

American Industrial Policy Regains its Mojo

The U.S. Federal Department of Energy has taken a significant step in the creation of an American industrial policy for a specific (group of) critical natural resource(s) – in this case, the Rare Earths. Late last week the Office of Fossil Energy at the U.S. Department of Energy selected three applicants from more than a dozen to receive up to one million dollars each to investigate processes such as the one winning submission entitled “Recovery of Rare Earth Elements from Coal Mining Waste Materials FOA -000127”.” The FOA was itself entitled “**Production of Salable Rare Earth Elements** [emphasis mine] from Domestic U.S. Coal and Coal By-Products.” One of the three awards (entitled as above) went to Inventures Renewables Inc, which has developed a system combining continuous ion exchange, CIE, with continuous ion chromatography, CIC, to separate mixed rare earth solutions into high purity individual rare earth salts. Inventure was partnered with Texas Mineral Resources Corp. (OTCQX: TMRC) a junior Rare Earth mining venture which, in the interests of full disclosure, I am on the advisory board thereof. The CEO, Dan Gorski, drafted the part of the submission that dealt with extracting the rare earths from the coal mining by-products and concentrating them into a pregnant leach solution, i.e. “building a mining operation.” This is the first time that any U.S. governmental entity has “invested” in a new or newly applied technology for the separation and purification of “all” of the rare earths by a non-solvent extraction method.

It was a group at the Department of Materials’ Science at Pennsylvania State University that discovered two years ago as part of a DoE grant that there was a significant rare earth content (thousands of parts per million) in the clay overburden extracted when strip mining certain coal deposits

in the eastern United States. Further they determined, surprisingly, that these rare earths were ionic and adsorbed so that like the well-known Chinese "ionic clays" they could be extracted from the clay by a simple wash with an aqueous solution of a common and essentially non-polluting (it is in fact a fertilizer) chemical, such as ammonium sulphate, again just as the Chinese miners do.

Another winner in this first round, Equinox Chemical, will utilize IBCAT's MRT system to accomplish the primary goal (proof of concept) and the secondary goal (a profitable rare earth products' production system).

After the first responses are evaluated the DoE reportedly may dedicate more than 20 million dollars next year to underwrite most of the construction of a commercial plant using the chosen new or newly applied technology.

I believe that the DoE decided to investigate whether or not there might be a way to develop a coal industry offshoot, rare earth mining, to help create jobs in areas where hard coal mining is declining rapidly due to environmental concerns. Rare earth mining, it must have been reasoned, could be a two-for; not only would it create jobs it would also advance the US towards a desirable goal of self-sufficiency in the critical rare earths needed for the alternate production of energy, which goal is what is driving the coal mining industry down the path to extinction.

The major problem, as the DoE engineer/scientists realized was that there is no rare earth separation capacity operational in the USA and the cost of constructing a traditional separation facility, a solvent extraction plant, is prohibitive, even as an experiment, besides the fact that such plants take years and specialized skills to bring into operation efficiently, as has been evidenced in the US in recent years .

To the credit of the DoE's perceptive scientific staff they

realized that this could be an opportunity to look at new and newly applied methods of rare earth separation especially those that might be cheaper and easier to run than solvent extraction.

As I understand the DoE project it is to determine whether or not a low cost extraction (mining) and separation system can be devised to create an environmentally secure system for the economic and efficient recovery of the rare earths from coal mining residues such that even when separation costs are included the "mine" will be able to deliver commercially purified separated salts of the individual (and selected mixes of the) rare earths to a rare earth metals and alloys maker- hopefully in the USA (and there are two viable candidates at this time), who will then deliver rare earth magnet alloy to any one of several American magnet makers that either today use Chinese, Vietnamese, or Japanese imported alloy to produce American "manufactured" rare earth permanent magnets or having done so in the past still retain the ability to do it.

The "coal" project's ultimate goal is an actual vertically integrated (from the mine to the separated individual salts and mixtures) rare earth production plant. The first level awards will be used to demonstrate the feasibility of the selected "mining" and "refining" processes; the next level of awards will be for sufficient money to build and operate an actual integrated rare earth salts and blends production plant. This plant will have to be able to be a lowest cost operation. The difference between today's DoE and yesterday's is striking. The previous administration's DoE just poured more than 500 million dollars into building a solar cell factory without ever having proven that the technology to be used was scalable could be operated economically and competitively. This became a very costly failed "experiment." Today's DoE knows, as all professional engineers do, that a demonstration plant must precede a full scale plant in order to prove the applicability and economic efficiency of any

technology.

I have no direct knowledge of the technologies or models to be used by the two other winners of this FOA, but I wish them luck.

Finally I need to note that the Department of Defense, the DoD, is fully aware of the DoE project and to its credit will in the very near future be awarding a grant to do a pilot project on recovering rare earths for re-use from industrial/consumer/military scrap using one of the above non-traditional separation technologies, and I know they will both work. I also note that the DoD's DLA has already looked at CIX/CIC for the purification of selected rare earths and has found that technology to be applicable and efficient. The change of administrations in Washington seems to have been very beneficial for breaking the logorrhea jam.

Thus the DoE and the DoD are taking positive steps to reduce American reliance on foreign sourced rare earths. They are both putting (our) money where their mouths are while Congress dithers with a "METALS" Act that will be too little, too late.

I see this as more than baby steps towards an American industrial policy on critical materials.

I congratulate both the DoE and the DLA, the arm of the DoD that is sponsoring the separation technology research.