

WHEN THE LIGHTS START DIMMING

A World Heading For An Energy Bottleneck

Is Nuclear Energy A Morally Attractive Answer?

StockInterview.com's Andy Barrett interviewed Dr. Hans von Michaelis, a geochemist and an advisor to Strathmore Minerals (TSX-V:STM) about innovative techniques in uranium extraction and recovery as well as the world's energy crisis. Is the world heading toward increased nuclear energy use? Dr. von Michaelis thinks so, saying, "I am an ardent proponent of nuclear power as a big part of the solution to the world's energy needs. Nuclear power is constantly improving, safe, clean and efficient. When the lights start dimming, I believe safe, sound nuclear energy will be rediscovered as a sound and morally attractive answer." He added, "There is a relationship: as oil goes up and becomes increasingly less available, then there is a bigger driving force for people to overcome their inhibitions about using nuclear power. They may start to appreciate it a bit more as the most common sense form of energy there is."



Dr. Hans von Michaelis

StockInterview:

Do you believe as some others do that uranium is in a bull market?

Dr. Hans von Michaelis:

Uranium has gone from a low of \$7.50 or so to \$20 plus. That's nearly a 300-percent increase. Gold had a 65-percent increase. Uranium is performing better than gold. Both are coming out of bear markets, I'd say. And I believe the bull market in both of them has yet to take off. This is early days for both. Whatever it takes to get that uranium is what the price will be. If the price of oil and gas comes down, then there will be less incentive, perhaps, to build new nuclear power plants. The demand for uranium may increase not quite as quickly.

StockInterview:

Is uranium tied to the price of oil?

Dr. Hans von Michaelis:

No, it's not. The uranium cost of making nuclear power is almost insignificant. The cost of nuclear power is generally dominated by the capital costs of building power plants. The cost of uranium is an insignificant component of nuclear power, so the price of uranium can increase several times before nuclear power plants would consider throttling back on account of fuel costs. There is a relationship: as oil goes up and becomes increasingly less available, then there is a bigger driving force for people to overcome their inhibitions about using nuclear power. They may start to appreciate it a bit more as the most common sense form of energy there is. In my opinion, we are going to see an energy crisis. There is just not enough new oil being discovered. Not enough drilling to satisfy the increasing global demand, especially with China's huge new increase in demand for oil as result of China's growth.

StockInterview:

Do you believe we have a real energy crisis in the near future?

Dr. Hans von Michaelis:

If you look at projections for energy needs of the USA and China for the next quarter century, the picture is bleak. There is not enough developed oil and gas to meet the needs. If the price is right, oil and gas resources are there, but we're not exploring fast enough for new fields to be developed in time to meet the needs. Recent projections show huge shortfalls being filled by non-conventional sources.

StockInterview:

What are your assessments, then, of the alternatives to oil and gas?

Dr. Hans von Michaelis:

Coal-fired energy is dirty and, if one looks at the big picture, environmentally much less favorable overall than nuclear power. Look what China's coal fired power industry is already doing, and will be doing to the atmosphere. The US has very stringent power plant flue gas desulphurization laws going in place to pull sulfur out of power plant emissions, but what about the other nasties? Don't ask. I believe developing solar, wind etc. to that extent in that time frame is a pipe dream, and that the world is heading for an energy bottle neck. Fuel cell technology is growing, but it will take a lot of time yet to become a factor. Fuel cells are not the answer either when the hydrogen comes from hydrocarbons – the CO and CO₂ still has to go somewhere. Fuel cells make much more sense when the hydrogen is generated using nuclear power to crack or hydrolyze water into clean hydrogen and oxygen.

StockInterview:

What are the innovative mining techniques for the environmental-friendly mining of uranium?

Dr. Hans von Michaelis:

I just did a survey for the DOE (Department of Energy) on looking at innovative techniques for in situ leaching. The way you apply it would be, and whether it is applicable at all, a function of the nature of the ore reserve, or the rocks in which the uranium is hosted. The way it is in Wyoming, in porous sandstone, you would use one technique. If it's in non-porous minerals, then you would use another. The key is in getting the leaching solution in contact with the ore, and at the same time containing the distributes so you don't contaminate ground water, so you don't do environmental damage. In the situ-leaching that has been practiced, thus far, in Wyoming and Nebraska, they are particular to find resources that are within an aquifer that is contained, and sealed off, from other aquifers. Then, to be able to use a means of putting solution into the system so that it would be underneath the water table, and to get a solution to flow toward the point at which you are leaching rather than flowing outwards and getting lost into the environment. If you were to put a hole into the ground and suck water out, you would cause a cone of depression. Water would be removed from that point and would flow in toward the point that you pulled it out of. You want to keep everything flowing towards where you are pulling it out. Rather than distributing solutions into the environment. You want to be able to make sure you can contain it.

StockInterview:

So you have the water driven in and sucked back out through the other end?

Dr. Hans von Michaelis:

That's correct. It goes around and around and you take the uranium out of what you have pumped out. It's a relatively small area that gets impacted if you do it properly. The U.S. has been very particular about it. They studied it to death before they allowed it to happen in the first place. They monitor this very carefully to make sure one doesn't do environmental damage. If you let amateurs go rampant on something like this, then things could get out of hand very quickly.

StockInterview:

Are there any other techniques you could talk about?

Dr. Hans von Michaelis:

Others have looked at leaching uranium out of tailings, using in situ leaching. That is something requiring quite a bit of technology and art. If you fluidize tailings, they can run away from you. You pump solution into tailings and then pump it out again. Then, you can leach an additional amount of uranium out of the tailings. There are technologies, for example, for sorting. You can sort radiometric particles from non-radiometric particles very efficiently. That was practiced very effectively in South Africa twenty to thirty years ago. Heap leaching could now be applied to uranium. Heap leaching has been applied to gold very effectively. When they started doing it for gold, they borrowed technology that had just started to evolve in the uranium industry. Now, gold heap leaching has evolved to a real technology. It can be now be borrowed back and applied to uranium in a more advanced fashion. In situ leaching, heap leaching, open pit mining, underground mining or ore-sorting are the viable technologies. I've just returned from observing an ore-sorting operation in South Africa that is very effective.

StockInterview:

But isn't cyanide used in heap leaching?

Dr. Hans von Michaelis:

Cyanide is efficient. You'd probably be surprised if I told you I believe that cyanide is one of the more environmentally friendly chemicals. It doesn't survive long in the environment. It is biodegradable. And you don't use very much of it. But, you don't use cyanide for uranium leaching. You would probably use sulphuric acid or bicarbonate solutions or even salt solutions. Sodium chloride, under certain conditions, leaches certain types of uranium. In fact, uranium is in-situ leached from brines in Australia, where there are certain deposits with very high chloride content.

StockInterview:

In what way would you be assisting Strathmore Minerals to grow as a company?

Dr. Hans von Michaelis:

I believe I am focusing on looking for additional projects and resources. Strathmore Minerals (TSX-V: STM) wants to grow and build its resource base. It's got a lot of uranium already. A whole lot. While the going is good, why not accumulate as much as possible? And develop the best ones first. I'm sure we'll all pool our know-how about extracting and recovering uranium. Once you've leached it, you also have to recover it. Once you've done in situ leaching, you've got uranium in a solution. And then you need to recover it. I did a very thorough study a number of years ago on ion exchange recovery of uranium from solutions. The know-how in that would still be valuable today. Remember, uranium has been pretty dormant since the last boom. I also did a study on liquid separations to get uranium solutions out of leached ore. That's not for in situ leaching, but for conventional mining techniques. Subsequently, I've looked at a lot of innovative technology for gold extraction and recovery. All of these would be very appropriate for a modern-day uranium recovery plant. Uranium just requires different reagents and slightly different chemistry, but it is the same principle as leaching precious metals.

StockInterview:

You sound very bullish on nuclear energy, as opposed to other energy sources.

Dr. Hans von Michaelis:

I am an ardent proponent of nuclear power as a big part of the solution to the world's energy needs. Nuclear power is constantly improving, safe, clean and efficient. When the lights start dimming, I believe safe, sound nuclear energy will be rediscovered as a sound and morally attractive answer. This does not need to happen, however, for uranium production to become tight, considering the projected uranium shortfall to keep existing nuclear power plants running.

StockInterview:

In an earlier interview, a new form of nuclear reactor was mentioned, which should assuage fears about a nuclear plant meltdown. Is that a likely candidate to replace conventional nuclear reactors?

Dr. Hans von Michaelis:

The modular pebble based reactor is very interesting technology developed in the U.S. and in Germany. It's being developed to commercialization in South Africa. The Chinese and the Africans are going to have the benefit before we do. These would have tennis-ball sized uranium fuel particles, like pomegranates of silicon carbide graphite mixed with uranium, in a form that would be the ultimate in disposal. It doesn't have any gaseous or liquid byproducts that can harm anybody. It can just take a long time to cool down completely. The maximum temperature it can reach is 800 degrees Celsius, which will not melt down a reactor. They're building the first demonstration model now in South Africa. You can make it modular and safe so you can reduce the cost of nuclear power plants. The modular pebble bed reactor offers tremendous safeguards in the generation of nuclear power and disposal of spent nuclear fuel pebbles. If I had to choose among energy sources, I would choose nuclear, over other forms of polluting energy, but it has to be done properly. I think the pebble-based reactor a huge step in the right direction.

(Editor's Note: <http://web.mit.edu/pebble-bed/>)

Dr. Hans von Michaelis

Dr. Michaelis is President of Randol International Ltd. which he founded in 1977. Since 2000, Randol has provided corporate development, business development and financial services to the mining industry. Prior to 2000, Randol organized leading international conferences on mining opportunities, and extractive metallurgy. Randol originally gained notoriety for its research and publication of major multi-client studies on Innovations in Gold and Silver Recovery, and on the application of Belt Filtration and Ion Exchange for the recovery of uranium. Dr. Michaelis graduated from the University of Cape Town with a Ph.D. in Geochemistry in 1970.

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