Bill Gates goes (mini) nuclear

Backs 'small reactor' startup

By Rik Myslewski in San Francisco

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A startup firm funded in part by Bill Gates is in talks with Toshiba about creating small, efficient nuclear energy reactors

that are fuelled not by treacherous uranium-235 or plutonium-239, but by relatively benign uranium-238.

According to a report (paid subscription) in the Wall Street Journal,

a Toshiba spokesman says that the company is in the early stages of talks with TerraPower, a division of Intellectual Ventures, a self-styled "invention company."

Intellectual Ventures was co-founded by former 14-year Microsoftie Nathan Myhrvold.

In addition to his long association with the world's second-richest man, Myhrvold has also worked with Stephen Hawking on research in cosmology and quantum theory and holds a doctorate in theoretical and mathematical physics from Princeton University.

We're talking some serious brainpower. The TerraPower team includes researchers who've worked with the Lawrence Livermore Laboratory, Argonne National Laboratory, Massachusetts Institute of Technology, and the University of California at Berkeley.

TerraPower's efforts are focused on travelling-wave reactor (TWR) technology.

A TWR has the advantage over traditional fission reactors in that it contains only a small amount of enriched uranium, which triggers a wave of neutrons that move relatively slowly through the TWR's core of depleted uranium, more efficiently splitting uranium atoms in the core.

After its initial boost from enriched uranium, a TWR can run for 50 to 100 years without refuelling or removing any used fuel, according to TerraPower.

Needless to say, such a "start it up and forget about it" reactor has clear advantages over reactors based on expensive enriched uranium - not only in

cost, but also in the elimination of the need to dispose of that pesky nuclear waste.

TerraPower has said that its goal is to create small-scale reactors that can produced "a few hundred megawatts," which would be ideal for emerging markets.

The International Atomic Energy Agency (IAEA) defines "small" as being under 300MW in output,

but the World Nuclear Association (WNA), an international nuclear-energy trade organization, boosts that definition to 500MW.

The WNA reports that companies such as NuScale Power are working on reactors as small as 45MW.

NuScale's small reactor, however, is of the more traditional pressurized water reactor (PWR) type commonly found in nuclear-powered seagoing craft, and doesn't have the cost, safety and waste advantages of TWR technology.

According to the WSJ, long-time nuclear energy company General Atomics is also working on a reactor that uses spent fuel as its power source, but GA hasn't released information on their target size.

Gates' attraction to TerraPower's efforts and his interest in a possible collaboration with Toshiba come as no surprise.

His Bill & Melinda Gates Foundation lists as one of its "Guiding Principles" that "science and technology have great potential to improve lives around the world".

An energy source that gobbles up existing nuclear waste, **(does it?)** is small enough to be installed in emerging markets, and that can run for decades with no intervention could certainly improve lives, especially at a time when carbon-spewing oil, coal and gas plants are contributing to climate change.

In addition, by obviating the need for uranium enrichment and reprocessing, TWR technology could allow the production of nuclear energy without that annoying drawback of the proliferation of weapons-grade nuclear materials.
