

America's Energy Future

WASHINGTON – The good news is that America is now among the top three world fossil fuels producers. The bad news is that increased US fossil fuels production will create a disincentive in exploring and then deploying needed alternatives to fossil fuels.

The real challenge

The energy policy challenge for the US –both the government and the private sector–is to be able to look at current and future reliance on abundant domestic oil and gas both as a providential support for current energy needs but also as a temporary “necessary evil”, as we get busy trying to identify non carbon energy sources that will power America in the long run.

Indeed, these –oil and gas– are the essential energy sources that we badly need right now. However, as we take advantage of the fossil fuels bonanza, at the same time we must be steadfast and relentless in the all out pursuit of economically viable, emissions free energy alternatives, however long this may take. Put it simply, if we do not want to cook up the planet, our long term future –America's future and the world's future– has to be powered by clean, emissions free energy sources.

The fracking revolution

That said, if you did not know anything about the immense threat represented by man-made global warming, and therefore you had no reason to doubt that fossil fuels are the best answer to America's massive energy needs, then you would be reassured and comforted by recent trends. Indeed, thanks to abundant domestic oil and gas, this is a great season for the American economy, and for the US fossil fuels industry.

Thanks to hydraulic fracturing technologies, (better known as “fracking”), and horizontal drilling, scores of US energy companies, large and small, in the last decade managed to tap into vast energy resources, (located mostly in Texas, Oklahoma, North Dakota, Louisiana, and Pennsylvania), until recently deemed to be uneconomic because of the technical challenges represented by drilling into shale formations in order to free up the hydrocarbons trapped in shale.

Well, thanks to old-fashioned Yankee ingenuity, the technical challenges were overcome –with spectacular results. Thanks to fracking, US oil and natural gas production jumped to almost unimaginable heights, this way transforming not just the American energy market, but the entire dynamics of global energy markets.

US is ahead

Let’s take stock. America is now the number one world producer of natural gas, and poised to surpass Russia as the biggest oil producer in 2019, having already overtaken Saudi Arabia. (This forecast may change, of course, because both Russia and Saudi Arabia have ample spare capacity that could be easily tapped, this way increasing their production).

A mere decade ago, the idea of a massive scale US fossil fuels renaissance would have been labeled a silly fantasy. Any reliable forecast would have pointed out that the US had already used most of its known fossil fuels reserves.

In 2008 the consensus was that, going forward, America could have powered itself only via massive additional energy imports, (both oil for transportation and natural gas for power generation and heating).

This unpleasant assessment created unease in many quarters, given the enormous cost involved in importing most of the hydrocarbons needed to power America, the second largest energy consumer, (after China), and given the worrisome

negative national security implications of utter dependence on foreign suppliers for such vital commodities.

The impact of fracking

Well, today we have a completely different scenario. While America continues to rely on some oil imports, the percentage has shrunk substantially. Furthermore, today the national security concerns related to imported oil are far less significant, because our oil imports come mostly from our close neighbors: Canada and Mexico, (and some from Venezuela), therefore these supplies are relatively secure. Which is to say that America is now close to achieving what the experts call "*Hemispheric Energy Independence*". Indeed, as most of our additional energy needs come from stable countries located in our immediate neighborhood, we no longer rely on a significant scale on distant and potentially unreliable suppliers.

And it gets better. In fact, while we still import some oil, now we also export oil, and growing amounts of oil products. And the quantities of our energy exports are growing.

The real challenge is to develop emissions free energy sources

That said, this positive short and medium term energy outlook is deceptive. This fossil fuels renaissance is not the end of the story when it comes to America's energy sources and their impact on the environment.

We now know that continued reliance –on a massive scale– on burning fossil fuels will contribute to additional greenhouse gases emissions and therefore to the exacerbation of global warming.

Of course, we know that many companies and scientists are busy trying to find workable –that is technologically viable and cost-effective– alternatives to reliance on hydrocarbons. But this is not easy.

Bad policies will not help

And it seems that policy-makers are approaching the problem in the wrong way. The prevailing policy choice is to “force” the adoption of currently available renewable energy solutions –today– by creating mandates for renewable energy usage, and tax subsidies for wind, solar and electric vehicles. In my view, while these policies of mandates and subsidies may be well intentioned, they will not succeed.

The fact is that new forms of energy production and new types of vehicles will be spontaneously adopted on a massive scale only once they prove to be cost-effective, without the distorting incentives of mandates and tax subsidies.

Fund more R&D

Public policy can help not via subsidies but by providing significantly more funding for additional research in alternative, emissions free, fuels. We simply do not know today what the future ideal new energy mix will be. It is too early to say.

Electric vehicles, EVs, look very promising. And yet manufacturers still need to find ways to make cheaper, more energy-efficient, and lighter batteries. The good news is that the cost of wind and solar has gone down –very significantly. But we still do not have effective ways to store the electricity they produce so that it can be used when the wind is not blowing and the sun is not shining.

In other words, still plenty of work to do before we can reliably move away from hydrocarbons for both power generation and transportation.

Fast track the development of clean energy sources

So, here is the challenge for America. By all means, let’s take advantage of the incredible fossil fuels renaissance,

simply because today there is no reliable alternative technology that could be deployed on a massive scale.

But let's not fool ourselves. Oil and gas are not and should not be looked at as long term energy solutions. The long term solution has to be in emissions free, clean energy sources –whatever they may be. With this goal in mind, let us unleash American ingenuity so that we can get to a reliable, and economically viable post-fossil fuels era as soon as possible.

We all love our planet. Let's do our best to preserve it.

Coal Makes India The Super Polluter

WASHINGTON – In case you were wondering, we are not making much progress in our planetary war against global warming. There is cause for serious alarm. However, despite the exaggerated media focus on Washington, the real problem is not President Donald Trump and his denial of the dangers of global warming, illustrated for instance by exiting the Paris Accord, and by his “promises” to support US coal miners in order to make coal great again.

America failing to lead

Sure, the fact that America, the world's number two country (behind China) when it comes to emissions, is failing to lead is not helpful, to say the least. That said, while America's position on this global threat is very disappointing, America is not the main problem.

The problem is India

The monstrous size problem is India. The Subcontinent's economy, (with a population now in excess of 1.2 billion people), is growing, and with growth comes a voracious appetite for energy, specifically for thermal coal, the kind of cheap coal used for electric power generation. A recent long survey in The Economist paints a rather horrible picture. 3/4 of India's electricity is generated by coal, and coal consumption is actually growing.

Too much coal

Sure, India has also launched a large number of important renewable energy projects. But compared with the amount of electric power generated by coal they are not very significant.

And cutting down on coal used for power plants is almost impossible, for economic and political reasons. Coal mining is concentrated in the rather poor East of the country. Which is to say that this industry provides badly needed jobs and income to many low income Indians. By the same token, coal transportation is a major source of revenue for Indian freight railways. And coal is relatively cheap. Hard to see how India's policy-makers can cut down its use without causing major upheavals.

Dependence here to stay

If you take all is this together, unless the cost of renewable energy goes down more rapidly, it is easy to realize that India's heavy dependence on coal is not going to go away any time soon. And this means that India will continue to lead on global greenhouse gas emissions, because of its super sized fleet of coal-fired plants.

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Does America Need Nuclear Energy?

WASHINGTON – Can nuclear power come back as a cost-effective modality to generate electricity in America? Some scientists and innovators claim that the sector, challenged by prohibitively high costs of construction and fears of accidents may have a future after all, and it is called Small Modular Reactors, or SMRs. According to them, it would appear that the sweet spot for nuclear will not be in the traditional model of large scale, expensive and difficult to build power plants that will serve millions of customers. The future is in Small Modular Reactors, SMRs that can be built quickly and cheaply.

Small nuclear?

If this were indeed so, if we could indeed quickly build several SMRs at a reasonable cost, this would be a true game changer, for the nuclear power industry, for the future of electrical power generation in the U.S., and more broadly for all efforts aimed at devising a mix of electrical power generation sources that will help us drastically reduce carbon emissions, and therefore finally put a stop to global warming.

On the road to extinction

By most account, here in the U.S., nuclear power plants are on the road to a silent and unlamented extinction. A combination

of fears of accidents, uncertainties about a reliable way to dispose of all the spent fuel and then huge, in fact prohibitive, upfront construction costs for new plants created almost insurmountable policy, political, psychological and financial barriers that work against the very notion that nuclear is a viable, safe, reliable, non carbon solution to our needs for electricity.

As all this was debated here in America several years ago, the Fukushima Daiichi accident of March 11, 2011, in Japan was an additional and huge body blow to the entire nuclear power sector and the companies and policy-makers that support it.

Leaving aside all the technical analyses about the very specific circumstances that caused that major accident in Japan, (a major tsunami that flooded the plant, disabling the pumps), U.S. public opinion, or at least a big chunk of it, became even more convinced that nuclear power generation is inherently dangerous.

There are other options

Therefore, energy experts argued, as we do indeed have choices, let's discard nuclear power as a means to generate safe and reliable electricity. The Greens of course advocated renewables. Others focused on the emerging and promising shale gas sector. Indeed, with so much new and cheap natural gas coming on line, America could reliably generate all the affordable electricity it needs, for decades.

And so, as a result of all this skepticism regarding nuclear, while other commercially viable alternatives have been developed, we are witnessing the progressive shrinking of the U.S. nuclear power electricity generation sector. The stark reality is that no new nuclear plants are built, while old plants little by little are phased out and decommissioned.

This is a big deal. Nuclear used to provide about 20% of all electrical power generation in America, a huge percentage of

the total and a large overall amount for an advanced industrial power like the U.S. that produces and consumes a great deal of electricity.

Nuclear is dangerous and too expensive

As indicated above, for some this transformation may not be so bad. Nuclear –they argue– is dangerous, as we do not have an effective way to dispose of all the waste produced by the plants. And then there are possible accidents. May be not of the Fukushima kind. But other possible malfunctions may cause the release of harmful radiations in the atmosphere. The consequences of such events would be dire.

On top of that, the fact that nuclear is now so expensive is an additional reason for deciding to move on to other more promising technologies. If you are Green, you want to focus on solar and wind, technologies that have become much more cost-effective in recent years. If solar has become so cheap, why bother with nuclear? If you are not Green but are simply looking at cost-effective ways to generate electricity, you focus on shale gas, not exactly clean, but far better than coal when it comes to emissions.

Renewables are not enough

Well, the advocates of SMRs argue against complete reliance on renewables as the silver bullet that will deliver enough safe and sustainable, non carbon based, power. Unless renewables become dramatically more efficient, they argue, you simply cannot install enough renewable energy sources to meet current and future power needs. As things stand today, it is impossible to build enough wind farms and solar plants to power the entire planet. And if we seriously want to progressively “decarbonize” our power generation mix, they tell us, then shale gas will not do it. Yes, it is better than coal, but it is not clean.

In the end, say the SMRs advocates, if we want green

solutions, solar and wind, plus hydro power wherever it may be possible to develop it, will simply not be enough. You also need nuclear.

Small Modular Reactors to the rescue

Here is the strong argument in favor of a new generation of SMRs. If we agree that coal is bad, and natural gas from shale only somewhat less harmful, we simply cannot focus solely on solar and wind as the means to deliver all the power we need.

Unless we assume tremendous technological breakthroughs that will substantially increase the productivity of all existing renewable technologies, while solving at the same time the huge bottle neck of the lack of energy storage systems – a problem that limits the flexibility and therefore the usefulness of solar and wind power generation– renewables are simply not enough. Without large scale, effective storage solutions, renewables produce electricity; but not 24/7. No sun at night. No power when there is no wind.

And then there is the energy density issue. We simply cannot successfully address our planetary electrical power generation needs by building thousands upon thousands of wind farms, while covering large chunks of the Earth's surface with solar panels. It is just not practical.

That said, if we want to drastically diminish and eventually phase out our dependence on carbon based electrical power generation, we better come up with something else that can be successfully added to the mix.

Are SMRs commercially viable?

Hence the importance of refocusing on nuclear, albeit a different type of nuclear: small, modular, cheap, and effective. Of course, all this is very interesting. Except for one basic fact. SMRs, although the object of serious studies and research, are not commercially viable at this stage. They

are much more than concepts, but they are not part of the choices commercially available today to utilities and consumers. At this stage, SMRs are a hope, not a real alternative.

If this SMRs hope does not soon become reality in terms of companies that can offer safe and reliable SMRs to utilities at a competitive price, we are in a real bind. We can generate all the electricity we need; but we are and we shall be unable to seriously curtail greenhouse gases emissions. And this means that Global Warming will get worse.

This is bad news for Planet Earth.

Why Self-Driving Cars? Upgrade Bus Networks Instead

WASHINGTON – The ongoing buzz about the marvel of “driverless cars” soon hitting the roads is a bit too optimistic. A great deal of money and effort is devoted to perfecting this futuristic technology. We know that Google and other high-tech companies are involved in this research. General Motors has entered a \$ 500 million partnership with Lyft to produce a robot vehicle that will drive itself. Eventually driverless cars will be managed by Uber or similar services and used for ride-sharing.

The advantages

I see the point of getting into a car that can safely take you anywhere. Instead of focusing on driving, while in the car, you are just a passenger. You can read, do work. You can safely make phone calls, or rest.

I can also understand how older or disabled people who can no longer drive but need to go places would find a self-driving vehicle to be the perfect solution to their daily mobility needs.

I can also see how it may possible within a realistic time frame to match car services like Uber and driverless cars. If this formula worked, many people would simply not buy cars anymore. And this would help alleviate traffic congestion. (More on this in a moment).

You are still stuck in traffic

That said, this is not necessarily the best way to invest precious funds. And here is why. Suppose we get there. Suppose that there is some kind of breakthrough. Consumers will soon be able to buy an affordable, safe, intelligent car that they do not need to drive. Or we shall let Uber do the driving, so that some of us will not feel the need to own private cars anymore. Fine.

Now imagine yourself in your new robot-vehicle that drives you. You are in the middle of Los Angeles, or Cairo, or Paris, or Nairobi, at rush hour. Guess what, the car may drive you, but both the futuristic vehicle and you are still stuck in horrible traffic. Sure, you are not as stressed as you used to be by bumper to bumper congestion, because the car does the driving. But you are still stuck in an endless traffic jam. True enough, if many cars will be owned and operated by Uber or equivalent services, most definitely there will be fewer cars on the road. Still, there will be plenty of cars. Not to mention delivery vehicles, trucks, ambulances, police cars, buses, you name it. Which is to say that your daily commute will continue to be long and unpleasant. Your driverless car will help alleviate congestion. But it will not eliminate it.

So, here is my point. All this focus on making cars smart is a poor allocation of scarce resources. The problem is not that

cars are not smart enough. The fact is that in large urban areas the car, private or Uber managed, is a poor choice to address the issues of easy, affordable, dependable personal mobility.

Let me say it again. There are just too many cars on our roads! And too many cars means shared discomfort for all users.

The car is a bad solution to mobility needs

The fact is that we are way past the point of diminishing returns when it comes to the usefulness of the automobile in all large urban areas, anywhere in the world. In most big cities the car is the wrong answer to our need to move around at leisure, in comfort, and reasonably fast. There are just too many people with too many cars sharing limited road surfaces.

The answer to epic traffic jams and slow-moving traffic, often 24/7, is not to make cars more intelligent. ***The answer is to get rid of cars altogether in large urban settings, and opt for smart mass transit solutions.***

(PLEASE NOTE: This general rule applies only to large cities. People living in rural areas, in isolated communities, or remote farms need cars. And, of course, cars may still be necessary for road trips, long and short).

Bus Rapid Transit systems

While there may be several options available, at the moment the most cost-effective –and proven– solution seems to be **Bus Rapid Transit, BRT**, systems.

“Come again? We are working on high-tech, intelligent cars and you are proposing clunky old buses? “Yes, I recognize that this does not sound terribly sophisticated. And in fact it is not. And, yes, in the roll-out phase this BRT option can be

very disruptive.

But let me tell what you get with Bus Rapid Transit. You get all the advantages –in terms of speed and reliability– of an underground subway system, minus the often prohibitive cost of digging tunnels which make subways systems always inadequate from the perspective of the average would-be user. Walking 30 minutes in order to get to the subway station and then another 20 to get from the closest station to your final destination is not appealing. And in some large metropolitan areas there is no subway, because of cost. Period.

Dedicated lanes, fast buses

Here is the issue when it comes to buses operating like subway trains. In most large cities, in order to create a BRT system you would have to ban or at least severely restrict private cars. The new seamless bus network becomes fast and efficient only if buses can have complete right of way via “buses only” dedicated lanes, not shared with other vehicles. And this means large areas within cities where cars cannot travel.

Once we know that buses will be able to move freely without being stuck in traffic created by private vehicles, then BRT planners will be able to create a seamless network, with bus stops that become interchanges working just like subway stations. Passengers will buy their tickets before boarding. They will ride on a bus, exit at a stop that will also be an interchange, quickly board another bus, if they need to, and get to their final destination within the estimated time.

Just like a subway, minus the construction cost

In other words, you get all the advantages of an underground subway system, in terms of easy access, service reliability, and speed, minus the extravagant cost of digging tunnels and building underground stations.

In most countries, these upfront costs are prohibitive. And

this is why most cities do not have subways systems. Or, if they have them, they are not large enough to properly serve the entire population. Hence the continued reliance on private cars.

“So, are you telling us that the old-fashioned, humble bus can take care of all urban transportation needs?” Yes, it can. But this new (in fact not so new, as you will see in a moment) model assumes vision on the part of municipal leaders.

They have to be able to sell to their citizens the unfamiliar notion of people moving around quickly and efficiently using surface public transportation that works exactly like a subway system, minus the cost of construction. They have to convince them that the bus network will be user-friendly, affordable and efficient.

It works

Well, here are the key questions. Does this BRT system work? Has it been tried before? The answer is yes, and yes. It works and there is plenty of evidence to demonstrate this.

It all started back in 1974 in the city of Curitiba, Brazil. The very first BRT system was the result of years of experimentation by urban planners who finally came up with the model of *“bus just like the subway”*. And then the model spread throughout Latin America. In 2000 Bogotá, the capital of Colombia, launched its own TransMilenio BRT system.

And now you have similar mass transit solutions in Brisbane, Australia; Stockholm, Sweden; Cape Town, South Africa; Ottawa, Canada; and many more cities around the world.

Political impediments

The only reason why BRT systems have not been adopted more widely by other large cities across the world is that municipal leaders are afraid of voters' backlash. Mayors and

Municipal Councils do not want to deal with the unavoidable skepticism and probable resistance of millions of voters-drivers who may not believe that the new BRT system will work as advertised.

Oddly enough, faced with abrupt changes, most city dwellers would rather endure the misery they know –monstrous traffic jams– rather than try something new.

So, this is mostly a psychological/political impediment, rather than a technical obstacle. Meanwhile, however, millions of people spend hours and hours in traffic jams created by the shared, but totally mistaken, belief that the private vehicle is still the most cost-effective and most efficient way to address personal mobility needs.

Getting there, fast

So, back to driverless cars. Would you rather have a high-tech car that drives you, but can do nothing to avoid traffic congestion and an endless daily commute; or would you rather get where you need to go by low tech bus that gets you there fast, thanks to a seamless and efficient network?

Think about it.

OPEC Defeated By US Shale Oil?

WASHINGTON – It seems that American shale oil producers, an assorted group of small and medium-sized firms which gained strength in the last decade and are now operating in many

states, have become the swing producers in a position to influence global oil prices. How did that happen?

Cutting costs

U.S. shale oil production is relatively new. At the beginning of the “shale revolution” the cost of extracting oil from shale formations was quite high. But now they have come down significantly, mostly because of aggressive cost cutting measures adopted in response to OPEC imposed low prices. (More on this below). On account of this incredibly fast makeover, today a large number of the shale companies, especially those operating in West Texas, are profitable even with oil well below \$ 50 per barrel.

Most interestingly, shale oil producers now have the ability to ramp production up and down with relative ease, this way adjusting to global market conditions, without causing major disruptions to their operations. They can increase output when prices are higher and cut back when prices are too low. Conventional oil producers do not have this option.

With crude around \$ 50 per barrel, it is good news to have a substantial number of U.S. based oil producers supplying the domestic market, while making a profit even in this new era of low prices. This is a big plus for the American energy sector, and for all American consumers of energy products.

OPEC reactions

With good cause, OPEC saw the spectacular increase of U.S. production caused by the large scale exploitation of abundant shale oil reserves (an additional 4 million barrels a day in just a few years) as a threat to its market dominance.

Hence a very simple strategy aimed at eliminating the American shale oil threat. The plan was to deliberately over produce, this way causing a global glut and consequently falling oil prices. The bet was that a long stretch of low prices would

kill the U.S. high cost shale newcomers who –according to all analysts– could not survive with oil below \$ 60 per barrel.

After having eliminated the U.S. menace, OPEC would go back to business as usual, reaffirming its position as the oil cartel which alone has the power to dictate prices by manipulating supply.

The strategy failed

But it did not work out this way. Not by a long shot. And this is because the U.S. shale producers, surprising everybody, managed to quickly adopt major technological improvements which increased well productivity, while aggressively cutting other production costs, this way staying profitable even with oil below \$ 50 per barrel.

All in all, the Saudi/OPEC plan failed. While several marginal U.S. shale producers could not make the adjustments fast enough and went bankrupt, most of the shale sector survived the OPEC imposed squeeze on profits.

The high cost of low prices

In the meantime, the extended period of low prices hurt OPEC producers very badly. They saw their precious oil based revenue dwindle rather dramatically. It soon became clear that most OPEC countries could not sustain an extended period of low prices.

Therefore, led by Saudi Arabia, the OPEC cartel, (this time working in concert with non OPEC Russia), tried to change strategy and jack up prices by cutting production, this way eliminating the oil glut they had created.

But this new approach is also failing. As oil prices go up on account of OPEC/Russia production cuts, the U.S. shale companies ramped up production, this way offsetting the OPEC/Russia cuts. As OPEC imposes cuts on its members, the

U.S. shale sector produces more, while Saudi Arabia is denied the revenue gains that should have resulted from production cuts. So, the OPEC strategy aimed at eliminating the U.S. shale threat to its market dominance did not work.

Loss of precious revenue

That said, the sustained “attack” against US shale has been horribly expensive for the OPEC cartel members. Years of low prices hurt major Middle Eastern oil producers, (not to mention Nigeria and Venezuela, and non OPEC Russia, among others), in a significant way.

Most of these countries rely heavily on oil revenues to finance all or most public spending. Many of them had adopted national spending programs and budgets which assumed oil prices at \$ 90, or \$ 80 per barrel.

This means that all of them are facing fiscal problems or outright crises. Lacking oil revenue in the expected amounts, they have to cut spending and borrow more in international financial markets. But this is not an easy adjustment.

For example, in Saudi Arabia major spending cuts caused by declining oil revenue could lead to unprecedented political problems down the line. Almost the entire Saudi population depends one way or the other on direct or indirect government subsidies funded entirely via the oil revenue.

Reforms will take time

We know that the Saudi Monarchy is now openly committed to a major economic and fiscal transformation which will (hopefully) reduce and eventually eliminate all state subsidies, while promoting plans aimed at diversifying the economy. But, even in the best of circumstances, this is going to be a long journey. Cutting government largesse too much too soon could be politically dangerous.

Bottom line; U.S. shale wins; OPEC cartel and its new allies lose.

Trump Takes U.S. Out of Paris Accord on Climate

WASHINGTON – U.S. coal miners and out of work factory workers: this is for you! President Donald Trump publicly announced that the U.S. will withdraw from the Paris Climate Accord that his Democratic predecessor, Barack Obama, promoted and warmly endorsed. Trump's argument against the Paris deal is that it will penalize the American coal mining industry, and the overall American economy in the short term, with only vague hopes of somewhat lower world temperatures, way down the line.

Bad deal for America

As Trump sees it, this is a bad deal for America; and so the right thing is to get out of it. Sticking to the obligations created by the Accord would amount to enacting the equivalent of a huge energy tax on the US economy, because compliance with new, strict emission controls (in order to limit the amounts of greenhouse gases released into the atmosphere) will be very expensive.

As a candidate, Trump promised that he would withdraw from this climate deal, and now that he is President he is doing it. We know that his close advisers are divided on this issue. His daughter Ivanka and son in law Jared Kushner, along with

Secretary of State Rex Tillerson, recommended not withdrawing. Still, in the end Trump sides with the opponents.

What does this mean?

That said, from a practical standpoint, America's exit, at least in the short term, will not amount to any worsening of the global climate. Indeed, the Paris Accord, if all goes well, promises only modest progress on lowering the temperature of the world, and only after many years. And this will happen only if we assume that all the other participants will actually do what they promised to do in terms of enacting new policies aimed at lowering their consumption of fossil fuels, this way reducing greenhouse gases emissions. Do keep in mind that the Paris Accord has no enforcement mechanism. The commitments made by the signatories are purely voluntary. In the case of China, the world's biggest polluter, Beijing is theoretically bound to implement new policies several years from now.

Political consequences

Still, Trump's decision on this rather emotional issue has had immediate political consequences. From the stand point of other nations, particularly the leaders of the G 7 Trump just met in Taormina, Italy, this amounts to America choosing to go it alone, openly dissenting from a global consensus on the global threats to the earth created by the unrestrained consumption of fossil fuels.

U.S. no longer leading

In the short and medium term, this means that America is no longer leading the world on a critical policy issue, As most world leaders see it, America has now retreated in its narrow universe characterized by a bizarre anti-science fixation pursued by a strange president who is "anti everything".

Anti-everything Trump

Indeed, Trump is so anti-immigrant and xenophobic that he wants to build a wall along the entire border with Mexico.

Furthermore, according to the now widely accepted narrative, this is a president who is openly against free trade, against the EU, against NATO, and against Muslims, (sort of). Given all this, Trump being also against joint international efforts aimed at stopping and hopefully reversing climate change is disappointing; but not surprising. This new development fits the now accepted narrative.

America is no longer leading. Trump's America has retreated behind a myopic worldview of narrow self-interest.

From the standpoint of old friends and allies, Trump's announcement on exiting the Paris Accord is yet another (sad) sign that America is no longer the "Leader of the free World".

In fact, even before this new development on the Paris Accord, German Chancellor Angela Merkel had already publicly argued that it is time for Europe to think of and plan for a future without close ties to the U.S., since Trump's America is no longer a reliable friend.

Political symbolism

Again, keep in mind that all this is mostly about political symbolism. It will take four years for America to fully extricate itself from the obligations contracted under the Paris Accord. This is fairly long time. And again, keep in mind that under the terms of this Paris deal, major polluters like China and India have modest obligations when it comes to reducing their own emissions that will kick in much later. Which is to say that you should not expect world temperatures to start rising tomorrow, simply because today President Trump announced that America will pull out in four years.

No gain

However, as indicated above, this decision is not without political consequences. In the end, all this is will amount to an additional loss of international prestige for Trump's America.

With all this in mind, whatever you may think about the intrinsic policy value of the Paris Accord, it would have been better for Washington to be part of it, as opposed to becoming now a big pariah in the eyes of the world.

Trump is talking to his base

Well, then why did he do it? Very simple.

Trump's narrow concern here is to reassure his domestic political base –the millions of Americans who voted for him last November. This base includes out of work coal miners and people displaced by the closure of old manufacturing plants.

Trump's message to them is that his job is to revive the American economy. If this means heavy reliance on dirty energy, so be it. Out of work factory workers want money to pay their bills. They do not care about the fate of polar bears or about extreme weather phenomena in Africa. And they do not care about rising sea levels.

Finally, dire scenarios of New York City and Miami under water in just a few years (because of the rapid melting of the Polar Caps) are definitely a hoax –at least according to Trump and his supporters.

Facing Low Oil Prices Exxon Is Looking For New Strategies

WASHINGTON – Major oil companies are in deep trouble. Too much global supply means lower crude prices. If this continues –and there is every little evidence that it will not– this means that large exploration projects in far away lands that typically require large up front investments may no longer have economic justifications. Simply stated, these projects mean too much money invested now for potentially weak or even negative returns years from now.

Move into shale

Hence the decision just announced by the new Exxon leadership to invest more in the U.S. shale oil sector. This move would require lower up front capital investments, as opposed to the traditional focus huge on large “conventional oil” exploration ventures, many of them off shore operations, which may cost billions over a number of years before they become operational. It is hoped that this move into U.S. shale would create greater operational flexibility, since shale wells do not cost that much and can be “turned on or off” fairly quickly, depending on global demand and supply fluctuation.

This is how *Oil & Energy Insider* (March 3, 2017) describes the move:

“Exxon goes big on U.S. shale. New ExxonMobil (NYSE: XOM) CEO Darren Woods gave his first presentation to investors this week, where he outlined a strategy to step up investment in U.S. shale. Exxon will allocate a quarter of its 2017 budget to short-cycle shale projects. The move will help the oil major navigate an uncertain market, as cash can be returned to the company much quicker from shale drilling than it can from the major offshore projects that Exxon has long been

accustomed to. Still, Exxon will move forward aggressively on its large offshore discovery in Guyana, hoping to bring it online in the next few years. “

Diversify

So, here is the thing. Exxon is trying to diversify its energy portfolio. It will continue work on existing “conventional oil” projects. But it will try to mitigate the risks associated with large commitments to new expensive projects in a volatile and downward trending crude prices environment by buying more into the less risky U.S. shale sector.

I say smart move. However, it may just not be enough. In part thanks to the U.S. shale oil revolutions that began in earnest about a decade ago, there is just too much crude supply world-wide.

It may not work

Hard to believe that OPEC’s oil price support efforts –its decision to cut production, somewhat– even if aided by similar production cuts enacted by Russia and other non-OPEC producers, will manage to put a real floor on oil prices.

Good luck to Exxon. It really needs it in order to protect its position as an American oil giant.

China To Become Green Super Power?

WASHINGTON – Many Western environmentalists and commentators openly praise China for its declared energy policy objective of turning itself into a truly “*Green Super Power*”. They claim

that, unlike Trump's America, (ignorant and backward), China (smart and forward-looking) truly understands the threat of global warming, and is actually doing something very serious about it.

Hundreds of billions for green power projects

Indeed China has committed hundreds of billions of dollars to renewable energy projects. It is leading the world in massive investments in wind and solar projects, with more to come.

Contrast that with heretic America now led by a President who believes and publicly affirms that global warming is nothing but a hoax. Indeed, instead of leading the way in renewable energy investments, President Trump's America promises to revive (dirty, high emissions) coal production, while he just signed executive orders that will re-start two major oil pipeline projects that had been blocked by President Barack Obama, at least in part because of environmental concerns.

Responsible China

So, there you go. Communist China's leaders are acting as responsible stewards of our Planet Earth, while democratic America is the prisoner of anti-science bizarre bigotry that ignores "the facts" about green house gases and global warming, and the dire consequences of disastrous energy policies still based on fossil fuels that will end up cooking the world.

The truth is more complicated

Well, this is how the critics of American policies would like to frame the argument. But the truth is far more complex. It is indeed true that China is investing very substantial amounts in green energy projects. But it is also true that renewables are and will continue to be a small fraction of China's power generation capacity. The fact is that China relies today and will continue to rely in the future mostly on

coal –yes, old-fashioned dirty coal– to produce about 66% of its electricity.

In contrast, if you look at the current mix, U.S. electricity generation is on balance far greener.

Green America?

In the U.S. coal is now used for only 33% of power generation, a much lower proportion than China's, (50% less, in fact). On account of the shale gas revolution that made natural gas abundant and cheap, America now relies on low emissions natural gas for 33% of electrical generation capacity. This percentage is destined to increase, mostly at the expense of dirty coal. While this transformation is driven by market factors, as opposed to government green policies, the added bonus here is that natural gas is a much more environmentally friendly fossil fuel.

If you add 20% of power generation produced by nuclear and 6% from hydro, (an old-fashioned source of renewable energy), the picture is not that disastrous.

Less coal, more natural gas

While the contribution from other renewables is still rather small in America –solar represents only 0.6% of total power generation capacity, while wind is a still a modest 4.7%– the fact remains that America relies on coal for only 33% of its power generation, while China uses this dirty fuel for almost 70% of its total electricity generation.

So, looking at the numbers, (to date at least), America is far greener than China.

The truth is that coal-fired plants are and will continue to be for years to come the major electricity producers in China. Even at current levels of new investments in renewables, it will be a long time before China becomes green in a meaningful

sense.

Biomass

In the meantime, if we break down China's renewable energy mix, we see that (if we exclude hydro) by far the biggest percentage is represented by biomass. As noted by Bjorn Lomborg in a recent op-ed piece published in The Wall Street Journal (A "Green Leap Forward" in China? What a Load of Biomass, February 5, 2017):

"It is peculiar—though unsurprising given the sensibilities of Western environmentalists—that those who celebrate China's "Green Leap Forward" almost always focus on wind and solar technology. By far the largest source of renewable energy used in China is traditional biomass—that is, people burning charcoal, firewood and dung, as China's poor do to stay warm. Biomass is the biggest source of killer air pollution in the world."

Health concerns

As biomass energy production entails burning animal dung, wood and charcoal, this type of fuel is hardly green, because of the fumes and soot produced by its combustion. If you consider that in China biomass is used for home heating and cooking mostly by the rural poor, this means that the fumes released by these "green fuels" cause a variety of respiratory diseases to vulnerable, low income people.

It will take a long time

So, what is really going on here? It is true that China is committed to increasing the percentage of its electricity generation provided by clean solar and wind. In absolute numbers, China's renewable generation added capacity is truly impressive. However, as a percentage of the total (keep in mind that China has a population of 1.3 billion energy users), this contribution from renewables is and will continue to be

rather modest.

Still reliant on coal

The fact is that major efforts in wind and solar notwithstanding, China still relies and will continue to rely on traditional dirty coal as the key component of its power generation mix for many years. In fact, while wind farms are built, China is adding more coal-fired generation.

It is therefore a misrepresentation to state that China is well on its way to becoming a "Green Super Power". While the intention may be there, it will be a long time before China will be able to rely mostly on renewables for its power generation needs.

Let the markets decide

The larger lesson here is that in the end it will be superior technology delivered at competitive prices that will tilt the power generation balance. When renewables will be really cost competitive without subsidies, then they will be adopted on a massive scale in China, in America and elsewhere.

Right now, at least in the West, the push for early adoption of still expensive technologies is not driven primarily by economic considerations. It is pushed forward by policy-makers through mandates, set asides and tax breaks created because of strong environmental concerns.

While this is understandable, we should not muddy the waters by arguing that if China can go all the way with renewables, so should America. China is doing something important. But, on close inspection, a lot less than what is stated by Western environmentalists.

Oil Prices Will Go Down But U.S. Shale Will Survive

WASHINGTON – After the oil production cuts recently announced first by OPEC and then non OPEC oil producers, oil prices rallied. This is because supply cuts must mean tighter markets and therefore higher prices. Well, looking at what most energy sector analysts say, this idea of a sustained oil rally is a dream that will soon end. And this is because there are too many exemptions to these announced cuts, too many special cases and too many opportunities to cheat, since rather modest total production cuts are to be spread thinly among many producers.

Oil prices will fall again

Who is going to check about full compliance? Bottom line, expect oil prices to lose altitude again, as soon as hard data about production among OPEC and non OPEC countries will become known, probably towards the end of January. Keeping all this into account, while West Texas Intermediate, WTI, closed at about \$ 53 on January 5, it is hard to believe that it will stay at that relatively high level for much longer.

What will happen to the U.S. shale sector?

That said, the really interesting question, assuming persistent low crude prices, is whether the U.S. shale oil industry will be able to withstand another prolonged price squeeze.

If recent history is good guidance, I would say: yes, it will. Surprising everybody, the American oil shale sector, until a few years ago deemed to be profitable only assuming oil would stay at or above \$ 60 per barrel, managed to survive, when oil beginning in 2014 went down to \$50, \$ 40, and even \$ 30 per barrel.

Of course, the success record is quite uneven within a sector characterized by so many diverse players that differ in terms of size, profitability of their reserves and financial conditions. Many shale energy company, especially those carrying quite a bit of debt, just could not make it. They went bankrupt. Others were bought by stronger competitors.

U.S. shale oil sector made up of diverse players

In truth, there is no such thing as a homogeneous U.S. shale oil sector. There are many energy companies operating in different states. Each one is different. And the chances to survive or thrive in a tough market environment because of low oil prices depend on many factors unevenly spread. Indeed, while examining companies, analysts have to take into account the specific geology that will affect production techniques and oil recovery levels and related costs, the company's management skills, the amount of debt each company carries, the ability to apply in a timely manner state of the art new technologies, and a lot more.

Still, even taking to account that some companies are strong and some very weak, with many more in between, it is fair to say that the sector as a whole proved to be surprisingly resilient, given the low profit margins in a depressed oil price market.

Sustained production

Yes, the total U.S. rig count went down, dramatically, following the 2014 price collapse. But overall production, with some ups and downs, did not go down that much. The shale

oil sector proved to be quite flexible.

While large conventional operations cannot be brought on line, closed and restarted at will, the shale sector is far more flexible. And this means that shale operators do not need to bet on a 5 year window of high prices that will guarantee profits in order to start operations.

They can quickly respond to price fluctuations, producing more when prices are high; while shutting down production when prices drop below their break even point. Look, obviously it is not just like flipping a light switch. But you get the idea. Shale is nimble.

How much flexibility and resilience?

So, flexibility and resilience define the American shale oil sector. But here is the question. Is it possible for U.S. shale to become ever more productive and nimble? Or, at some point, no matter how much they try to cut costs, the energy companies hit a profitability wall?

While we know that the shale plays in the Permian basin in Texas can stay in business even with oil at \$ 40 or even \$ 30 per barrel, what about all the other reserves in Oklahoma, North Dakota and other states? If we assume prices going down to \$ 40 or even \$ 30 per barrel for an extended period of time, how many shale companies, many of them operating in far less favorable locations, have a realistic chance to survive, let alone be profitable? Can new fracking technologies perform more miracles, or has the sector become as productive as it can get?

How long can Saudi Arabia endure the adverse impact of lower oil revenue?

The honest answer is that we do not know. That said, we also do not know how long oil prices will stay this low. Indeed, we do not know how long Saudi Arabia, the world's biggest

producer and OPEC's *de facto* leader, can endure the economic and fiscal impact of low prices without resorting to much steeper cuts in order to jack up prices and therefore state revenues.

We all know that Saudi Arabia's oil industry will be profitable even with oil at \$ 30 per barrel, because Saudi extraction costs are very low. But the problem is that the Saudi Government depends on high oil prices to finance practically everything.

While the Monarchy is trying to change things, right now the Saudi State needs to lubricate with cash infusions a rent based society in which hardly any Saudi citizen is engaged in truly productive activities.

Low oil prices hurt

Which is to say that low oil prices hurt different producers in different ways. OPEC now has tried to drive prices up by announcing relatively modest production cuts to be spread among various producers. Some non OPEC countries indicated that they would also participate, with the shared objective of jacking up prices.

Based on what know, this time the trick probably will not work, because too many producers are saying one thing about cuts and then planning to do the opposite (keep production levels high, or in some cases, ramp up production).

When will Saudi Arabia announce serious cuts?

But at some point Saudi Arabia will start running out of cash; and so it will have to cut its oil production in order to drive prices up. This would help the Saudi state immensely in its effort to stabilize its finances. However, any Saudi move aimed at supporting oil prices would also help the marginal U.S. shale producers. Some of them are hanging tight, hoping for better days to come.

In other words, who will give up first? Will the U.S. shale sector be eventually defeated by prolonged low oil prices? Or will Saudi Arabia have to swallow the bitter pill and cut production (therefore giving up some of its market share) in a far more significant way in order to drive prices up, with full knowledge that this will help U.S. shale companies?

Bet on Yankee ingenuity

All in all, when it comes to endurance and resilience in adverse market conditions, I would still bet on Yankee ingenuity. The American shale oil industry surprised the world by inventing and then deploying hydraulic fracturing (fracking) and horizontal drilling on a large scale, this way bringing on line millions of barrels of oil that was deemed to be unrecoverable. And then they delivered an even bigger surprise when they managed to make the entire sector much more productive and efficient in record time, when faced with a sudden crude oil price collapse.

None of this could be done, everybody said. And the shale oil people did it. May be they will keep doing it, surprising all analysts once again.

Mass Produced Electric Cars? Sooner Than You Think

WASHINGTON – The still unresolved issue that will determine if and when there will be real mass demand for Electric Vehicles, EVs, is how to design and manufacture cheaper, lighter batteries for EVs with a higher energy reservoir, and therefore capable of traveling longer distances with one electric charge.

Getting there

The optimists tell us that we are getting there. They cite significant technological innovations and dramatic cost reductions already achieved in the past few years. All true. Batteries are cheaper. EVs now can travel farther. And the optimists also tell us that new collaborative efforts now underway may help expedite additional progress in battery design and effectiveness.

Cheaper batteries, coming soon

Here is a good example. *“Cheaper, more powerful electric car batteries are on the horizon.”* This headline appeared on ScienceDaily, 9 August 2016. The story is about a new joint effort linking the U.S. Department of Energy, several U.S. academic institutions and the private sector, under the leadership of a Binghamton University expert.

“The White House –Science Daily wrote– recently announced the creation of the Battery500 Consortium, a multidisciplinary group led by the U.S. Department of Energy (DOE), Pacific Northwest National Laboratory (PNNL) working to reduce the cost of vehicle battery technologies. The Battery500 Consortium will receive an award of up to \$10 million per year for five years to drive progress on DOE’s goal of reducing the cost of vehicle battery technologies.”

“[Assuming success, this effort] will result in a significantly smaller, lighter weight, less expensive battery pack (below \$100/kWh) and more affordable electric vehicles.

M. Stanley Whittingham, distinguished professor of chemistry at Binghamton University, will lead his Energy Storage team in the charge.”

“We hope to extract as much energy as possible while, at the same time, producing a battery that is smaller and cheaper to produce,” said Whittingham. “This consortium includes some of

the brightest minds in the field, and I look forward to working with them to create lithium batteries that will power future electric vehicles more affordably.”

According to the [Science Daily](#) story, other Battery500 Consortium members include:

- *Pacific Northwest National Laboratory*
- *Brookhaven National Laboratory*
- *Idaho National Laboratory*
- *SLAC National Accelerator Laboratory*
- *Stanford University*
- *University of California, San Diego*
- *University of Texas at Austin*
- *University of Washington*
- *IBM (advisory board member)*
- *Tesla Motors, Inc. (advisory board member)*

Breakthrough?

Well, is this an indication that we are on the verge of a major breakthrough when it comes to the most critical component of future generation EVs? Who knows, really.

Still, if I were the CEO of a major oil company, I would feel very nervous.

Never mind OPEC and its mixed signals regarding its willingness and ability to freeze/cut production in order to stabilize global oil prices. Never mind the ongoing tensions between political rivals Saudi Arabia and Iran and their potential impact on oil markets.

Oil will become obsolete

The real scary thought is that oil may soon become obsolete. Yes, you got it right: *"Oil may soon become obsolete"*.

Of course this will not happen suddenly. And of course there will still be a significant need for many oil derived products other than gasoline for automobiles. (Think jet fuel, diesel for heavy trucks, oil for plastics and other petrochemical products, and a lot more).

Still, the fact is that on a global scale crude is used mostly to produce the gigantic rivers of oil-derived gasoline that end up in the tanks of hundreds of millions of cars powered by internal combustion engines. Tanks that need to be refilled very often with more and more gasoline.

End of the conventional car

If and when cheaper EVs powered by cost-effective new generation batteries hit the road, there will be a fairly rapid revolution. This will be the end of the conventional car powered by an internal combustion engine.

Indeed, an electric charge is much cheaper than filling your tank with gasoline. Much cheaper batteries, assuming some companies will manage to manufacture them relatively soon, will lower the price of future electric vehicles, while increasing the distance EVs can cover with one charge.

As soon as this happens, there will be a consumers-led revolution. Millions of drivers across the world will quickly switch to EVs because they will be finally affordable, dependable, and much cheaper to operate, not to mention far cleaner than their gasoline powered counterparts. (By the way: not entirely clean. EVs run on electricity, a zero emission fuel. However, a significant percentage of electricity in the U.S. and elsewhere is produced by burning coal and natural gas. Which is to say that if you consider the source of their

fuel, although emissions free, EVs are still not entirely “clean”).

How soon?

That said, the big, open question for any oil executive is: *“How much time do we have left before the whole oil sector will collapse, due to lack of demand”?*

It is very clear that this revolutionary transformation brought about by mass-produced EVs will happen. But nobody knows when: 5 years? 10 Years? 15 Years?

And here is the big problem for the oil industry. In order to properly run their businesses, oil executives must plan ahead. And these plans entail major capital investments needed now in order to reap significant gains to be realized several years down the road in terms of new oil production coming on line.

Indeed, for oil companies to stay profitable, mature wells close to exhaustion need to be replaced by fresh production. And this means investing now, sometimes on a massive scale, in order to secure continuity of future oil production. This is how the industry works. Except that now this traditional approach is no longer a sure bet.

Given developments in EV battery technologies, today oil executives know that this cycle of investments-exploitation-new investments-future exploitation will no longer work indefinitely.

The end of oil companies as giant players

If and when EVs will become dominant because of technological and cost breakthroughs in batteries technology, this will signal the beginning of the end for major oil companies.

In the not so distant future, many of them will run the risk of being caught with new expensive projects half completed that all of a sudden are no longer economically viable on

account of collapsing demand for their product –oil– once coveted, and now out of fashion.

Beyond these contingencies, because of EVs almost all oil companies will have to cut production, concentrating on the cheapest crude, in order to survive in a new energy era characterized by drastically diminished demand for oil and oil products. The weakest players will not be able to make it. They will go under, or they will be bought by bigger companies.

Oil will still be needed

Having said all this, will EVs amount to a final catastrophe for the oil sector? Not entirely. Let's keep all this in perspective. Even assuming state of the art, cost-effective EVs quickly replacing an enormous global fleet of gasoline powered vehicles, there will still be demand for oil.

Heavy trucks and ships will continue to run on oil derived diesel fuel for many, many years. Likewise, thousands upon thousands of civilian and military airplanes will still rely on jet fuel made from crude oil. Petrochemical and plastics industries across the globe will continue to need oil derived products.

All this is true. However, assuming a fairly rapid switch to EVs, the global demand for oil, now driven largely by demand for oil derived gasoline, will collapse. All of a sudden, the global oil industry will face gigantic over capacity: too much oil and too little demand. Only the ultra lean, low-cost operators with a solid financial base will survive.

Good bye Exxon?

Hard to think of a world in which Exxon Mobil will be a mid-sized company confined to producing oil for jet fuel and diesel trucks only, since millions of cars will run on electricity, and no longer on gasoline. But we are getting

there. And this may happen sooner than we think. Call it the next "oil shock".