The Oil Drum
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

St Patrick and the Shortage of Engineers

Posted by Heading Out on March 9, 2006 - 3:47pm
Topic: Supply/Production
Tags: education, engineers, peak oil [list all tags]

So today I dug out that green tie that marks the approach of St Paddy's Day and all that that entails. St Patrick, lest you forget, is also the patron saint of engineers, and having now got past the 7th chapter of Tom Friedman's "The World is Flat" maybe it's time for another rumination on the other problem that faces the US and Western Europe as we start to bounce along the plateau of peak oil.

If you are going to rely on technology to solve the problems of running short on various fuels, as they are currently produced, then you need certain folk (engineers, scientists and technologists), who understand the current ways of producing those fuels, to come up with that technology. It is likely that some of the new advances will come from "thinking outside the box", but generally you need to know what's inside the box first. The problems that we have are several-fold, but let me hit just a couple, the current lack of students, and the growing shortage of faculty to teach them. (And while I write largely about the United States, much of this also applies to Western Europe.)

To preface the discussion let me quote Friedman:

> And it is our ability to constantly innovate new products, services and companies that has been the source of America's horn of plenty and steadily widening middle class for the last two centuries. . . . .The executives, the department heads, the sales force and the senior researchers are all located in the cities where the innovation happened. And their jobs create more jobs. The shrinking of the pool of young people with the knowledge skills to innovate won't shrink our standard of living overnight. It will be felt only in fifteen to twenty years, when we discover we have a critical shortage of scientists and engineers capable of doing innovation or even just high-value-added technology work. Then it won't be a quiet crisis anymore, said Jackson (President of Rennselaer Polytechnic) "it will be the real McCoy."

He gives some numbers

> It (the National Science Board) said that of the 2.8 million first university degrees in science and engineering granted worldwide in 2003, 1.2 million were earned by Asian students in Asian universities, 830,000 were granted in Europe and 400,000 in the United States. . . . Science and engineering degrees now represent 60% of all bachelors degrees earned in China, 33% in South Korea and 41% in Taiwan. By contrast the percentage of those taking a bachelor's degree in science and engineering in the United States remains at roughly 31%. Factoring out the science degrees, the number of Americans who graduate with just engineering degrees is 5%, compared to 25% in

> Russia and 46% in China.

I have mentioned this topic before several times , but in the past mainly from the point that we will not have enough engineers to run the operations that we will be needed. However it is in regard to the innovation issue that there is perhaps more reason for concern.

Universities have, over the past decade or so, been closing departments that teach in the energy production disciplines. Enrollments were down, there was not a great deal of external research funding available, the programs were very expensive and the faculty were ageing and retiring. They could take those positions and move them over into Management (to pick just one target) where there was a greater demand for students, the programs were cheaper to run, there were faculty available and there was a demand for the product. Well now enrollments are rising rapidly in the energy production departments (mining, petroleum, nuclear, geological engineering for examples) and oops! Where are the faculty to come from?

It used to be, back when my hair was a different color, that when the US fell short, it could go pirate faculty from Europe (that's partly why I am here) but Europe cut way back over the past decade and more, so that supply is gone. And as Friedman points out Asia is increasingly interested in keeping its brightest at home. Universities, as a general rule, do not pay quite as well as industry, and in energy at the moment that is more than usually true even at entry positions, further up the ranks it becomes an almost embarrassing comparison. It is likely, therefore, that faculty shortages will continue. This has two short-term consequences.

Higher teaching demands are going to make less time available for the faculty to make those innovations that are needed to help solve our supply problem (and yes there are some answers), but this also has a hidden cost. Because for junior faculty to remain at university they have to prove that they are research productive. Which means they have to find resources to fund the work that they can do. Historically that funding came from the US Bureau of Mines (the one Federal Agency that was closed and done away with) or the Department of Energy. Unfortunately as was noted DOE budgets are being cut all across the Energy field, despite Presidential promises to the contrary. So where can the faculty find the funding to develop these new ideas into solutions that have a chance of succeeding? Good question ? And without it, our colleagues will sadly deny tenure and another engineer will head back into industry.

This is not a hugely expensive problem. If we consider, for example, that there are 13 mining schools, and each has 1 junior faculty member, and they could do meaningful research for $100,000, then we are talking about $1.3 million a year as an investment. (I hasten to add that this is not my idea, but that of Mike Karmis at Virginia Tech). Expand it to all the energy programs and you would still be at less than $5 million.

Will it happen ? Well see one of the things one does at St Paddy's celebrations is to sit around and gloomily stare into a pint of ale and bemoan the tragedies of life. And here I have given you a start - you've still got a week to mediate, and have another beer, and then . . . .