



THINK FORWARD

Green Tech IP after Withdrawal from the Paris Climate Agreement

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August 14, 2017

The Paris Climate Agreement sets forth goals for the reduction of greenhouse gases with the magnitude and timeline for such reduction being self-imposed by each signatory country.¹ The withdrawal of the United States from the agreement in June raises the question as to what effect this withdrawal may have on the development of intellectual property (IP) associated with "Green Technology."

Conclusion

Innovation in the U.S. may be impacted with a decrease in the number of patent applications filed by small entities and individual inventors. An increase in patent activity from large entities or by foreign entities would be needed to offset this impact.

Discussion

Analysis of the current state of the IP landscape for Green Technology may establish a baseline from which comparisons and conclusions can be drawn. An IP landscape provides insight into the technical developments relative to a technology by analyzing issued patents and published patent applications that are still undergoing examination. The general process for creating an IP landscape involves the use of keywords to identify patent documents that incorporate such keywords in their title, abstract, and/or claims.² Initially, the keywords are selected to provide a broad data set that globally identifies strategic players, timelines, priority jurisdictions, and key concepts associated with the technology ("Data Mining"). The landscape analysis can then be narrowed to specific technical concepts by incorporating additional keywords that are more focused towards the desired technology ("Text Mining").²

Green Technology may be defined as technology capable of reducing or reversing the impact that human activity has on the environment. In this sense, Green Technology includes such concepts as sustainable development, energy conservation and management, alternate or renewable energy, and environmental remediation or waste reduction. Within the confines of these concepts, the energy value chain associated with the generation, change, distribution, storage, and usage of energy, may be used to define keywords. Figure 1 lists keywords that can be used to generate an IP landscape.³

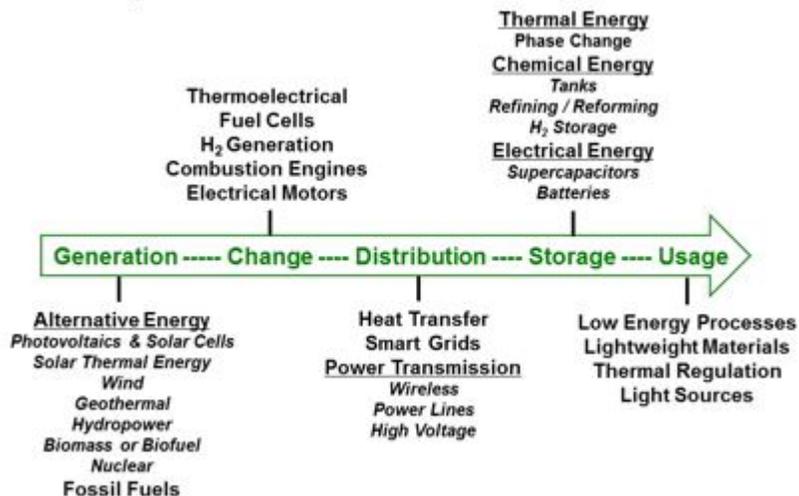


Figure 1. Keywords for Different Sectors in Energy Value Chain.³

The energy generation and storage sectors represent important sectors for “Green Technology” because they deal with alternative energy sources and the storage of energy via phase change materials and batteries. Using keywords associated with the energy generation and storage sectors of the energy value chain in a global patent search yields about 1.43 million documents, with the energy storage sector accounting for 72.3% of the documents.

The patent documents identified for the energy generation sector can be subdivided into the various alternate energy types that define the sector (see pie chart in Figure 2A). Technology development related to solar energy and nuclear energy exhibit the greatest activity over the last two decades, accounting for 43.4% and 30.0% of the documents, respectively. Wind energy is the next largest energy type accounting for 14.6% of the documents, with the other alternative energy types, namely, biofuel, hydropower, geothermal, and solar thermal power accounting for 5% or less of the documents. In comparison, the patent activity associated with fossil fuels over the same time-period is very low, accounting for only 1.2% of the documents.

The patent documents identified for the energy storage sector can be subdivided into storage concepts relative to thermal energy, chemical energy, and electrical energy that define the sector (see pie chart in Figure 2B). In this sector, technology relevant to batteries accounts for 89.1% of the identified documents, while phase change materials account for another 3.3% of the identified documents.

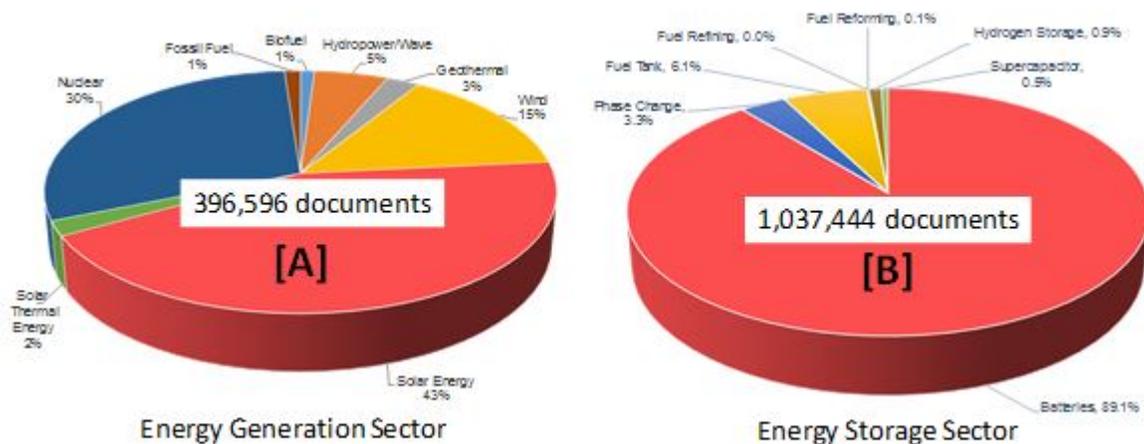


Figure 2. Subdivision of Patent Documents in Energy Generation and Energy Storage Sectors

The origin of the patent documents may also be determined in the landscape analysis (see timeline in Figure 3). The 1.43 million patent documents identified in the combined energy generation and storage sectors can be reduced into 574,209 patent families (i.e., applications addressing the same invention) in which the first patent application filed determines the country of origin. The number of original patents

filed in the four largest economies (US, CN, EP, & JP) were similar in magnitude until about 2004, when the number of patent applications filed in China began to outpace the applications filed in the other jurisdictions. In addition, the number of patent applications filed in the U.S., Europe, and Japan remained relatively constant over the past two decades with a slight peak around 2012-2013, while the number of applications filed in China continued to grow through 2016. Since the number of patent families that originate from foreign jurisdictions (e.g., CN, EP, & JP) greatly exceed the number of inventions originating from the U.S., the withdrawal of the U.S. from the Paris Climate Agreement should not have a substantial impact on the number of patent applications being filed globally.

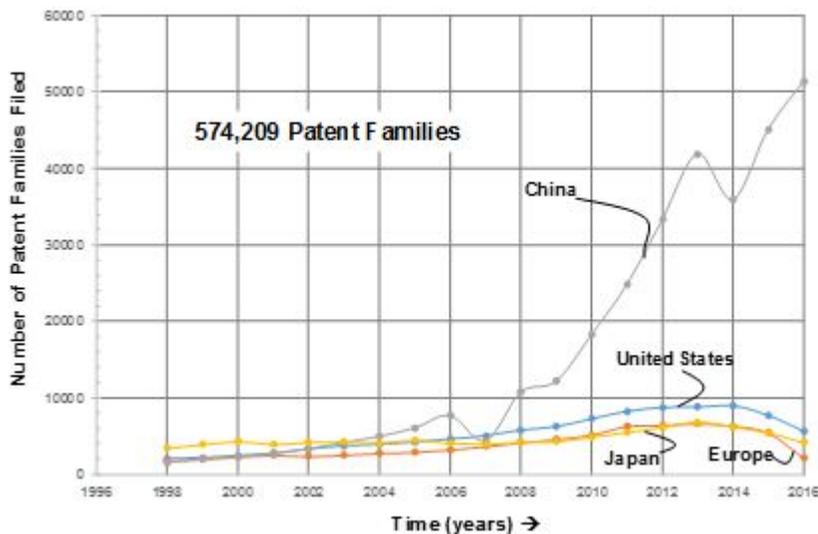


Figure 3. Timeline of Patent Families Arising from the Energy Generation and Storage Sectors

The owners of patent documents in both the energy generation and storage sectors are discernable from the landscape analysis. For example, in the area of batteries, the five entities having the largest number of patent families assigned to them include Samsung SDI Co. Ltd., Toyota Jidosha KK, Samsung Electronics Co. Ltd, Sony Corporation, and Sanyo Electric Co. Ltd. Each of the alternative energy types listed in the energy generation sector exhibit similar results in that the entities owning the largest number of patent families are medium to large multinational companies. Most of these medium/large entities are U.S. or foreign corporations that market products globally and are expected to continue their research and development efforts in Green Technology. Thus, the withdrawal of the U.S. from the Paris Climate Agreement should have minimal impact on research and development in Green Technology conducted by these companies.

However, the number of filings by small entities or individual inventors may be affected by the withdrawal of the U.S. from the Paris Climate Agreement. Overall, 42,781 entities own one or more of the battery-oriented patent documents. In addition, each of the alternate energy areas in the energy generation sector include a large number of owners. For example, in the areas of solar energy, nuclear, and wind, the number of entities that own one or more patent documents in these areas is 52,314, 28,572, and 30,378, respectively. In fact, even the smallest area in the energy generation sector, i.e., biofuel, includes greater than 4,200 assignees. Thus, in the battery area of the energy storage sector, as well as in the various alternative energy source areas, a significant number of small entities own a limited number of inventions (e.g., 1-3 patent families). The number of small entities or individual inventors that file patent applications within the United States may begin to decrease if a market is not readily available for their product(s).

Endnotes

1. Paris Agreement, United Nations – Framework Convention on Climate Change, http://unfccc.int/paris_agreement/items/9485.php.
2. Weiss, K.; Spink, M., “Intellectual Asset Management – Key Areas to Consider Prior to Product Launch, Proceedings of IEEE TEMSCON 2017, Santa Clara, CA, pages 168-173, June 2017.

3. Luther, W., "Application of Nanotechnologies in the Energy Sector", vol. 9, publisher: HA Hessen Agentur GmbH, Wiesbade, Germany, pages 1-82 (2008).

Further information regarding "*The Evolving IP Landscape for Green Tech*", is published by the author in Intellectual Property Magazine (July/August), pages 37-38 (2017).

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