



“Changing Course”

Exponential Icebergs

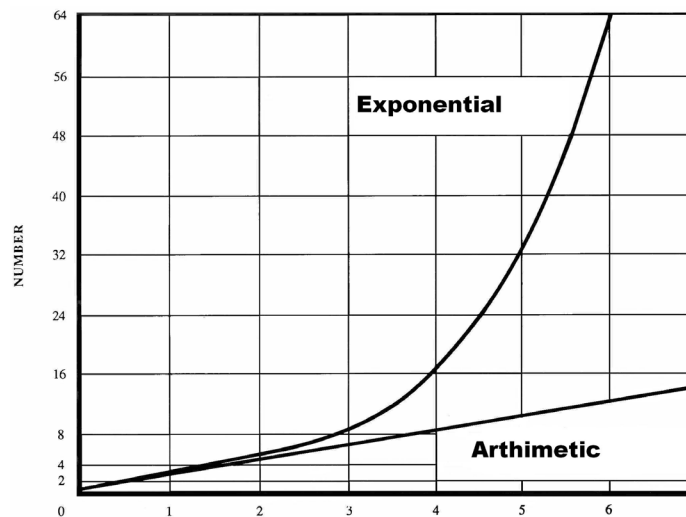
By Harry Braun

The priorities of President Bush and Senator Kerry of going to war with Iraq underscore that they and their senior advisors are unaware of the many “exponential icebergs” that threaten America and the human community far more than any potential threat from Iraq or Al-Qaeda. Indeed, given the exponential nature of the interrelated global energy and environmental problems, the U.S. and other countries should be focused on shifting from oil to hydrogen with wartime speed in order to avoid a “Day After Tomorrow”-type catastrophic event.

If we are not able to “change course” in time, we will not be able to avoid the devastating exponential icebergs of climate change that will result as major food production systems begin to fail. When temperatures increase 11 degrees, seed fertilization rates will go from 100% to 0. The exponential icebergs of global population growth, droughts, floods, and the destruction of the oceans have already started to disrupt global food production systems, and if this dangerous trend is allowed to continue, at some point in the not too distant future, supermarkets will be rapidly sold out in panic buying.

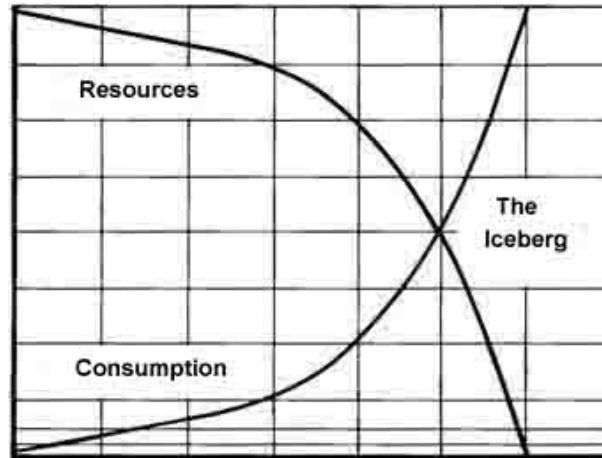
Millions of people will suddenly be dependent on what they have on-hand. Guns, ammunition and gasoline will become the most important assets as the fabric of civilization dissolves in matter of days – if not hours. No one will care about Iraq as panic and chaos impact millions of unprepared people who will desperately be attempting to avoid starvation.

Arithmetic vs. Exponential Growth



Note that the arithmetic growth increases at a constant rate. This is in contrast to the classic exponential growth curve that increases at an increasing rate.

The Exponential Iceberg



When the ascending curve of consumption intersects the descending curve of resources, one will find the iceberg. While President Bush wants to “stay the course,” Senator Kerry wants to rearrange the deck chairs. What is required is to “change course.”

The Exponential Time Of 11:59



One cannot understand the serious nature of exponential growth without knowing what is meant by the exponential time of 11:59. For example, if a bug is put in an empty bottle at 11:00 in the morning, and it is observed that the bottle is full of bugs at 12:00 noon, when will the bottle be half-full? The Answer: 11:59. The significance of this analogy is that if you were one of the bugs in the bottle, at what point would you begin to realize that you were running out of resources? Note that at 11:55, the bottle is only 3% filled, leaving 97% of the space for growth, but the exponential inertia of the last four minutes will totally consume what appeared to be a vast resource.

Another simple but graphic example of exponential growth is to consider what happens if one penny is saved on the first day of the month, and each day thereafter, the amount is increased at a constant rate of one cent per day. At the end of a 31-day month, one has accumulated 31 cents. However, if the amount is exponentially doubled each day, at the end of a month one will have accumulated over \$10.7 million – *an increase of over 34 million percent.*

Because of the Exponential Age in which we live, it is that it is much later that most people think. Existing oil reserves are expected to last for 40 or 50 years, but the primary oil fields in Saudi Arabia are already declining in their output, and no new substantial discoveries have been made in the last 30-years. However, even if there were a 1000-year supply of oil, with 5% annual growth in consumption, the 1000-year supply would be exponentially consumed in only 79 years. The U.S. has a 250-year supply of coal at current rates of consumption, but if it were used to make hydrogen on a scale to displace oil and natural gas in the transportation and energy sectors, the 250-year supply of coal would be used up in about 40 years, and the environmental impact from the strip mining alone would be devastating.

Even if the oil reserves were inexhaustible, their profoundly negative environmental impacts would still dictate a transition to a solar hydrogen energy system. Given these exponential consumption realities, the focus needs to be on manufacturing hydrogen from water with renewable energy resources and technologies, which is what photosynthetic green plants on the earth have been successfully doing on a global scale for over 3.5 billion years. Unlike oil and natural gas, the renewable energy technologies can not only make the U.S. energy independent, but allow it to be transformed from the world's largest energy importer, to the world's largest energy exporter of a fuel that is pollution-free and inexhaustible.

Utopia or Oblivion:

Given the Exponential Age in which we live, we are as close to a nanotechnology "designer gene" utopia as we are to an ecological oblivion, and the decisions made in the next election could determine which future evolves. Climate change is being driven by our exponentially increasing use of carbon-based fossil fuels, and hydrogen made from water with electricity generated by wind and other solar technologies is the only zero carbon emission fuel that is inexhaustible and can permanently replace fossil and nuclear fuels worldwide. The fact that hydrogen is the only "universal fuel" is significant because it means that it can power virtually every existing engine or appliance, from the family automobile, including Model T's and SUVs, as well as commercial aircraft, ships, trains, moon rockets, power plants, or a Coleman stove on a mountain top.

While President Bush and Senator Kerry want to make "dirty" hydrogen from fossil and nuclear fuels, such policies will do nothing to resolve the basic energy supply and environmental contamination problems. The Phoenix Project, by contrast, calls for simply mass-producing wind powered hydrogen production systems like automobiles. Approximately ten million one-megawatt wind-powered hydrogen production systems would be needed to displace all the fossil and nuclear fuels in the U.S. Given that a wind machine is very similar to an automobile from a manufacturing perspective, and given that we make over 15 million vehicles each year, it is easy to see how all of the 10 million units could be built and installed in a 5-year period.

While the Bush administration is seeking to secure the oil in Iraq and find the last of the world's oil offshore and in the remaining wilderness areas, neither of these efforts will resolve the fact that the remaining global oil reserves are unsustainable. Senator Kerry is primarily focused on conserving the remaining oil by getting consumers to give up their Sport Utility Vehicles (all of which can be modified to use hydrogen). However, neither party is talking about a wartime shift to wind and other solar -powered hydrogen production systems, which would fundamentally resolve many of the world's most serious energy, economic and environmental problems.

We have found our civilization addicted to an "Oil Economy" that is highly polluting and rapidly diminishing, and we have the opportunity to replace it with a "Solar Hydrogen Economy" that is inexhaustible and essentially pollution-free. But this change in course needs to take place before we hit the exponential icebergs that are closer than most people think.

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