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 be 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.