Opinion

What Our Political Leaders Are Afraid to Tell You (If They Even Know)

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Somebody has to start telling the truth. Citizens of the United States, indeed people of the world, I have some very disturbing news to tell you that, apparently, our elected officials are either unwilling (because they are afraid) or unable (because they are ignorant) to tell you. On the fear option, elected officials will only hold their jobs if they tell you what you want to hear and not tell you what you don’t want to hear. I am not worried about getting elected to anything so I am free to divulge the news. You will have to do with it as you will.

Alternatively, regarding the other excuse, I suspect very many elected officials are just plain ignorant of the scientific facts and are unable to draw the correct inferences by virtue of that ignorance.

Either way these officials do a disservice to the citizenry.

I believe there is a growing sense in the people that something is fundamentally different about this current global economic malaise (Bloomberg poll, http://www.bloomberg.com/news/2011-03-10/americans-in-poll-show-little-confidence-with-plurality-perceiving-decline.html). There is an undercurrent of worry that recovery of our economic system may not be following the same course as has happened historically after such dips. There are a growing number of people who are even saying we might not recover at all.

These fears are not ungrounded. The truth is that we have an extremely serious problem rushing at us, one that we humans have never had to face before. It will change the entire nature of civilization as we have come to understand it. The simple fact is that we are reaching the peak of fossil fuel energy extraction, the point at which the maximum amount of these fuels will be extracted. After the peak comes a long and very likely painful decline in energy availability. The effect can already be felt in the oil markets as it now appears that conventional oil extraction rates have reached peak and are starting to decline.

In spite of all the public relations and rhetoric that you have heard regarding the abundance of coal or natural gas, or the promises of switching over to renewable (so-called “green”) energy sources, the simple fact is that the net energy left to run our economies, after we expend the energy needed to obtain it, is actually declining already. And whether you believe it or not, that simple fact is underlying the entirety of the global economic crises we are enduring. And it is going to get a lot worse.

Take oil for example. Oil cannot be used directly to do economic work. First we have to convert the oil into various fuel products that can be burned to obtain high power for our many kinds of (especially) transportation machines. It takes energy to do the refining and delivering of the fuels to market. Moreover, it takes a considerable amount of energy to extract that barrel of oil in the first place. But it doesn’t stop there. Our oil industry had to invest considerable energy in the past to construct the modern oil extraction infrastructure. The off-shore platforms, for example, took a considerable amount of energy to construct and deliver. Their operations are complex and energy intensive. The fact is that there is a substantial amount of energy cost accounted for in fixed assets and operations, so much so today that out of a single barrel of oil we only have the energy equivalent of a little less than 80% of that barrel actually available to do useful economic work (summing the extraction, transportation, and refining energy consumed getting the final fuels to market). Some newer oil developments (ultra deep water or shale oil, for example) may be coming in at less than 60% due to much higher energy usage in extraction. Those numbers might seem high but they need to be compared with historical net values, initially at over 90% return for land-based light, sweet crude. Moreover, the return percentages are declining at an increasing rate. As we chase harder-to-find, harder-to-reach, harder-to-pump, and harder-to-refine oils (e.g. the Canadian tar sands) the energy needed for extraction and refinement is taking a bigger bite out of the gross production. Some experts have estimated that once all of the relevant energy cost factors have been accounted for, it may turn out that tar sand kerogen-to-oil extraction plus shipping and refinement will net less than 30% return and that is without considering the environmental costs incurred in extraction.

The reason that the average return on oil extraction is declining so rapidly is due to another very disturbing issue. Globally the older, cheaper-to-produce oil fields are running down. Production is declining or flat or simply not increasing in every major oil field from Texas to Saudi Arabia to Mexico. As this cheaper oil becomes a smaller percentage of the total oil on the market, the average cost (in energy) per barrel is going up more rapidly.

The pundits and economists have been telling us that oil prices are high due to everything from speculators (who in fact are speculating that oil will be more expensive in the future because it will become scarce!) to geopolitics. While those, ‘above ground’ factors may account for much of the short-term volatility we see in oil prices, they cannot account for the long-term trend we have been seeing. The real price of oil has been steadily climbing. Until 1971 crude prices averaged less than $20/barrel in 1980 dollars. Even with the oil shocks due to the Middle East conflicts and OPEC’s actions, until 2001 oil was running on average less than $40 a barrel; upward in direction but still far less than what it has been running, on average, for the last decade – about $75-$80 per barrel. Most recently the annual average cost of oil on the global markets has been over $100/barrel. Meanwhile the rate of extraction, globally, has decelerated and has been essentially flat since 2005.

We consumers had gotten so used to having cheap abundant oil that we can hardly imagine there not being essentially an endless supply. Now the pundits look for any excuse they can find to explain those high prices. Since most of these pundits are political thinkers they tend to look for political or socio-economic excuses. They do not very often think of physical limits. One of the more ludicrous responses in some political sectors is the now famous “Drill-baby-drill” mantra, where people actually believe there MUST be more oil down there somewhere. But the simplest explanation is most likely to be the correct one. We are running out of oil that we can afford to extract and refine. The data on this are actually very clear.

More people are becoming aware of this phenomenon. Official energy agencies like the International Energy Agency (IEA), the group funded by the Organization for Economic Co-operation and Development (OECD) nations to track energy matters, are beginning to acknowledge the peak conventional oil phenomenon. Their latest reports include the fact that oil production has been essentially flat or in an undulating plateau since 2005, the year many oil analysts said that we would see the effects of peak. Little by little these more financially-oriented analysts (as opposed to geophysically-oriented ones) are getting the bigger picture and no longer claiming that we have an abundance out to 2050, as they formerly did.

But we still can’t give up the notion that we will keep on growing the economy just as we did when oil was cheap. So we look to the new savior, natural gas. Reports of the abundance of natural gas locked in shale deposits have been wildly exaggerated it appears (see: “Insiders Sound an Alarm Amid a Natural Gas Rush”, Ian Urbina, New York Times, June 25, 2011). Or at least the claims that we could cheaply extract it have been. We also believe that we have coal in our back pockets for endless electricity generation. However, as more scientific eyeballs survey the issues we are discovering that there is more hype than truth behind these claims as well. Neither natural gas nor coal is cheaply abundant as it turns out. Both have exactly the same energy cost increase problems as oil. In fact a substantial energy input into coal extraction is diesel fuel! So far as a fossil fuel future is concerned, there is simply no escaping the fact that they are finite resources that we have been burning through as fast as we could possibly extract them. And that era is coming to an end much sooner than anyone thought possible.

Over the past several decades there has been increasing talk about, and a lot of smoke swirling around, the ideas that a technological solution would be found involving so-called renewable energy sources, solar, wind, even geothermal. Certainly there are now efforts to turn talk into action and there are many projects underway to increase the amount of electricity supplied by these means. But taking a closer look at the reality of both the technologies and their economics raises some red flags. First the scale of the problem of replacing fossil fuels with alternative sourced electricity is tremendously underestimated, especially by the general public who are not greatly involved in planning and implementing large scale projects of any kind. Fossil fuels account for over 80% of the OECD countries’ energy consumption. It is even a substantial fraction of the developing world’s energy when you take into account the imports of products, especially say food, that represent the expenditure of energy in the OECD world. Currently, nuclear and hydroelectric account for most of the remaining 20%. By comparison, electricity from alternatives and biofuels for transportation, on a global level, represents less than 1% of total energy. Even growing at a sustainable 10% rate per year of installed capacity (highly unlikely for many more years), it would take several decades to make a substantial dent in the fossil fuel usage at current levels. And complicating this is the fact that to do so requires a massive conversion of our transportation system from liquid fuels to electric power in order to have electricity substitute for fossil fuels. That conversion will eat up a fair amount of investment energy to get done. Since our only real source of energy now is from fossil fuels, that means investing more of those fuels in the build-out of alternatives and an electric transportation system.

The scaling problem is bad enough but hiding even deeper in the complexity of issues is the fact that *we do not know for certain that the technologies involved in alternative energy sources can pay for themselves energetically*. That is, we do not yet know if these sources will produce sufficiently more energy than is needed by the economy so as to renew themselves over the years. As of now, the energy capture and conversion capital equipment (e.g. solar panels and wind turbines) is being built using fossil fuel energy, for the most part. To achieve true *technical* and practical renewability, and hence true sustainability, some combination of solar and wind equipment need to produce enough extra energy to supply the manufacturing plants and repair operations of that capital equipment in perpetuity. Indeed, for truly long-term sustainability these sources have to supply the energy to build the manufacturing plants and power the extractive and processing industries that supply the raw materials. If one is really insistent on completeness, they must also energetically support enough of the farming industry to account for the food used by the production and repair labor force and their families. The complexities of accounting for all of the energy inputs to produce and maintain alternative source capital equipment are daunting and that is why I say we simply do not know if this is even feasible. No one has collected, let alone analyzed, the data. It certainly isn’t the case now, however, and very few people, especially the current spate of equipment manufacturers, are addressing this requirement in their calculations. Without this kind of knowledge how can policy makers and long-term investors make informed decisions regarding which technologies to pursue?

This is why the press tends to carry hopeful stories about ‘green’ technologies. Since no one really knows the true energy balance situation and we are grasping at straws to generate hope that we can continue our business as usual the media play up every little new ‘advance’ that someone claims *might* solve part of the energy crisis. As more information emerges, however, it looks more and more like false hope.

Take biofuels from algae as an example. Every time someone claims to have shown that it is possible to get, say, biodiesel out of growing algae in ponds, the press lights up with optimistic enthusiasm. The general reader or viewer goes away sighing a breath of relief thinking that a solution is at hand. No one says anything about the ultimate constraints on production of the large volumes of biodiesel that would be needed for even a fraction of the transportation sector requirements, namely that photosynthesis is notoriously inefficient (~3% of sunlight is converted into biomass and only a small fraction of that is converted into fuel grade oils). If you do the math you discover that we would need to cover an area the size of Texas with ponds, operating year round, just to supply half of our diesel requirements. And that doesn’t take into account any economic growth at all. Once again, the scale of the need versus what can be done technologically or economically is working against us.

As another example of the subterfuge by elected officials, and some appointed as advisers, as well as the naiveté of the media, consider the ‘promise’ of “clean coal”. President Obama continues to mention this option as a way to get off foreign oil AND decrease our production of CO2 implying that this technology will help solve our energy needs AND reduce the threats of global warming. His Energy Secretary, Stephen Chu, a physicist who knows how to do the math, must not have been looking at the numbers here either. Current estimates show that we would have to build one additional coal-fired power plant for every three we plan on using to generate electricity for the economy just to extract the CO2 from the exhaust gases of all four plants and push it into some mode of sequestration, perhaps in deep underground reservoirs. And that is only if we can actually succeed in engineering these plants to operate at maximum capture and efficiency. The majority of scientists and engineers who are intimately familiar with the technical problems and open questions (such as how much CO2 could we actually sequester and what about leaks back into the atmosphere?) have pointed out that talk of clean coal as a pending solution is at best premature and at worst downright deceitful. Even if carbon capture & sequestration (CCS) power plants somehow could be built and operated this would only mean we would go through our coal supply 25% sooner than estimated.

So this is the dismal truth. The energy needed to run and grow our modern economies is in decline and will continue in this mode for the foreseeable future. We don’t know if there might be some ‘miracle’ energy source that no one has thought of yet that could be built cheaply and scaled up rapidly. We can’t claim there isn’t such a thing just over the horizon. But we can claim that given what we do know about the availability and cost structures of fossil fuels, the uncertainty and low production potential of alternatives, and the needs of a society based on consumption that we are on a crash course at present. Should we ignore this and bet on that miracle?

Do we expect our leaders to understand the dangers and guide us through trying times? Or do we, as a people, only expect to hear rosy projections and promises that someday it will all turn around and be better? Our politicians apparently think the latter. They don’t seem inclined to mention that we might be standing on the deck of a global Titanic and that the crunch noise we just heard might be something to worry about. We have to be honest about the fact that we humans have grown so used to the idea of progress, technological and economic, that our unshakable expectations are that things will get better over time. We expect our leaders to show us how to achieve that end, not tell us that things are not going to progress, that we will have to learn to make do with less physical wealth. We are pretty spoiled. But realistically, where is it written that we have a guarantee that we will continuously and forever get richer?

I suspect that the leaders really don’t understand the reality themselves. I don’t know which is worse; maybe the two situations are equally problematic. Either way we end up facing the future without foreknowledge of the challenges ahead. And by the time they are obvious to all, it may be too late to do anything to minimize the pain.

In a way I can’t blame them if they are simply hiding the truth, I suppose. Most of you who are reading this will be looking around at the world in front of you (and most of you will be in an OECD country doing so). You will see something that resembles normality even in light of the severe economic problems we have. Cars are still being driven. People are still going to restaurants and ball games. On the surface things appear to be pretty much what they have always been, so we can easily tell ourselves that nothing is wrong. Our expectations that the economic situation will get back to what it had been before the Great Recession are based on faith, given prior experiences, and bolstered by this illusion of normality. What politician is going to burst that bubble? What leader is going to try to convince the masses that this normality is nothing but an illusion – that the chicken is running around even though its head is gone? Our historical experiences came while humanity was discovering and exploiting expanding supplies of cheap fossil fuel energy. As long as we had more energy we could always find ways to recover from economic downturns, or wars, for that matter. Most people have not looked below the surface of economic reality to see this. Most people have taken energy for granted, including most (possibly all) economists. There is nothing in our common experiences to suggest that the normality is about to change drastically.

Seeing what is going on just below the surface is not something the typical person in the street is accustomed to doing without provocation. Even for supposed experts who do look below the surface, the complexities often hide what is really going on. The current economic problems and the prior meltdown of the financial system, as well as the impending meltdown of the sovereign debt situation, hide the real underlying causes. We are so used to focusing on money that we don’t realize that money is really just a token indicating an amount of work that has been or could be done. In other words, money just marks the availability of energy – that which does work. Real economic wealth comes from doing real physical work (and, by the way even thinking is real physical work and consumes energy!). The economy is trending downward as the amount of net energy to do economic work declines. All of our machinations, especially our sorry attempts to keep the illusion of growth going by permitting ourselves, individuals and governments, to go deeper into debt have actually been a kind of collective subconscious reaction to this fact. We invented the modern version of financialization (e.g. unregulated derivatives and sub-prime mortgages) to mask the reality that we are, on the whole, producing incrementally less real wealth per time period.

Even as China and India appear to be in growth phases, for example, the specter of diminishing net energy is rapidly catching up to those economies as well. Their approach to maintaining the illusion has been based on two major strategies. They ignore the external costs suffered in the environment by operating with corner cutting practices. It took China winning responsibility for hosting the 2008 summer Olympics and realizing that people wouldn’t want to come to a dirty environment that brought those external costs into sharp relief. The second strategy is that they are totally dependent on really cheap labor to support the export of value added. Cheap labor comes from the laborers having low energy consuming lifestyles. So what is happening in China now? Laborers are beginning to want to buy the energy-intensive products and services their western counterparts have had. This is what their government promised them. But then they need higher wages to afford to buy those things. As their attempts to consume goods that rely on cheap energy increase, the cost of those goods will rise as energy there is becoming just as dear as it is everywhere else. China has no magic wand to wave over the availability of fossil fuels, though they are busily trying to make deals with oil and coal exporters such as Venezuela (oil) and Australia (coal). Already they are importing significant fractions of both to fuel their economic growth. But that is as unsustainable for them as it is for the OECD countries. Their glory will not be long lived, I’m afraid.

China actually provides the rest of the world with a very interesting experiment regarding alternative energy production. They are putting much more capital investment into these technologies. China had more savings to start with, as compared with the United States, and their form of government has much more leeway in terms of controlling how they spend their capital. So a cost-benefit rational that a western corporation would need might not be as much at issue. Their efforts will give us a great opportunity to test the scalability and energy return on energy invested in wind and solar and provide that information we are currently missing I mentioned above. We, in the west, might lament not having the leadership position in developing these technologies, but from the evidence I’ve seen to date, I am perfectly happy letting someone else take the lead into the dark cave where a bear might be sleeping. In their rush to produce a larger fraction of electricity from renewables they have possibly overlooked the scaling and technical sustainability issues. The rest of the world should watch very carefully.

There is no free lunch. We thought there was because for a while fossil fuels just sort of popped out of the ground. Energy wasn’t free, but it was damned cheap. And we got hooked on the stuff. Almost every new invention we’ve come up with over the last hundred years or so has allowed us new ways to consume fossil fuels to gain speed and convenience. At some point we completely lost the ability to think it could be any other way. We are addicted to power. And oil, coal, and natural gas provide lots of it. Society is about to go through withdrawal. That is the truth. What do you want from your elected officials? Truth or comforting rhetoric?

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