will have a grand total of over 850,000 acres in inventory, but it will still rank second behind Continental Resources' (CLL-NYSE) 1.2 million acres.

The implied value for Kodiak shareholders represented a 2% take-under, although the merger price represented a 5.1% premium to the average trading price for the prior 60 days

Under the terms of the merger, Whiting is offering \$3.8 billion in stock for Kodiak along with the assumption of \$2.2 billion of debt, for a combined price of \$6 billion. Based on the closing price of the shares the Friday evening before the deal was announced on the subsequent Monday, the implied value for Kodiak shareholders represented a 2% take-under, although the merger price represented a 5.1% premium to the average trading price for the prior 60 days, according to *The Wall Street Journal*. While admittedly takeover speculation has existed around some of the stocks of companies heavily exposed to the Bakken play, most investors have assumed that the takeover deals would involve large international or integrated oil companies buying up the smaller companies. The combined enterprise value of the merged Whiting will be \$17.8 billion, a mouthful for many of the industry's behemoths. So what likely drove the deal?

The result of this switch is that its wells are producing greater volumes with well costs about unchanged

The main driver behind the deal is the shift in phase of the development of the Bakken. The future of companies in this basin is no longer tied to their success in exploration, but rather to their operating scale and greater efficiency in drilling and completion operations. According to a Wall Street research report, Whiting has generally been accorded favorable marks by investors for its execution and operating performance, although there have been some questions raised about its capital efficiency. Kodiak, on the other hand, has been challenged about its execution. It has recently experimented with down-spacing its drilling operations in hopes of improving ultimate recoverability and as a way of lowering its well costs. It has had some success using 12 wells per drilling spacing unit (DSU) and is now experimenting with 16-well DSUs. Kodiak has reduced its average well cost from over \$10.5 million to less than \$9 million per well. Whiting has a lower well cost than Kodiak and it has received some notoriety for new completion techniques it introduced during the fourth quarter of last year. Whiting switched to using a cemented liner and larger volumes of sand in its fracturing operations. The result of this switch is that its wells are producing greater volumes with well costs remaining unchanged.

When we look at this deal from a big picture view, we see that Whiting paid the current market value of Kodiak's assets. The larger company and greater production should enable Whiting to handle the additional debt, which we suspect was a drag on Kodiak's current, and future, results. As of the first quarter 2014 data, Whiting

had a 67% debt to equity ratio while Kodiak's was 184%. The combined balance sheet will remain highly levered.

We don't know whether Whiting will be able to apply its new completion approach to Kodiak's acreage, but if it can reduce well costs while boosting output, this could be a very good deal. On the other hand, Whiting should be able to affect synergy operational savings on the combined entity. Savings of just a few hundred thousands of dollars per well could meaningfully boost returns. At the end of the day, this is another way that the petroleum industry will restructure to deal with the new Era of Austerity.

We suspect this deal may have emerged out of the realization that the combined company will immediately become a significant producer in the Barnett, allowing it build an operationally and financially stronger company quicker than either party could do on its own

This pattern of combining to become stronger is even happening at the small end of the producer ranks as two private equity backers of E&P startup companies targeting the Barnett basin have announced plans to combine. The entities, backed by KKR & Co. LP and Riverstone Holdings LLC, will be merged to form Trinity River Energy LLC. This transaction is somewhat unusual among private equity firms as they usually back management teams and don't want to reduce the incentive for them to build successful businesses. We suspect this deal may have emerged out of the realization that the combined company will immediately become a significant producer in the Barnett, allowing it build an operationally and financially stronger company quicker than either party could do on its own. Even though the private equity backers may not be looking toward near-term financial returns, a larger, and presumably more profitable, company could generate a greater return for the owners faster than if the companies remained independent. This deal, like the Whiting/Kodiak merger, speaks to the industry's need to build organizations that can execute, have operational scale and can demonstrate operational efficiency in order to survive and prosper. Time will tell how well these strategies will work.

The Success (Mirage) Of Renewable Energy Supplies

She spoke of the changing energy market and warned the audience that the idea of U.S. energy security – a Golden Age for the country – is an illusion

Maria Van der Hoeven, executive director of the International Energy Agency (IEA), delivered a keynote address at the 2014 Energy Information Administration Energy Conference held recently in Washington, D.C. She spoke of the changing energy market and warned the audience that the idea of U.S. energy security – a Golden Age for the country – is an illusion. In a nutshell, she cautioned, as her organization has repeatedly warned, that the American shale revolution will run its course within a decade leaving the country increasingly dependent on output growth from OPEC supplies, especially Iraq as it is seen as the largest source of future OPEC supply growth. The IEA projects Iraq will supply up to 60% of OPEC's capacity growth over the next five years. She was critical of national fuel subsidies, although she acknowledged that the U.S. does not directly subsidize the consumption of fossil fuels. Yet, as she pointed out, the price of unleaded gasoline in the United States is the lowest among all the Organization for Economic Cooperation

Low gas prices have upset the utility business model, which along with increased emissions restrictions are forcing the closure of older power plants

She commented that the new Environmental Protection Agency (EPA) rules limiting carbon emissions for new power plants are not “compatible with minimizing the global temperature rise to 2° C.”

and Development (OECD) members. At the moment, Ms. Van der Hoeven has support on Capitol Hill from various senators and representatives who are arguing that the U.S. needs to raise its federal gasoline tax in order to generate the income necessary to support increased payments from the Federal Highway Trust Fund that funds state spending on highways and is due to be exhausted shortly unless there is some funding agreement reached among our politicians.

The Executive Director had some other comments directed at the impact of the shale revolution on the U.S. natural gas market. She commented on how the growth in shale gas output had driven natural gas prices to a low level. Low gas prices have upset the utility business model, which along with increased emissions restrictions are forcing the closure of older power plants. As she said, “I have no problem with old plants being retired. But be careful about the degree to which you rely on gas. Energy security requires diversity; you do not want too many of your eggs in the same basket.” She pointed to the success of the diversity of energy sources for generating electricity in the U.S. during the polar vortex last winter as the best example for not concentrating too heavily on a single fuel source to meet the nation’s power needs.

Mixed in with these warnings was her admonition that Americans should not embrace the view that the climate would benefit significantly from the increased use of natural gas. As she put it, “Let me be clear: Gas may be the cleanest of fossil fuels, but it is still a fossil fuel.” She said that the IEA would back policies that would promote “only the most modern and efficient gas plants being built with the anticipation of further carbon constraints” needing to be adopted by countries to counter global warming. She commented that the new Environmental Protection Agency (EPA) rules limiting carbon emissions for new power plants are not “compatible with minimizing the global temperature rise to 2°C.” According to Ms. Van Der Hoeven, renewables and energy efficiency will become the primary focus in the future of efforts to limit carbon emissions. As she put it, it will require “carbon capture and sequestration and other low-carbon technologies to pave the way for oil, gas and coal to play a full role in a secure global energy system for decades to come.” She must be pleased that Germany has now replaced the United Kingdom as the energy efficient country given its greater commitment to renewables for powering its economy.

The 2014 International Energy Efficiency Scorecard issued by the American Council for an Energy-Efficient Economy, which is the only report of its kind that identifies best practices across 31 key metrics in the world’s largest economies, put Germany in first place. Italy placed second, with the European Union ranking 3rd. China and France tied for 4th place, while the UK and Japan were tied for 6th. The United States was ranked 13th, while Canada was 9th. This report comes only days after Fraunhofer ISE reported that

The renewables effort has caused significant financial damage to the country's electric utilities

Germany produced around 31% of its electricity from renewables during the first half of 2014, a report that we have read has a number of flaws in its data collection and measurement. What we do know about Germany is that it has made promoting the use of renewables a top priority, but that effort is being massively overhauled due to the cost it has inflicted on the economy and its citizens. In addition, the renewables effort has caused significant financial damage to the country's electric utilities. It has them resorting to using more coal, in particular, cheap lignite, to generate electricity. The result has been that Germany's carbon emissions have increased, wiping out many of its environmental gains of recent years.

Exhibit 3. German Utilities Have Been Hurt



Note: GDF and Suez were distinct companies until June 2008.

Sources: IEA analysis and 2* Investing Initiative, based on Bloomberg Professional service.

Source: *London Telegraph*

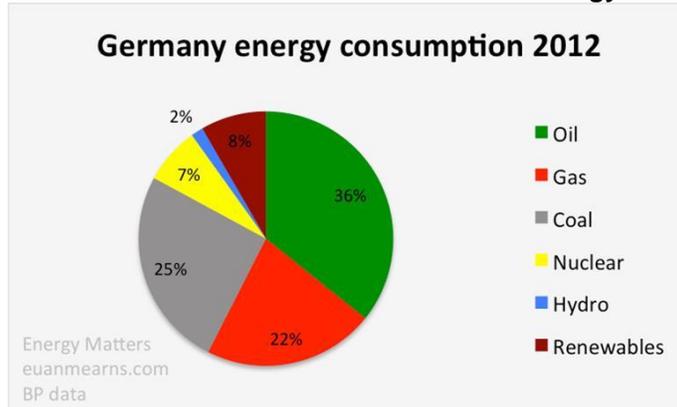
E.on has seen its profits plummet by 33% this year, while RWE suffered its first loss since World War II last year and expects further losses in the future

Germany's two largest utilities, E.on SE (EOAN-GR) and RWE AG (RWE-GR), have been significantly impacted by the government's 2011 decision to shut down all 17 of the country's nuclear power plants by 2022. E.on has seen its profits plummet by 33% this year, while RWE suffered its first loss since World War II last year and expects further losses in the future. RWE, which provides power to industrialized central Germany, only produces about 6% of power from renewable energy, so it has ramped up its use of lignite coal-powered plants and is applying to build new ones to replace its highly profitable nuclear plants. E.on, on the other hand, generates about 12% of its power from renewables, and has the advantage of earning profits from generating electricity in several developing countries such as Brazil and Turkey.

We found it somewhat amusing that the energy efficiency scorecard praised Germany's comprehensive energy strategy and awarded the country maximum points for its building codes, retrofit policies, and tax credit and loan programs, some of the vary programs that are being revised, cut back and reoriented. To understand the challenge Germany faces following its radical shift in energy policy that requires shutting down all its nuclear power plants and

replacing that output with renewables - primarily wind and solar, one only has to look at the charts in Exhibits 4 and 5 showing the nation's energy and electricity mix by fuel source.

Exhibit 4. Fossil Fuels Still Rule German Energy Market

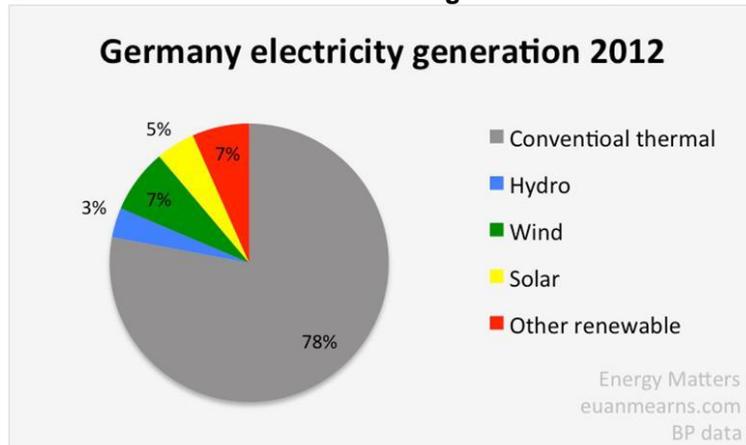


Source: Energy Matters

If renewables can displace all of the nuclear energy consumption, then it can double its share of the energy market

With coal accounting for 25% of Germany's energy consumption in 2012, before the push last year to burn more of it for power generation, and oil and natural gas representing nearly 60% of the nation's energy use, it is hard to see how this country is going to quickly transition to a renewables-powered economy. If renewables can displace all of the nuclear energy consumption, then it can double its share of the energy market, but that remains to be seen given the redesigned energy policy. In the power market, it is interesting that in 2012 conventional thermal generation accounted for 78% of the market, suggesting that the Fraunhofer ISE study's claim of 31% renewable power generation in 2014 would mean that the conventional thermal market has lost about 9% of its share, a not impossible percentage shift over 18 months.

Exhibit 5. Renewables Are Meaningful Portion Of Power Market



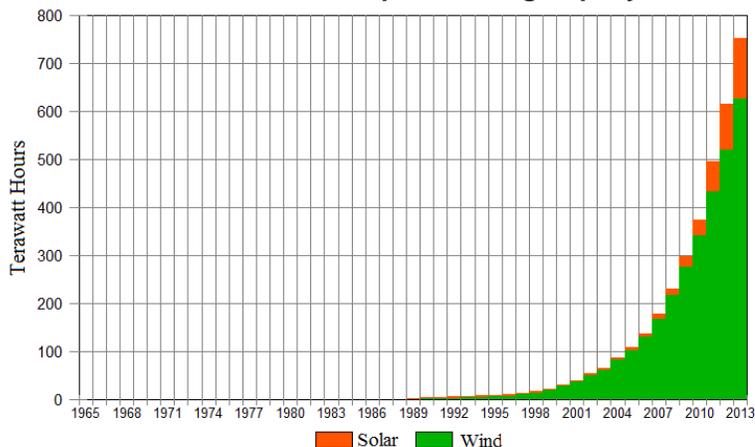
Source: Energy Matters

While renewables have shown dramatic increases in consumption, overall they remain merely a drop in the global energy bucket

While the German experiment with renewable energy has not been a complete success, it has been hailed by many environmentalists as the example of what other countries should embrace. Of course, most of those claims were made before the government announced its plans to revamp its energy policy because of the significant dislocations it has caused to its economy. A recent analysis of BP Ltd. (BP-NYSE) historical energy data by Roger Andrews shows that while renewables have shown dramatic increases in consumption, overall they remain merely a drop in the global energy bucket suggesting it will be years, if not decades, before renewables are able to seriously challenge any of the three fossil fuels that dominate the energy market today as a major source of supply. This would be in keeping with the history of energy market transitions, which seem to take much longer to accomplish than shifts in other sectors such as technology, food and health.

When you look strictly at the growth in global power output from wind and solar, its growth in recent years is impressive. In fact, over the decade 2003-2013, wind and solar power output has grown by more than 12-fold. Between 1965 and 2003, however, the consumption of wind and solar power output was barely measured.

Exhibit 6. Wind And Solar Output Growing Rapidly

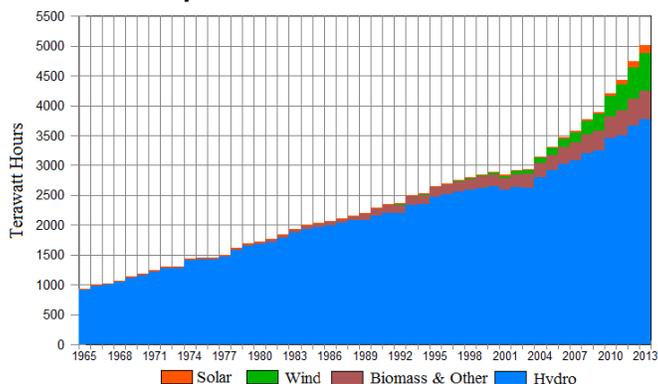


Source: Energy Matters

The contribution from wind and solar is fairly recent, essentially only during the past decade

When wind and solar are grouped with other renewable fuels such as biomass and hydro, their contribution to the growth of clean fuels becomes less significant. What is clear from Exhibit 7 is that the contribution from wind and solar is fairly recent, essentially only during the past decade. The chart also shows that biomass and hydro have grown at a significant rate.

Exhibit 7. Output Growth Of All Renewable Fuels

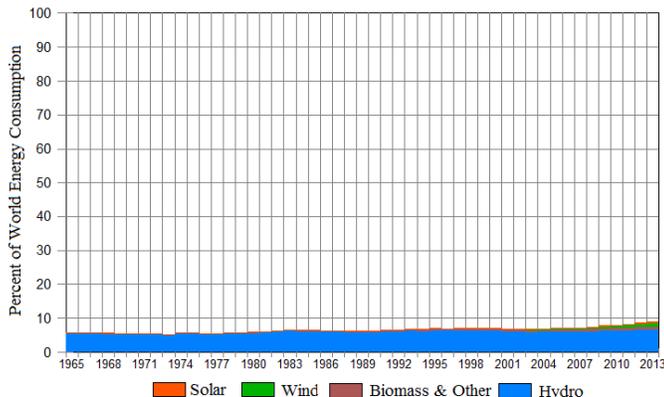


Source: Energy Matters

Over the 48-year span from 1965 to 2013, total renewable energy consumption has not quite doubled

When the contribution of renewable fuels is measured against total energy consumption, it becomes easy to see that over the 48-year span from 1965 to 2013, total renewable energy consumption has not quite doubled from slightly over 5% in the early years to about 9% now. The chart shows how strong the contribution of hydro has been to the total renewable fuel mix.

Exhibit 8. Renewables As Share Of Global Power

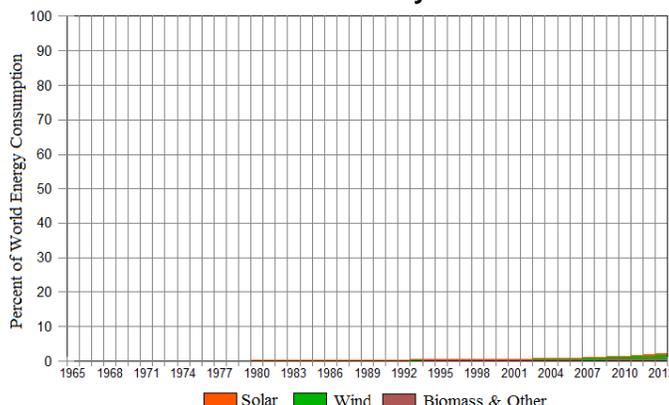


Source: Energy Matters

This lack of meaningful market presence given the strong push by governments via mandates and subsidies for wind, solar and biomass, suggests that these energy sources face serious hurdles in order to penetrate deeper into the global energy market

If you exclude hydro from the renewable fuel contribution to world energy consumption, the conclusion one has to draw is that if only the popular renewable fuels of today are considered – wind, solar and biomass - then renewable fuels as a power source have barely dented the global energy market. This lack of meaningful market presence given the strong push by governments via mandates and subsidies for wind, solar and biomass, suggests that these energy sources face serious hurdles in order to penetrate deeper into the global energy market. As governments are increasingly reluctant to add to the world’s dam population, it is unlikely hydro power will grow absolutely or relatively, meaning that renewable fuel growth will largely be dependent on increased solar and wind power.

Exhibit 9. Renewables Without Hydro As Power Share



Source: Energy Matters

maintenance. Fire is a significant risk due to the many flammable

We believe there is a greater chance of a totally new power source not on everyone’s radar screen, such as LENR, being the next global power source as there is for renewables such as solar and wind capturing the market

With the triumvirate of popular renewables – wind, solar and biomass – accounting for about 2% of the world’s energy consumption, the idea that they will be the power sources for the future seems far-fetched. If we had to guess, we believe there is a greater chance of a totally new power source not on everyone’s radar screen, such as Low Energy Nuclear Reactions (LENR), being the next global power source as there is for renewables such as solar and wind capturing the market. That is not to say that these energy sources won’t have their place in the global energy mix of the future, especially as governments continue to sponsor them financially and through regulation, and research into improved battery storage continues, but it is difficult to see them as the silver bullet of our future energy supply.

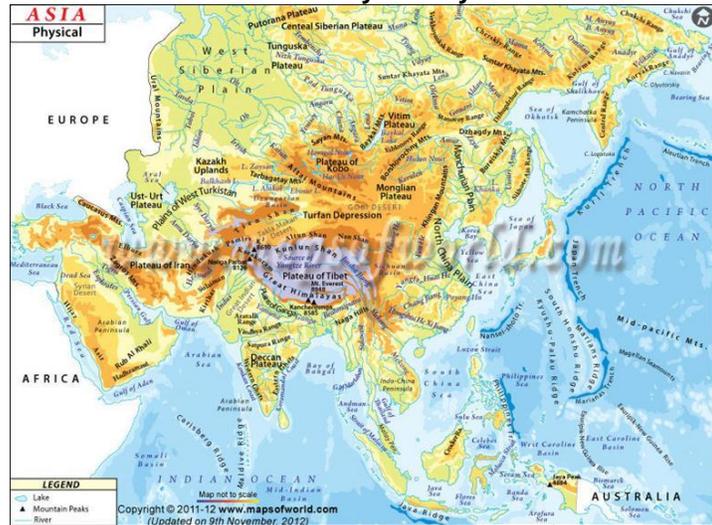
Why Is U.S. Navy Funding Study To Stop Onshore Tornadoes?

The study has proposed erecting barriers to block the climate forces that combine to produce thunderstorms, which often spawn tornadoes

We were amazed and surprised to read about a partly-funded U.S. Navy study that examined how to protect the Midwest from tornadoes including the possibility of erecting huge, tornado-blocking barriers. The author of the article interviewed Dr. Rongila Tao of Temple University in Philadelphia who was the lead researcher in this study. The study has proposed erecting barriers to block the climate forces that combine to produce thunderstorms, which often spawn tornadoes. Dr. Tao said the idea for these barriers in Tornado Alley in the south-central region of the United States came from a study of the geography of China, which has regions with similar geographic layouts to the U.S. storm region. Tornado Alley is essentially a large expanse of flat ground that provides a mixing bowl for cool polar and warm subtropical air masses that lead to the formation of supercell thunderstorms that can morph into tornadoes.

The study examined other regions in the world where similar geographic conditions exist but that lack tornado activity for signs of why the storms fail to form. The examination pointed to two regions

Exhibit 10. China Plains May Be Key To Tornado Protection



Source: mapsoworld.com

The explanation appears to be that these plains have three east-west mountain ranges that protect the plains from the tornado threat

in China that have similar geographic conditions to those in Tornado Alley – the Northern China Plain and the Eastern China Plain. These two plains lie in zones where diverse air masses mix but they seldom produce violent storms. The explanation appears to be that these plains have three east-west mountain ranges that protect the plains from the tornado threat. The first defense is the 300 kilometers-long (186 miles-long) Yan Mountain range that lies at the northern boundary of these plains. The second mountain range is the 600 kilometers-long (373 miles-long) Nanling (Nan Mountains) range lying across the southern boundary of the plains. The third mountain range is the 800 kilometers-long (497 miles-long) Jiang-Huai Hills that runs through the middle of the plains. While the Jian-Huai Hills are only about 300 meters (984 feet) above sea-level, they combine with the other two mountain ranges to eliminate major tornado threats for the area.

Exhibit 11. Tornado Alley Continues To Expand

Where is Tornado Alley?

"Tornado Alley" typically includes the Plains states from the Dakotas to Texas. However, a new study shows that the frequency and severity of tornadoes are actually much more widespread, so Tornado Alley should also include several states in the upper Midwest and Deep South, along with Florida.



Source: CoreLogic; Storm Prediction Center
By Doyle Rice, Jerry Mosemak and Julie Shidel, USA TODAY

Source: Wikipedia

The study's recommendation is to build gigantic walls running mostly west to east in three parts of the United States – North Dakota, the middle of Oklahoma and from Texas to Louisiana

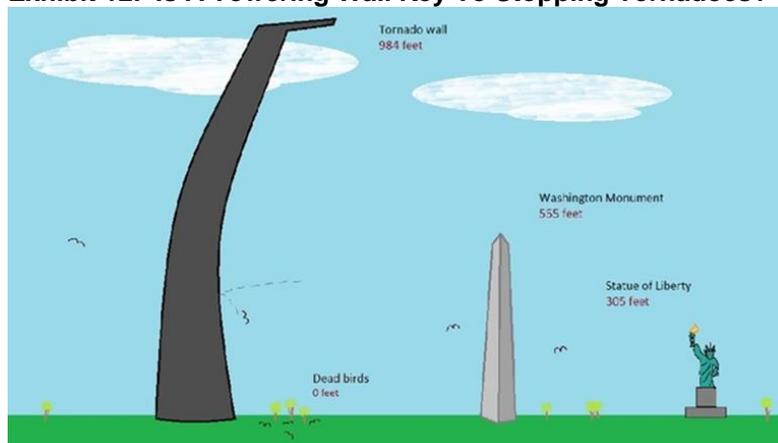
The wall the study envisions erecting would need to be 984 feet tall and 164 feet wide at its base

According to Dr. Tao, the dampening powers of the mountain ranges is demonstrated by the fact that where there is a gap in the Jiang-Huai Hills, helping to create an open plain, there are regular outbreaks of storms. Thus, the evidence suggests that the presence of these mountain ranges helps to eliminate severe thunderstorm and tornado activity.

Given the evidence, the question becomes how could this information be used to minimize the number of destructive tornadoes experienced in Tornado Alley? The study's recommendation is to build gigantic walls running mostly west to east in three parts of the United States – North Dakota, the middle of Oklahoma and from Texas to Louisiana. The last set of walls would be erected to help counter tornadoes that form in the Dixie Alley extending from East Texas through Arkansas, Louisiana, Mississippi and Alabama and over to the Carolinas. The study suggests that the initial walls should be constructed in areas frequently visited by tornadoes such as Moore, Oklahoma. The idea is that from this initial section, the anti-tornado wall would be extended much like the Great Wall of China.

Extrapolating from the height of the Chinese mountain ranges that protect the Chinese plains from devastating tornadoes, the proposed wall would need to be 984 feet tall and 164 feet wide at its base. The article's author produced a sketch of his vision of how this wall would look and how it would compare to two well-known U.S. landmarks – the Washington Monument (555 feet tall) and the Statue of Liberty (305 feet tall). Based on the sketch, maybe this is what the U.S. border fence should look like in order to become 100% effective in keeping illegal aliens out.

Exhibit 12. Is A Towering Wall Key To Stopping Tornadoes?



Source: *Citylab*

Dr. Tao said he had prepared estimated economics for building the wall. Since Dr. Tao is from Philadelphia, he looked at the cost to build the Comcast Center there, roughly 990 feet tall. Based on

We laughed when we saw the sketch of the wall since it included some dead birds that had flown into it

extrapolating its cost data, he estimates that to build a one mile long stretch of the study's proposed barrier it would cost about \$160 million. He counters this expense with the point that the recent tornado that destroyed part of Moore, Oklahoma in May 2013 caused multibillions of dollars in damages. While we haven't seen the detailed cost calculations, we wonder whether the cost of building a wall would truly be comparable to the cost of constructing an office tower, which includes all sorts of infrastructure needs such as water, sewage, electricity, air conditioning, etc.

We laughed when we saw the sketch of the wall since it included some dead birds that had flown into it. We guess that if the U.S. government decided to build these walls it would issue permits allowing for the killing of protected birds as it recently did for a wind farm in California that is allowed to kill bald eagles, one of the nation's most highly protected birds, for the next 30 years. We remain puzzled as to why the U.S. Navy is contributing to the cost of this study, since the dangers are onshore and tornadoes seldom appear near naval bases. May be this a case of a government agency with money to spend on climate change studies but few study opportunities that truly bear on its mission?

Does building a 900+-foot tall wall to possibly deflect air masses that mix and create violent thunderstorms and/or tornadoes seem like a rational strategy for our country?

Maybe the most ironic point of the study is that its proposals come just when the U.S. is experiencing a period with the lowest number of tornadoes ever, in contrast to the claims by climate change proponents that the nation would be experiencing increasingly frequent incidents of extreme weather due to higher levels of carbon dioxide in the atmosphere. Does building a 900+-foot tall wall to possibly deflect air masses that mix and create violent thunderstorms and/or tornadoes seem like a rational strategy for our country, or is it just another scheme to keep climate scientists employed?

Study Shows Wind Turbine Fires More Prevalent Than Thought

Fires are the second leading cause after blade failure for turbine destruction or downtime resulting in meaningful economic losses

A new study in *Fire Safety Journal* written by five professors – three from the School of Engineering of the University of Edinburgh, UK, and one each from SP Technical Research Institute of Sweden and the Department of Mechanical Engineering of Imperial College London, UK – suggests that the real number of turbine fires is ten-times greater than reported by the industry. According to the industry's accident data, fires are the second leading cause after blade failure for turbine destruction or downtime resulting in meaningful economic losses. Fires account for 10%-30% of reported turbine accidents in any given year since the 1980s. Reportedly, about 90% of turbine fires lead to a total loss of the unit or a meaningful amount of operational downtime.

The leading causes of fire ignition in descending order are lightning strikes, electrical malfunction, mechanical malfunction and improper maintenance. Fire is a significant risk due to the many flammable

Exhibit 13. Germany's Gross Eilstorf Turbine In Flames

Source: IAFSS/European Platform Against Windfarms

The only viable options for controlling a turbine fire are early detection and effective control over the fuel supply and fire suppression systems

materials used in the construction of wind turbines – fiberglass reinforced polymers, foam insulation, cables, etc. – along with the large oil storage in the unit used for lubrication of mechanical components. A problem for the wind industry is that once a fire is detected it is extremely difficult for external forces to fight the fire due to the height of the nacelle (turbine motor) and often due to the remote location of the turbine. In the case of offshore wind turbines, it is virtually impossible to fight a fire given the time and distance for mobilizing an offshore fire-fighting vessel. The only viable options for controlling a turbine fire are early detection and effective control over the fuel supply and fire suppression systems. While a turbine engulfed in flames is shown in Exhibit 13, the result, as in Exhibit 14, is usually total destruction.

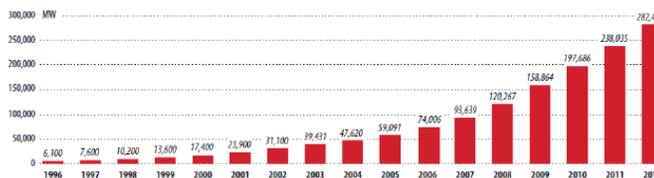
Exhibit 14. Remains Of Germany's Gross Eilstorf Turbine

Source: Associated Press

The global wind industry has been expanding rapidly as a result of a push by governments to replace fossil fuels

The global wind industry has been expanding rapidly as a result of a push by governments to replace fossil fuels used to generate electricity with power produced from renewable sources, primarily wind and solar. In many locations in Europe and North America, governments are mandating a certain percentage of their electricity be generated from renewable energy sources. The result has been an acceleration in global wind turbine installed capacity, although the periodic expiration of wind energy subsidies, such as in the U.S., has led to periods with low new turbine construction until the subsidy is restored.

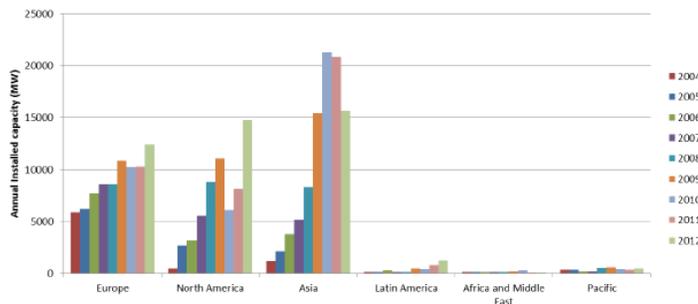
Exhibit 15. Installed Wind Energy Growing Rapidly



Source: Global Wind Energy Council

Exhibit 16 shows that wind energy growth has primarily been concentrated in Europe, the United States and Asia. These are regions where concern about the quality of the atmosphere is high, and governments are willing to mandate or subsidize the development of renewable power sources such as wind and solar.

Exhibit 16. Wind Energy Grows In Asia, Europe & US



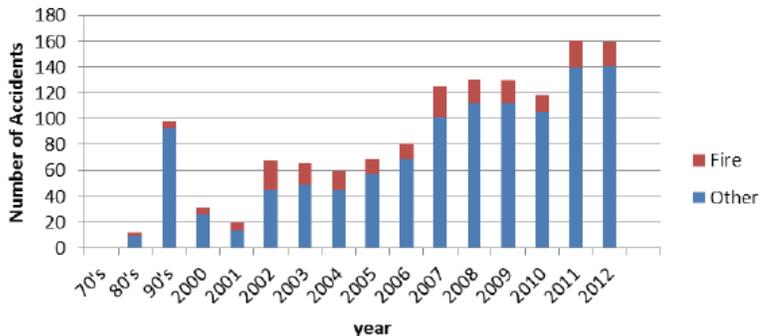
Source: Global Wind Energy Council

The authors reviewed some of these alternative reports and concluded that the Forum estimates are probably understating the actual number of accidents by upwards of 70%-90%

Since the 1980s, the UK wind lobbying group Caithness Windfarm Information Forum has published an annual accounting of the number of accidents for wind turbines. We have written about their data in past *Musings*, including the revelation that one British power company disclosed significantly greater numbers of wind turbine accidents than the Forum had counted. In fact, the utility's single-year accident total equaled a decade's worth of Forum data. The Forum relies on official reports by utilities to their respective government regulators and media accounts of turbine incidents. The authors reviewed some of these alternative reports and concluded that the Forum estimates are probably understating the actual number of accidents by upwards of 70%-90%. So, instead of

160 accidents per year for 2011 and 2012, of which 20 were fire-related, the number of turbine fires could have totaled upwards of 200, or more fires than all turbine accidents reported for those two years by the Forum.

Exhibit 17. Wind Turbine Fires Could Be 10-fold Greater



Source: Caithness Windfarm Information Forum

The cost of the design and operational changes to reduce fires is a fraction of the potential loss from a wind farm accident

The conclusion of the professors' article was to relate the cost of building new wind turbines against the estimated cost of redesigning turbines and changing the materials they are made from along with how they are operated. The point the professors were making is that the cost of the design and operational changes to reduce fires is a fraction of the potential loss from a wind farm accident.

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