The Oil Drum
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

Campfire: Towards Homo Sapiens - A Movie Script

Posted by nate hagens on August 30, 2013 - 11:33pm

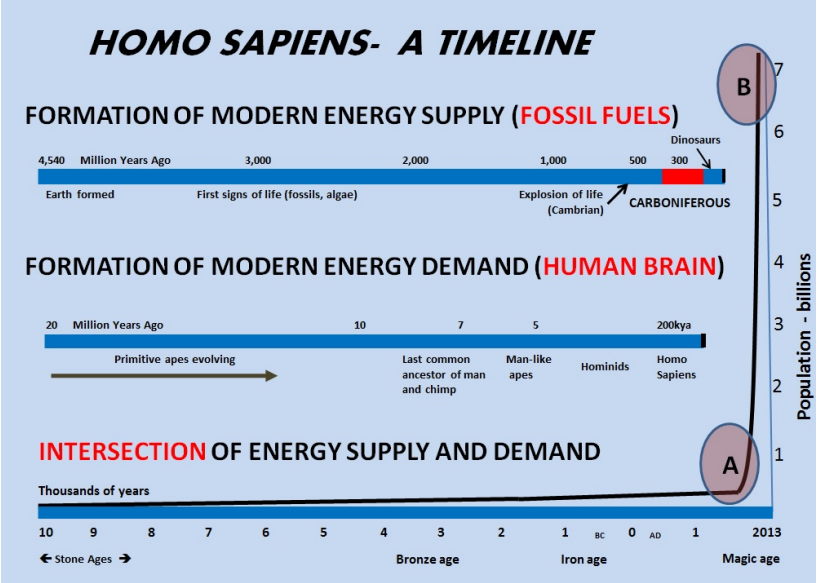
For a few years, on Saturdays, theoildrum.com hosted a "Campfire" discussion - with a focus not on charts and graphs, but more on the social science glue connecting the many subjects revolving around energy, the environment and society. Rather than a place to discover correct answers, the forum was intended to be a sandbox where folks interested in the broader implications of our human ecosystem could interact with peers in a cross disciplinary conversation. This sort of "systems overview" has been one of the strong points of the eclectic mix of commenters who helped make TOD unique. We had a weekly Campfire here for a couple years because the dialogue was so diverse and high level.

Before we break Camp, I still hope there will be more insights from the assembled gurus and thinkers who hang out here. Below I provide a brief outline of homo sapiens history in several 'Acts' and then ask theoildrum readers how it could play out and what sort of underlying principles might apply were we to have a 'New Constitution' or such. Folks will disagree on specifics, yet it is clear that our current trajectory is unsustainable. The latin name for our species - homo 'sapiens' was perhaps ill-chosen, for given the behaviors accompanying our current moon shot in consumption and population, we are proving to be more clever than wise. We have turned into problem solvers as opposed to visionaries - or at least, our visions have limits measured in human lifespans, or perhaps election cycles. With so much focus on the near term, we've lost awareness of the brighter beacon - despite the fact we are at the material and energetic apex of industrial civilization, throughput and science, we have no real ethic, no blueprint, for the long-term trajectory of our species and our planet's ecosystems. Scientific evidence shows existential risk for the species, seas, forests, and carrying capacity, being alarmed is the only non-sociopathic response. But will that alarm suffice to steer us away from disaster? How might various things happen in the real world of path-dependence, luck, and emergent effects? And the larger question - to what end are these precursor events happening today? What sort of map under a stone might we leave for the future?

"Say, How about we turn the site into an Archive?"

Below the fold, following a short history of homo sapiens, I invite oildrum readers to share their

visions of what a (more) sustainable human system might look like, not now, and not in the next 20-30 years from now, but in the year 2100 or distant future.



History of evolution and homo sapiens on earth. *click to enlarge*
For those who prefer animations:
Heres a good one, and another (endure commercial).

All readers here know about the rise of Homo Sapiens. I've written a lot about it over the years. It's a long story and I'll give a Clifs notes version below, but with a twist.

Act I - Life, Mammals, Primates, Hominids, Homo Sapiens...

Longer ago than most of us can easily grasp, the Earth was formed and for billions of years geological processes dominated. As soon as the planet cooled, life emerged from the chemical soup. There were other equally extraordinary events which changed the world, and probably involved a strong element of luck. One was the evolution of photosynthesis, which gave the earth an atmosphere with free oxygen and caused a huge dieoff of anaerobic species. Another was the joining of two dissimilar single-celled organisms which created hybrid cells with both nuclear and mitochondrial DNA. These hybrid cells could do something special: extract solar energy from the free oxygen and store it as the molecule ATP, where it could be almost instantly available for a new race of fast, reactive critters: the animals. They were, by their very nature, tapping the energy of stored sunlight. At this juncture, there were no heroes, only the seeds of such.

For a very long time, organisms were simple - primitive 'brains' moved organisms toward the light or towards food. Millions of iterations of dynamically accessing energy and nutrients was ample fodder for evolving more complex organisms. About 200 million years ago, mammals came on the scene and about 65 mya, primates. And about 6-7 mya, hominins diverged from the other great apes. By 200 kya, we were down to 3 species of hominid, of 12 that had walked the planet. By 30,000 years ago, one remained. Us.

Act II Eusociality, Agriculture, Fossil Carbon Bank Account...

About 190,000 years after our species became anatomically modern, whether due to climate or laziness or chance, bands of humans stopped picking berries and chasing game and began to domesticate agriculture about 8,000 BC. This had important physical and social implications. It set the stage for certain positive feedback loops - wealth accumulation, surplus accumulation, valuation of such surplus, and the resultant social stratification that comes from such surplus. (whether related or not, the size of the brains of our movies main character peaked roughly 20kya, and they're now about 10% off that peak. Nobody knows why, some speculate that it might be due to ultrasociality - that humans began to outsource certain decisions and kinds of cognition to the 'cloud' (larger society)).

Compared to other species our movie star shared the planet with, he was awe inspiring, to be feared, extremely intelligent, but perhaps not altogether wise. Our "intelligence", (neocortex) evolved to serve, not lead. It was not intelligence directing the characters of this movie, but instinct. The instincts that our hero had developed on the Pleistocene, when game was scarce and physical dangers abounded, were carried with us as sort of an 'executive secretary' reacting to whatever social and physical conditions our hero would face in more modern environments.

For thousands of years, populations expanded, finding new niches with fertile soils and robust ecosystems full of natural resources to extract. Biological systems require some entropy gradient to exploit, generate and store useful energy and human systems were no different. For a long time we lived off of the stored carbon in soils and the old sunlight stored in trees coupled with the daily ecosystem services of the time. Let me repeat that, *for a **long** time we lived off of the stored carbon in soils and the old sunlight stored in trees coupled with the daily ecosystem services of the time.*. Physically and mentally, the characters in this movie living 500 or 1000 years ago or even 10,000 years ago were little different than we are today. But there would be one major difference....

One metaphoric day our unsung hero dug a hole in the ground and out walked thousands of slaves made from fossil carbon (Labeled 'A' in above graph). These slaves didn't talk, didn't eat, didn't complain, but because they were so cheap - essentially free - their power was increasingly applied to all areas of society in large amounts to replace tasks that humans used to do manually and invent many wondrous new things they had never been able to do. To our hero, these fossil slaves were so tireless, so powerful, so omnipotent in increasing food, novelty, comfort and trade that they became indistinguishable from magic. From this point thru at least the end of Act II, the motion picture "Towards Homo Sapiens" had moved from black and white, to technicolor. Steel plows gave way to tractors gave way to gargantuan specialized machines. Fires gave way to coal burning fireplaces gave way to microwaves and fancy outdoor grills. Etc.

Our clever hero had previously puzzled out how to make neat things happen by setting fire to wood, and now this new black stuff burned hotter and longer and was lighter to transport than wood. Clever clever man!!! Clever man and his extended phenotype learned to fly higher than the birds, race faster than the fastest cheetah, dive deeper than the greatest whales, and increasingly to claim all that was formerly theirs for himself. Indeed, Clever Man came to think, after a time, that it was his cleverness and not the magic slaves which made the miracles happen (period B in the graph). Did he not direct the slaves and tell them what to do? Magic was handy, but cleverness was the ultimate resource! Yes, technology did some amazing things, but mostly was a vector for producing both novel and 'useful' ways to use more magic and use it faster. The heroes

designed automobiles that used 100x the energy of walking but got us there only 10x faster, etc. Technology was thus more of an enabler, than a driver of productivity and wealth. After all, there is no permutation of wood and glass that would take our hero to the moon, but successful space exploration in the 1960s laid a psychological foundation that presumed dilithium crystals would only be a matter of iterations. But, without fossil carbon a race of Einsteins could never have made Sputnik, or even Wally World. Our hero, blissfully unaware of such trivia, marches on, confident that technology will turbocharge his sneakers, should any hurdle arise.

Eventually our hero and his conspecifics started reaching a point of declining returns to magic. It turns out the fossil helpers weren't exactly 'free' but some portion of the magic had to be reallocated to get the rest of the magic in a form assimilable by humans. The magical equivalent of a rising rate mortgage. Around mid-20th century, this % started to increase. For a while, just digging more holes was the answer, because we could drill faster than the magic cost increased. But soon the cost was rising enough to slow the acquisition of magic... unless something was done.

All along our hero and his tribe had created monetary chits which represented claims on magic. Since the planet was largely 'empty', most of the time these monetary chits, whether shells, coconuts, pieces of paper, or electronic digits, were in the ballpark of fair representation of what underlying technology and resources could service. But, as more and more magic was required to retrieve the stored magic, the clever humans invented a sleight of hand. Credit - or an agreement to switch consumption between two people at two times, was not magic itself, but could be created 'poof!' effortlessly, it did temporarily widen the spigot that distributed real magic all around. It disguised the limits by hiding their effects, slowly raising the level of magic but eroding its largesse. After 30-40 years, this dynamic also had exhausted itself, and central tribal chiefs tried their hand at it for a time. When this sleight of hand also became less effective, humans changed to diverting the magic towards those in power, leaving fewer tricks and treats for the toilers of the species. Finally, they turned to rule changes, definition changes, and language changes, all in an effort to keep the nominal magic spigot, and hence societies overall living standards, ostensibly intact.

But the sleights of hand would only last a short time into the future. Alas, being clever was turning out not to be the same as being “sapiens”, and it began to be clear that using the energy slaves was history’s biggest monkey trap. For everything which had allowed humans to prosper in the first place – the land, the forests, the wildlife, the seas and fisheries, the stable temperate climate of glaciers, gentle weather and monsoons – was progressively used, broken and diminished in the pursuit of novelty, stimulation, and a one-time orgy of human biomass. And, near the end of Act II, this biomass was itself coming directly from buried carbon: the protein in the bodies of homo sapiens was increasingly fixed in factories by haber-bosch rather than nitrogen from soils and bacteria. Every calorie of food eaten contained around 10 times the embedded fossil energy than the solar input. Clever man had bonded with the fossil slaves in a profound way en route to a 10 billion population, and the implications were not fun to think about. So most didn't.

Fossil carbon and its associated magic had also replaced and subverted mankinds culture itself. Decrees from societies Wizards were easily accepted in true cargo cult fashion, as people gradually lost awareness of the distinction between magic and reality. Perhaps because they were naive, or perhaps because the magnitude of change required to bring a happy ending to the movie was too overwhelming to consider, pablum, novelty and greed became operative memes. Marketing and commercials assured that consumption and stuff was more important than empathy and fiduciary. Keeping up

with the Joneses, near the end of Act II, required resource throughput, and extra rooms to hold ones possessions. Though frequently within sight, and almost within reach, our hero never quite caught up with Jones. Had he done so he might have been shocked to find that Jones was an idiot.

Many Cassandras spelled out the dangers facing our heroes and the planets species in aggregate and called the modern way of life a broken system. But the only events that would confirm their warnings were exactly the events that they were warning against. Furthermore, from a thermodynamic and evolutionary perspective, where organisms and ecosystems self-organize in order to access an energy gradient, the human system of throwing more and more scarce magic at an increasingly complex infrastructure with increasingly less benefits didn't appear broken at all - in fact it was working perfectly! From the perspective of the collective hive, our leading heros did not want a minority with crazy ideas to be able to swerve society away from the rich feeding grounds of yet unoxidized fossil carbon. The crazy minority in this film would remain as such. (Except for the ecologists and biologists in that minority who were stone cold sober). As to biodiversity and environmental externalities, well....no ecosystem puts a price on resources until they're gone. A hypothetical "sapient" hominid might; but Homo sapiens is, again, mostly just clever; and used this cleverness to do stuff which is not necessarily wise.

As they approach the end of Act II, in a strange numerical twist, homo sapiens, 200,000 years after becoming a distinct species were adding 200,000+ distinct net new young of their species every 24 hours, a number greater than the entire wild populations of all the other great apes combined (orangutans, gorillas, bonobos, chimpanzees). At this time, circa 2013 total biomass of humans and their livestock outweighed the sum total of wild vertebrates by a ratio approaching 50:1. Depending on the boundaries, the movies hero and his friends were using between 15 and 40% of net primary productivity of the planet (and many times that in past productivity, stored in fossil carbon). The fossil slaves, still powerful and plentiful, were starting to ask for stiffer pay raises. And, although they were deaf and mute and therefore invisible to most everyone benefiting from them, some humans started realizing that the slaves had been breathing and pooping all along. Though many were concerned about this, the infrastructure and living standards built around them was so complex and vital that continued breath and poop seemed a necessary price to pay. A fossil magic finger trap. Our hero did possess the technology to build a bridge to the future using 2nd derivative magic - like wind and solar, but the bigger the bridge, the fewer that could cross. Virtually no one wondered how much magic would be left in 100 years or 1000 or how our descendants would carry on. Going into Act III of the movie "Towards Homo Sapiens", instead of paying it forward, our heroes and heroines were fully sucking it backward.

Act III - Myriad Limits to Growth 2013-2100

Act III will be a defining moment in the movie Towards Homo Sapiens - so far the movie has been an amazing documentary, but we as yet don't know whether it turns out to be in the science fiction, horror, drama or comedy genres. We can all guess that during Act III, some melange of disaster, discovery, war, peace, invention, sacrifice, triage, breakthrough, maturity, and awareness is likely, but if possible I'd like to skip Act III for this Campfire discussion.

In Production

Everyone watching this movie has at least three things in common: 1) they come from an unbroken line of ancestors back to proconsul in the trees 17 million years ago and from smaller mammals before that, and from simpler organisms before that: each of us is something immensely old, the fragile direct result of life's first quickening billions of years ago, and the lucky descendants of beings lucky enough to reproduce. 2) all of our ancestors had enough resources to mate and successfully raise young and the neural machinery that allowed their success is still with us, and 3) we will all die in this century (spoiler alert for Kurzweil devotees). All of these things influence our behaviour and how we envision the upcoming acts of the movie "Towards Homo Sapiens". We are related to our ancestors, created by them, executing the adaptations which allowed them to reproduce. Our focus on the present, aversion to situations, statements or actions that put our status at risk, penchant for being hijacked by novel but irrelevant stimuli, strong cognitive biases that tell us our own view of the world is the correct one, etc. all contribute in unique ways to hamstring our ability to properly navigate a viable future trajectory. But we also have built in wiring to be pro-social, cooperate, experience empathy and follow cultural cues of 'what is acceptable or respected' in our environment. The movie script is not yet written.

The very thought of humans being alive in 200,000 years (which would put us now at the 1/2 way point) seems a bit like science fiction, yet why should it? Before releasing the carbon slaves and becoming addicted to their largesse, there was no a priori reason humans would not go forward much longer than that, in large numbers on a healthy planet. Yet currently we assign essentially zero value to such a future, because we don't believe in it -not most of us, not really.

Act IV - The Year 2100 and beyond

For purposes of this campfire, let us ignore the upcoming Act III and focus instead on the distant future, when all of us reading this today, and our children will no longer be a factor in our thinking. In my experience we are all too focused too on the next 10-20 years -its natural, because we will live it. But if that is our focus people will bicker about the impossibility of such and such due to X and Y reasons. There will be high representation at the poles of 'just use UN population of 9 billion' or 'we will go extinct'. If we instead focus imaginations on the distant future we might come up with some creative ideas of what humans could aspire to and accomplish without being overpowered by the near term constraints. We may not yet be sapient, but neither are we idiots. The actors in this movie - us -, right now, face the ultimate intersection of nature (focus on present, consumption, novelty, status) and nurture (science, cultural evolution, ability to envision and plan for the future). Dark - light - in the middle. we can't KNOW the future. It's a probabilistic world - and we can still influence the probabilities. A thriller for sure.

Some Campfire questions:

Do we even care about people in the year 2100? Should we?

How is human society organized in 2100?

What is the population and energy throughput per capita relative to today?

What is the energy mix? How do we interact with eachother and other species?

What are the goals and aspirations of young people?

What is desirable, or undesirable about where we have arrived in 2100?

What does the rest of the earth look like? What webs of life predominate? What is the

world's largest animal? What self-aware animals are left besides humans?

What will They think about those who lived 100 years earlier? Gods, devils, saints, fools? Will they remember us at all?

What part of the bottleneck is behind us, and what is still ahead?

What sort of a Constitution for a Full Planet might we start to craft?

Same questions, but for 12,100? That is, a ten thousand years in the future; sounds like a long time but it's not all that long in human history.

Be as general or as detailed as you wish. Answer any set of my suggested questions or come up with your own in same spirit.

"And they had this stuff, and it could do the work of a THOUSAND men!...."
Speak, friends.