

The interim results of the survey on using the GXTI

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The interim results of the survey on using the GXTI (Green Transformation Technologies Inventory) revealed the followings.

- The Level 2 categories in which the number of internationally deployed inventions¹ by **Japanese applicants**² (in total for 2010-2021) ranks first are; “Solar Photovoltaic Power Generation”, “Fuel Cells”, “Energy Saving in Buildings (ZEB, ZEH, etc.)”, “High-Efficiency Motors and Inverters”, “Electromobilities”, “Secondary Batteries”, “Electric Double Layer Capacitors, Hybrid Capacitors”, and “Measures Against Non-CO2 Greenhouse Gases”. In particular, in the categories of “Solar Photovoltaic Power Generation” and “Fuel Cells”, Japanese applicants are in first place by a margin over **European and US applicants**.
- Looking at the total for 2010-2021, although the number of inventions³ by **Chinese applicants** ranks first in almost all Level 2 categories, the number of their internationally deployed inventions is small, and **Japanese, US and European applicants** occupy the top three positions.
- Looking at the year of 2019 alone, in terms of the number of inventions, **Chinese applicants** rank first in all Level 2 categories. In addition, in terms of the number of internationally deployed inventions, in many of the Level 2 categories within the Level 1 category “gxA Energy Supply”, such applicants rank within the top three, replacing **Japanese applicants**, which has been increasing the presence of **Chinese applicants**. However, in the Level 2 categories of “Solar Photovoltaic Power Generation”, “Fuel Cells”, “Hydrogen Technology”, and “Ammonia Technology” within the Level 1 category “gxA Energy Supply”, **Japanese applicants** remain in the top group along with **Europe and US**.

The circled numbers in the explanation below indicate the sheet number of the appendant Excel file (for example, ① means the sheet of “① Number of inventions _all years”).

¹ **Number of internationally deployed inventions:** Number of applications for inventions filed in multiple countries/regions. Sometimes referred to as the "International Patent Family (IPF)".

² **Country/Region of applicant:** The country/region identified based on name/address of the applicant.

³ **Number of inventions:** The number of applications for inventions filed in any country/region. Even if applications for the same invention are filed in multiple countries/regions, they are counted as one. (If an application for an invention is filed in only one country/region, it is also counted as one.) If applications are filed in multiple countries/regions, the collection of those applications is sometimes referred to as a “Patent Family”.

In addition, “European Applicant” means that country/region of the applicant is a member state of the EPC⁴ (European Patent Convention).

<Comparison by country/region in all survey years (2010-2021)>

- In each Level 2 category, the number of inventions by Chinese applicants is very large (①). On the other hand, in terms of internationally deployed inventions, there are few applications by such applicants, and Japanese, US and European applicants occupy the top three positions (①, ②).
- Japanese, US and European applicants occupy the top three positions in terms of the number of internationally deployed inventions in almost all Level 2 categories (②).
- The Level 2 categories in which the number of internationally deployed inventions by Japanese applicants ranks first are; “gxA01 Solar Photovoltaic Power Generation”, “gxA09 Fuel Cells”, “gxB01 Energy Saving in Buildings (ZEB, ZEH, etc.)”, “gxB02 High-Efficiency Motors and Inverters”, “gxB05 Electromobilities”, “gxC01 Secondary Batteries”, “gxC04 Electric Double Layer Capacitors, Hybrid Capacitors”, and “gxE02 Measures Against Non-CO2 Greenhouse Gases”. In particular, in the categories of “gxA01 Solar Photovoltaic Power Generation” and “gxA09 Fuel Cells”, Japanese applicants are in first place by a large margin over European and US applicants (②).
- The Level 2 categories in which the number of internationally deployed inventions by US applicants ranks first are “gxA07 Biomass”, “gxA08 Nuclear Power Generation”, “gxB07 Power Transmission and Distribution, Smart Grids”, “gxD01 Chemical Production from Biomass”, “gxE01 CCS, CCUS, Negative Emission”, and others (②).
- The Level 2 categories in which the number of internationally deployed inventions by European applicants ranks first are technology categories within “gxA Energy Supply” including “gxA10 Hydrogen Technology” and “gxA11 Ammonia Technology” (②).
- The Level 2 category in which the number of internationally deployed inventions by Chinese applicants ranks first is “gxB04 Energy Saving and Supply/Demand Flexibility in Treatment of Water, Wastewater, Sewage, and Sludge” (②).
- In the Level 2 category “gxC01 Secondary Batteries”, South Korean applicants rank second in terms of the number of internationally deployed inventions (②).

<Comparison by country/region in 2019>

- The number of internationally deployed inventions by Japanese applicants is within the top three, along with Europe and US, in many of the Level 2 categories, except for the Level 2 categories within the Level 1 category “gxA Energy Supply” (④).

⁴ EPC member states are the following 38. Albania, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Monaco, Netherlands, North Romania, Norway, Poland, Portugal, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, and United Kingdom.

- The number of internationally deployed inventions by Chinese applicants surpassed that by Japanese applicants, in many of the Level 2 categories within the Level 1 category "gxA Energy Supply", and now ranks within the top three. On the other hand, in "gxA01 Solar Photovoltaic Power Generation", "gxA09 Fuel Cells", "gxA10 Hydrogen Technology", and "gxA11 Ammonia Technology" of the Level 2 categories within the said Level 1 category, the number of internationally deployed inventions by Japanese applicants remains in the top group along with Europe and US since 2019 (④).
- The number of inventions by Chinese applicants ranks first in all technology categories (③).
- In terms of the number of internationally deployed inventions in the Level 2 category "gxC01 Secondary Batteries," Japanese applicants are in the first place, followed by South Korea in second and China in third (④).

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