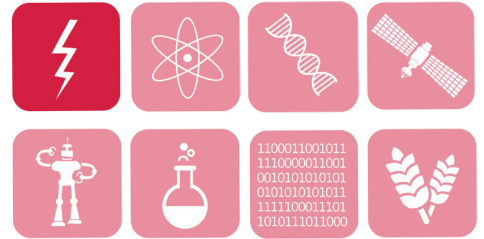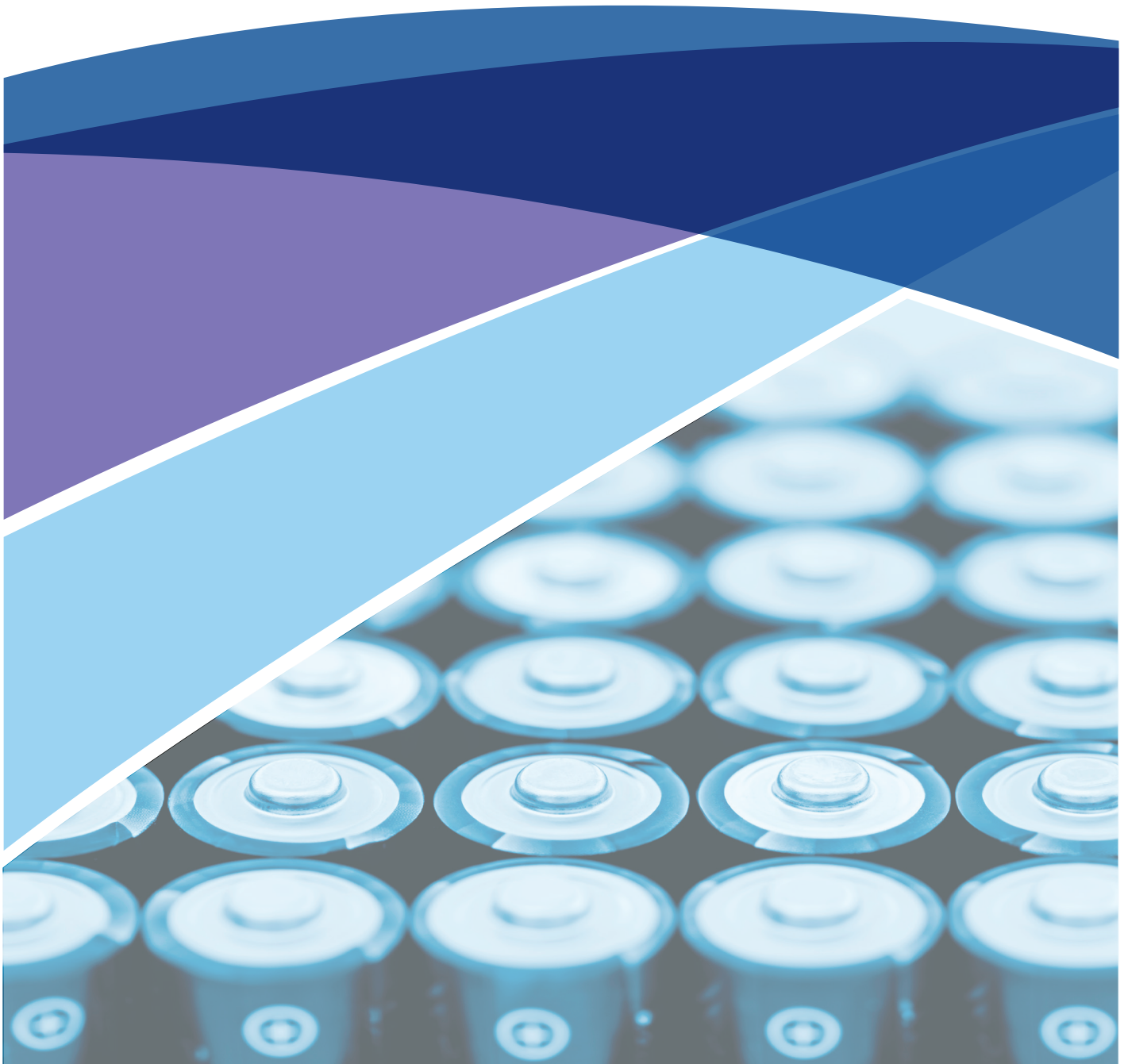# Eight Great Technologies
Energy Storage
A patent overview

#8Great

This report was prepared by the
UK Intellectual Property Office Informatics Team
June 2014

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www.ipo.gov.uk/informatics

Contents

1   Introduction

The UK Government has identified 'eight great technologies' which will propel the UK to future growth. These are:

- the big data revolution and energy-efficient computing;

- satellites and commercial applications of space;

- robotics and autonomous systems;

- life sciences, genomics and synthetic biology;

- regenerative medicine;

- agri-science;

- advanced materials and nanotechnology;

- energy and its storage.

Patent data can give a valuable insight into innovative activity, to the extent that it has been codified in patent applications, and the IPO Informatics team is producing a series of patent landscape reports looking at each of these technology spaces and the current level of UK patenting on the world stage. As an aid to help people understand the eight great technologies and to consider the direction of future funding, the IPO is offering a comprehensive overview of what is already patented in the each of these technologies and in which direction the technology is developing.

This report analyses the worldwide patent landscape for energy and its storage. Energy and its storage encompasses many different technologies, but the current report has concentrated on small modular nuclear reactors, energy storage for vehicles, fuel cells, nanotech for batteries, supercapacitors, flow batteries and smart grids. The dataset used for analysis was extracted from worldwide patent databases following detailed discussion and consultation with patent examiners from the Intellectual Property Office who are experts in the field and who, on a day-to-day basis, search, examine and grant patent applications relating to these technologies.

This report is based on analysis of published patent application data and not granted patent data. Data for published patent applications gives more information about technological activity than the figures for granted patents because a number of factors determine whether an application ever proceeds to grant. These include the inherent lag in patent processing at national IP offices worldwide and the patenting strategies of applicants who may file more applications than they ever intend to pursue.

2 Worldwide patent analysis

2.1 Overview

Table 1 gives a summary of the extracted and cleaned dataset used for this analysis of energy and its storage. All of the analysis undertaken in this report was performed on this dataset or a subset of this dataset. The worldwide dataset for energy and its storage published between 2004 and 2013 and contains over 440,000 published patents equating to over 15,000 patent families. Publications may be at the application or grant stage, so are not necessarily granted patents. A patent family is one or more published patents originating from a single original (priority) application. Analysis by patent family more accurately reflects the number of inventions present because generally there is one invention per patent family, whereas analysis by raw number of patent publications inevitably involves double counting because one patent family may contain dozens of patent publications if the applicant files for the same invention in more than one country. Hence analysis by patent family gives more accurate results regarding the level of inventive activity taking place.

Table 1: Summary of worldwide patent dataset for energy and its storage

Number of patent families	158362		
Number of patent publications	441651		
Publication year range	2004-2013		
Peak publication year	2012		
Top applicant	Toyota Motor Corp.(Japan)		
Field choices	**Field name**	**Number of entries**	**Coverage**
People	Inventors	15271	99%
Applicants	Patent assignees	47267	92%
Countries	Priority countries	55	100%
Technology	IPC sub-group	19350	100%

Figure 1 shows the total number of published patents by publication year (top) and the total number of patent families by priority year (bottom – considered to be the best indication of when the original invention took place). Figure 1 suggests that patenting in energy and its storage has grown slowly over the period. The peak years by publication and priority are in 2012 and 2013 respectively. The patent family chart in red does not show any patents filed after 2011 because a patent is normally published 18 months after the priority date or the filing (application) date, whichever is earlier. Hence, the 2012 and 2013 data is incomplete and has been ignored.
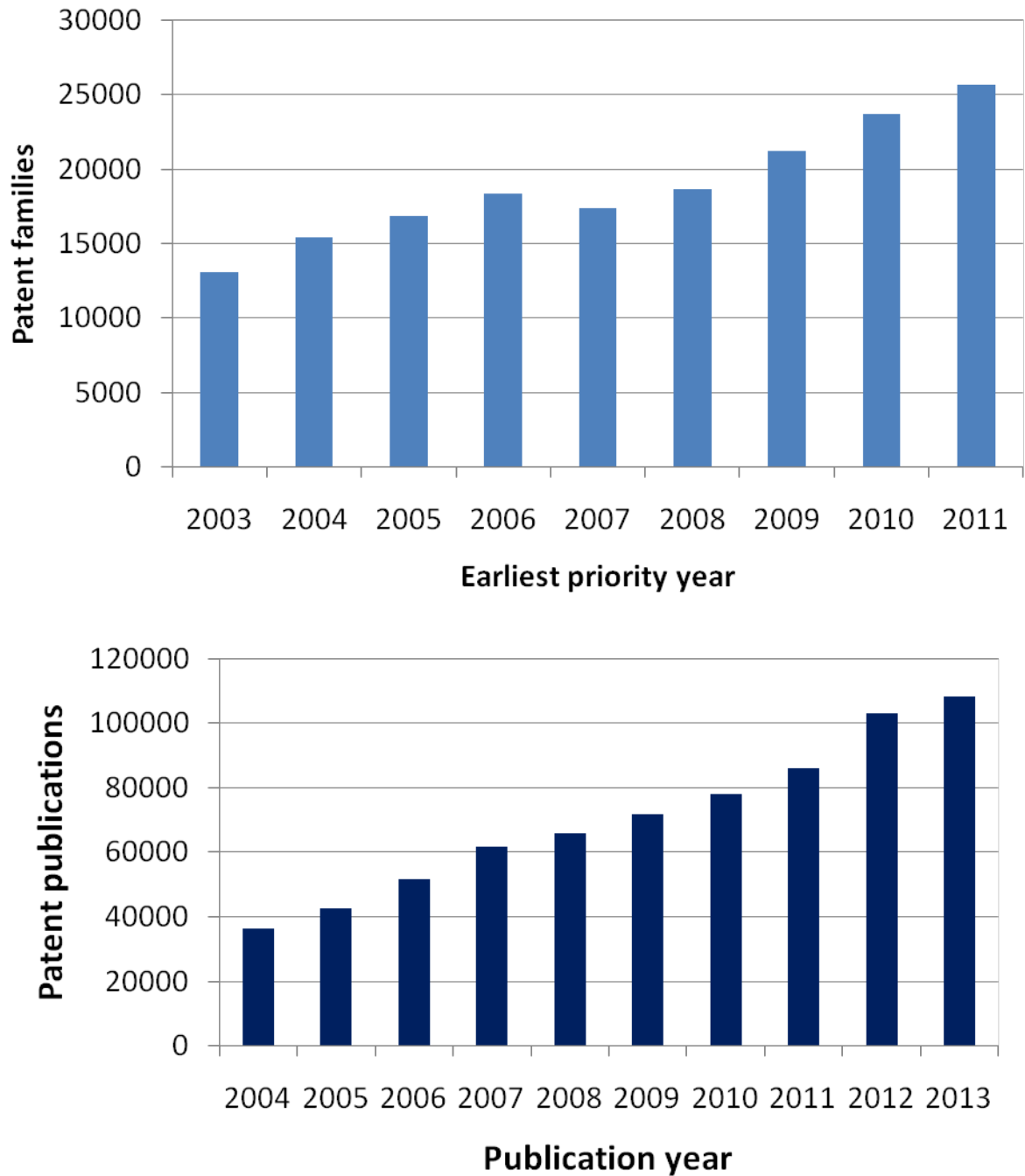

Figure 1: Patent publications by publication year (top) and patent families by priority year (bottom)

General patenting levels globally have continued to grow at an ever-increasing rate. Figure 2 tries to address this issue by normalising the data shown in Figure 1 and presenting the annual increase in the size of the worldwide patent databases across all technologies against the year-on-year change in the size of the energy and its storage dataset. For example, from 2012 to 2013 worldwide patenting across all areas of technology increased by 8.6% and this can be compared to a similar increase in energy and its storage patenting over the same time period. The data suggests that that patenting in energy and its storage is a growth area in terms of patenting.
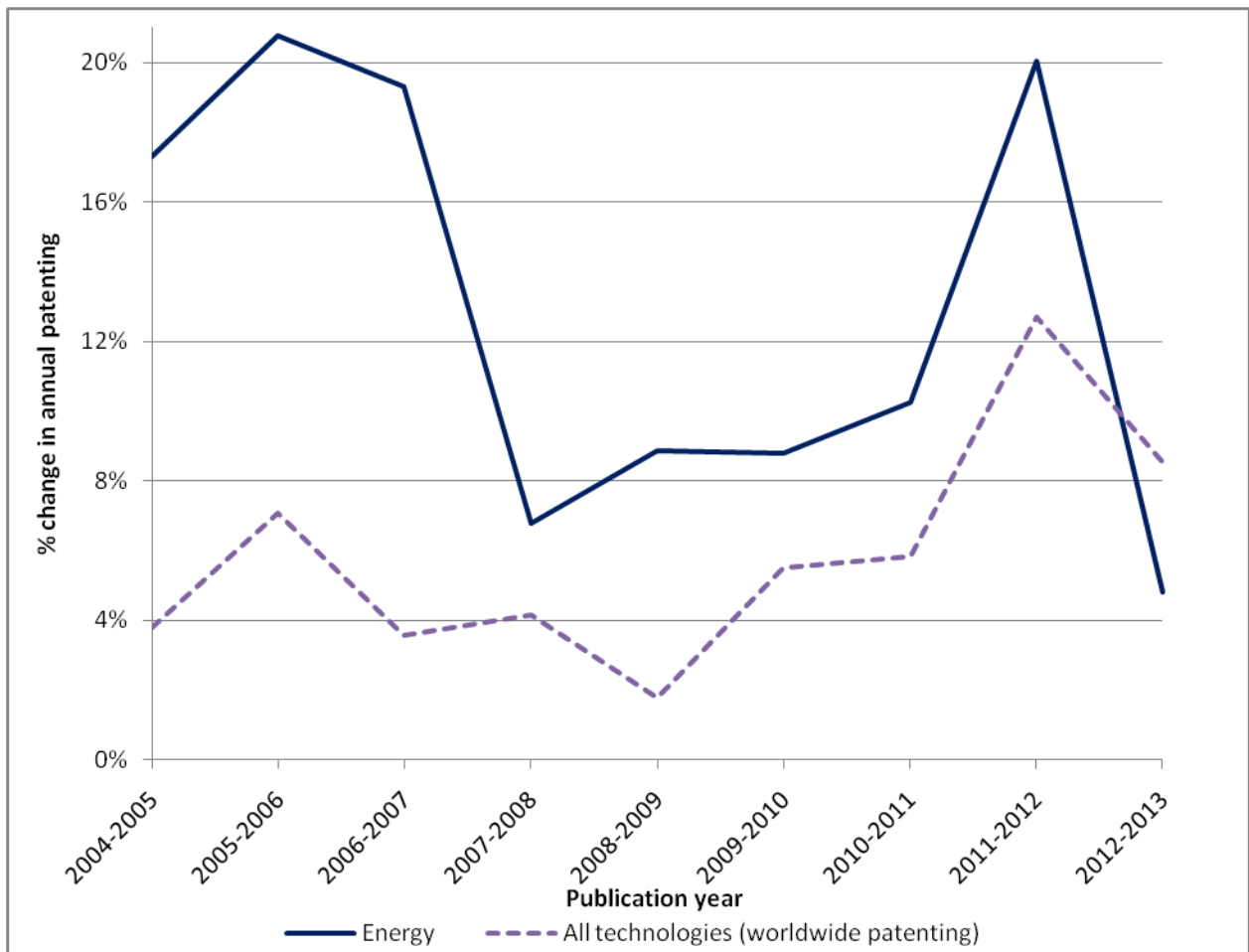

Figure 2: Year-on-year change in energy and its storage patenting compared to worldwide patenting across all technologies

Figure 3 shows the priority country distribution across the dataset with almost half of energy and its storage patents first filed in China. 0.5% of energy and its storage-related patents are first filed in the UK. Traditionally priority country analysis has been a good indicator of where the invention is actually taking place because many applicants will file patent applications first in the country in which they reside[1], but in recent years drawing firm conclusions from this data is harder because there may be other strategic reasons for an applicant choosing the country of first filing (e.g. tax treatment).
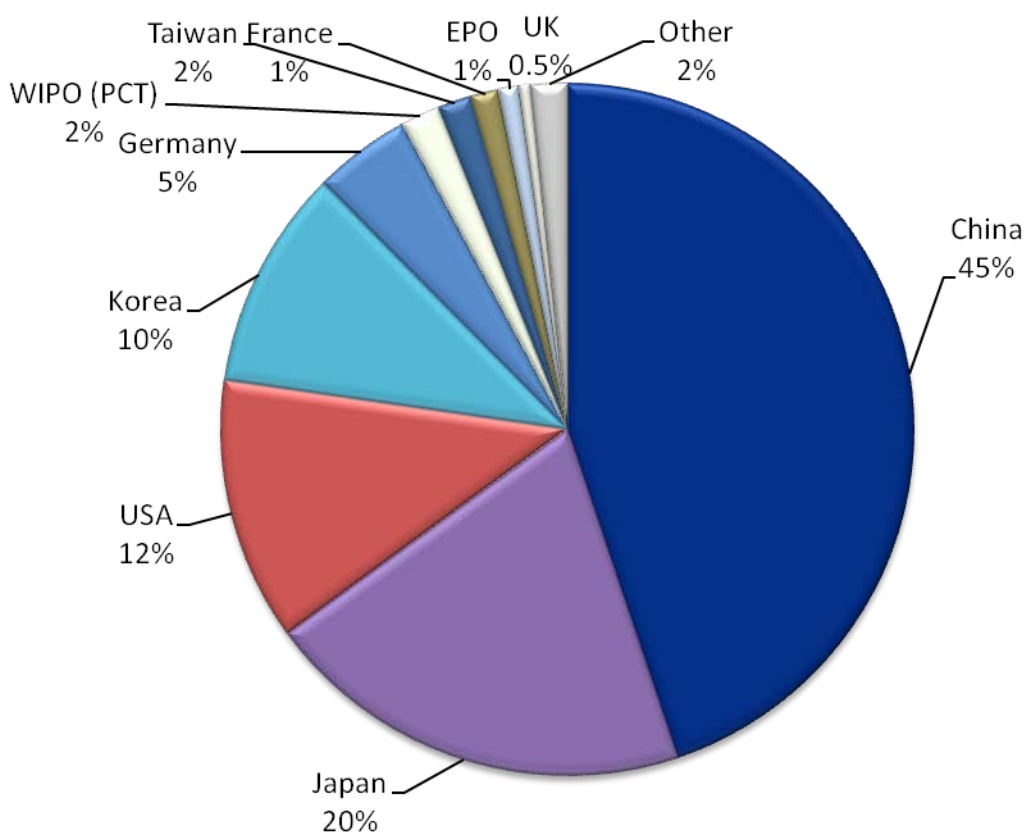

Figure 3: Priority country distribution

It is interesting to compare the priority country distribution shown in Figure 3 and the applicant country distribution shown in Figure 4. The applicant country distribution shows a much greater diversity than the priority country distribution. Note that EPO and WIPO[2] may exist as priority countries but not as applicant countries.

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[1] In some countries this is/was a requirement (e.g. in the UK this was a requirement until 2005).
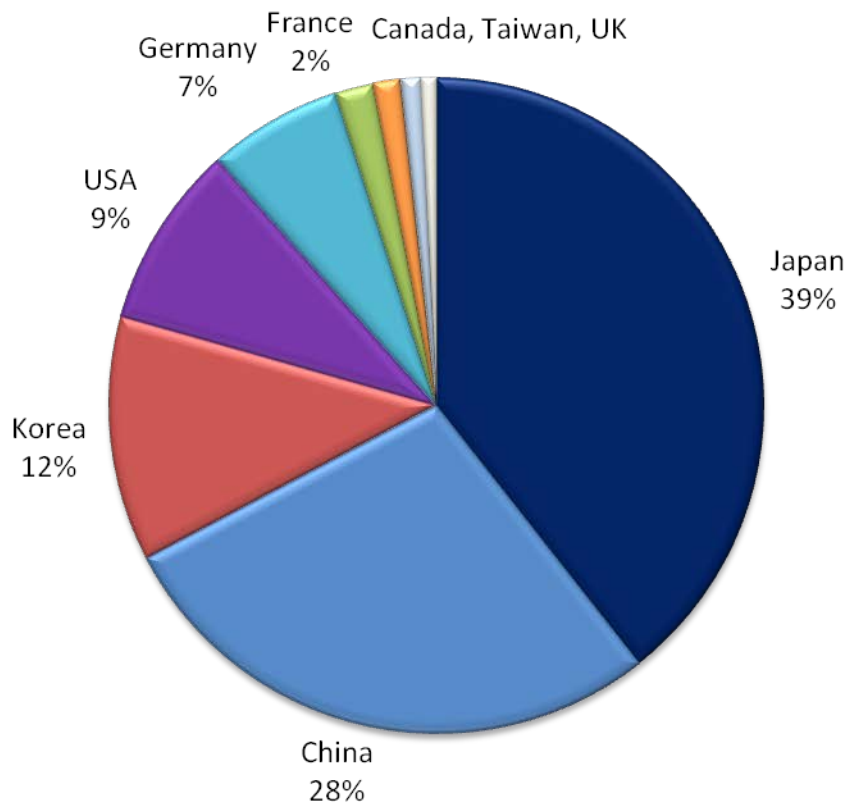[2] Alternative filing routes to single national patents, as outlined in Appendix A.3.

Figure 4: Applicant country distribution

It is well known that there is a greater propensity to patent in certain countries than others, and the trends shown in Figure 4 may change if the figures are corrected for this difference in behaviour. A Relative Specialisation Index (RSI)[3] for each applicant country has been calculated to give an indication of the level of invention in energy and its storage technologies for each country, compared to the overall level of invention in that country, and is shown in Figure 5.

The RSI shown in Figure 5 indicates that Japan, China, Korea and Hong Kong in particular show a high specialisation in energy and its storage. Switzerland and the Netherlands show low specialisations. Hong Kong and Australia in particular have small shares of applicants in absolute terms but this picture highlights that they have a particular focus in energy and its storage. Japan and China, on the other hand, both have a large share of applicants and a significant specialisation and are therefore quite dominant. The UK sits in the lower middle ground with some positive specialisation in energy and its storage compared to other fields of patenting.
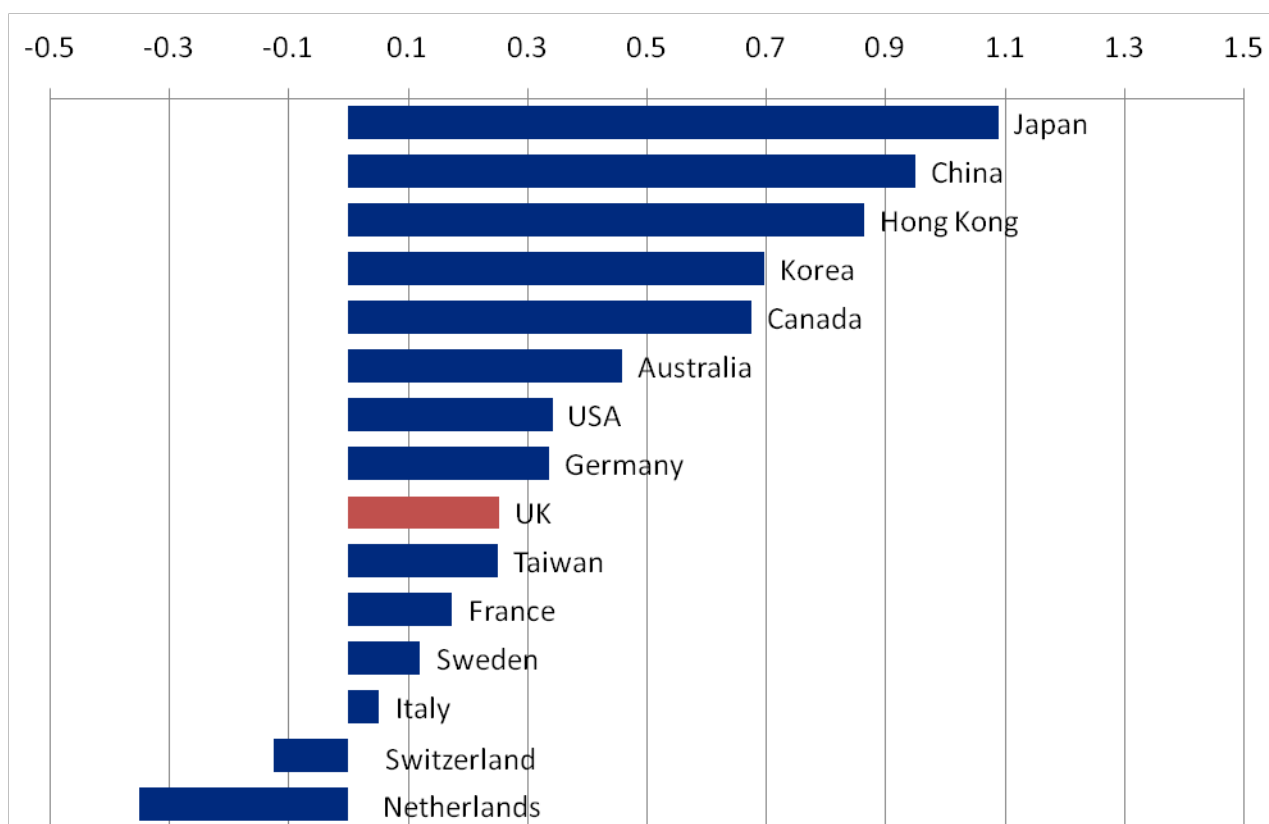

Figure 5: Relative Specialisation Index (RSI) by applicant country

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[3] See Appendix B for full details of how the Relative Specialisation Index is calculated.

Figure 6 shows the countries in which applicants in the field of energy and its storage technologies are interested in seeking patent protection, with the strength of colour reflecting the quantity of published patents in each jurisdiction. Patents filed via the EPO [⟐] and WIPO (PCT) [wipo ▤] routes are also shown. Strong coverage is found in Japan, consistent with Figure 3 and Figure 4. Patent families with publications in the USA and through the EPO and WIPO have applicants from a wide range of other countries, however, indicating that there is a strong international dimension in energy and its storage. A high level of coverage is found in Japan, consistent with the high specialisation seen in this country.
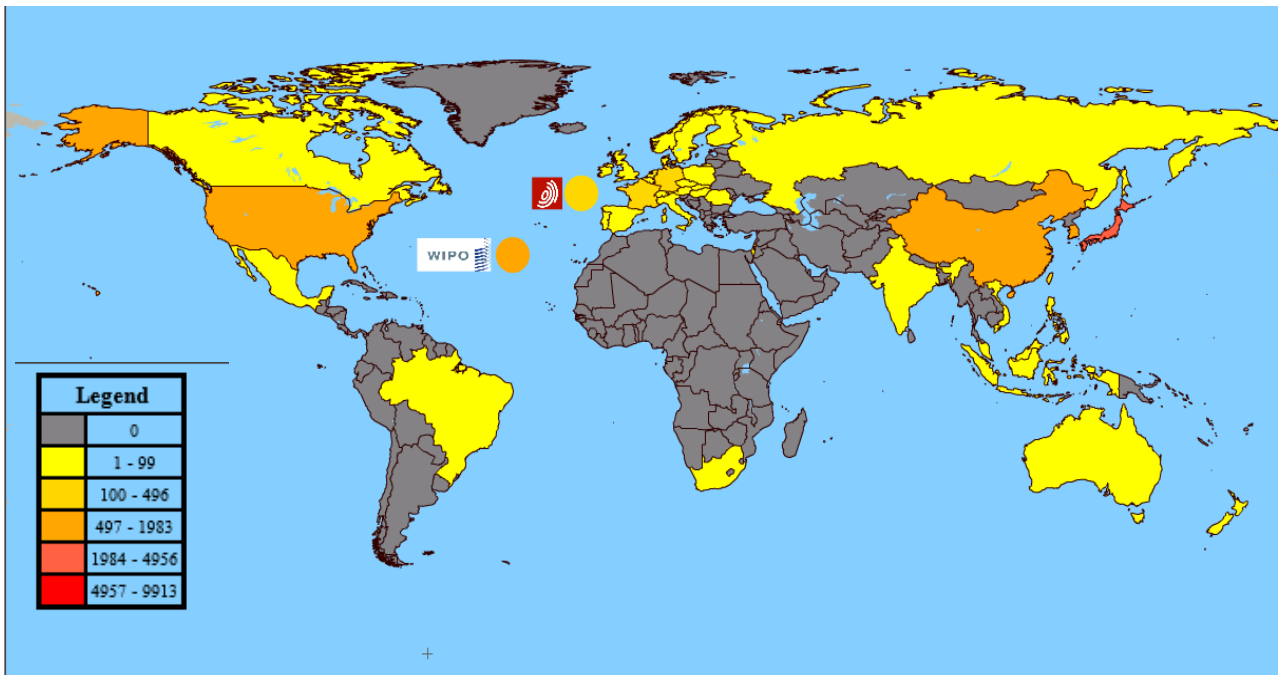

Figure 6 : Patent coverage (publication country coverage)

2.2 Top applicants

Patent applicant names within the dataset were cleaned to remove duplicate entries arising from spelling errors, initialisation, international variation and equivalence[4]. Figure 7 shows the top 20 applicants in the energy and its storage dataset.

As would be expected from the applicant distribution data already seen, many of the leading applicants are based in Japan. However, what is most striking is the number of automotive companies in this list, indicating that energy and its storage is a highly competitive field, and hence an emerging technology with large further potential for growth as more businesses compete to develop the next technology that will give them a competitive edge in this area. The Toyota Motor Corporation has a large lead over any other applicants, with few university applicants in this dataset.

The patents assigned to Toyota relate to hybrid vehicles, battery charging systems, fuel cell systems and secondary battery systems to name but a few.
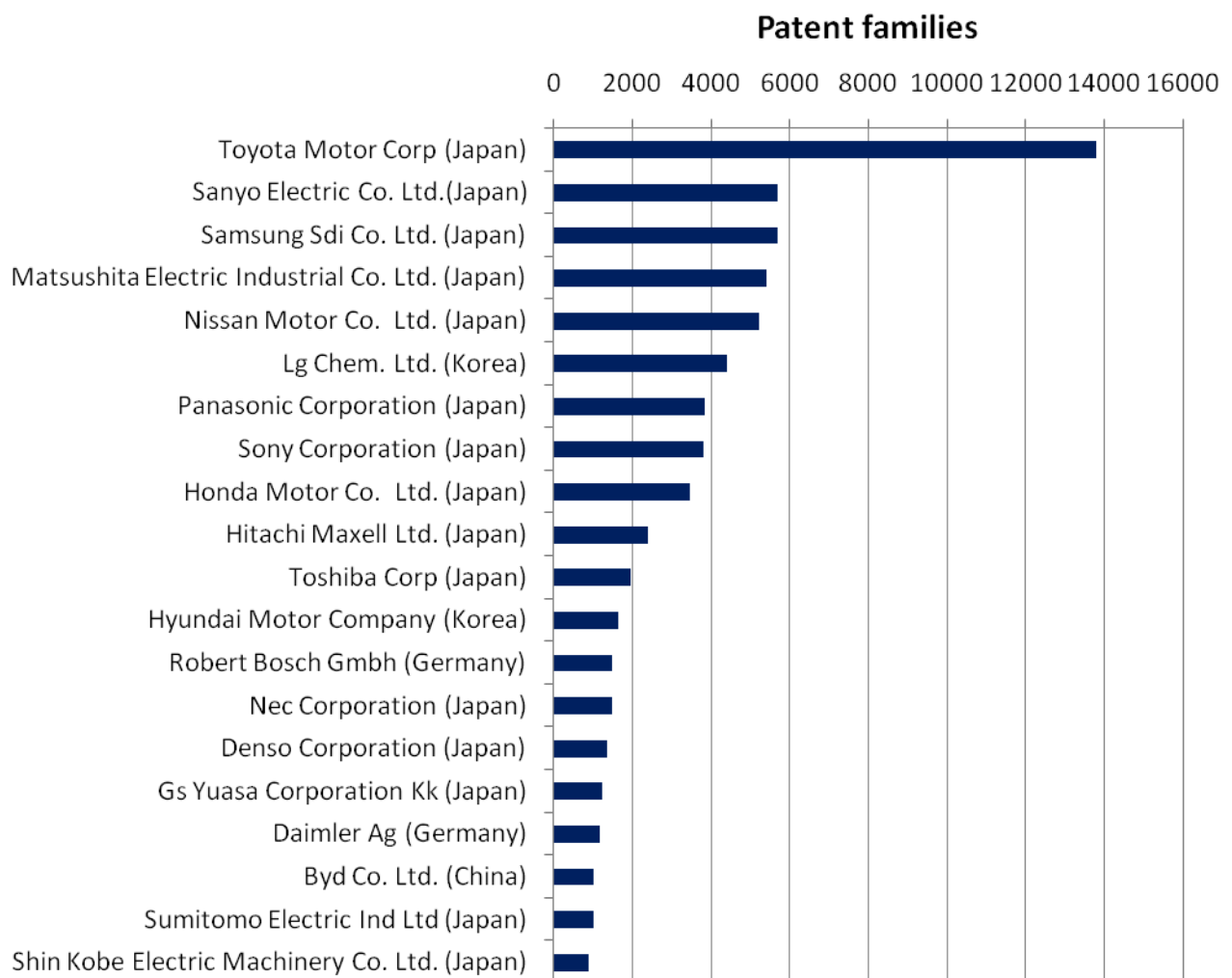
Patent families

<div align="right">

Figure 7: Top applicants

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[4] See Appendix A.4 for further details

Figure 8 is a bubble map showing a timeline for the top 20 applicants and shows the filing activity of these applicants in the last 10 years. It shows that most of the top applicants have been involved in energy and its storage patenting throughout the period albeit in varying degrees. For example, Toyota and Panasonic show large growth in recent years. It is evident that the major players in the field such as Toyota, Panasonic and LG appear to have dominated this area in terms of patenting activity. However further splitting of this dataset into individual technology areas show potential areas with a smaller number of incumbents.
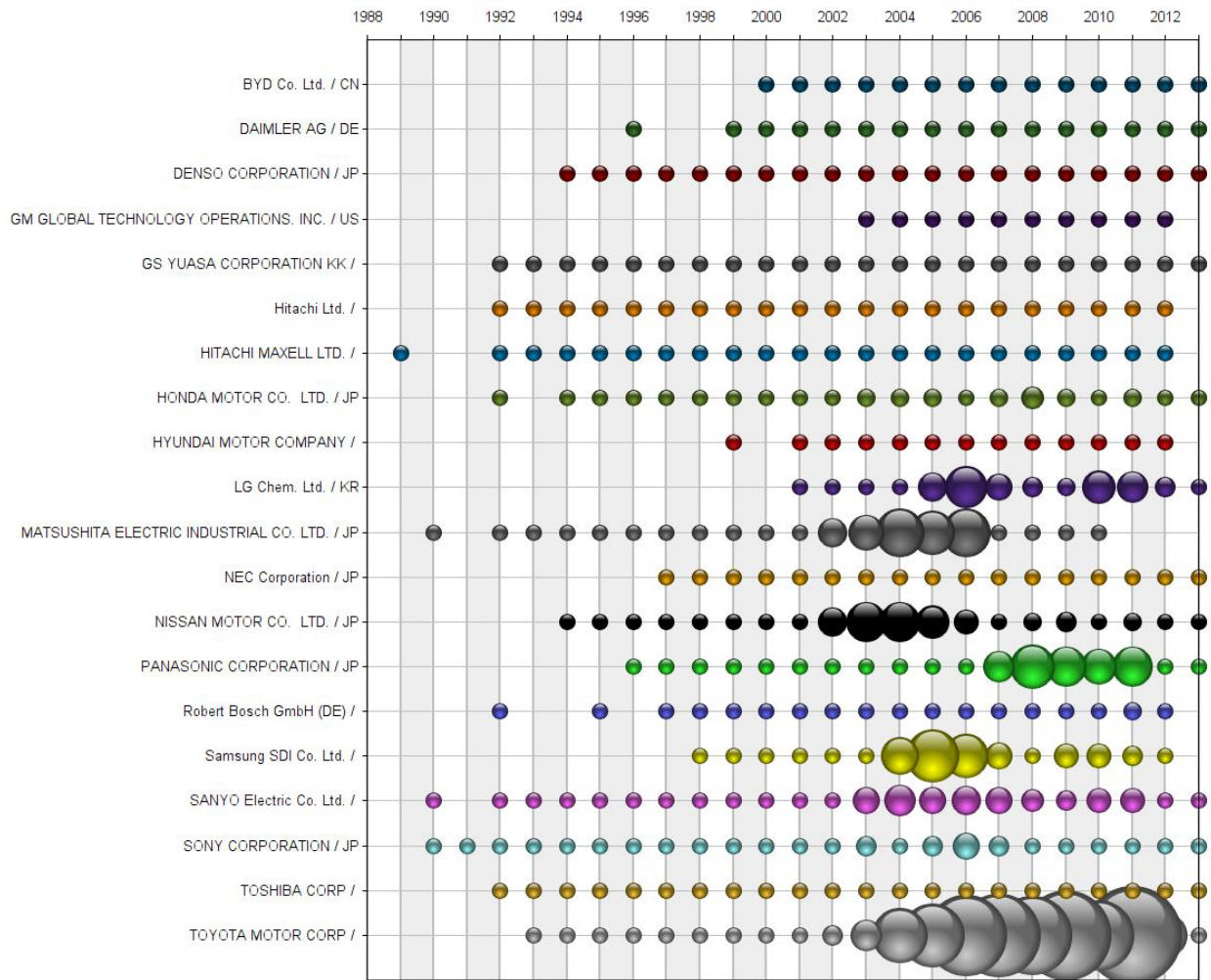

Figure 8: Applicant timeline of patent families by priority year

2.3 Collaboration

Figure 9 is a collaboration map showing all collaborations between the top UK applicants in the dataset (the top UK applicants shown in Figure 12) and their collaborators. Each dot on the collaboration map represents a patent family and two applicants are linked together if they are named as joint applicants on a patent application. A collaboration map is an indicator of technology transfer.
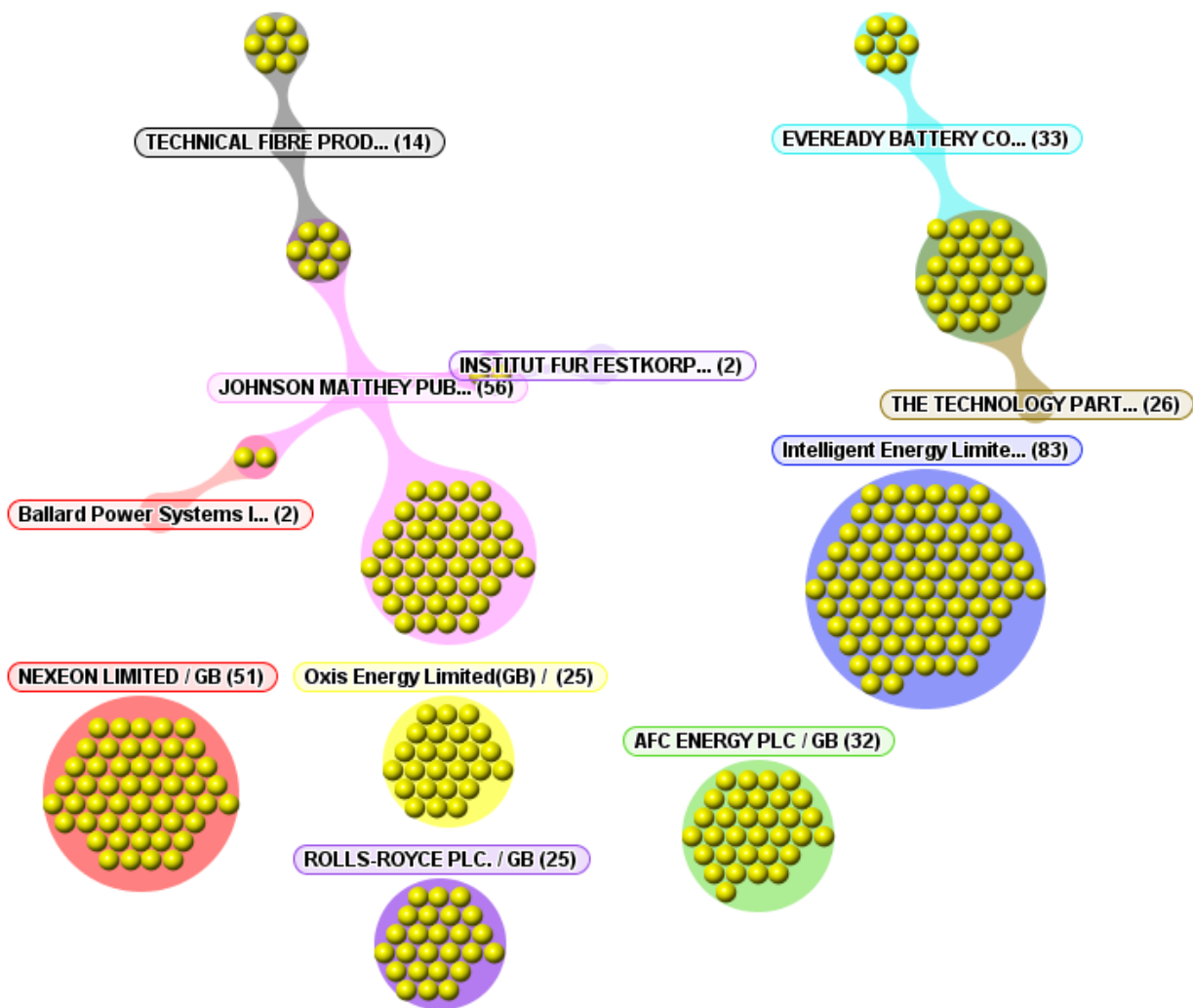

Figure 9: Collaboration map showing collaborations between the top UK applicants and their collaborator(s)

Figure 9 reveals that there is a degree amount of collaboration and knowledge flow within the energy and its storage field. Of the top UK applicants, the Johnson Matthey and Eveready Battery Co. are the only ones who collaborate directly. There are a number of isolated clusters from Intelligent Energy, Nexeon and Oxis Energy at least.

Consideration was given as to plotting a similar representation of the top international applicants in this area as listed in Figure 7 but given the size and diversity of the current dataset, this was not thought to be useful.

2.4 Technology breakdown

Figure 10 shows the top IPC sub-groups. It is important to realise that the size of sections of the dataset i.e. that relating to batteries and fuel cells, overshadows that of some other areas such as modular nuclear reactors. It might therefore be useful to look at these technologies independently rather than as a group, to gain the most insight into these technologies and their development, relative to the patenting activity in these areas. The structure of the dataset is also highlighted by the occurrence of a number of multinational motor manufacturers, illustrating the close links between transport and energy storage.
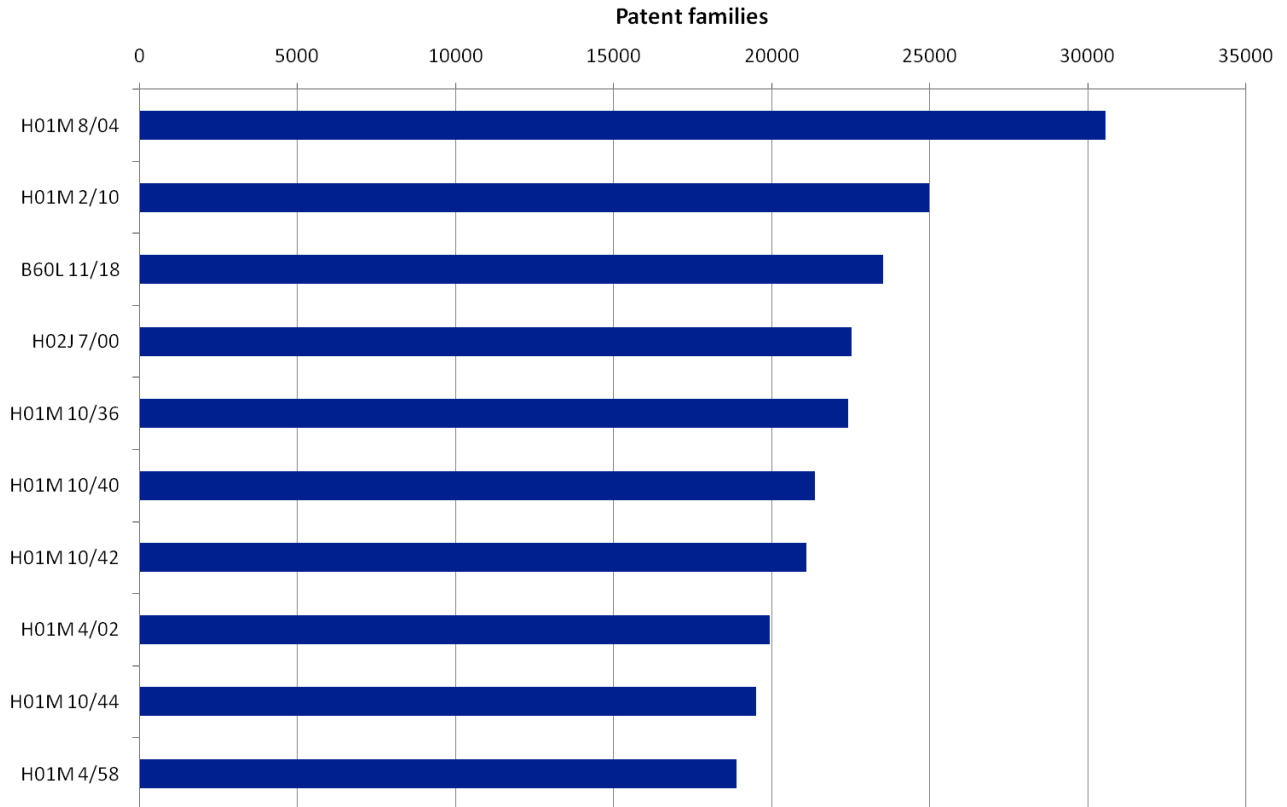

Figure 10: Top IPC sub-groups

Table 2 lists the description of each of these sub-groups.

H01M 8/04	Fuel cells; Manufacture thereof -> Auxiliary arrangements or processes, e.g. for control of pressure, for circulation of fluids
H01M 2/10	Constructional details, or processes of manufacture, of the non-active parts -> Mountings; Suspension devices; Shock absorbers; Transport or carrying devices; Holders
B60L 11/18	Electric propulsion with power supplied within the vehicle -> using power supplied from primary cells, secondary cells, or fuel cells
H02J 7/00	Circuit arrangements for charging or depolarising batteries or for supplying loads from batteries
H01M 10/36	Secondary cells; Manufacture thereof -> Accumulators not provided for
H01M 10/40	Secondary cells; Manufacture thereof -> Accumulators not provided for-> with organic electrolytes
H01M 10/42	Secondary cells; Manufacture thereof -> Methods or arrangements for servicing or maintenance of secondary cells or secondary half-cells
H01M 4/02	Electrodes -> Electrodes composed of, or comprising, active material
H01M 10/44	Secondary cells; Manufacture thereof -> Methods or arrangements for servicing or maintenance of secondary cells or secondary half-cells -> Methods for charging or discharging
H01M 4/58	Electrodes -> Electrodes composed of, or comprising, active material -> Selection of substances as active materials, active masses, active liquids -> of inorganic compounds other than oxides or hydroxides

Table 2: Key to IPC sub-groups referred to in Figure 10

3　The UK landscape

3.1　Top UK applicants

Figure 11 shows the top UK-based applicants within the energy and its storage dataset. Note that there is potential for further growth and development of energy and its storage in the UK. However it is interesting to realise that there are some large multinational companies listed in the main UK top applicants field The Rolls Royce entry has not been directly linked to the Rolls Royce Fuel Cell Systems entry as the patents from the original company do not necessarily contain fuel cell subject matter. However, if these entries were grouped together then Rolls Royce PLC would be in the top four companies in the UK.
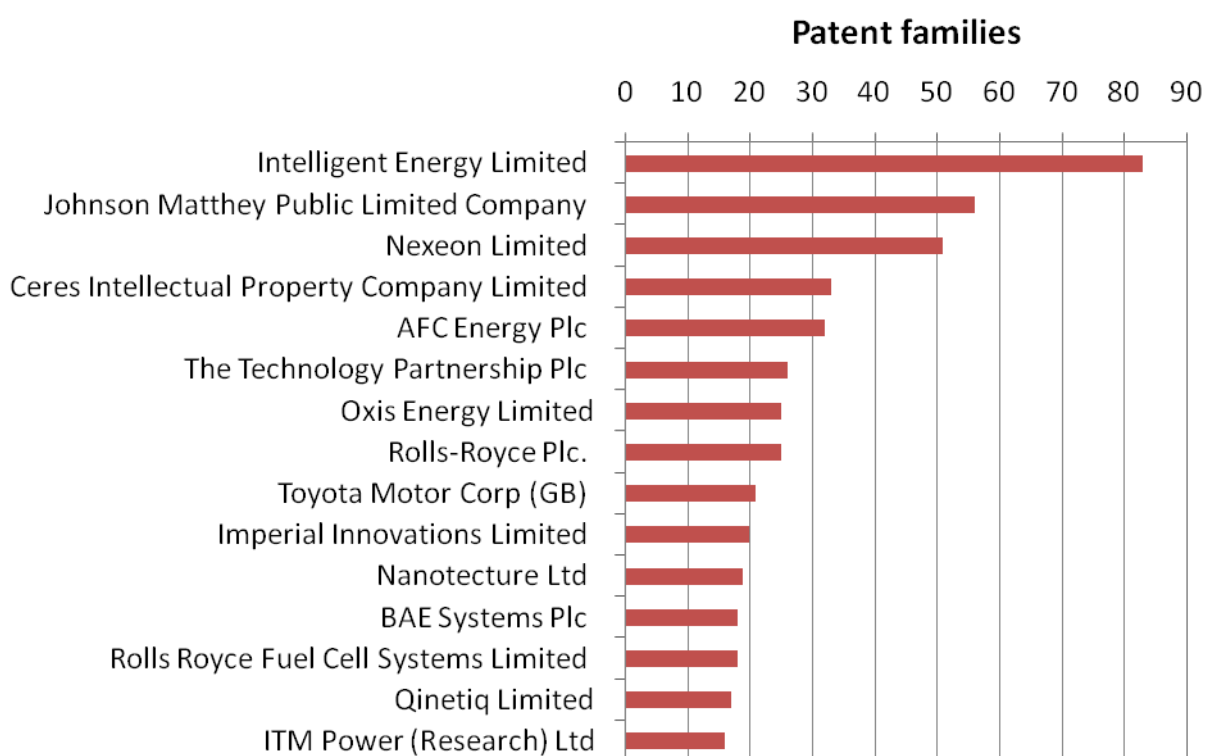
Highlighting some of the key UK applicants, from Figure 11:

Intelligent Energy is marketed as a global power company and work in three main sectors: automotive, consumer electronics and distributed power distribution. They specialise in modular, low carbon fuel cell systems; their headquarters is based in Loughborough. A number of other offices are located in Japan, India and the USA. The company developed the world's first hydrogen fuel cell motorbike, the ENV, and powered the world's first manned fuel cell power flight. It has also recently developed a compact fuel cell, for personal use.

Ceres Power were founded in 1991, based on patents relating to fuel cell technology and are British based. They work in developing fuel cell technology which operates on natural gas using conventional materials and processes.

OXIS Energy are working with Oxford University materials department as well as ABSL power solutions. The Technology Strategy Board (TSB) have also awarded a grant to this company in order to further develop lithium-sulfur (Li-S) technology for batteries. The company has developed technology around sulfur based cathode materials, highly stable electrolyte systems and anode made of lithium metal and intercalation materials. They are based in Oxfordshire where the original lithium-ion batteries were first developed and prototyped.

Nexeon was founded in 2004, as a "spin off" company based on research completed in the electrical engineering department in Imperial College. It has also been invested in by Imperial Innovations, who own a 40% stake in the company. The company also employs many academics from Imperial College and develops anodes for the next generation of lithium-ion batteries. Imperial Innovation are also highlighted in the list of top UK applicants.

Nanotecture is a company that was founded in 2003 by academics in the University of Southampton. Recently they have created supercapacitor technology with applications in both the consumer electronic and energy storage sectors. The improved power density of these nonporous materials for supercapacitors means the approach can be applied to a range of energy storage applications such as the transport sector (most notably applications associated with hybrid vehicles) the electric utility grid and in energy conservation. The academic work was initialised through funding from EPSRC.

These illustrate that there is scope for relatively new companies to enter this technology area, and highlight the effectiveness of the commercialisation of university research. The contrast between UK based top applicants as discussed above and the top applicant for the worldwide dataset as shown in Figure 7 could not be more marked. In Figure 7 it is evident that the top applicants are all well established multinational companies whereas in the UK top applicants most companies are relatively new and have their basis in a particular aspect of technology.

3.2 UK inventor mobility

Figure 12 shows the top worldwide applicants with named UK inventors on their published patents. This list is largely a reflection of Figure 11 since all but three entries in the list are UK-based organisations. The exceptions are Nokia, based in Finland, Toyota based in UK/Japan and Eveready Corporation based in USA/UK. This shows that there is a degree of collaboration between inventors in this country and those outside the UK, albeit within the same multinational organisation.
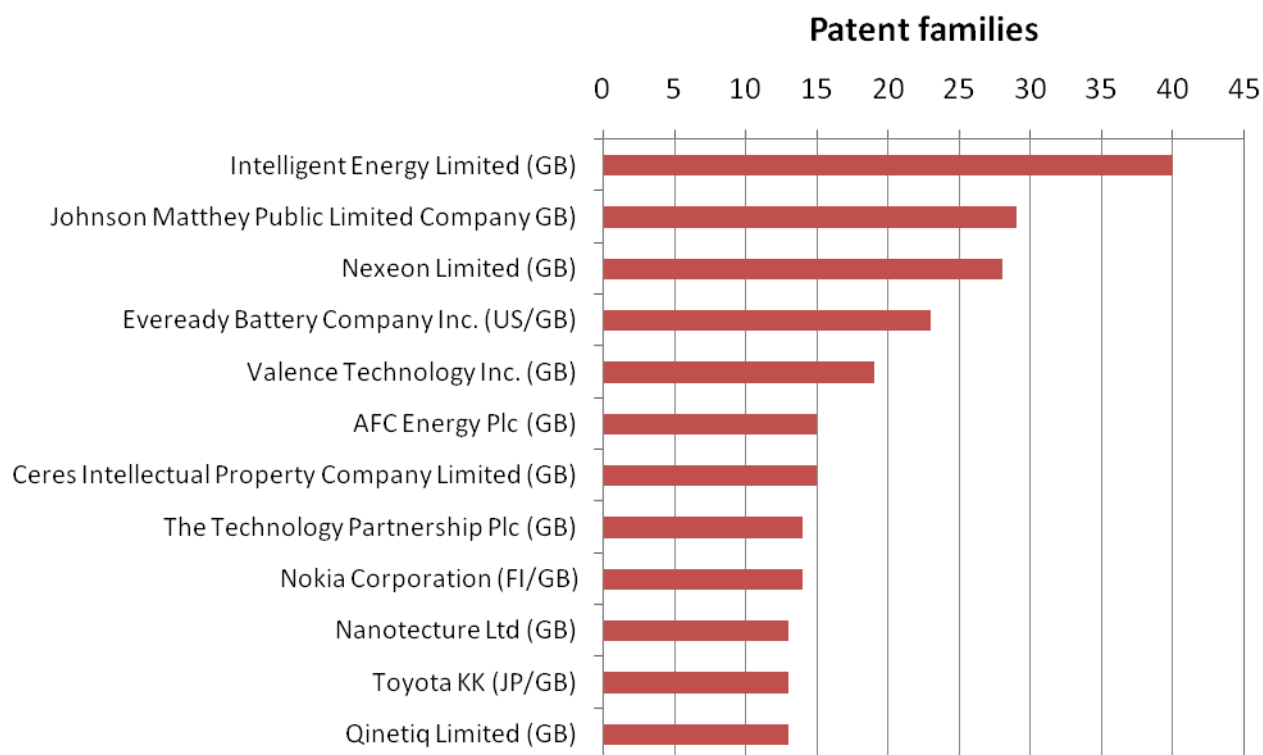
Patent families

Figure 12: Top worldwide applicants with named UK-based inventors

3.3 How active is the UK?

A subset of the main worldwide dataset designed to reflect all UK patenting activity was selected. Figure 13 shows the year-on-year change in UK patenting activity against the worldwide year-on-year change in energy and its storage patenting shown in Figure 2; this shows that changes in UK patenting activity in energy and its storage have clear overall positive trend, even when compared to worldwide patenting activity.
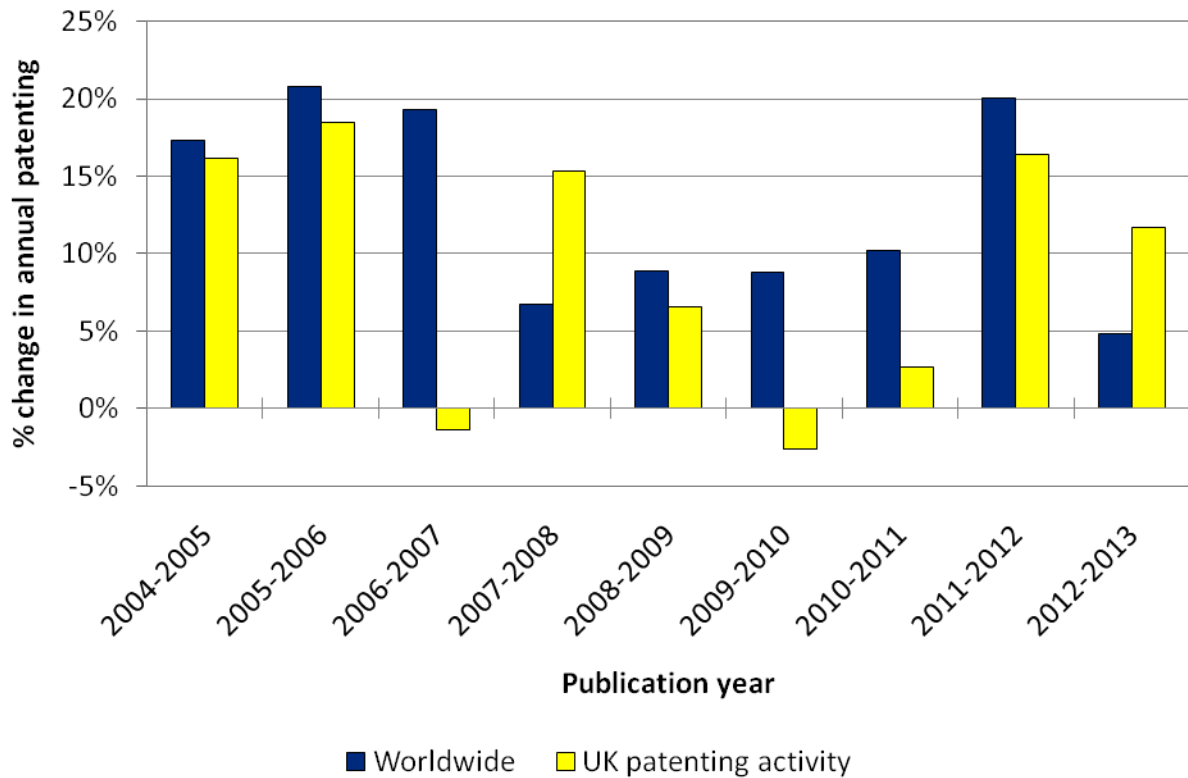

Figure 13: Year-on-year change in UK and worldwide energy and its storage patenting

Similar patent subsets were created to reflect patenting activity taking place in several comparator countries (France, Germany, USA, Japan, China, and Korea) to produce the comparison chart shown in Figure 14.

It is notable that China, Japan, France and to some extent Korea, exhibit consistent growth each year over the period. The UK has seen an increase of greater than 10% of patents between 2012-2013. However, two comparator countries showed a consistent negative growth; these were the USA and Germany. Although these countries are not all marked as areas of high patent filings there is still growth which outstrips other comparator countries according to this measure, and so the emergence of energy and its storage appears to be focussed in these places. Notably, the USA now appears to be gaining patents as numbers of these patents are achieving positive growth over the most recent time period.
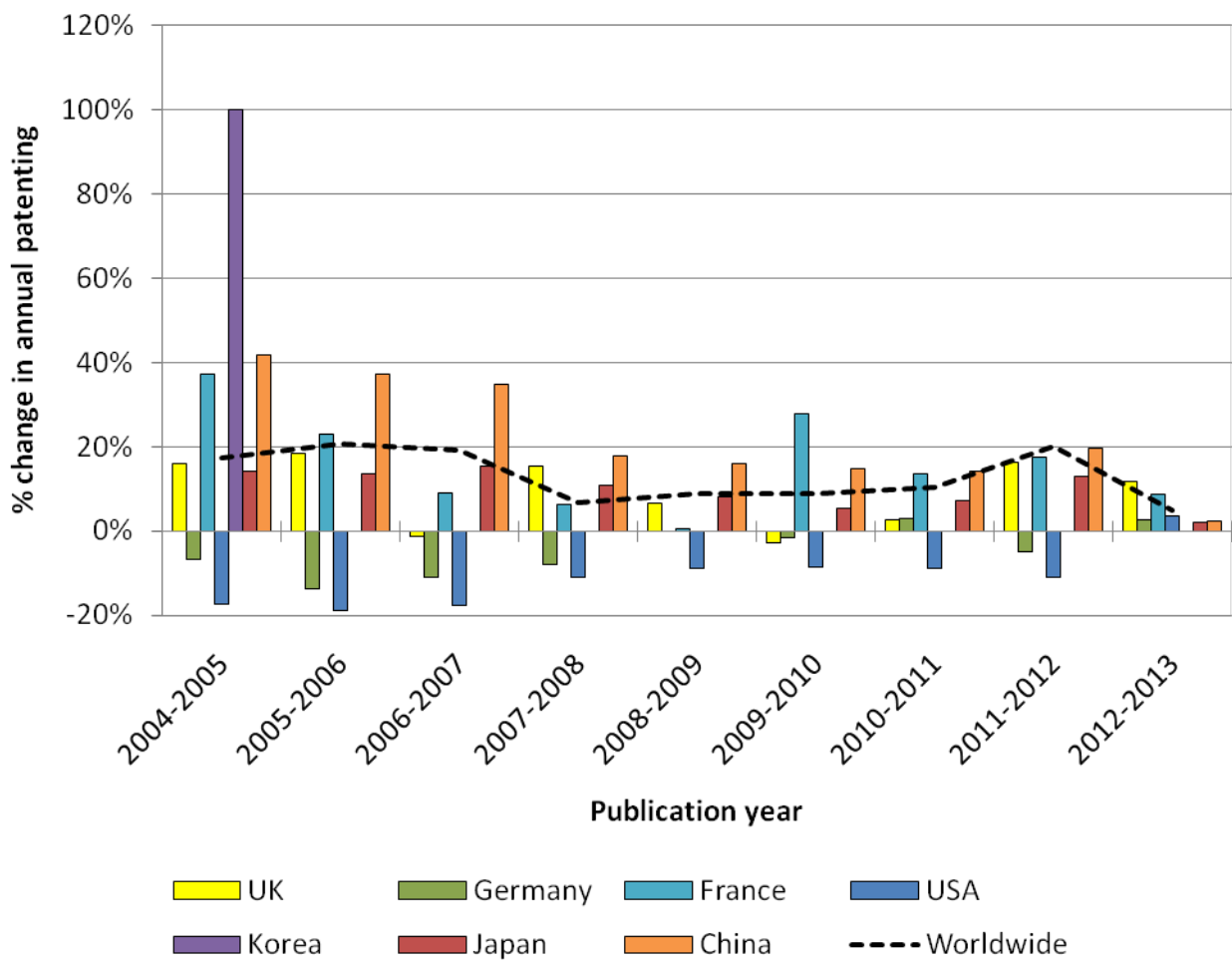

Figure 14: Year-on-year change in energy and its storage patenting activity against comparison countries

4   Patent landscape map analysis

In order to give a snapshot as to what the patent landscape looks like for this technology space, a patent map provides a visual representation of the dataset. Published patents (not patent families) are represented on a patent map by dots and the more intense the concentration of patents (*i.e.* the more closely related they are) the higher the topography as shown by contour lines. The patents are grouped according to the occurrence of keywords in the title and abstract and examples of the reoccurring keywords appear on the patent map[5].

Therefore a patent landscape map of the most recent five year period for energy and its storage technologies (2009-2013) has been created it is shown in Figure 15. The major topics in the map are *DC switching (DC/DC converter), lithium oxide, electrolyte, carbon/carbon double layer wheels (torque),* and *information transmitting user*.
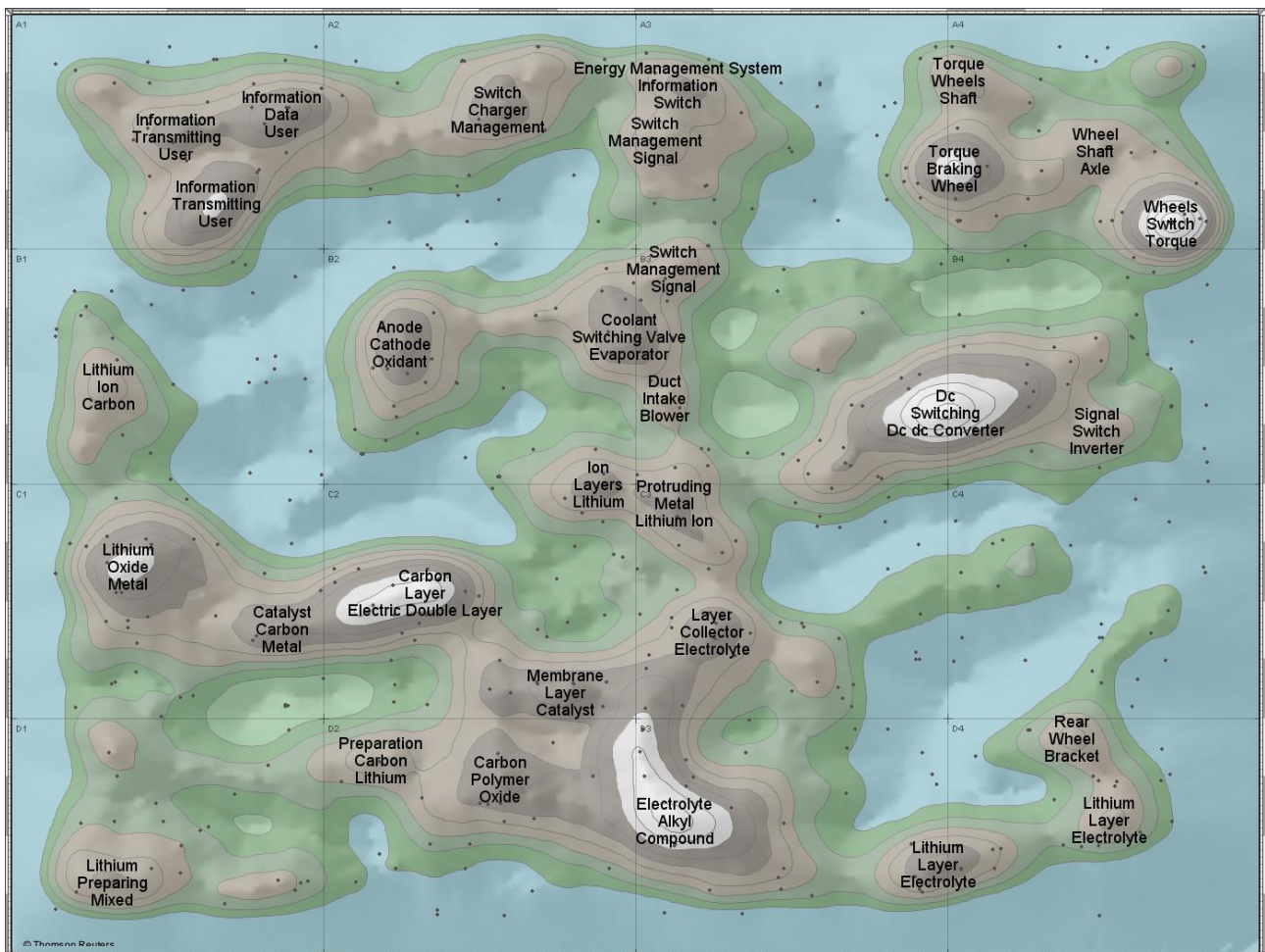

Figure 15: Patent landscape map of patent claims, abstract, and title term

Upon investigation, it is found that the leading applicants are distributed fairly homogeneously throughout the map as in shown in Figure 16 This indicates the applicants have a wide and varied

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[5] Further details regarding how patent landscape maps are produced is given in Appendix C.

interest over the entire field. Toyota, in particular is distributed fairly evenly over the "map".

Figure 16 Patent landscape map of patents assigned to the top five companies with the greatest volume of patent applications (Toyota dark blue, Sanyo, Samsung, Matsushita and LG are the remaining colours)

However, the patents owned by the other four main applicants are obscured by the prolific nature of this company's patents.

A landscape map has also been created showing where the patents with a UK priority are located. This is shown in Figure 17. Again, it demonstrates the general nature of the subject matter of these patent applications.

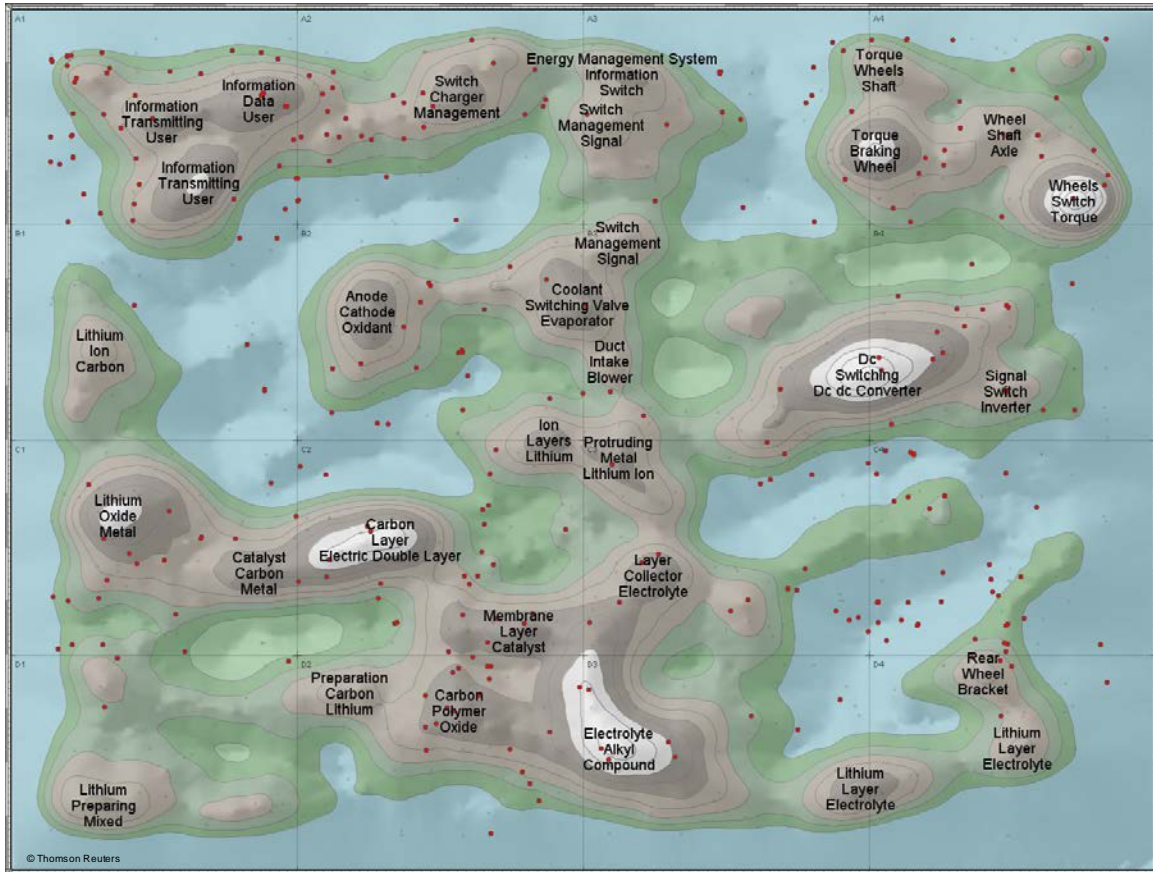**Figure 17 Patent landscape map with UK priority patent applications highlighted in red**

For comparison purposes the patent landscape has highlighted occurrence of two key UK applications (Nanotecture and Nexeon) to illustrate their technology specificity. This is shown in Figure 18.

Figure 18 Patent landscape of the with Nexeon (green) and Nanotecture (red) patents highlighted

Figure 19 shows an alternative landscape map formed using words only from the "use" and "advantage" parts of the DWPI abstract. In this case the following topics relating to particular applications are found: *electrolyte, charging system, preparation of lithium, fuel cell system and catalyst and dc/dc converter*. The emphasis in this map is directed towards the challenges that the applicant might face and how the technology described within these patents addresses these issues.

In this map the applicants are, again, distributed homogeneously, with Toyota dominating the patent applicants in this dataset; and no particular specialism evident.

Figure 19: Patent landscape map of advantages and uses

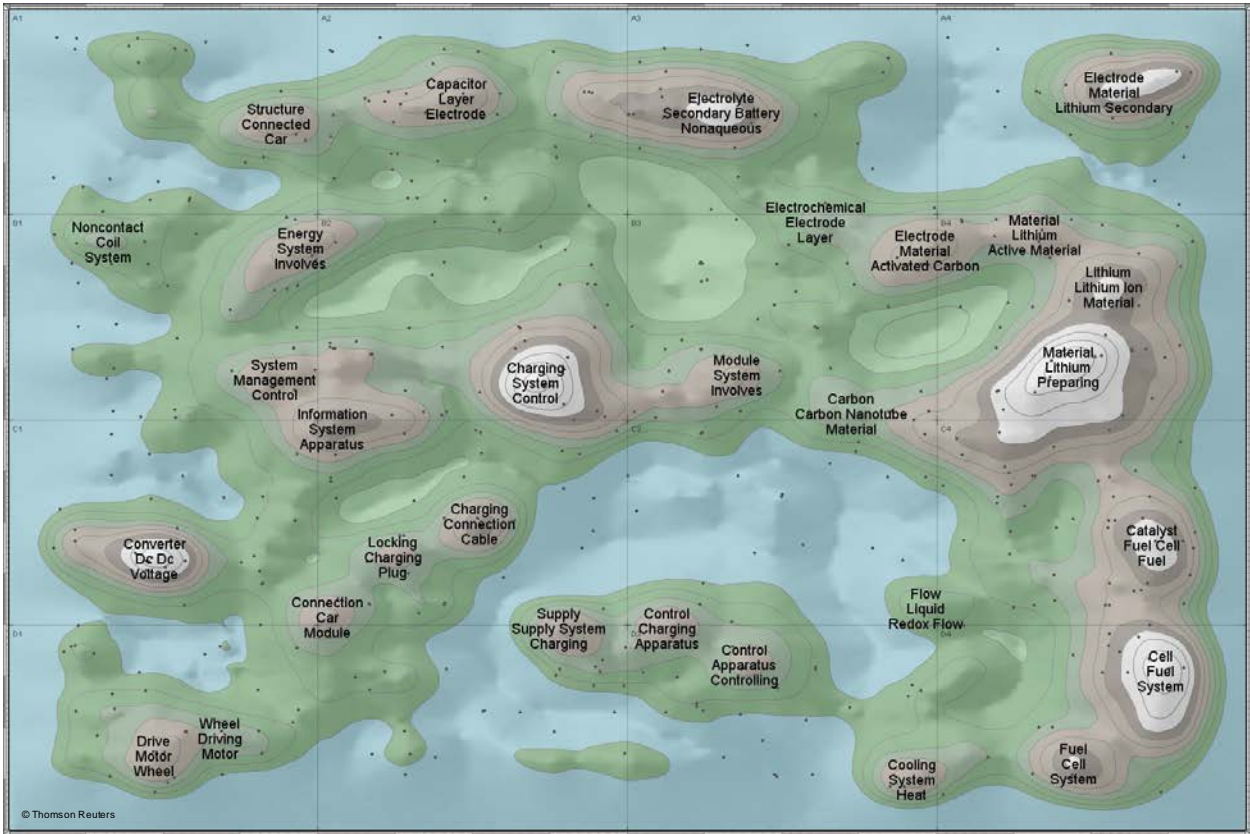# 5   Conclusions

Energy and its storage patenting has seen an increase in patent activity over a ten year period from 2004 to 2013, both worldwide and in the UK. However, given the general nature of the dataset it would be beneficial to divide the some of the technologies encompassed within this data to get a more representative view of some of these technologies contained within the current dataset. Thus this increase in UK patenting agrees with the general increase in volume of patenting globally over the same period. It also shows the patenting characteristics of an emerging technology with the potential for much further growth.

Almost half (45%) of energy and its storage patent families have a first filing in China, with the next largest country being Japan at 20%. The UK is at 0.5%. An index of relative specialisation of applicant countries indicates that China, Japan, Korea, and Hong Kong in particular show a high degree of specialisation in energy and its storage. China, Korea, Japan and the UK all show consistent and positive percentage growth since 2004 and so further technological developments may occur in those countries. The Netherlands and Switzerland have the lowest levels of specialisation. The UK has a reasonable degree of specialisation in this study.

Fifteen of the top twenty applicants in energy and its storage are based in Japan. All of them are reasonably well known multinational companies. Toyota (Japan) takes the leading position with 13787 patent families, with Sanyo (Japan) being some way behind at 5695 patent families, and Samsung (Japan) in third place with 5692 patent families. The role of multinational businesses in energy and its storage patenting is therefore important and could be expected to increase as further developments in technology are subsequently developed and commercialised. The mix of top applicants includes applicants who have become less and more active in recent years, suggesting that there is still scope for organisations to establish and maintain leading positions. In the UK, Intelligent Energy (83 patent families), Johnson Matthey (56), and Nexeon (51) take the lead. UK inventors tend to be associated with UK applicant companies and multinational companies.

Interestingly, Nexeon and Nanotecture were relatively recently founded by academics from Imperial College and Southampton University respectively. So, although there does not appear to be an immediate academic input into this field, with a high number of corporate incumbents worldwide, these examples illustrate that there is scope for relatively new companies to enter this technology area. It also highlights the effectiveness of the commercialisation of university research. It is also evident that the top applicants worldwide are all well established multinational companies whereas in the UK, top applicants in most companies are relatively new and the companies have their basis in a particular aspect of technology.

Collaborations appear to occur most frequently in large multinational organisations in the UK. As would be expected, technology specific UK based companies do not tend to collaborate with others.

Patent landscape analysis further demonstrates the general nature of energy and its storage patenting, with worldwide applicants tending to show interest in the entire field and to lack niches. However the main feature of the dataset is its domination by large multinational companies.

Appendix A Interpretation notes

A.1 Patent databases used

The *Thomson Reuters* World Patent Index (WPI) was interrogated using *Thomson Innovation*[6], a web-based patent analytics tool produced by *Thomson Reuters*. This database holds bibliographic and abstract data of published patents and patent applications derived from the majority of leading industrialised countries and patent organisations, *e.g.* the World Intellectual Property Organisation (WIPO), European Patent Office (EPO) and the African Regional Industry Property Organisation (ARIPO). It should be noted that patents are generally classified and published 18 months after the priority date. This should be borne in mind when considering recent patent trends (within the last 18 months).

The WPI database contains one record for each patent family. A patent family is defined as all documents directly or indirectly linked via a priority document. This provides an indication of the number of inventions an applicant may hold, as opposed to how many individual patent applications they might have filed in different countries for the same invention.

A.2 Priority date, application date and publication date

Priority date: The earliest date of an associated patent application containing information about the invention.

Publication date: The date when the patent application is published (normally 18 months after the priority date or the application date, whichever is earlier).

Analysis by priority year gives the earliest indication of invention.

A.3 WO and EP patent applications

International patent applications (WO) and European patent applications (EP) may be made through the World Intellectual Property Organization (WIPO) and the European Patent Office (EPO) respectively.

International patent applications may designate any signatory states or regions to the Patent Cooperation Treaty (PCT) and will have the same effect as national or regional patent applications in each designated state or region, leading to a granted patent in each state or region.

European patent applications are regional patent applications which may designate any signatory state to the European Patent Convention (EPC), and lead to granted patents having the same effect as a bundle of national patents for the designated states.

Figures for patent families with WO and EP as priority country have been included for completeness although no single attributable country is immediately apparent.

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[6] *http://info.thomsoninnovation.com*

A.4 Patent documents analysed

The energy and its storage technologies patent dataset for analysis was identified in conjunction with patent examiner technology-specific expertise. A search strategy was developed and the resulting dataset was extracted in June 2014 using International Patent Classification (IPC) codes, Co-operative Patent Classification (CPC) codes and keyword searching of titles and abstracts in the *Thomson Reuters* World Patent Index (WPI) and limited to patent families with publications from 2004 to 2013.

The applicant and inventor data was cleaned to remove duplicate entries arising from spelling errors, initialisation, international variation (Ltd, Pty, GmbH *etc*.), or equivalence (Ltd., Limited, *etc*.).

A.5 Analytics software used

The main computer software used for this report is a text mining and analytics package called *VantagePoint*[7] produced by *Search Technology* in the USA. The patent records exported from *Thomson Innovation* were imported into *VantagePoint* where the data is cleaned and analysed. The patent landscape maps used in this report were produced using *Thomson Innovation*.

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[7] *http://www.thevantagepoint.com*

Appendix B Relative Specialisation Index

Relative Specialisation Index (RSI) was calculated as a correction to absolute numbers of patent families in order to account for the fact that some countries file more patent applications than others in all fields of technology. In particular, US and Japanese inventors are prolific patentees. RSI compares the fraction of energy and its storage technologies patents found in each country to the fraction of patents found in that country overall. A logarithm is applied to scale the fractions more suitably. The formula is given below:

$$\log_{10}\left(\frac{n_i/n_{total}}{N_i/N_{total}}\right)$$

where

n_i = number of energy and its storage technologies patents in country i
n_{total} = total number of energy and its storage technologies patents in dataset
N_i = total number of patents in country i
N_{total} = total number of patents in dataset

The effect of this is to highlight countries (in this study, Hong Kong and Australia in particular, as shown in Figure 5) which have a greater level of patenting in energy and its storage technologies than expected from their overall level of patenting, and which would otherwise languish much further down in the lists, unnoticed.

Appendix C Patent landscape maps

A patent landscape map is a visual representation of a dataset and is generated by applying a complex algorithm with four stages:

i) **Harvesting documents** – When the software harvests the documents it reads the text from each document (ranging from titles through to the full text). Non-relevant words, known as stopwords, (e.g. "a", "an", "able", "about" etc) are then discounted and words with common stems are then associated together (e.g. "measure", "measures", "measuring", "measurement" etc).

ii) **Analysing documents** – Words are then analysed to see how many times they appear in each document in comparison with the words' frequency in the overall dataset. During analysis, very frequently and very infrequently used words (i.e. words above and below a threshold) are eliminated from consideration. A topic list of statistically significant words is then created.

iii) **Clustering documents** – A Naive Bayes classifier is used to assign document vectors and Vector Space Modelling is applied to plot documents in n-dimensional space (i.e. documents with similar topics are clustered around a central coordinate). The application of different vectors (i.e. topics) enables the relative positions of documents in n-dimensional space to be varied.

iv) **Creating the patent map** – The final n-dimensional model is then rendered into a two-dimensional map using a self-organising mapping algorithm. Contours are created to simulate a depth dimension. The final map can sometimes be misleading because it is important to interpret the map as if it were formed on a three-dimensional sphere.
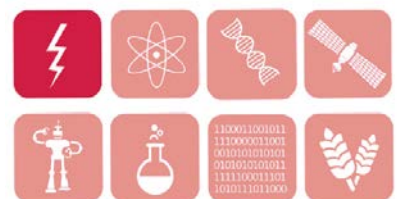
Thus, in summary, patents are represented on the patent map by dots and the more intense the concentration of patents (*i.e.* the more closely related they are) the higher the topography as shown by contour lines. The patents are grouped according to the occurrence of keywords in the title and abstract and examples of the reoccurring keywords appear on the patent map. Please remember there is no relationship between the patent landscape maps and any geographical map.

Please note that the patent maps shown in this report are snapshots of the patent landscape, and that patent maps are best used an interactive tool where analysis of specific areas, patents, applicants, inventors *etc* can be undertaken 'on-the-fly'.

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