



FOLEY & LARDNER LLP

Water Technology U.S. Patent Landscape Annual Report

December 2013



Preface

“Water is life’s mater and matrix, mother and medium. There is no life without water.” ~Albert Szent-Gyorgyi

Water is central to life. Its necessity and growing scarcity are two of the main reasons why water technology and innovation is a vital industry in the U.S. and global economy.

Foley’s *Water Technology U.S. Patent Landscape Annual Report* (Report) analyzes U.S. patent activity in water technology sectors to identify the trends in water innovation. Identifying trends and innovation in water technology affects multiple industries within the U.S. economy, including government, business, environmental, and venture capital.

According to the U.S. EPA, Americans drink more than one billion glasses of tap water per day. The processes that occur to make this and other water use possible on a large scale should not be taken lightly. There are many underlying factors that threaten the availability of clean water such as climate change, chemical and microbial contaminants, infrastructure, and cost restraints. Federal and local government officials and agencies devote significant time and funding to developing technology that will protect our water and make the processing and production of it more energy and cost efficient. For these reasons, we look at the patent activity as one metric of current and future commercial environment. My colleagues share their brief perspective on *The Business of Water*, which follows this Preface.

For More Information

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The Business of Water

The current trends in water technology and innovation not only illustrate new business endeavors, but also new opportunities for government to regulate water quality.

For example, the emergence of (i) “smart” piping systems that can detect leaks, temperature changes, and other physical impacts, or (ii) “purple pipes” that carry semi-treated water for non-drinking/cooking activities, begs the question whether and how government agencies will regulate water quality.

This wave of technology has prompted the next generation of water quality regulation — born out of water scarcity issues and the pursuit of sustainable production methods.

Other sectors of the economy also recognize these opportunities and are taking steps to play a role in such developments. In the non-profit/NGO sector, organizations are developing new ways to measure water use to ultimately reduce water loss and improve water quality. Likewise, finance companies are acknowledging the value of accurate information regarding water use/quality and sustainability in making investment decisions. These finance companies have partnered with non-profits, educational institutions, and other entities to support business, research, and development initiatives.

The convergence between the next generation of water quality regulation, water scarcity, and the nexus between water and energy (for sustainability), will likely stimulate continued global innovation in new technology and the application of existing technology in new ways.

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Executive Summary

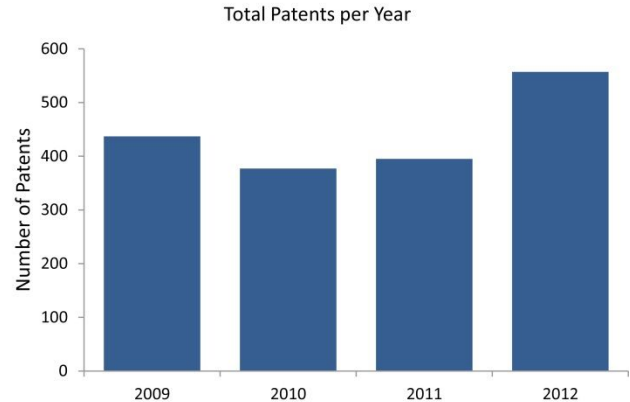
Foley's 2013 Water Technology U.S. Patent Landscape Report (Report) focuses on all U.S. utility patents that issued in 2010, 2011, and 2012. The prior edition of the Report covered 2008 and 2009. The general water technology categories of patents studied for this Report are:

- » Purification
- » Desalination
- » Metering
- » Irrigation
- » Groundwater

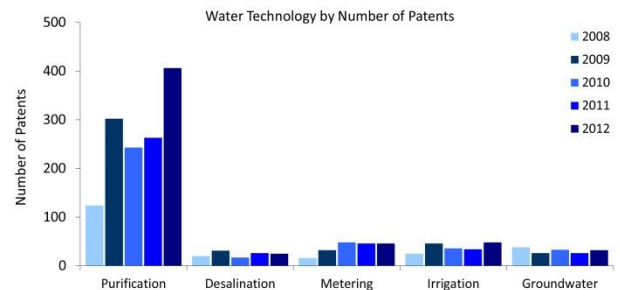
These categories were selected due to industry relevance and significant patent activity. In general, there was an increase in patent activity in 2012 compared to 2009. However, the total number of patents issued in the categories studied decreased from 2009 to 2010, and then increased from 2010 to 2011 and from 2011 to 2012.

Water Technology Patents Rebound After Decline

- » The number of water technology patents issued per year between 2009 – 2012 showed a decrease in 2010 followed by an eventual increase:



- » In 2009, 471 water technology patents issued (in comparable categories reviewed in this Report).
- » In 2010, 377 water technology patents issued, which was a 19-percent decrease from 2009.
- » In 2011, 395 water technology patents issued, which was a five-percent increase from 2010.
- » In 2012, 557 water technology patents issued, which was a 41-percent increase from 2011, and a 15-percent increase from 2009.
- » The large jump between 2011 and 2012 may be attributed to the rise in purification activity.



- » Between 2009 and 2010, this decline occurred in purification, irrigation, and desalination, but not metering and groundwater.

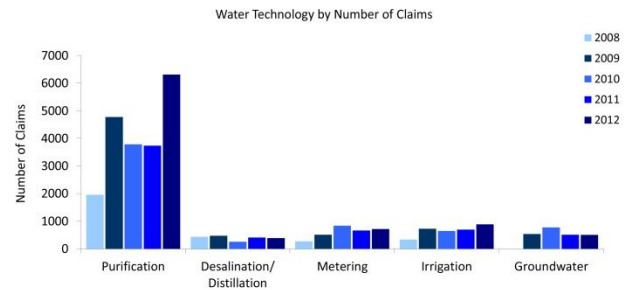


- » Between 2010 and 2011, this decline occurred in groundwater, irrigation, and metering, but not purification and desalination.
- » Between 2011 and 2012, patent issuance increased for all categories except metering, which remained the same.
- » By 2012, patent activity in all categories except desalination increased compared to 2009.
- » This decrease may have been caused by the recent recession, which started in late 2007. Generally, most patents take between two and a half to three years or 30 – 36 months for an application to undergo prosecution and issue as a patent. The actual time depends on the technology area and other factors. Many patents issuing in 2010 and 2011 were being filed in 2007, 2008, and 2009. During this time, many companies were reducing R&D budgets, R&D staff, and legal expenses. These recession-related reductions may have affected the patents issuing in 2010 and 2011.

Water Purification Patents Again Lead the Way

- » Among 377 patents issued in **2010** across the five categories of the water technology landscape studied, the category that produced the most patents and the most patent claims was purification (243 patents and 3,787 claims in 2010). Purification also led our last Report. All other categories trailed significantly.
- » Among the 395 patents issued in **2011**, the category that produced the most patents and the most patent claims was purification (263 patents and 3,736 claims in 2011). All other categories trailed significantly.
- » Among the 557 patents issued in **2012**, the category that produced the most patents and the most patent claims was purification (406 patents and 6,310 claims in 2012). All other categories trailed significantly.
- » In 2010, 2011, and 2012, the water technology categories that produced the fewest patents and the

fewest claims were desalination (17 patents in 2010, 26 patents in 2011, 25 patents in 2012) and groundwater (33 patents in 2010, 26 patents in 2011, and 32 patents in 2012).



Representing areas of strong interest and investment between 2010 – 2012, the subject matter categories in which the most patents and **claims** were granted were:

- » Housings or structures components for water (97 patents, 1,386 claims)
- » Pool or pond filtration devices (60 patents, 894 claims)
- » Materials and compositions for water treatment (53 patents, 809 claims)
- » Purification devices for faucets, sprayers, dispensers, or appliances (50 patents, 735 claims)
- » Controls or instruments for water treatment systems/devices (44 patents, 687 claims)

Potential Patent White Space in Metering

- » “First action allowances” are instances where the USPTO’s first substantive action on the merits was a Notice of Allowance, not a rejection.
- » First action allowances of subject matter claimed in granted patents could be used as one indicator of potential patentable water technology white space. Generally, the more first action allowances that issued for a given type of claimed subject matter, the more reliable indicator of potential white space.
- » In 2010, the USPTO granted approximately 14 percent of the patents studied under a first action



allowance, indicating the possibility that a certain scope of patentable water technology white space still exists, despite the advances in patents granted over the years. This was a slight decrease from the 18 percent found in the Report for 2009 (for comparable categories).

- » This trend changes in 2011, when the USPTO granted approximately 21 percent of the patents studied under a first action allowance, indicating possible white space. This is an increase from the 14 percent found in the Report for 2010.
- » In 2012, the USPTO granted approximately 15 percent of the patents studied under a first action allowance. This is a decrease from the 21 percent found in the Report for 2011.
- » It is not just the “newest” water technology areas that appear to have available white space. The areas having the most first action allowances between 2010 – 2012, and thus the greatest white space according to this indicator, were:
 - » Metering (25 percent)
 - » Purification (18 percent)
- » The category that had the fewest number of first action allowances from 2010 – 2012 was desalination (10 percent).

Licensing Opportunity Possible for Corporate Entities

- » The patents owned by individuals could represent an area where new technologies may be available for licensing by corporate entities or others looking for an entry point in the water technology field, or companies looking to expand an existing water technology presence.
- » In **2010**, 27 percent (on average) of the patents were unassigned when issued, indicating that they were owned by individuals and not corporations. This is significantly more than the more than 21.1 percent of patents granted to individual inventors in 2009.

- » In **2011**, 27 percent (on average) of the patents were unassigned when issued. This is comparable to the number of patents granted to individual investors in 2010.
- » In **2012**, 20 percent (on average) of the patents were unassigned when issued. This is slightly less than the patents granted to individual inventors in 2011.
- » Corporate entities continued to hold higher shares of patents in the categories of metering, where the specialization and sophistication of the technology and the market barriers to entry are relatively high.
- » The highest percentage of individually owned patents was in the area of irrigation.

Methodology

- » The Report focused on all U.S. utility patents that issued in 2010, 2011, and 2012 and that were directed to one of five different water technology categories. Keyword searching for each of the water technology categories studied was conducted in the USPTO’s database of patents granted during 2010, 2011, and 2012. The searches were not limited to any particular patent classification(s) assigned by the USPTO. Rather, the Report searched for applicable keywords in the abstract of each patent.
- » The patents identified by the search were then individually screened for applicability to the relevant water technology category, and cross-referenced among the other categories to more accurately categorize any patents that appeared under two or more categories.
- » In addition, patents that were directed to relatively small-scale items (e.g., decorative fountains) or that were primarily directed to other technologies where the water application was a secondary or ancillary aspect (e.g., fuel cells, semiconductors, certain kitchen appliances, and dental and medical devices) were not considered in this Report. These technologies are understood to be relevant in the broader water technologies landscape and may be included in future editions of the Report.



- » Each of the remaining U.S. patents was studied to determine its ownership and origin; the number, type, and subject matter of claims; and whether the patent granted under a first action allowance.

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