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IP FRONTIERS

IP's role in providing clean water

Until recently, a sentence that used the words “water,” “centrifuge” and “Kevin Costner” would exist only as a punch line.

The Gulf of Mexico oil spill, however, brought the issue of novel water technologies into every home in the nation. Arguably the top news story for 2010, the Gulf of Mexico oil spill forced mainstream America to consider a new realm of environmental concerns, turning water technology and innovation into hot, water cooler topics.

One such topic was the patent for the Costner centrifugal oil-water separator. In 1998, inventor David Meikrantz received a U.S. patent for a centrifugal separator that separates oil and water (U.S. Patent No. 5,762,800), later assigned to and developed by Costner Industries.

Most people never heard of the Costner centrifuge until this year, when after nearly five million barrels of crude oil gushed into the gulf, BP reportedly ordered 32 of the Costner centrifugal separators from Costner's company, surprising many.

Of course that was not the only patented technology claiming it could save the gulf. Genoil Inc., a Canadian company specializing in oil and water separation technology, announced it was granted a U.S. patent for a breakthrough sand decontamination technology known as Crystal Sea water cleaner (U.S. Patent No. 7,704,400).

In June, independent inventor John Merrick jumped on the bandwagon, claiming to have filed a patent application that “promises to capture 85-90 percent of the oil not now being captured by the cap that BP has in place on the blowout preventer.”

By late July, two weeks after the flow of oil had stopped, headlines regarding Costner's centrifuge patent and other water-related innovations disappeared from the public eye, almost as quickly as the crude oil from the ocean's surface.

While it's not front page news, the escalation in water technology innovation does not stop at the gulf crisis. Traditionally, global technology for providing clean, safe drinking water represents a combination of coagulation, sedimentation, and filtration with chlorine disinfection. While such conventional technologies remain the most widely used globally, alternative treatments are gaining popularity.

As reported in earlier editions of this column, the Clean Energy Patent Growth Index reveals that innovations in alternative clean or “green” technologies have continued to grow in number since

2002, and most dramatically over the past two years.

Similarly, investment and innovation in alternative water technologies also have increased, trending away from conventional technologies. As stated in the Cleantech Group's Executive Brief, “The State of Water Innovation (2010)”: “Water innovation is on the rise, scarcity issues are gaining visibility and water policy is catching up — and so begins the floodgates of the water sector's opportunity.”

Although total venture capital investment dropped in 2009, according to that report the number of VC deals surprisingly increased. In analyzing such activity, the Cleantech Group breaks water technologies into three categories — Water treatment, wastewater treatment and resource management. Each claimed about a third of the money invested in 2009. Several of the companies receiving venture funding hold U.S. patents for water technologies, revealing a relationship between innovation, intellectual property and the availability of capital.

In the water treatment category, one of the top seven companies to raise venture funding, WaterHealth International (US), owns five issued patents related to ultraviolet water purification and disinfection technology. NEI Treatment Systems (US) holds at least one patent for a system of water treatment, Hydro-photon (US) holds five patents primarily for a hand-held water disinfection device, and Nordaq (FR) holds at least one patent for purification device for drinking water. Each of those companies received VC funding in 2009.

In the wastewater treatment category, AquaPure (US) holds one relevant patent for purifying and disinfecting water containing contaminants and MAR Systems LLC (US) holds three related patents for reducing inorganic contaminants, in particular mercury and arsenic, from waste streams.

In the resource management category, Sorbisense (DK) has one pending patent application directed toward a sampling device for measuring the chemical and biological properties of water. Again, each received funding in 2009. Historically an area largely avoided by the private sector, both investment and intellectual property in alternative water treatments for providing clean water is becoming increasingly vital.

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Innovation in water technology is not limited to start-up venture funds. Siemens Water Technologies holds more than 2,100 patents in water technologies, according to its website. A leading producer of water- and wastewater-treatment equipment worldwide, Siemens actually can claim title back to the 1913 invention of the chlorinator used for municipal disinfection of drinking water. More recently, Siemens Water Technologies applied for and was granted 16 water technology patents in 2007, 16 in 2008, 20 in 2009 and 13 so far in 2010, according to a search of the USPTO database. Its technologies range from wastewater treatment, water treatment and filtration, to desalination.

Formerly an issue for the public sector to address, the increased movement toward water technology investment and innovation in the private sector long has been anticipated due to the limited supply and well-known shortage of water worldwide. Due to the high demand for water in many areas of the world, water often is referred to as the "new oil". About 1.2 billion people currently are without drinking water. By 2025, it is estimated there will be a 40 percent increase in water consumption, and a third of the world's population will be affected by water shortages. The latter statistic is expected to rise to an alarming 60 percent by 2050.

Such critical needs are driving the development of novel water treatment technologies that are more effective and cost efficient in both the private and public sectors. The main areas of growth appear to be in technologies related to disinfection, infrastructure and desalination. Other growth areas include river bank filtration and water electrolysis.

Taking just one of those areas, a review of issued U.S. patents directed to "desalination" provides valuable insight regarding the innovation trend for desalination technology. Desalination is the process through which salts are removed from water. In the past it frequently involved energy-intensive processes only the oil-rich Middle East nations could afford. Desalination processes are becoming cost-competitive with other methods, however, due largely to advances in membrane and pretreatment technology. As a result, desalination is a more viable water treatment technology, fostering global investment in desalination's dramatic increase in recent years and the spread of the technology's use to Spain, England, the United States and Mexico.

That growth is paralleled by a recent escalation in issued U.S. patents. Up until 2008, issued patents with claims citing "desali-

nation" averaged seven or eight. In 2008, the number of issued patents jumped up to 22, followed by 18 in 2009. In 2010, 20 desalination-related patents already have been issued, and about 44 patent applications published in 2010 are now waiting in line to be granted. Clearly the need for clean water and investment in alternative water treatments are generating demand for innovation in desalination technologies.

What role can intellectual property play in moving innovation and water quality forward? As with other Cleantech areas, the role of intellectual property in advancing innovations in water technologies can be debated. Historically, research and development in water technology has been perceived as a "public good." If innovation does occur, it is not always possible to exclude the public from using the technology.

Water often is perceived as a free commodity, such that consumers typically do not want to pay more for it. The private sector is hesitant to invest in such areas because the investment cannot always be recouped. The ability to obtain patent protection on novel technologies, however, provides an incentive to the private sector to engage in water technology innovation.

On the other hand, because patent rights essentially convey a monopoly over the technology, use of alternative water technologies will be less available to the general public, and the price of water can be raised by those who own such rights. That conflicts with the social perception that water is a public good that should be available to all, and that novel technologies should not be withheld from people who need water.

In the end, it is better to grant patent protection than to not have the advancements in technology at all. Although patent rights may conflict with the social perceptions of water on a philosophical level, private sector innovation simply will not occur without an incentive to engage in research and development.

As communities struggle with the availability of safe drinking water, the overall trend in water technology is shifting away from more traditional treatments and advancing novel technologies. While new processes continue to emerge and become more cost effective, the availability of patents and other mechanisms to protect innovation will continue to provide incentives for private investment.

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