Clean Energy Patent Growth Index

Presented by the Cleantech Group- Heslin Rothenberg Farley & Mesiti P.C.

April 23, 2014

CLEAN ENERGY PATENT GROWTH INDEX 2013 Year in Review

U.S. patents for Clean Energy technologies in 2013 were at an all time high of 3175, which was 114 more than 2012. GM took the annual Clean Energy Patent crown back from Toyota after lending it to the Japanese automaker last year and GE the year before. Solar patents led all other technologies for the first time, ending the long reign of Fuel Cell technologies back to 2002. The United States led all other countries in the number of granted U.S. clean energy patents followed by Japan and then a slew of others. California again led U.S. States while Michigan jumped and New York fell, swapping the second and third spots from 2012.

The CLEAN ENERGY PATENT GROWTH INDEX (CEPGI), published quarterly by the CLEANTECH GROUP at Heslin Rothenberg Farley & Mesiti P.C. provides an indication of the trend of innovative activity in the Clean Energy sector from 2002 to the present. The CEPGI also ranks the leaders among Clean Energy Patent Owners, along with the Countries and the U.S. States which receive the most clean energy patents.

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The granting of patents by the United States Patent and Trademark Office (PTO) is often cited as a measure of the inventive activity and evidence of the effectiveness of research & development investments. Patents are considered to be such an indicator, because to be awarded a patent, it requires not only the efforts of inventors to develop new and non-obvious innovations but also successful handling by patent counsel to shepherd a patent application through the PTO. Thus, the granting of a patent is an indicator that efforts at innovation have been successful and that an innovation had enough perceived value to justify the time and expense in procuring the patent.

The CEPGI (shown below annually) tracks the granting of U.S. patents for the following sub-components: Solar, Wind, Hybrid/Electric Vehicles, Fuel Cells, Hydroelectric, Tidal/Wave, Geothermal, Biomass/Biofuels and other clean renewable energy.

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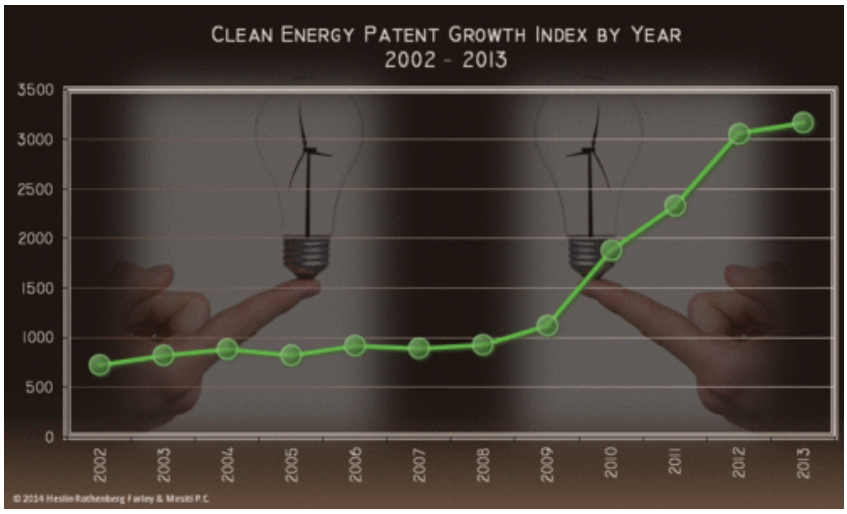
CLEAN ENERGY PATENT



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U.S. patents for Clean Energy technologies in 2013 were at an all time high of 3175, which was 114 more than 2012, which although bringing Clean Energy patents into record territory was the smallest year-to-year increase since the 2007 to 2008 bump of 32.

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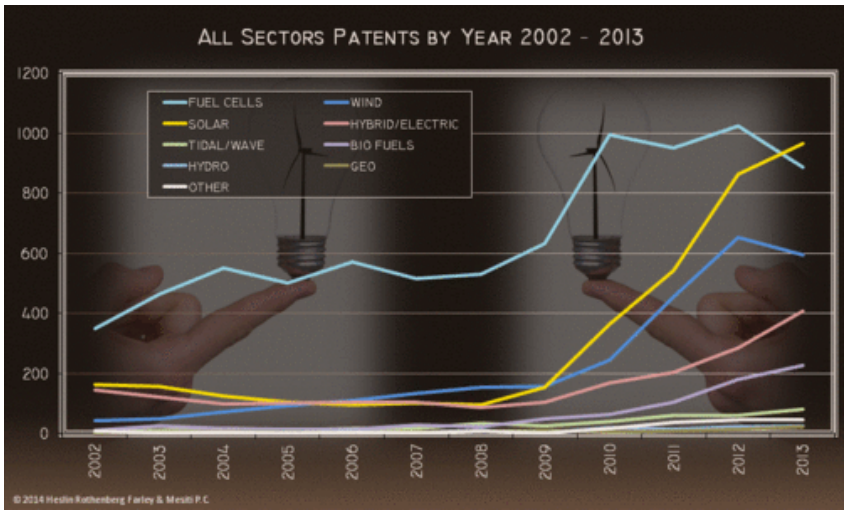
As depicted in the below breakdown of the CEPGI by its sub-components, Hybrid/Electric Vehicle technologies topped other major sectors on a percent basis with a 43 percent increase followed by Biomass/Biofuel technologies up 26 percent and Solar technologies up 12 percent. Tidal/Wave energy was up 21 patents (34%) while Geothermal technologies jumped 7 patents (a small number, but a 50% increase). The number of U.S. Wind patents granted in 2013 fell relative to 2012 which was the summit of a three year climb as depicted in the chart.



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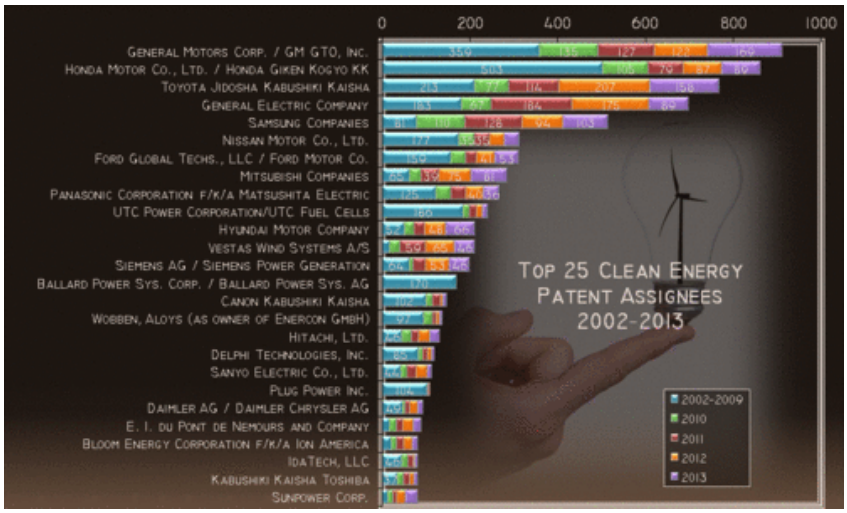
Solar was the big winner among the components of the Clean Energy Patent Growth Index in 2013, overtaking Fuel Cells for the first time since 2002 with 965 patents - which was lower than the all time high of 1024 patents awarded to Fuel Cells in 2012

- but still more than 70 above the total of 886 in 2013 for Fuel Cells. The Fuel Cell sector had an impressive run of year-to-year increases dating back to 2002 with small dips in 2005, 2007 and 2011 while dominating the other technologies until the rapid ascent of Solar technology patents starting in 2009. After a rapid climb tracking that of the Solar sector, Wind patents in 2013 dropped for the first time since the tracking of the CEPGI began and after jumping around 200 each of the last two years. Hybrid/Electric Vehicle patents are on a roll since 2009 and jumped 123 patents to 409 granted patents by the USPTO. Biomass/Biofuel patents are also on a roll up 47 patents relative to the year before to 226. Biomass/Biofuls continue to pull away from Tidal technologies at 82 and Geothermal at 21. The old man of renewable energy, Hydroelectric technologies, continues to plug along at the bottom of the heap . . .

The top patent owners since 2002 are shown below, ranked relative to total number of patents, and also annotated to show the particular totals for the last several years and a cumulative total for earlier years:



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GM took the overall lead in Clean Energy patents since 2002, knocking Honda out of the top spot that it has enjoyed since tracking began on the strength of 169 Clean Energy patents in 2013. Toyota and GE held at third and fourth places as in 2012 while the holders of places 5 to 7 (i.e., Samsung, Nissan and Ford) retained their spots.

In contrast, Ballard, easily in the top ten until recent years, fell to 14th place. It loses places to Hyundai, Vestas and Siemens all in 2013. It was only a matter of time, though; Ballard hasn't received a Clean Energy patent since 2009, and only 7 since 2007. We have recalculated the patent totals for the Mitsubishi companies and Panasonic. When we include the diverse Mitsubishi companies (Mitsubishi Heavy Industries, Car, Electric, Truck, etc.) they would have been in 10th place in 2012 and place 8th in 2013. Mitsubishi is gaining ground fast with a over half of its tracked patents in the last two years. We originally placed Panasonic at 13th place in 2012 but when accounting for the patents it used to receive as Matsushita Electric, it placed 9th in 2012 and remains there for 2013. This chair shuffling also seems to further cement the auto industry's hold on the top ten - despite the rapid growth in Solar technology patents which vaulted this category to the lead in 2013. Car companies accounted for 5 of the top ten Clean Energy patent holders and six if you count Mitsubishi, though many of their patents come from their Heavy Industries division in Wind technology and elsewhere. But don't overlook Hyundai knocking on the door to the top ten at 11th and 66 patents in 2013 alone.

Looking only at 2013 (below), around 1500 entities contributed to the record total of Clean Energy patents in 2013, which is hundreds more patent grantees than 2012.

GM jumped two places and took the annual Clean Energy patent crown back from Toyota after lending it to the Japanese automaker last year and GE the year before. GM led the Prius maker by 11 patents but Samsung trailed these two by over 50 patents. GE had a huge drop last year, from 175 to 89 Clean Energy patents, while dropping from second to fourth in the annual race. Samsung was up 9 patents from 2012 and took third place topping GE and Honda. Honda tied for fourth place gaining 2 patents over the previous year before to arrive at 89 Clean Energy patents and was again followed by Mitsubishi (81), up 6 compared to the year before. Hyundai (66) and Ford (53) both jumped two places to trail Mitsubishi in Clean Energy patents in 2013. Vestas fell to the ninth spot from the 7th spot the year before. Siemens rounded out the top ten in 2013 with 46 patents - dropping from 8th place the year before. As noted previously, despite the explosion in Solar patents, no Solar-centric firm cracked the top ten in granted U.S. Clean Energy patents.

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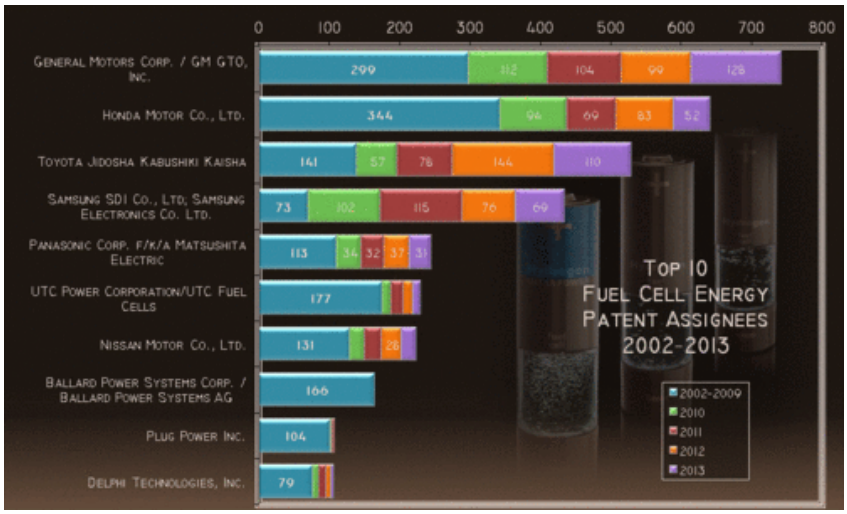
We will now look in more detail at each of the CEPGI's major components along with the top patent owners and geographical areas.

As depicted below in the Fuel Cell patent owner breakdown, GM took the annual Fuel Cell crown for the third year in a row which is interesting in and of itself since Honda and Toyota, the second and third place all-time Fuel Cell patent place holders, will be coming out with Fuel Cell cars in 2015 while GM appears to be focused (at least externally) on the Volt and Cadillac ELR series hybrids with the Chevy Spark EV also hanging around.

As indicated, GM remained ahead of Honda for the third year to retain the all time Fuel Cell leader crown, and unlike in 2012, GM also took the annual Fuel Cell crown - again from Toyota, last year's winner. GM had 128 Fuel Cell Patents to Toyota's 110 in 2013. Samsung (69) trailed Toyota by over 40 Fuel Cell patents, but led Honda (52) by 17 and Panasonic (31) by over 30 in 2013. Hyundai (not depicted above) was next in 2013 with 29 Fuel Cell patents granted followed by Nissan with 22. Bloom Energy had 13 Fuel Cell patents which was 7 less than the year before while Daimler was the grantee of 12 fuel cell patents, three less than 2012. Societe Bic and UTC rounded out the 2013 class of top Fuel Cell patent leaders with 11 granted.

Returning to the overall totals for Fuel Cells, the top four overall Fuel Cell patent holders held on to their respective spots. Panasonic jumped a few spots bumping Nissan down to 7th place overall for Fuel Cell patents. UTC, Ballard, Plug Power and Delphi remained in the top ten despite little (UTC, Dephi) or no (Ballard, Plug Power) contribution in 2013 to their Fuel Cell patent totals. UTC is notable in that it sold its Fuel Cell business to Clear Edge Power. Approximately 300 different entities were granted Fuel Cell patents in 2013.



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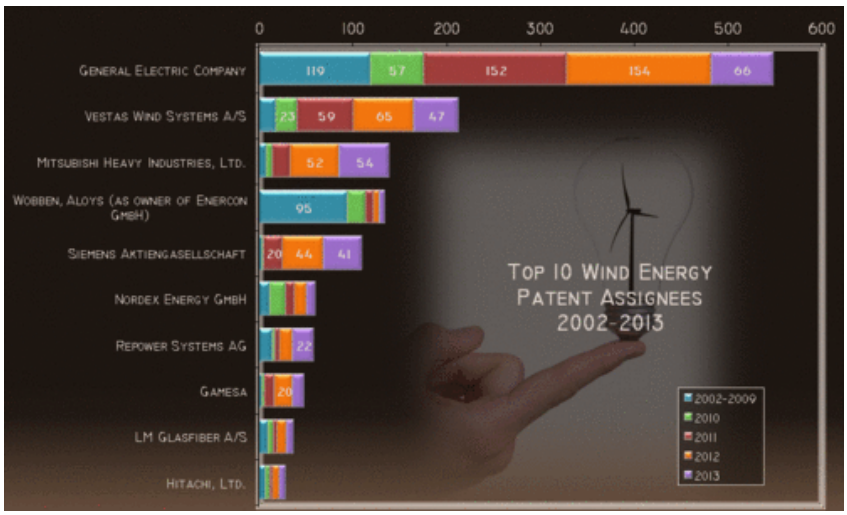

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GE took the annual Wind patent crown for the eighth year running despite dropping almost 90 patents relative to the previous year, thereby showing its dominance in the Wind patent race. In contrast to the past few years, Mitsubishi, which moved up two spots to second, was within striking distance of GE (66) at 54 Wind patents in 2013. Vestas trailed by 7 at 47 patents and dropped a spot in the annual rankings to third. Siemens (41) was again in fourth place in 2013 and led REpower by 19 Wind patents. Repower's 22 Wind patents were almost twice the amount of Gamesa (12), its nearest rival. Nordex Energy had 9 Wind patents while LM Glasfiber had 8. Newcomer Modular Wind Energy had 7 patents.

Looking at totals back to 2002, GE still leads over Vestas, while Aloys Wobben (of Enercon) and Mitsubishi swap places relative to their finishes in 2012. Alloys Wobben still hangs on for fourth despite much lower current annual patent counts (i.e, 5 in 2013) than rivals, such as fifth place Siemens. The rest of the cumulative top-ten positions mirror those of 2012 except for the different placement of Mr. Wobben.

Over 300 different entities were granted wind patents in 2013.

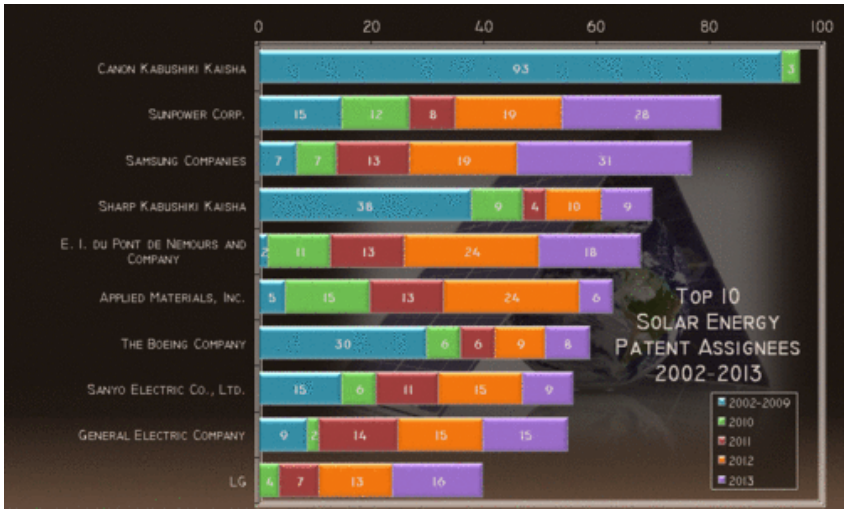
In the much less predictable annual Solar patent race, Samsung took the annual patent crown with only 31 patents. As indicated below, Samsung jumped to third in the cumulative Solar patent grantees since 2002. The title continues to be owned by Canon which had no new Solar patents. As is evident from the patent totals of the annual winners of the other technologies above and below, the Solar industry, or at least Solar Research & Development, is less concentrated than the others. This results in a much lower annual total providing a win to the annual patent crown leader in Solar - Samsung in the case of 2013.

Sunpower (28) came in second trailing Samsung by three Solar patents. Du Pont took third after tying for first in 2012 with Applied Materials - which dropped beyond at least 20 other Solar patent grantees with only 6 Solar patents in 2013. IBM went from 10th place to fourth in 2013 despite few being aware of its Solar Research & Development. GE tied its 2012 Solar patent total at 15 but lost by one patent to LG (16).

In a multiway tie, Varian, Miasole, First Solar and Industrial Technology Research Institute had 10 patents each. Sanyo and Sharp each had 9 Solar patents in 2013 while Boeing, Kyocera, Precurser Energetics and GTAT Corporation had 8 Solar patents granted.

Looking at the cumulative chart, Canon still teeters at the top while Sunpower and Samsung are coming on strong - both with significant 2013 contributions as described above - and both jumping several spots in the rankings after 2012. Sharp dropped from second to fourth on the weakness of its recent patent totals while Applied Materials went from third to fifth. Whereas Canon used to have a huge lead in Solar patents since 2002, aside from Canon and Sharp most of the Solar patents owned by the leaders have been granted in the last few years resulting in much more fluidity in the cumulative Solar rankings relative to some of the other technologies and the overall title race keeps getting tighter. This has also led to a very tight group in the top ten, as shown by the preponderance of longer bars (and associated coloring) in the overall Solar chart in contrast to some of the other technologies. Despite adding a few patents, Boeing dropped two spots to 7th overall and Sanyo fell to 8th. GE maintained its place while LG took 10th place overall from Emcore.

Over 600 different entities were granted Solar patents in 2013.



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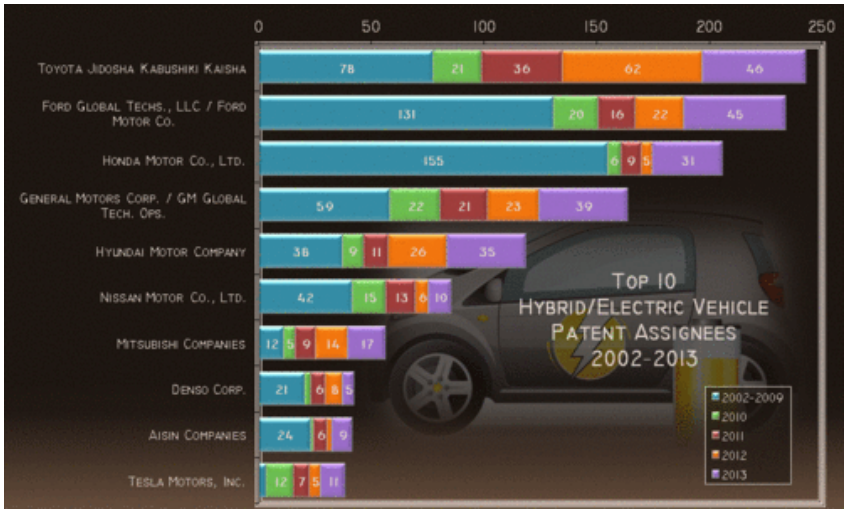
The "Prius" effect has vaulted Toyota to the top of the 2013 and cumulative Hybrid/Electric Vehicle patent rankings since 2002. Ford, however, is right on Toyota's tail trailing by only one HEV patent in 2013 and nine patents overall.

For 2013, GM (39) was close to the leaders, just behind Ford (45). Hyundai (35) and Honda (31) were spaced apart from each other and GM, respectively, by only 4 patents. A bigger gap separated Kia (17) and Mitsubishi (17) from Honda. Tesla hit the 8th spot in 2013 followed by Nissan and Bosch both with 10 Hybrid/Electric Vehicle patents in 2013tying for the 9th spot.

In the cumulative rankings, the top six places remained constant in 2013 relative to 2012. However, the bottom four spots of the top ten HEV U.S. patents were scrambled. Mitsubishi debuted in the top ten in seventh place while Hitachi fell out of the top ten. The remaining top ten finishers (i.e., Denso Corp, Aisin and Telsa) in the cumulative Hybrid/Electric Vehicle patent rankings fell a notch in 2013 relative to 2012.



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Also, although not depicted above, Ocean Power Technologies continues to lead in the Tidal/Wave sector since 2002 picking up 5 patents in 2013 and has a total of 24 since 2002. Mitubishi and Rohrer Technologies had three patents in 2013 and seven entities had two. Over 60 other different entities had one patents in this area last year. In Hydroelectric patents, Kenneth Millard had 3 patents, OpenHydro group had 2, and over 20 other entities had a single patent.

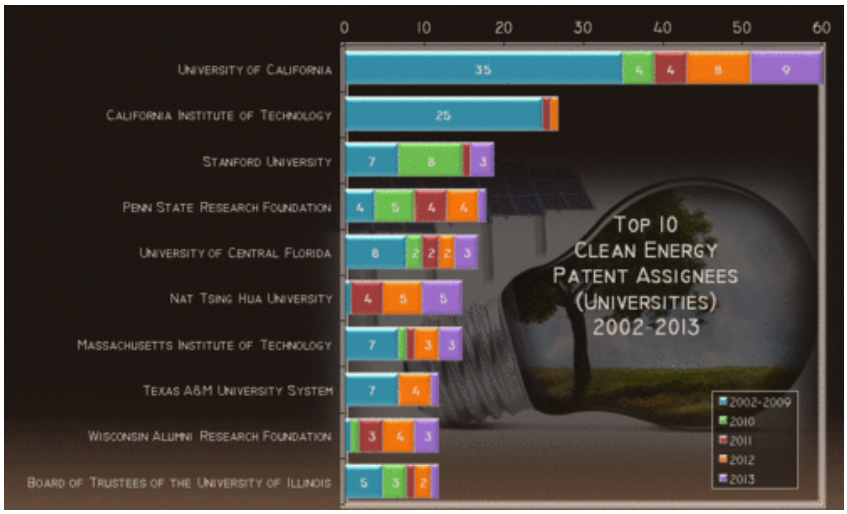
Three Geothermal patents were granted in 2013 to Michael Parrella while 19 other entities each received one patent. Kalex, LLC continues to lead in Geothermal patents (8) overall since 2002 despite not having any patents in 2008-2013. Ormat stays in second with two more patents in 2013 for a total of 6. Canyon West picks up another patent for a total of 4, and GE, Kimberly Peacock, Michael Parrella and Nuovo Pignone S.p.A. each have 3 total Geothermal patents since 2002.

In the Biofuel/Biomass area, the 2013 race once again went to Heliae Development. A newcomer in 2012, Heliae had 9 patents, while KiOR, Inc received 7 for second, one more than Virent with 6. Chevron and Menlo Energy Management tied for fourth with 5, while Honda, The University of Texas and Rockwell Automation each had 4. Heliae's 28 total patents in 2012 and 2013 were enough for the overall crown. Chevron remains in second with 10. UOP was third with 9 and Rockwell and Wisconsin Alumni Research Foundation each had 8.

Focusing solely on Universities, in 2013, the University of California again led all challengers with 9 patents (up one) while Nat Sing Hua University of Taiwan again had 5 Clean Energy patents to grab second place, tied with The University of Texas. There was a two-way tie for fourth place by National Central University (from Taiwan) and National Taiwan University. Seven universities had three Clean Energy patents in 2013, including: the University of Western Ontario, Stanford, Wisconsin, University of Central Florida, MIT, Tsinghua University, and the University of

Southern California. Over 80 additional Universities had Clean Energy patents in 2013.

As indicated above, the 2013 patents are shown in purple in the chart below while the chart as a whole shows the cumulative top ten patent grantees since 2002. As is evident from the Cumulative chart, the University of California continues to lead overall in the number of patents granted since 2002 followed by the California Institute of Technology. Stanford and Penn State Research Foundation swapped the second and third spots. while Central Florida stayed in fifth place. Nat Tsing Hua University displaced MIT from sixth place, moving up from 10th. Texas A&M also dropped a spot to 8th. Wisconsin joined the top ten in 9th place while the Research Foundation of State University of New York dropped out of the top ten, having only one Clean Energy patent in 2013. The University of Illinois rounded out the top ten university Clean Energy patent grantees.



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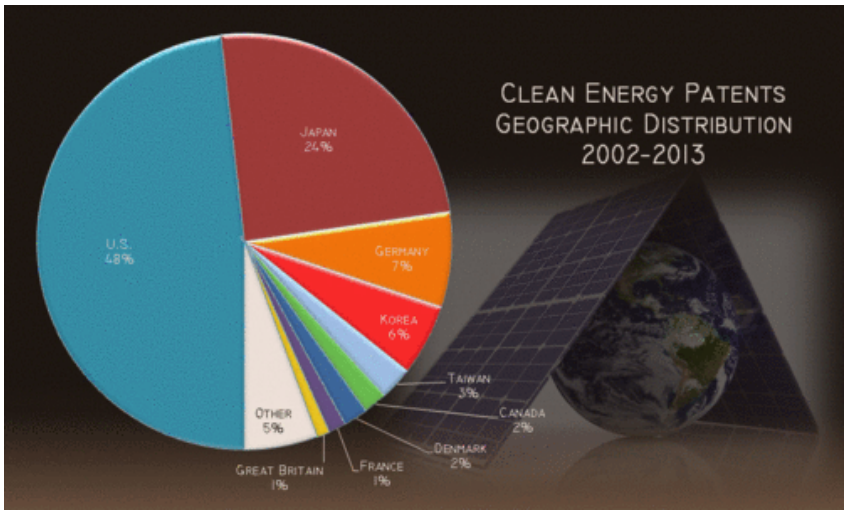
Turning to the geographical extent of U.S. Clean Energy patents, U.S. patent owners had slightly less than the rest of the world in the number of U.S. patents granted in the Clean Energy field over the period 2002-2013 with 48 percent of the granted U.S. patents as depicted below. Patent applicants from Japan (24 percent) and Germany (7 percent) were issued the second and third largest number of U.S. patents since 2002 with Japan's percentage dropping two points and Germany one. South Korea, Taiwan, Canada, and Denmark followed as depicted.



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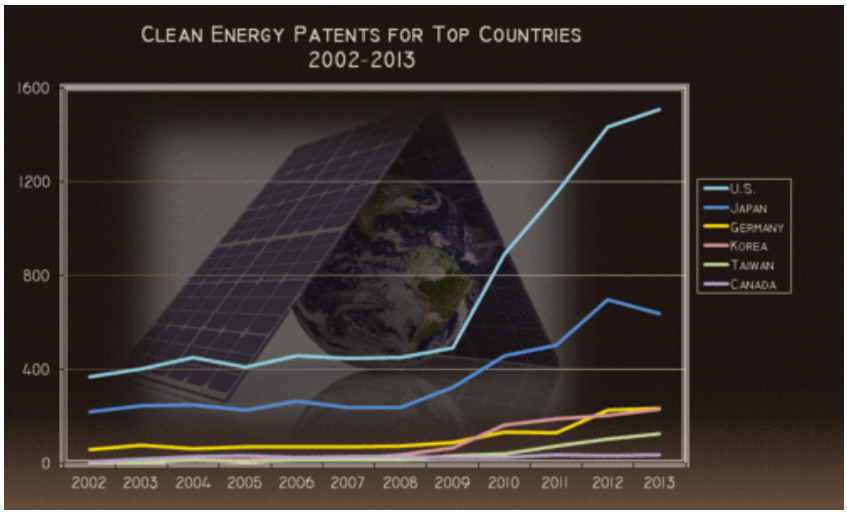
In 2013 U.S. entities had less Clean Energy patents than the combined total of all other countries receiving Clean Energy patents in the United States by a margin of 1668 to 1507, up 73 and 41 respectively relative to 2012. As depicted below in the line chart, the U.S. and Japan continue to dominate all others in the number of granted U.S. Clean Energy patents. Among the countries depicted, the U.S. has the sharpest upward trajectory jumping over 70 patents relative to 2012 while Japanese companies had 60 less granted Clean Energy patents than the year before. As illustrated, the U.S. has accelerated rapidly since 2010 with the other depicted countries having much less pronounced trajectories.

As indicated in the top ten chart below, Germany had six more patents in 2013 compared to 2012 while Korea jumped 26 patent grants. Taiwan was up 22 Clean Energy patents while Canada only managed four more than 2012. Denmark had 68 Clean Energy patents in 2013 which was 17 less than the year before. France (54) and Great Britain (33) took the eighth and tenth spots with France jumping 11 and its erstwhile rival having 8 Clean Energy patents more than the previous year. China took ninth place with 42 cleaning energy patents in 2013 which was 15 more than the previous year. Spain tied its cross channel neighbor at 33 patents, down one. It is interesting to note that Germany entities had about as many U.S. Clean Energy patents as the rest of the top European countries combined. Also, other than U.S. entities, Korea and Taiwan were up the most in absolute number of Clean Energy patents.



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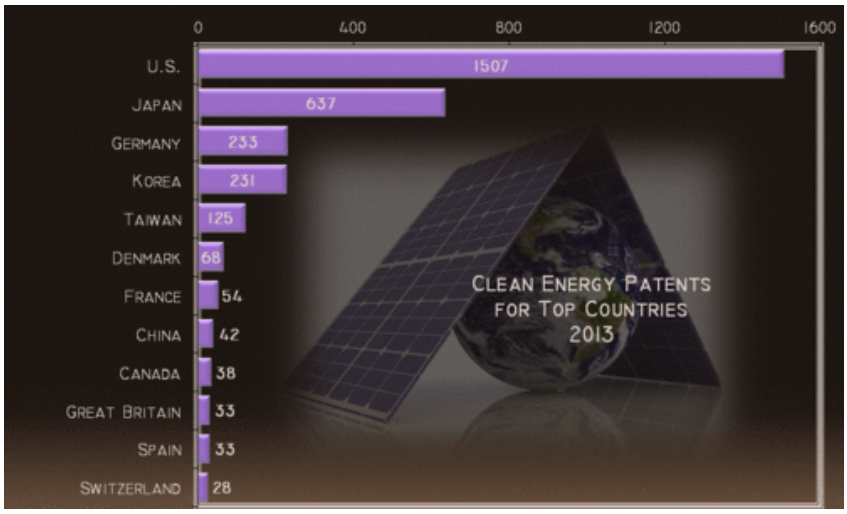

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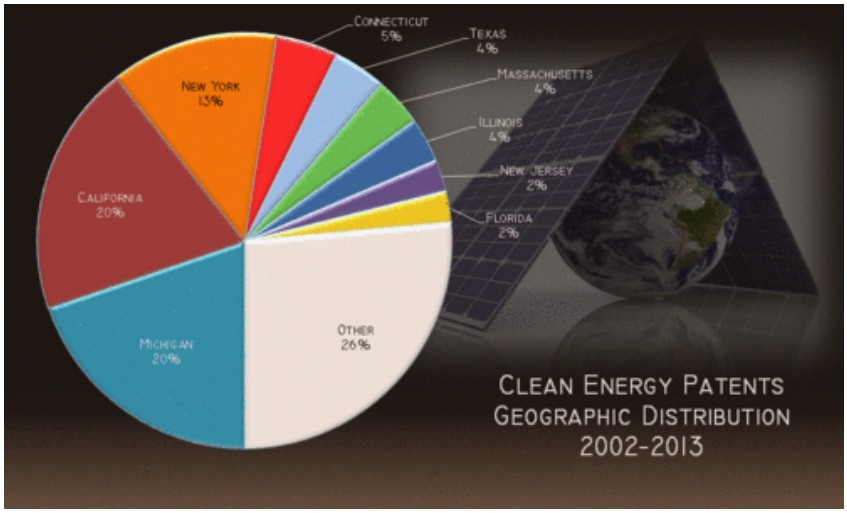
The big U.S. industrial states also continue to dominate the Clean Energy patent rankings. California jumped a percentage point to a near-tie with Michigan and lead the U.S. states in the Clean Energy area since 2002 at 20 percent of the U.S. Clean Energy patents. New York dropped a point to 13 percent of the U.S. Clean Energy patents granted since 2002. Michigan's patent strength rests largely the Fuel Cell and Hybrid/Electric Vehicle activities of U.S. car manufacturers. California entities have patents in Hybrid/Electric Vehicles, Solar technologies and Fuel Cells, among others, and New York companies have patents in Wind technologies and Fuel Cells. Connecticut has 4 percent of U.S. entities' granted Clean Energy patents since 2002 with most of those being Fuel Cell patents to UTC. Texas, Massachusetts and Illinois all had four percent while, Florida and New Jersey followed.



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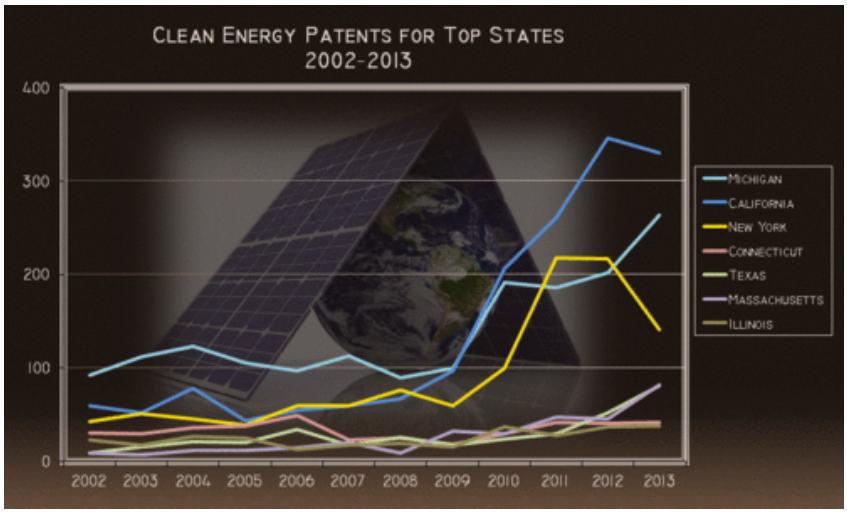
Looking at 2013 and the line chart below, California stopped its meteoric rise and dropped 16 patents for the first drop in Clean Energy patents in the Golden state since 2005. New York also took a plunge of over 90 patents largely attributable to a drop in GE's Wind patent haul.



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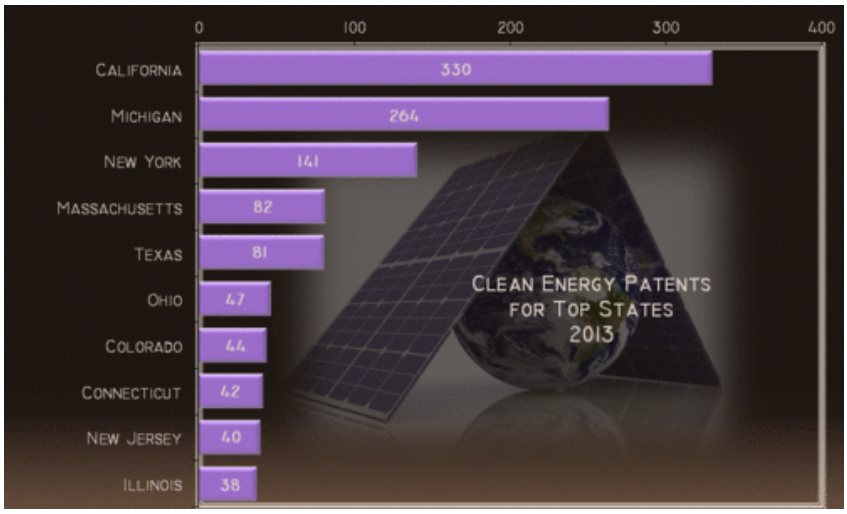
Looking at the chart of the top U.S. states, Massachusetts edged Texas by one patent to take fourth place with the Northeast state almost doubling its patent total jumping from 46 to 82. Texas took almost 30 more patents than the year before. Ohio (47), Colorado (44), Connecticut (42) and New Jersey (40) took the 6th through 9th spots among the top ten U.S. states in Clean Energy patents granted in 2013. Illinois took the 10th spot with 38 patents and Florida trailed at 32. Pennsylvania, Delaware and Arizona all had 27 granted Clean Energy patents in 2013.



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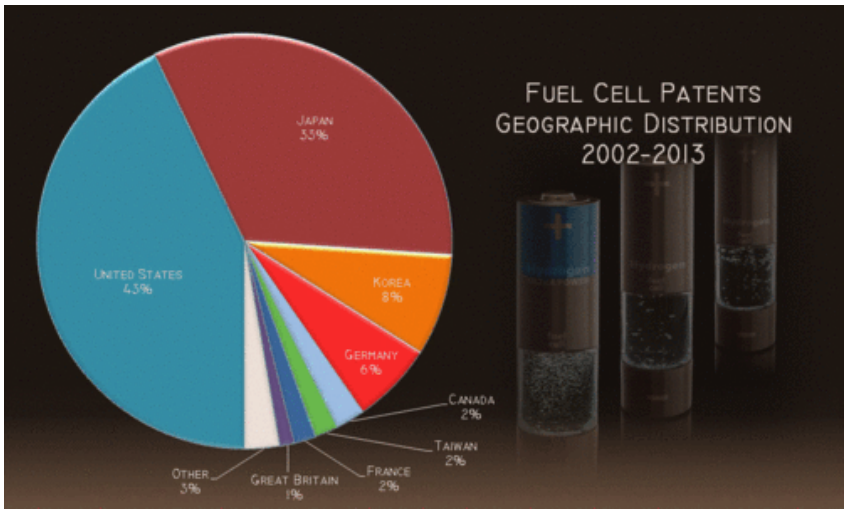
If instead of looking at individual countries versus the U.S. as a whole, we look at the top U.S. states individually (i.e., separately from the U.S. as a whole) and foreign countries in 2013, Japan led the field with 637 patents followed by California at 330, about half of the Japanese total. Michigan took third place from New York (141) with 264 patents dropping the Empire State to sixth place behind Germany (233) and Korea (231). Taiwan (125) followed but Massachusetts and Texas leapfrogged Denmark into eighth and ninth place, respectively, leaving the Danes in tenth place among U.S. states and foreign nations in grantees of U.S. Clean Energy patents.

As depicted below, Fuel Cell patents since 2002 are dominated by the U.S. and Japan, followed by Korea and Germany. The U.S. leads the world with 43 percent of U.S. patents (down one percent) in Fuel Cells followed by Japan with 33 percent

(unchanged since the end of 2012). Korea and Germany hold 8 (up one) and 6 percent, respectively, of the cumulative granted Fuel Cell patents. Within the U.S., Michigan (32 %), California (12%), Connecticut (10%), and New York (10%) lead in overall Fuel Cell patents granted since 2002. Michigan and New York gained one percent in the cumulative totals since last year. Texas, Massachussets, Illinois, Oregon, and New Jersey have scored Fuel Cell patents since 2002 as depicted.



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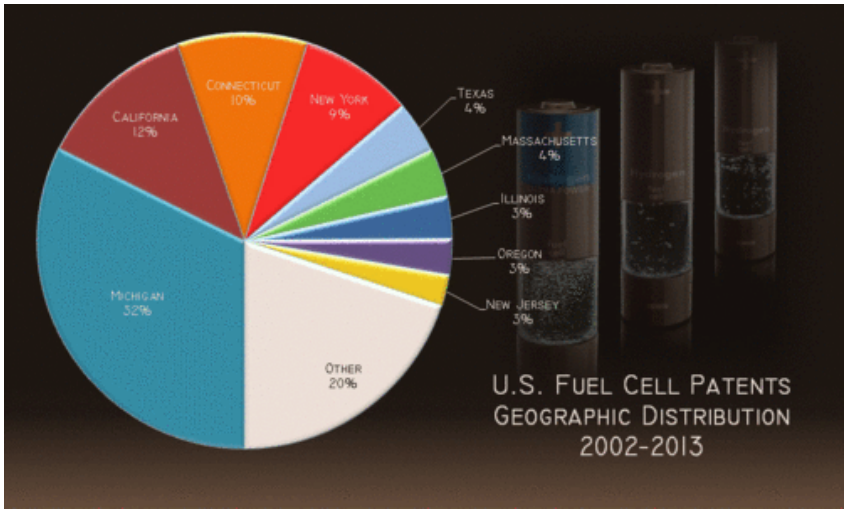

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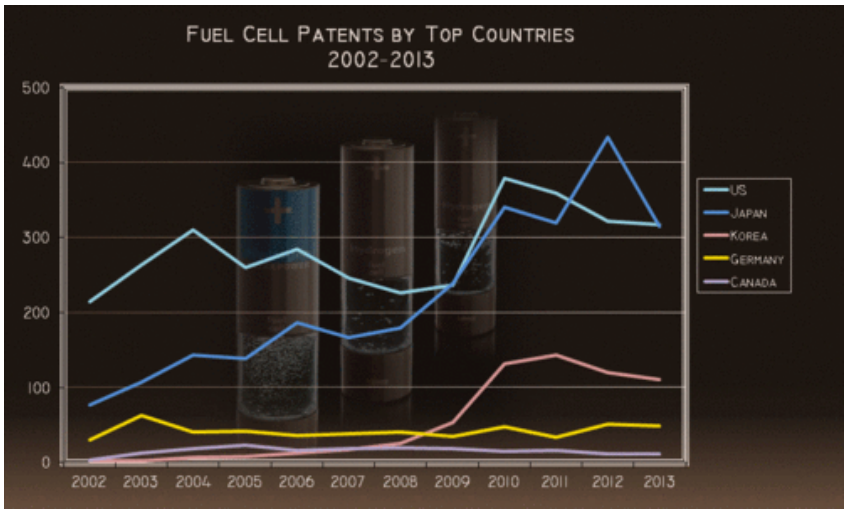
As shown in the line chart, Japan had a large blip in Fuel Cell patents and fell to the level of the U.S. which also dropped in 2013 though less profoundly than the number of Japanese owned U.S. Fuel Cell patents.

Korea fell further while Germany held its own relative to 2012.



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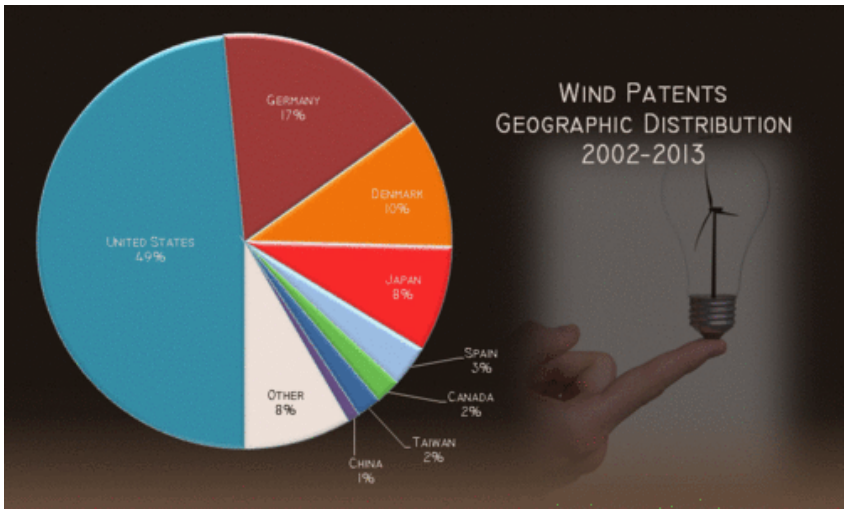
In 2013 the U.S. (317) regained the annual Fuel Cell crown, but dropped 5 patents relative to the year before after having fallen 37 between 2011 and 2012. Japan lagged the U.S. by 2 Fuel Cell patents and dropped 119 patents compared to 2012. Korea was next with 111 patents which was a drop of nine compared to 2012. Much further below, Germany (49) fell two and had less than a half of the number of Fuel Cell patents held by Korea. France jumped one Fuel Cell patent to 25 after jumping one the year before and edged Taiwan (24) which barely beat France two patents the year before. Canada again had 11 Fuel Cell patents and Great Britain dropped one to ten Fuel Cell patents granted in 2013. In single digits were Switzerland (4) and Denmark (3). Italy, China, Finland and Israel had two while nine other countries had one Fuel Cell patent.

Looking at U.S. states in 2013, Michigan led all others with 139 Fuel Cell patents, up 14 relative to 2012. California (42) took second in the Fuel Cell race dropping 13 relative to the year prior and having less than a third of the patents taken by Michigan. Connecticut (28) and Massachusetts (23) took third and fourth place in 2013 while Ohio had less than half of these states with 11 Fuel Cell patents. Sixth place was a three way tie between Texas, New York, and New Jersey with 7 each. Minnesota and Oregon rounded out the top ten Fuel Cell states in 2013 with 6 patents.

In Wind energy the U.S. remained ahead of the rest of the world in the number of U.S. patents granted since 2002 with 49 percent (down one percent), as depicted below, largely on the strength of GE's Wind patents. Germany held steady at 17 percent due to Siemens and Enercon (Aloys Wobben). Denmark held at 10 percent due to Vestas while Japan had 8 percent which was one more than last year. These numbers are largely consistent which makes sense given the long timeframe covered. New York leads U.S. states with 43 percent of the U.S. Wind patents, down three percent since last year, thanks to GE. California again follows with 11 percent while Texas follows at 5 percent, Massachusetts has 4 percent, and Florida and Illinois each have three percent. Pennsylvania, New Jersey and Michigan each have two percent of the U.S. share of Wind patents since 2002.



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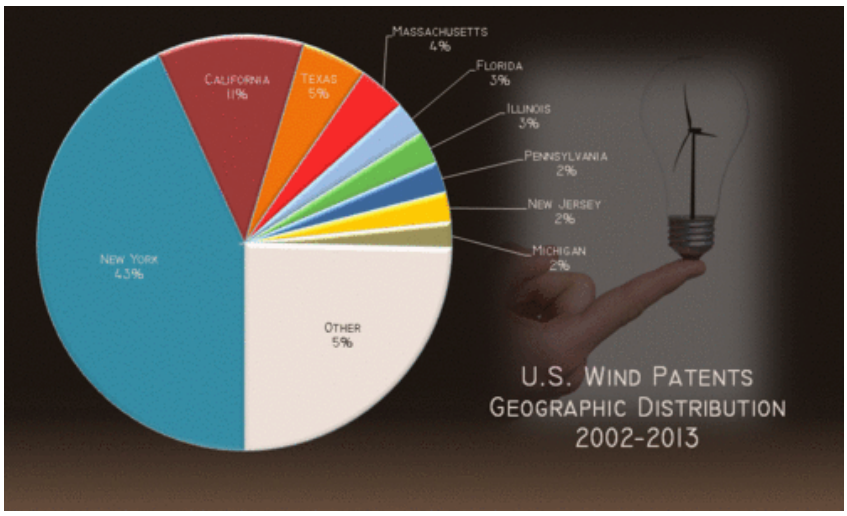

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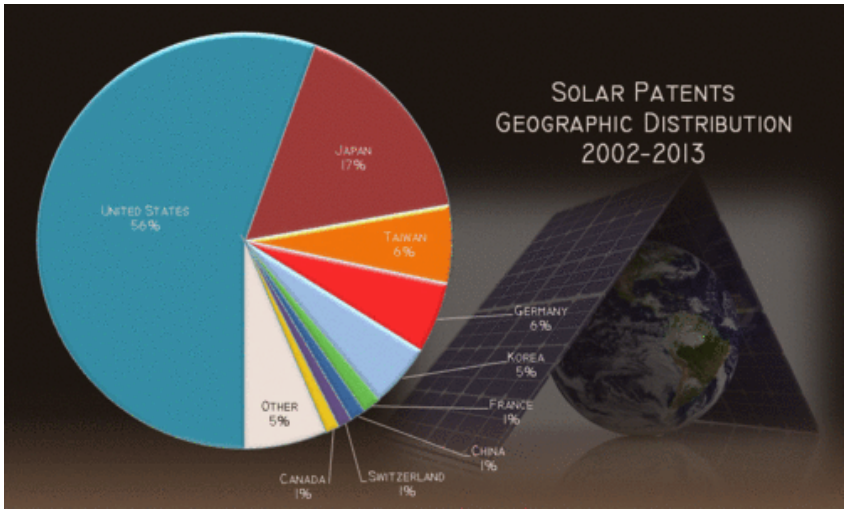
Looking at foreign grantees of U.S. Wind patents in 2013, Germany again took top honors for two years in a row and three of the last four with Denmark winning in 2011. Japan (64) followed-edging out Denmark by 3 after Japan fell 6 and Denmark dropped 15 compared to 2012 in Wind patents. Spain (25) again took fourth place, up one relative to the previous year. Taiwan had barely more than half the number of Wind Patents granted to Spain, at 13, and was up 4 compared to 2012. Canada (10) gained one to take sixth place while Korea and China had nine patents in a tie for seventh place. France (7) and Norway (6) rounded out the top ten.

In the U.S., New York again topped the other states in Wind patents but only after a precipitous drop of 83 patents to gain 74 Wind energy patents in 2013. California (36) again took the runner up spot in 2013 at about half of New York's total after gaining 15 wind patents compared to 2012. Texas (17) jumped three patents and overtook Pennsylvania (5) which fell all the way to ninth place in 2013. Massachusets trailed its southern rival by 2 Wind patents after gaining 8 patents compared to the year before. Florida took fifth place with nine patents (down two), followed by Michigan which doubled its 2012 total at eight. Ohio (7) and New Jersey (6) also scored Wind patents while a four way tie of 5 Wind patents was performed by Pennsylvania, Maryland, South Carolina, and Arizona.

The U.S. percentage of Solar patents since 2002 rose to 56 percent, up one percent over 2012. Japan's share dropped two points to 17 percent, after dropping eleven over the last three years, while Germany held steady at 6 percent and Taiwan jumped one percent to tie Germany. Korea also had 5 percent of Solar patents since 2002. California's share of the U.S. total since 2002 dropped two points compared to 2012 to arrive at 39 percent. New York jumped one percent to seven while its neighbors to the east, Massachusetts, again had 6 percent. Colorado, Delaware and Michigan each had four percent of the U.S. Solar patents granted since 2002.



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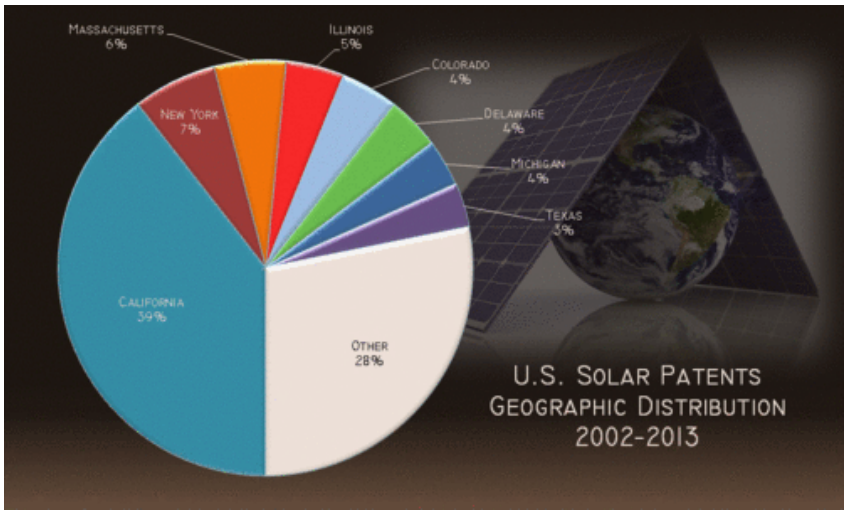

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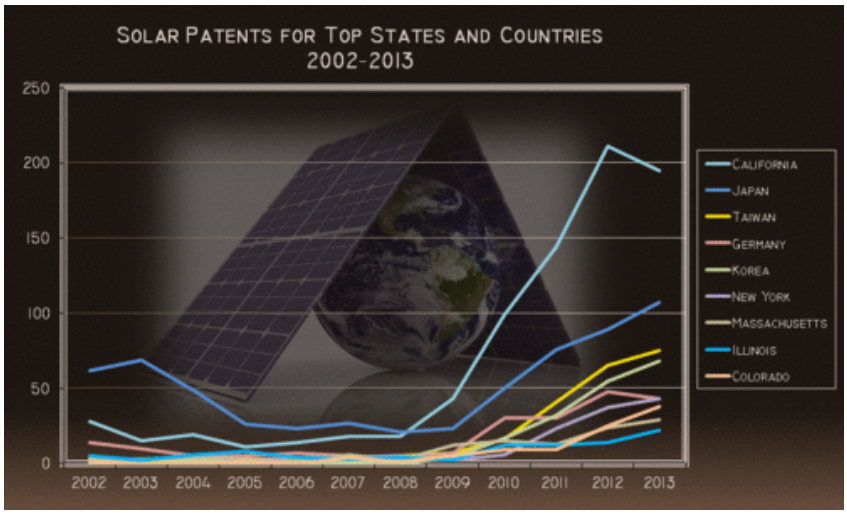
The U.S. led all other countries in granted U.S. Solar patents in 2013 by over five to one, leading Japan 556 to 107. Looking at the 2013 totals for non-U.S. Holders of U.S. Solar patents, Japan was up 18 to 107 Solar patents while Taiwan jumped 10 to 75. Korea (68) jumped 13 while again leading Germany (43) which fell five patents. China took the fifth spot from France (13) with 18 granted U.S. Solar patents. France fell two spots while Switzerland (14) gained 7 patents compared to the year prior to take sixth place. Israel (12) took the eighth spot followed by Canada and the Netherlands, tying at 9 granted U.S. Solar patents in 2013.

Relative to the U.S. States' showing in 2013, California fell 16 patents to 195

compared to 2012 yet still led second place New York by over four times even with the Empire State adding 6 patents compared to the year before. Colorado chased New York with 38 patents up 13, while Massachusetts (29) jumped from fifth place to fourth pushing Delaware (23) back to sixth place. Texas (29) sat in a tie with Massachusetts above Delaware while Illinois had one less than Delaware's 23 granted U.S. Solar patents in 2013. Pennsylvania (19), Michigan (18), and Ohio (17) descended one by one in the number of Solar patents to round out the top ten U.S. states for granted Solar Patents in 2013.

As depicted in the line chart below, California also had more Solar patents than any other country, and despite a drop in 2013, led the other top states and countries by a huge margin. The remaining contenders continue steady upticks except for Germany which took a fall.



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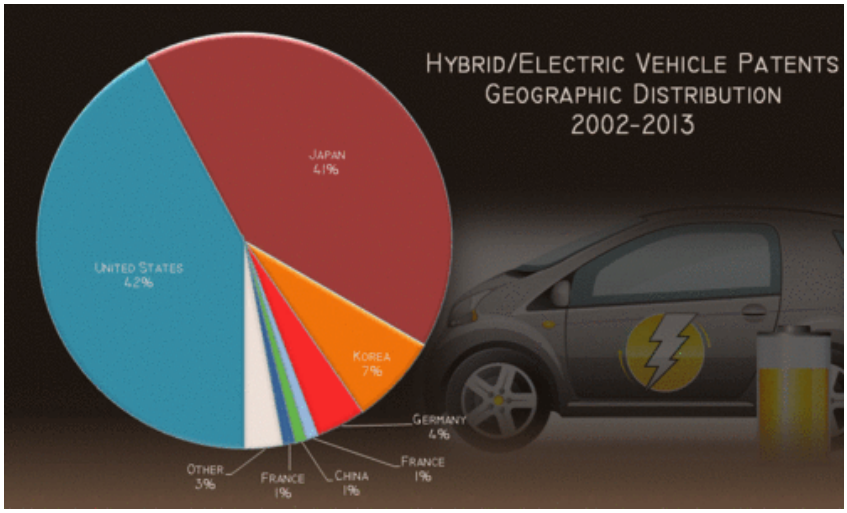
The U.S. took the lead from Japan among U.S. Hybrid/Electric Vehicle patents since 2002 with 42 percent of the granted U.S. patents while maintaining the same percentage of these patents at 42 percent with Japanese owners of these patents dropping two points to 41 percent. Korea jumped a point to 7 percent while Germany gained a percentage point.

Michigan fell a point among U.S. state owners of HEV patents since 2002 with 56 percent of the U.S. share of the granted U.S. patents in this area. California held steady at 14 percent while New York again stayed at five percent. Ohio, Illinois, Florida and Washington DC each have three percent or less.



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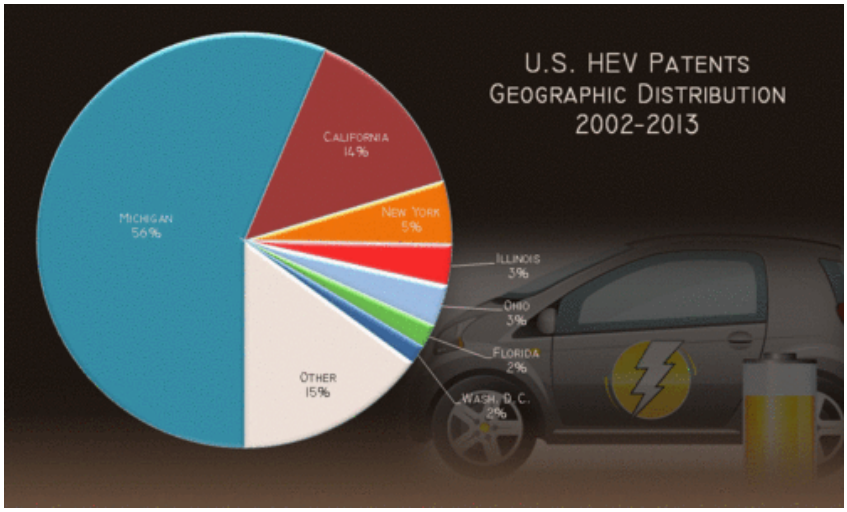

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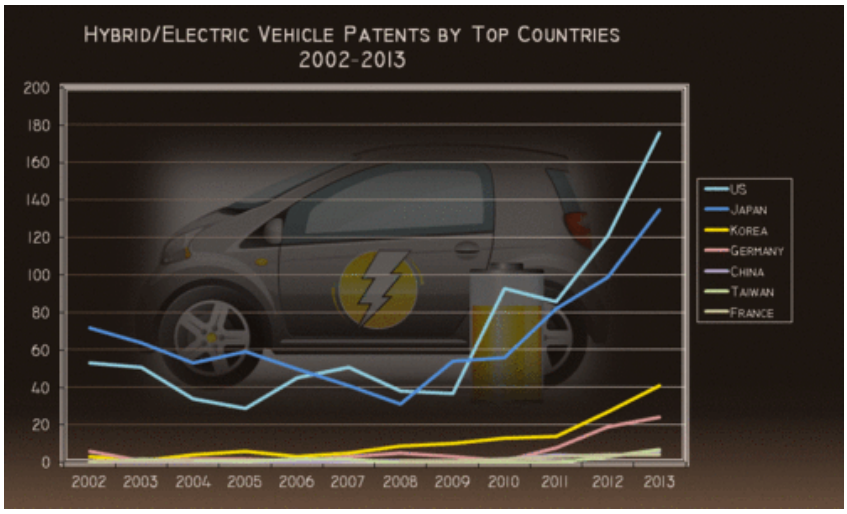
Looking at granted U.S. Hybrid/Electric Vehicle patents in 2013 only, the U.S. (176) led Japan (135) but Japan led the non-U.S. Patents holders by a wide margin-topping Korea (41) by over three times in the number of granted U.S. HEV patents. Japan gained 36 patents compared to the year prior while Korea added 14. Germany was far below Korea at 24 granted HEV patents up 5 compared to 2012. The remaining patent holding countries for Hybrid/Electric Vehicles were in single digits in 2012 with Taiwan having 7 patents and China 6. Switzerland and France had four while Sweden and Canada had three. Great Britain had two HEV patents while Italy, India, Israel and Austria each had one. It is interesting to note that only 14 different countries scored HEV patents in 2013 which points to the concentration in the auto industry and potentially the inherent costs in working in this area.

Relative to Hybrid/Electric Vehicle patents in 2013 for the U.S. States, Michigan furthered its lead jumping 41 patents to 95 while its nearest rival California added seven to arrive at 27. Much further below, New York had eight granted HEV patents, down one, while Massachusetts, New Jersey and Washington DC tied at 5 granted U.S. HEV patents. Illinois and Washington State tied at four patents while Ohio and Kentucky tied at three. Seven states tied with two HEV patents granted in 2013 while three each had one patent. As indicated above relative to the number of foreign countries having HEV patent holders, the U.S. state owners of HEV patents are confined to 19 states with the vast majority being held by entities in Michigan and California.

Looking at the line chart below, the U.S. led Japan for the fourth straight year while U.S. entities (176) had fewer U.S. Hybrid/Electric Vehicle patents than the rest of the world combined.



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