The Oil Drum
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

So will it be the Emperor Coal?

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I must begin by stating that I really don't think I am that old! Why, you might ask, do I need to say that? Well, I have just finished reading "Coal – a Human History", which, as I mentioned at the time, was recommended by Tim Appenzeller during his talk on coal, at the Emerging Technologies Summit in Santa Barbara last month. The presentations for which have now been posted, and the DVD's will follow soon. Since I have also just finished Big Coal by Jeff Goodell, and Time had an article on Chinese coal it seemed a good time to revisit the subject. Particularly since there were a couple of papers at the Summit that spoke to one of Jeff Goodell's issues.

So why do I need to start by commenting on my age? Well it is because I can remember the smogs of England before the Clean Air Act came in, I can light not only a coal fire (piece of cake) but also a coke fire (you try!), I have lain on my back to hand-load coal in a seam that was, at the time, some 20 inches high, I have "black-leaded" a stove, and holystoned a curb after shoveling coal into the "coal hole". Which made reading the book, by Barbara Freese, to some degree a voyage down Memories Lane. And, I must admit, that, not having learned my lesson, this will be, not only a book review, but also a comment on where I think folks are making a bit of a mistake in remaining complacent about the future of the world energy supply, particularly as it relates to the old King of the fuel business.

It is interesting to look with the view from today, back on the contemporary comments as coal progressed from individual use into the power source that it has become. In **Coal**, Barbara Freese quotes the first observers of locomotives in 1830 as seeing "a huge monster in mortal agony, whose entrails are like burning coals." Well, having seen a replica of Locomotion #1 (1825) toddling around the track at the Beamish museum it seemed like a small, almost toy-like artifact, so much has perspective changed. However we also no longer have the open carriages where, as she notes, "some of the more safety conscious railways had their passengers travel with buckets of sand in their laps to pour on each other after they caught fire." This was from the flying embers landing in the carriages as the train reached speed.

Beamish lies in the lands of the Prince Bishops, and, as the book notes, much of the early development of mining in the UK was under church control. The NCB film Nine Centuries of Coal begins with women gathering coal that has washed ashore along the Northumbrian Coast, and carrying it to Tynemouth Priory, hence the name "sea coal". Although the passage of time shifted ownership to the Crown. King Charles the Second, for example, allowed the Duke of Richmond to charge a shilling (20 shillings to a pound, and this was before the time of dollars) per chauldron (28 cwts) on all the coal shipped from Newcastle.

From the beginning coal use was a hard choice between the pollution that it generates, and the heat and power that it provides. The smogs and fogs that came with its widespread use persisted into the 1960's and I can remember being in one so thick I could not see my hand in front of my face. But it also powered the Industrial Revolution, and provided an industry that, in the end, brought people through the initial traumas of the early industrial cities into the more healthy conditions of today.

That passage was not without many struggles, the book notes that a study had shown that it takes about an hour a day to tend a coal stove properly on the one hand, and there were the much greater social upheavals that embroiled nations in the conflicts between labor and management on the other. It was, I think in this latter aspect that I was a little disappointed that more was not made of the struggles that occurred. The stories of the Molly Maguire, The Ludlow Massacre and the social hardships of running families in small communities might have been more fully covered in a book that includes – a human history – in it's title. In the latter regard, for example, my Great Grandmother had not only her husband, but also six sons work in the mine on shifts, and so throughout the week, she would be constantly getting one up, preparing his sandwiches, cooking for his supper, cleaning his gear, and helping with his bath, all at intermittent hours of the day, in an overlapping cycle so that she slept in the chair by the fire, and only saw her bed at weekends. My father said that she died of overwork. It was a common lifestyle of the time. The book does, however, speak to the difference between coal and oil. It differentiates between the glamour of oil, and the "bleak images of soot-covered coal miners trudging from the mines, supporting their desperately poor families in grim little company towns." Coal has never had much respect as a fuel, and the book, in its evolution of the history, recognizes the impact that this has had, not just on the fuel, but also those that mine it.

Big Coal, on the other hand, is a more contemporary story, with the author visiting some of the mines, both the underground in the East, and the large open pit mines of Wyoming. He has the most fun riding the trains that carry Western coal out of the mining district and up onto the High Plains, as they carry the coal all across the country. But he also saw the pride and camaraderie that exist among miners. The spirit that can enliven a group struggling together in a physically demanding job, day after day, with the always-present danger of something going wrong. He describes some of the problems that led to the Quecreek Disaster and that it was one of those miners whose spirit so caught his attention.

Big Coal goes beyond just the mining however, to look also at the politics both of marketing the fuel, and of sustaining the share that coal has in the fuels portfolio, by looking at the politics of the power generation. And here there is some information from the Summit that is pertinent. In discussing the big problems of the gases and particles that come from a power station stack, he notes the difficulties in cleaning up the stack gases. Frank Alix discussed the use of ammonia as a means of getting not only the SO2, the NOX, the PM and Hg from the stack, but also in removing the CO2, in a form that can then be sequestered. Unfortunately, in a dash of reality (and as I commented at the time) while he can remove the gas at $15 a ton, Sally Benson also had done the cost calculations that showed that the sequestration costs could almost double electricity costs, and this led to some discussion in the audience, as to whether this would be publically acceptable, the consensus seeming to be not.

Both authors write about the problems that greenhouse gases are creating for the environment. Jeff Goodell is, however, willing to acknowledge the existence of the Oregon Petition signed by 17,000 "scientists" questioning the impact of GHG on global warming. However, he quickly points out that a check by Scientific American showed that only perhaps 200 of them were climate researchers. That in itself is a bit of a relief, since I was beginning to think that dissent on this

topic had been banned by Papal Bull.

I would however quibble that if, as is the case, there is geological evidence (the ice cores mentioned in the National Research Council Report on Surface Temperature Reconstruction that show that Greenland was over one deg C warmer a thousand years ago; historical documents – Bardson's contemporary comments about wheat growing in Greenland; and archaeological records where they are digging though the permafrost to uncover the homes of the Greenland Vikings. and that just last week the Telegraph had a story that polar bears seem to be thriving as the arctic warms up, that this, collectively, seems to suggest that perhaps the discussion is too restricted if only confined to climate scientists. The information from those with expertise in the above disciplines might have a pertinent and valid point of view. The exact cause of the polar bear increase seems to be of some debate, conservationists feel that they should get some of the credit, but it is at the point that the Alaskan government is questioning their being put on the endangered species list and where their hanging onto iceberg shards has been recognized to be a standard practice while they look for lunch – as might have been known when the photo was used.

However, in dealing with numbers, there is a much more critical one that the book brings up, and that will likely lead to a more detailed post of how true they are (closer than you might like) and that relates to the actual coal reserves that exist. The book notes that the first survey of coal reserves was in 1909 when 2 USGS employees estimated the US held about 3 trillion tons of which about 2 trillion was considered mineable. This study was not superseded until 1974 when Paul Averitt, also of the USGS, did a more detailed study, that brought the practical number down to 483 billion tons of "reserve base" with about 50% of that being recoverable. However, in 1986 the USGS did a detailed study of the Matewan coalfield in south-eastern Kentucky and looked in more detail at the geological constraints that would better define true reserves. From this they concluded that the amount that could be recovered was more likely no more than 30% of the base.

In 1989 this study was updated with the help of the US Bureau of Mines (the agency that was eliminated in the last Administration) who brought a more realistic cost evaluation, from which it was concluded that the more realistic recovery percentages would be in the 5 – 20% range, and that, for places such as the Powder River Basin (where all the coal is currently strip mined for supply as low-sulfur coal to much of the US) may ultimately recover only 11% - given that most of the reserve base lies underground where it can no longer be easily stripped (in much the same as the oil sands of Alberta must ere too long also go underground).

These are worrisome numbers since, regardless of whether the GHG issue is resolved, there has always been this sense that if we gulped hard and accepted the cost (either in health, global warming or clean-up) there would be enough coal to get us through until the magic real answer arrived. Perhaps that is not going to be true, and the limitations of government to control some of these issues is becoming clearer.

Both the authors had been to China, and commented on the primitive nature of the coal mines outside the large industrial sites. Barbara Freese has a very good chapter on how mining arose in China and her visit to a small mine in the Ordos region of Inner Mongolia. Jeff Goodell was in Unumqi, in Xinjiang also in Western China but down closer to the India border but was more involved with the carbon capture theme by that time in the book. Both however tell an engrossing tale about the growth of Chinese mining. It is underlined, with an indication of the problems that the government of that country has in managing the coal industry, by last week's Time article. Noting that 5,000 miners died in accidents in that country last year, officially, the problems go

back to those with which I began this post. Whether in the mines of America and Europe early in the last century, or in China today, the power of the coal owners, and the dreadful working conditions that they impose on their miners, has not changed much. The need for the coal, and the money that can be made does not improve the conditions for many of the small, often illicit mines in the hinterland, and only the owners and the local and bribed officials get rich. It is a condition that the central government cannot, as yet change, but which takes time.

In the United States the laws have been changed to significantly improve mine working conditions and to enforce good practice, and in the main, the industry has benefited well from this. It is however critical that regulations to ensure that the mines are run well, and that the land is properly reclaimed after use, be in place and enforced. This means that an educated workforce and management be in place.

Jeff Goodell notes that in 2004 there were less than 100 mining graduates in the Universities of the United States, and 65,000 who graduated with a law degree. So I suppose that we will get the laws and regulations, the problem is getting those that are useful and pertinent. Chris Bise , who provided the information to him on the Mining Schools has just moved to West Virginia to take over the Department there, as the previous head retired. The number of experienced faculty is getting significantly lower, as his generation start to retire, and one occasionally wonders where the technologies that we will soon need to expand the reserve base beyond that low number might come from. But as I said, that is likely the topic for another post, and ultimately maybe a change in the name of this site to The Coal Bin, or some such, within the decade.