Are We Nearing the Peak?
Sustainable Tompkins Blog
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Hi everybody, welcome to the Sustainable Tompkins May 2012 Blog. The ST Board is attempting to provide monthly opportunities for community discussion and May is my month. I would like to share some information and a few thoughts on the topic "Are we approaching the energy descent?" Could that approach be part of the cause of the current economic crisis? Nice, easy subjects, right? If you're interested, read on…

In thinking back over the past few decades I could not help but notice that years ending in "2" seemed to have a lot of significance for sustainability. 1962 was the year of Rachel Carson's *Silent Spring*. 1992 was the year of the Rio Earth Summit and the Declaration of the 27 principles on Environment and Development – it was also the year of the Scientists Warning to Humanity.

And then there was 1972, the year of the Limits to Growth.

I got to thinking of the *Limits to Growth* study several days ago, when, on May 2 (another "2") I attended a presentation at Cornell by J. David Hughes of the Post Carbon Institute. In 108 powerpoint slides – nearly all of them graphs or charts – Hughes identified the main apparent trends in "availability and deliverability" of oil, gas, coal and uranium, aspects of electricity production, and implications of population growth and other factors for future energy needs. You can view all 108 slides by clicking here, or go to:

http://www.eeb.cornell.edu/howarth/HUGHES%20Cornell%20Ithaca%20May%202%202012.pdf

For those of us active in Ithaca in the sustainability movement, I see the following as among his most valuable and challenging observations:

- World per capita annual energy consumption since 1850 has risen by 794% (slide 6); (my comment: this is the basis for much of our modern lifestyle)
- Of the fossil fuels consumed so far since 1850, 50% were consumed since 1985 (slide 8);
- In 2010 hydrocarbons provided 84% of the world's primary energy (slide 14);
- Renewables in 2010 provided 1.32% – and wind, was about 0.3% (slide 13) – as Hughes pointed out, this means that wind could increase by many times over and still be only a minute fraction of deliverable energy;

- No matter how much hydrocarbon might be in the earth's crust, ultimately there is an absolute barrier at the point where EROEI becomes less than one – or when the Energy Return On Energy Invested is less than one, meaning we are actually losing energy to acquire more of that source (slide 11 and others);
- With steady world demand, 4 new Saudi Arabia's (in terms of oil) have to be found by 2030. If world demand grows as expected, 6 new Saudi's will be needed (slide 37);
- A Caltech study predicts that Oil and Gas will peak in 2019, Coal in 2022 (slide 76) – they aren't betting on finding any more Saudis;
- Many other problems with gas and coal are presented in detail;
- Significant inequality in production and consumption of energy worldwide (slides 93 – 101);
- We need the remaining hydrocarbons to build the alternative energy equipment – for example, a wind turbine requires 260 tons of iron ore, mined and transported by hydrocarbons (slide 78);
- There are no scalable alternatives for hydrocarbons known at present (slide 107) (i.e. alternative energy such as wind power cannot deliver the density and convenience of the energy from oil, gas and coal);
- "…the US and Canada have no real energy strategy" (slide 107).

These are but a few of many important details and insights in Hughes' presentation. I would like to focus on two of his points to raise a couple of questions for possible discussion on this blog.

1. First, the points from slides 13, 78 and 107 above: no matter how fast we build wind capacity, it's going to remain a minor element in the overall energy picture for perhaps decades to come. In his 2005 book *The Party's Over: Oil, War and the Fate of Industrial Societies*, another post-carbon institute member, Richard Heinberg raised similar points, but took this one even further. He argues (p. 155) that to produce the estimated electrical needs of the US in 2030, "would require the installation of something like half a million state-of-the-art turbines, or roughly 20,000 per year starting now." [i.e. 2005]

To see if Heinberg was overly pessimistic up to now, I looked up the currently available data on [US installed windpower as of 2011](http://content.usatoday.com/communities/greenhouse/post/2011/11/us-energy-use-back-up-in-2010-after-2009-dip/1#.T66yAlLh9ac).

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This (probably authoritative) source gives a figure of 0.92 quads or about 5% of the 18 quads Heinberg thinks wind could eventually generate. Overall energy use in the

US in 2010 however, was about 98 quads. Seems like we have a lot of wind turbines to install and not much time to do it in?

2. When I got home from Hughes' talk, I ran over to the bookshelf and pulled down my copy of *Limits to Growth: The 30-Year Update* published in 2004. There's a lot of interesting (and scary) info in this book, but Hughes' talk led me to page 8, in the chapter on "Overshoot." There was Table 1-1: *Worldwide Growth in Selected Human Activities and Products 1950 – 2000*. Hughes had made many of his charts run from 1850 to the present or from 1850 to 2030. This gave an impression of ever-increasing rates of production and use. But authors Meadows, Randers and Meadows of LtG contrasted the rates of increase between 1950 and 1975 with the rates between 1975 and 2000. In other words, two sets of rates for two consecutive 25-year periods. You can see a jpeg of this one page with the reference by clicking here. Or, type in: http://msuweb.montclair.edu/~franker/LimitstoGrowth30yrupdatepage08.jpg

8 *Overshoot*

TABLE 1-1 Worldwide Growth in Selected Human Activities and Products 1950–2000

	1950	25-year change	1975	25-year change	2000
Human population (million)	2,520	160%	4,077	150%	6,067
Registered vehicles (million)	70	470%	328	220%	723
Oil consumption (million barrels per year)	3,800	540%	20,512	130%	27,635
Natural gas consumption (trillion cu. ft. per year)	6.5	680%	44.4	210%	94.5
Coal consumption (million metric tons per year)	1,400	230%	3,300	150%	5,100
Electrical generation capacity (million kilowatts)	154	1040%	1,606	200%	3,240
Corn (maize) production (million metric tons per year)	131	260%	342	170%	594
Wheat production (million metric tons per year)	143	250%	356	160%	584
Rice production (million metric tons per year)	150	240%	357	170%	598
Cotton production (million metric tons per year)	5.4	230%	12	150%	18
Wood pulp production (million metric tons per year)	12	830%	102	170%	171
Iron production (million metric tons per year)	134	350%	468	120%	580
Steel production (million metric tons per year)	185	350%	651	120%	788
Aluminum production (million metric tons per year)	1.5	800%	12	190%	23

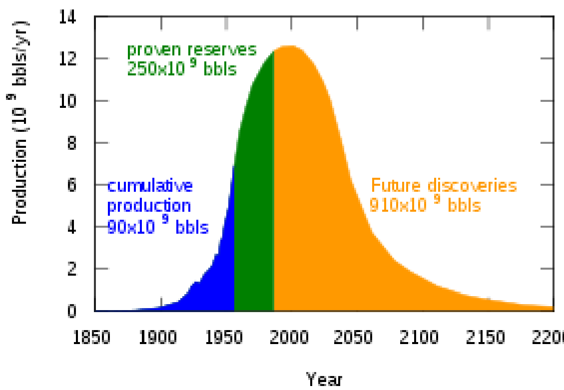
(Sources: PRB; American Automobile Manufactures Association; Ward's Motor Vehicle Facts & Figures; U.S. DoE; UN; FAO; CRB.)

Source: Meadows, Donella, Jorgen Randers and Dennis Meadows. 2004. *Limits to Growth: The 30-Year Update*. White River Junction, Vermont: Chelsea Green Publishing Company. Page 8

This table compares 14 human activities on these two contrasting time periods. And – in every single case, the rate of increase from 1975 to 2000 is slower – often much slower – than the rate had been from 1950 to 1975. A few examples: between 1950 and 2000 human population rose 160% while from 1975 to 2000 it rose 150%. This is the only one that's a bit close. For rice production, it was 240% vs 170%; for registered vehicles 470% vs 220%; for oil consumption 540% vs 130%; for aluminum production 800% vs 190%; for electrical generation capacity 1,040% vs 200%.

Now, in peak oil theory (and peak anything by extension), the production, the production curve goes up steeply, tapers off to a sort of horizontal moment and then curves sharply downwards. To see the standard Hubbert peak oil curve from the Wikipedia entry on Hubbert Peak Theory, click here. You can view the blue-green-orange one or the red line one several lines below under "Hubbert Curve;" they both have the same shape.

If you mentally trace a line from the bottom left up to the top of the curve in about the middle, you can see that the line goes up less and less and veers more and more towards horizontal before slipping over the top and starting the sharp descent. This struck me as interesting because the data from LtG: The 30-Year Update seem to show exactly that: a slowing of a rate of increase.



Now, what if this turns out to be true? What if we are on a Hubbert-like peak curve just approaching the top? What are the implications? Given that we live in an economy mostly dependent on growth for improving the standard of living, such a set of slowdowns would almost have to result in an overall economic downturn. And notice that the data in LtG + 30 do not include the 2008 recession – the precede it. Is it possible that our location on a Hubbert Curve played a role in the current downturn – and if so, what does this tell us about where we should go to deal with the downturn? The two alternatives offered by those with access to the mass media are: austerity and budget cuts by the right wing and Keynesian style government growth stimulation by the liberal wing of the Democrats (e.g. Paul Krugman). But is either of these alternatives realistic if we are slowing down as a result of approaching peaks in several key resources needed for industrial growth? And if so, what other alternatives should we consider?

J. David Hughes bothered me a lot with his presentation. Not because it was weak or disorganized but because it was so convincing. But after I went home and thought about the connection with page 8 in *Limits to Growth: The 30-Year Update*, I began to think we need some new ideas. Let us on the ST blog know if you have any, or any other types of comments and responses as well. Many thanks in advance.

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