The Oil Drum: Campfire

Discussions about Energy and Our Future

Where should we be putting our mitigation priorities?

Posted by Gail the Actuary on May 23, 2010 - 10:42am in The Oil Drum: Campfire
Topic: Environment/Sustainability
Tags: mitigation, peak oil, peak oil mitigation [list all tags]

It seems like there are three distinct approaches to mitigation:

1. Modifying our current system so that it can continue, perhaps on a lower level, hopefully maintaining an acceptable lifestyle for most people.

It seems to me that most of the climate change inspired mitigations and most of the efficiency mitigations are in this category (electric cars, carbon capture and storage, more efficient light bulbs, more efficient cars, more large wind turbines added to the grid). This category might also include building more trains, building more energy-efficient homes, and improving insulation.

2. Doing things that might help our immediate families survive for some period of time--a few weeks up to 40 years.

Things in this category would include hoarding food, water and medicine; buying water filters; setting up gardens; raising chickens; buying solar PV panels; buying bicycles; saving tradable items, from gold or silver coins to small bottles of alcohol; and buying guns and ammunition.

3. Doing things that would truly be helpful for several generations in the future, if we need to go to a much lower energy life style.

Some things (which may overlap with (1) and (2)) are closer to this ideal than others. Building a farm using hedge rows instead of electric fences, and using a mixture of crops suitable to the climate including some which fix nitrogen might be an example. Building factories powered by small wind that can be repaired with local materials would be another example. Building small solar ovens using reflective materials that can be used for many years would be another.

Below the fold, I discuss these three approaches briefly, and ask for your thoughts.

Approach (1), (2), or (3), or some of all of them?

I think many of us try to do some mitigation from all of the above lists. The question is more one of priories since we don't have infinite resources for mitigation. Also, it may be useful to stop to think that there is a difference in approaches.

Some people put more emphasis on *(1) Approaches that would allow our current system to continue, perhaps at a lower level.* Various readers will have different views as to how long we will really be able to maintain our current system, and that may explain a big part of the difference in views on this matter. If we are truly approaching a tipping point, and electricity will be lost within a few years (perhaps because of oil dependence for transporting coal; perhaps for

financial reasons; perhaps because of geopolitical factors), then putting a lot of effort into (1) becomes less important. If we really can keep business as usual (BAU) going indefinitely, then (1) is all that is needed.

The big issue with *(2) Doing things to help our immediate families survive* is the question whether it is really possible to have "individual salvation". Perhaps if the downslope is slow, the preparations we make will help for some period of time. Preparation may even be helpful for many years, if something close to BAU can be maintained (including a working financial system and electrical system). If things are truly awful, there then there is a question whether our preparations will leave us more open to attack than we would otherwise be the case.

The problem with *(3) Doing things that would truly be helpful for several generations in the future, if we need to go to a lower energy life style* is that these things tend to be more difficult and more expensive--for example buying a farm and setting it up in a way that can be maintained without fossil fuel inputs. In addition, It would be difficult for an individual family to live in this manner, so we would need to build communities that include a range types of foods produced and services. In this way, families would have neighbors to trade with, and other community members might provide essential services.

One issue is that many (most) probably think an approach as (3) is not needed. Another is that it is not clear that we could support the world's current population with approach (3). And clearly there is a significant cost involved. There are a few little things we can do (for example, plant fruit trees that are suited to our areas, along with nitrogen-fixing plants), but trying to make a wholesale change to a lifestyle that is truly sustainable is very difficult.

What will the downslope look like?

One of the questions in deciding which approach to emphasize is "How fast will the decline in world oil production be?" If there is an 80% decline in oil production by 2050 (as some forecast, and as would be preferred from a climate point of view), the decline in oil production would average about 3.9% a year.

There is a question at to what extent productivity increases can be expected to offset this decline. EIA forecasts a 2% annual increase in labor productivity to 2035 in its Annual Energy Outlook 2010. But historical productivity values are based on using more and more oil and electricity as a substitute for labor. One might expect labor productivity increases to be less than 2.0% per year, and perhaps to decline absolutely, if we need to start substituting manual labor for work currently done by machines.

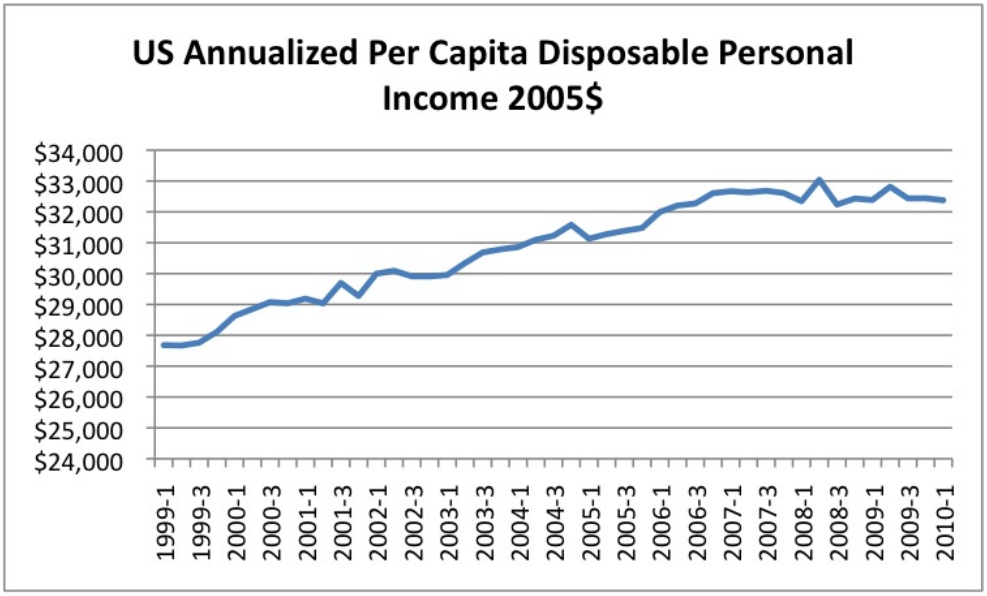
Another source of efficiency gain relates to technology changes alone - say more efficient cars. These depend on capital investment. They also depend on the turnover rate of new vehicles (or other machinery) into the system. Capital is at this point quite scarce, so expecting huge improvement in efficiency (enough to offset a 3.9% annual decline in oil production) seems optimistic, unless changes are quite drastic--replacing autos with bicycles, for example.

The Government Revenue Problem - Higher Tax Rates Likely Ahead

Before finishing our analysis of what the decline will look like, it is helpful to understand the

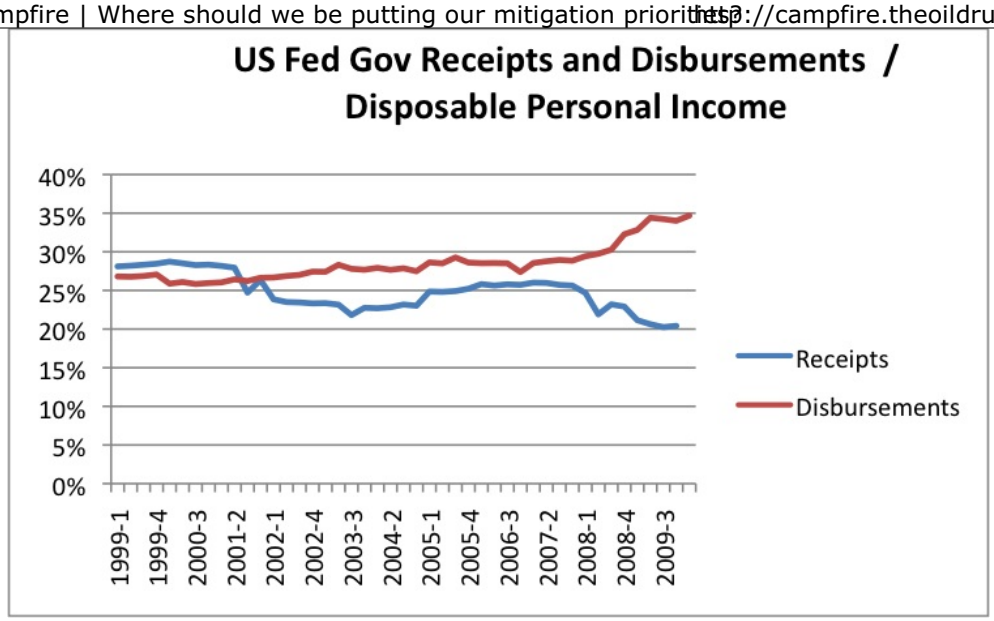
financial bind that governments are in now. For a while, consumers and banks tried to handle the problems that arose from the mismatch between revenue and expenses, as world oil prices rose but salaries did not (and perhaps other problems as well). Then governments stepped in, and tried to fix the situation. But the time is coming to "pay the piper," and governments will need to do something differently. I like to look at graphs--shown below are some graphs based on US data from the US Bureau of Economic Analysis. It seems to me that a similar situation is likely to face many OECD countries.

One of the issues with peak oil is that it tends to hold down personal income. This is a graph of US per capita disposable personal income in 2005 dollars, based on data of the US Bureau of Economic Analysis.



Average per capita US Personal income in 2005 $ flattened starting in mid 2006, and is still flat through the first quarter of 2010. I would expect a fairly similar pattern to hold for much of OECD. Without an increase in oil production, it is hard to see a substantive rise in per capita personal income.

At the same time government revenues (which include more than personal income tax) sank. Governments needed to bail out banks, and to "stimulate" the economy, so their expenditures soared.



As a percentage of disposable personal income, US federal government disbursements soared and receipts sank. Outstanding debt also soared, but because interest rates are so low, interest payments have remained relatively low.

This whole situation is not very sustainable for most countries facing a situation of stagnating incomes, soaring expenditures and declining receipts. At some point, creditors will not want to offer more debt, or will require higher interest rates. And taxes must be raised to bring receipts in line with expenditures. Even if not all of the taxes are personal income taxes, the impact will still indirectly be felt by consumers through higher prices for products. The net effect on consumers is likely to be less after tax income, in "real" dollars.

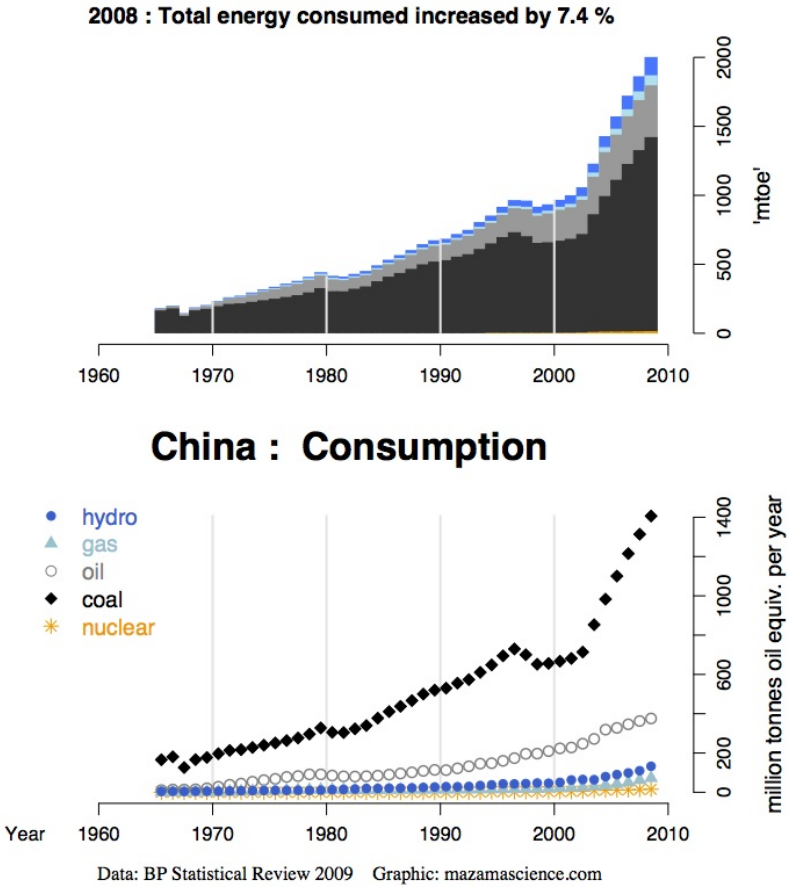
Can a Drop In Oil Production be Offset by a Rise in Gas and Coal Production, or Will the Decline Spread Beyond Oil, to Other Fuels

One question is the extent to which a decline in oil production can/will be offset by increases in natural gas and coal production. My personal belief is that the various systems are very much interconnected, so they will all tend to decline together--oil, gas, coal, and nuclear. A cutback in oil consumption (even if due to a drop in demand) can be expected to have adverse impacts on financial systems and on revenues of governments. As governments attempt to raise taxes to offset this lack of revenue (a point they are now reaching), the higher taxes can be expected to destabilize the system further, leading to a reduction in demand, recession, and an additional decline in oil, gas, coal and uranium prices. The slow economic growth will cause debt to continue to unwind, leading to even lower demand, and more decline in housing prices.

With all of these impacts, government revenues are likely to continue to be too low, despite tax increases. The continued recession and low revenues are likely to lead to yet more tax increases, or a reduction in services provided by government--a feedback loop that is likely to get worse and worse, as it is repeated. Declining demand from these feedbacks can be expected to affect not just oil, but natural gas, coal, and nuclear as well.

I would expect the result to be a decline in oil, natural gas, and coal consumption by more than the average 3.9% per year one might expect from Hubbert's curve. And this decline in

consumption, in my view, will be described as primarily a decline in *demand*, rather than supply. Saudi Arabia will no doubt to continue to point out that it has extra supply available, if needed, but this will be irrelevant.



China's consumption of fuels, separately (bottom) and combined (top) from Energy Export Data Browser

There are many who believe that oil production will not decline at a rate faster than suggested by Hubbert's curve (or by historical decline rates, offset by some new production), and that increases in natural gas, coal and uranium production will act to offset the decline in oil production. Whether or not this is true is debatable. Certainly, China has greatly ramped up coal consumption recently, and has increased gas consumption from a small base. If others can do this, it might be possible to mitigate the downslope, and to allow BAU, or a scaled back version of BAU, to continue for a while longer. I see this as a small possibility if governments can somehow circumvent higher tax rates, and instead, can continue to borrow and spend freely, despite low tax revenue, so that they can help facilitate growth in natural gas, coal, and nuclear.

It remains to be seen whether ramping up coal, gas, and nuclear will be used to offset a decline in oil production on a world wide basis--existing coal and gas reserves will become depleted in some areas, and gas from shale gas may prove to be expensive. Also, adequate capital is needed for any scale-up. With more and more debt defaults and less and less after tax personal income, debt based financing is likely to become less available. In addition, international trade, needed for high tech industries of any sort (including current natural gas, coal, and uranium production), may become less available. Climate change concerns may also act to hold back coal production.

To summarize, my conclusion is that production of all fuels is likely to decline quite quickly, even

faster than the 3.9% per year suggested by Hubbert's Curve, but there is room for other beliefs as well. With respect to the various mitigation approaches, my beliefs would make Approach 3, involving planning for long term mitigation more important. Approach 1, involving efficiency and climate change issues becomes less important because energy use is likely to fall off very quickly, whether or not any steps are actively taken to promote such a drop. Our real need is to plan for the long term future--what Approach 3 is looking at.

Questions

1. For how many years do you think the world can maintain its current complex system (financial, electric, industrial agriculture, Internet, paved roads, etc) after energy availability begins to decline?

2. How does your view of (1) influence what your view of the most important mitigation approaches?

3. Do we have resources to do all three mitigation approaches simultaneously? If we need to scale back on one, what would it be?

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