The Oil Drum
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

Can we get by with fossil fuels ?

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One of the benefits of flying around the country for a couple of weeks has been the chance to finish the odd book, and given the current subjects of the site, it is time to toss one of them into the fray. Mark Jaccard has recently written "Sustainable Fossil Fuels, the Unusual Suspect in the Quest for Clean and Enduring Energy." To give you a taste of his credentials, apart from being a Professor in the School of Resource and Environmental Management at Simon Fraser University in Vancouver,

> Dr. Jaccard is responsible for the Canadian Industrial Energy Efficiency Data and Analysis Centre, funded by the Canadian government and other agencies. The centre is directed by Dr. John Nyboer, University Research Associate, who collaborates in research, supervision and advisory work. Dr. Jaccard has chaired the B.C. Utilities Commission (92-97), served on the IPCC (93-96), and served on the China Council for International Cooperation on Environment and Development (96-2003).

I had therefore been looking forward to reading his book since it was first publicized (it came out at the end of December). It was, unfortunately, a bit harder to read and follow than I had hoped (despite the fact that it comes with it's own student's abbreviated version at the back).

The book is replete with odd facts that are used to build a case, and which have value in some of our discussions. For example in terms of megajoules/kg the estimates of energy density of fossil fuels are given (p 15) as peat 15; wood 18; coal 20 - 30; natural gas 45 and oil 50. And one of the first things one notes is a wee bit of a cheat. For after defining sustainable as enduring indefinitely, he switches the definition to encompass only the next 50 - 100 years.

If I follow correctly he uses as his data base the energy scenarios that were developed for the Intergovernmental Panel of Climate Change(IPCC), the United Nations Development Programme and the World Energy Council. And this was where I first began to get a bit frustrated. This is because of the many scenarios that came from these bodies he picked two, but did not give a good reason why. He then goes on to state energy supply sources for those scenarios, as well as other economic metrics, but with little rationale for his choices. Though again interesting data pop up.

> This means that the typical American household potentially commands close to half a megawatt of power if it were to use all its devices at the same time (furnace, vehicles, appliances, etc), an amount similar to the power available to a Roman landowner with 6,000 slaves or a nineteenth-century landlord employing 3,000 workers and 400 horses.

The quote comes from the chapter where he is working to assess the growth in demand over the

next century, which he posits will go from double to quadruple current levels (430 to 1,390 exajoules (EJ), with the supply in 2100 coming from fossil fuels (920 EJ); Nuclear (90 EJ); Traditional renewables (90 EJ); and modern renewables (290 EJ). The modern renewables include conversion of biomass into gaseous and liquid fuels and into electricity.

However it was at this point that I became somewhat disappointed since it is here that he notes

> my current trends projection has oil and gas declining after 2050, albeit not as dramatically as some analysts predict (p 45).

As I went through the book from this point I continued to try and find the justifications for the assumptions that he makes, but, like this one, found that it seemed to be more on the basis of personal choice than a solid rationale. For example, by 2100 Dr Jaccard believes that hydrogen will have captured about 30-40% of the secondary energy market, equivalent at that time to the amount that hydrocarbons will contribute. In discussing oil supply he writes as though the market will continue to control supply and demand, with additional resources coming on stream as price rises. Geological limits don't seem evident, only the bounds set by price.

And so, in the end, the book will not be one that I refer to for authority on where we are going. But I will keep it around since it has these inserted facts that are valuable. For example, through a personal story, he did point out that energy savings are not always as great as anticipated, using the example of a switch to fluorescent bulbs in his house (he broke one and had to rebuild some fixtures - neither being considered in projected cost savings).

But having said all this, there is also a section on carbon sequestration and injection for EOR. He notes that a "carbon capture" system on the outlet of a power plant could capture 85-90% of the carbon dioxide, but at a price of 8-9% drop in plant efficiency. And he answers a couple of questions raised in comments on my last two posts. Particulates removed from flue gas are collected and used as material in structural fill, nitrogen can be converted to fertilizer and sulfur is recovered in solid form, though he notes that the poor price now can lead to it being injected in deep reservoirs. Carbon dioxide, he notes, is now injected at rates of around 20-30 million tonnes a year at more than seventy sites for EOR. Giving costs for transportation and injection, he projects an additional cost of 2 - 3 cents/kWh for carbon capture and storage.

The creation of an energy future based on parameters that are selected without clear justification and without recognizing supply limits is going to stop me using this book as a basis for future projections, but I will keep it on my immediate shelf, since some of the facts he does provide, exemplified above, have value, and may appear in future posts.

(And for those curious, I am now reading Tom Friedman's "The World is Flat", which has more to do with other aspects of societal evolution and which, therefore will not be quoted - though it is proving to be a more interesting and easy book to read, follow and agree with).