

Air Quality: Global Leaders and Innovators

A view across the enabling technologies of Air Scrubbers, Oxidation Catalysts, Biofuels, Diesel Particulate Filters and Multi-Pollutant Monitoring Devices.

The first industrial revolution supported Great Britain in becoming a commercial superpower in the mid 18th century. The long-term effects to the environment were not fully apparent until centuries later leading to the Clean Air Act of 1956, passed to preserve public health. Today the issues of pollution control and climate change are viewed as critical to moving forward as a global community. Yet, there are relatively few sources of objective and independent data available to identify the countries and companies leading in innovation of sustainable enabling technologies. There is an intrinsic bias in self-reported data from organizations, the staple for traditional ESG analysis. Our view is that this void in sustainability analysis can be plugged in part through published, classified patent data as an indicator for sustainable innovation and investment.

In this update on sustainable innovation being made in critical technologies related to air quality, we provide our view of the leading innovators to watch based on recent published inventions and overall weightings to enabling technologies. The technology areas covered include Air Scrubbers, Oxidation Catalysts, Biofuels, Diesel Particulate Filters and Multi-Pollutant Monitoring Devices.

The World's Leading Air Quality Innovators To Watch



LanzaTech

Sekab



IndianOil

IAE 고등기술연구원
Institute for Advanced Engineering

umicore

Air Liquide

MicroJet



JM Johnson Matthey
Inspiring science, enhancing life



KIMM

KURITA

Valmet

Cipher view of the world's leading innovators to watch based on recent publications and overall weighting of inventions to enabling air quality technologies: Scrubbers, Oxidation Catalysts, Biofuels, Diesel Particulate Filters and Multi-Pollutant Monitoring Devices.

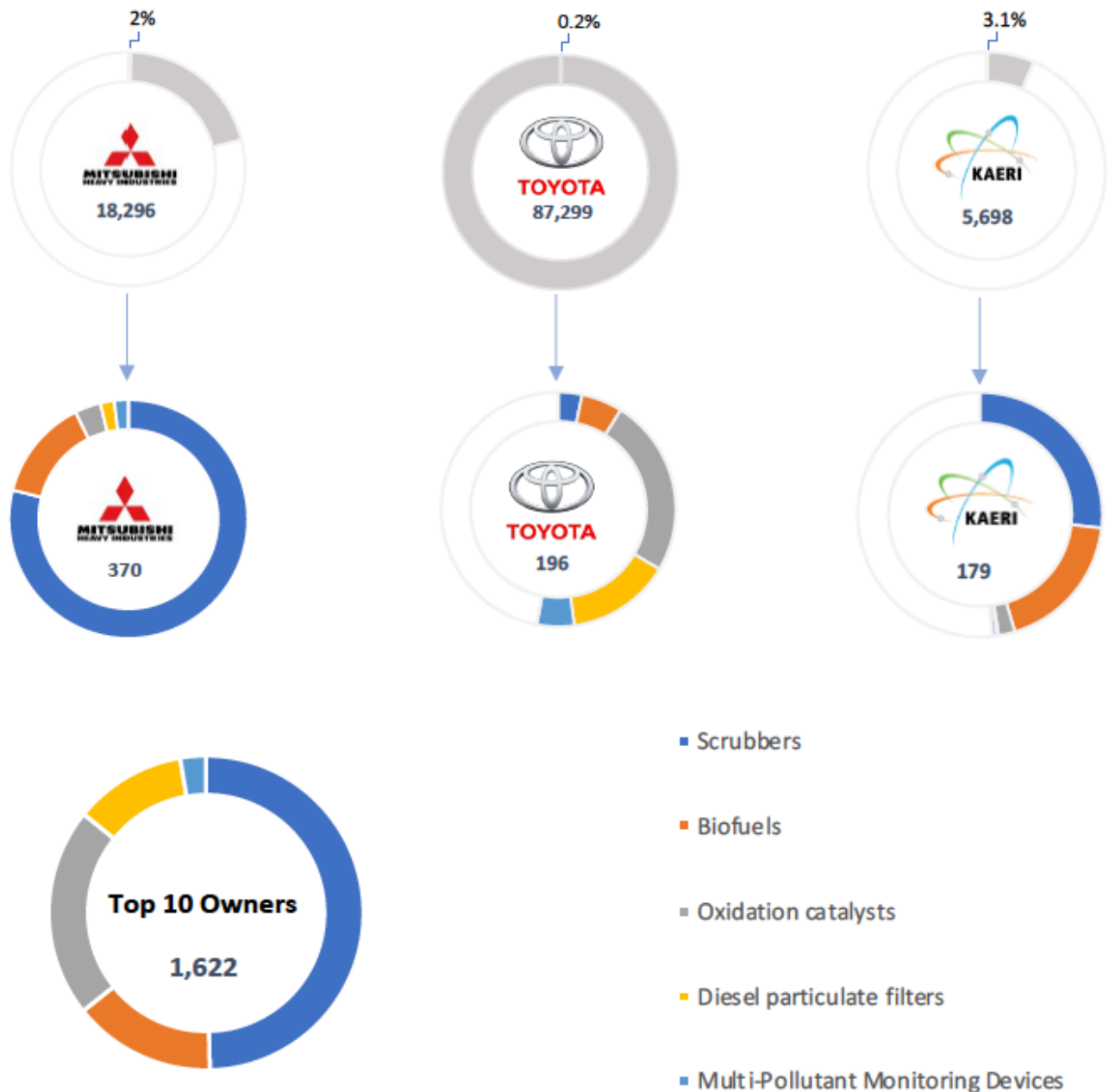
Bringing Clarity to Sustainable Innovation

At LexisNexis® Intellectual Property Solutions, we support many of the world's largest organizations in scoring and benchmarking on sustainability. For more information on how you can access critical insight on sustainable innovation specific to your business, please visit: www.lexisnexis.com/sustainable-innovation.

Top invention owners globally in Air Quality technologies include Korean research institutes and Japanese keiretsus Mitsubishi and Toyota. Scrubbers the dominant technology theme.

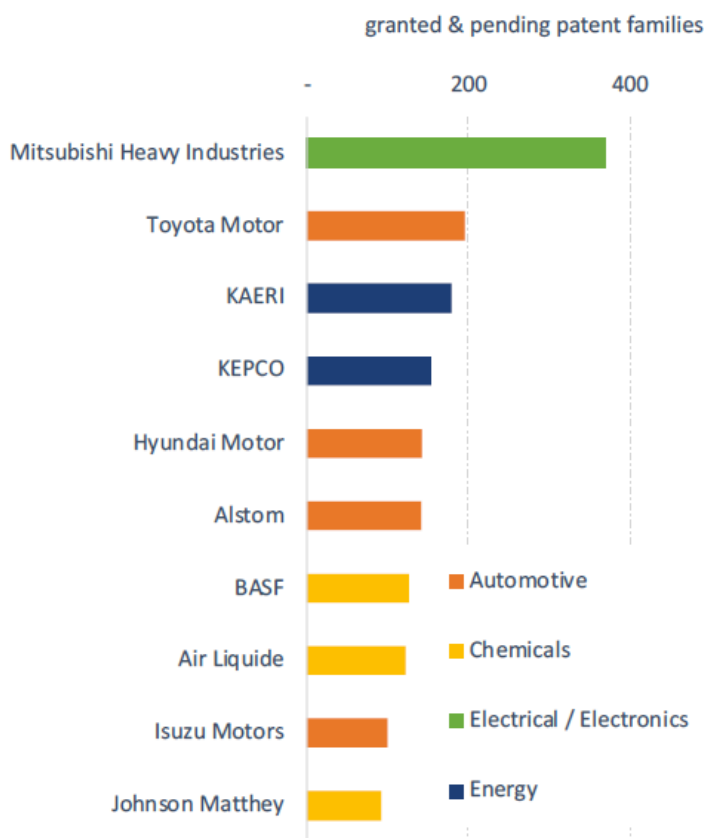
Air Quality tech accounts for only a fractional portion (0.2-3.1%) of the published inventions owned by the top three invention owners Mitsubishi Heavy, Toyota Motor and Korean Atomic Energy Research.

Top Invention Owners: Air Quality Technologies



Patent families classified according to technologies using Cipher's internal sustainability classifiers. Global excluding China-only patent families. The extended list of 50 top owners is included on page 5.

Top Invention Owners: Air Quality Technologies



Mitsubishi Heavy Industries ranks 1st in Air Quality technologies patent count with 376 granting and pending families in the outlined technologies, followed by Toyota and KAERI.

Automotive sector leads in this technology area, including both big players (Toyota and Hyundai) and emerging companies such as Alstom, a French rolling stock manufacturer and Isuzu, a Japanese multinational commercial vehicle manufacturer. Alstom focuses solely on scrubbers, while Isuzu’s portfolio is based on oxidation catalysts and diesel particulate filter technologies.

Other companies of note include Korean research and energy companies KAERI (Korean Atomic Energy Research Institute) and KEPCO (Korean Electric Power Corporation), where the primary focus is scrubbers, followed 2nd by biofuels technologies.

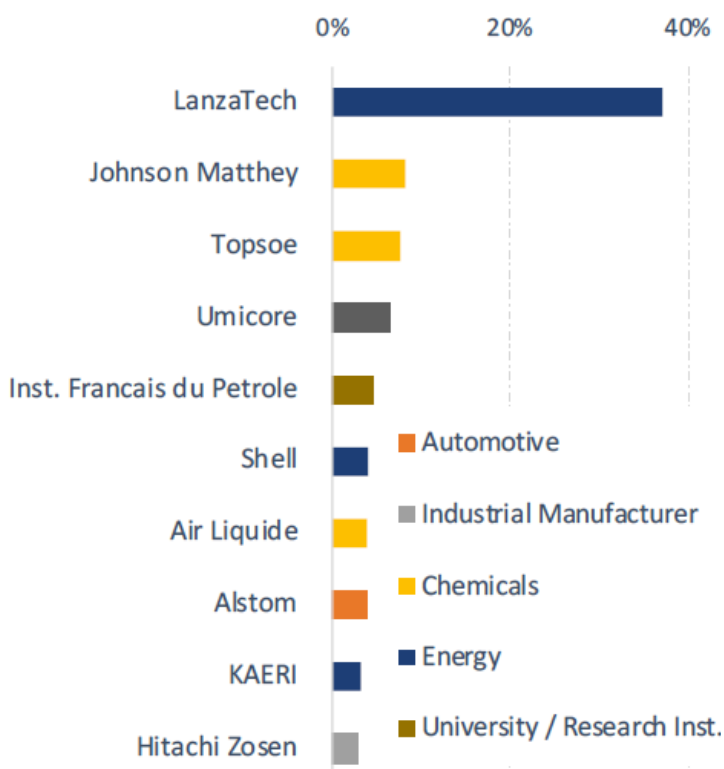
Air Quality Tech Weighting: patent families owned as a percent of the total for each top owner

Recognizing that air quality tech accounts for only a small fraction of the top owners’ published inventions, we rank the top 50 owners by percent exposure. This provides color into the strategic importance and weighting given to air quality technologies across the full top owners list.

Chicago-based LanzaTech leads the charge with the most targeted portfolio, with a size of 124 granted and pending families, 37% of which are targeted towards Air Quality technologies. British multinational company Johnson Matthey follows in 2nd place, with a particular focus on oxidation catalyst; followed in turn by Topsoe at 3rd place, a Danish catalysis company.

The extended list of 50 top owners by air quality tech weighting is included on page 5.

Air Quality Tech patent families, % of total owned



The leading air quality weighted innovators based on recent patenting activity by scale and overall exposure; biofuels and scrubbers the dominant technology enablers

These are the companies that we view as the leaders to watch in air quality innovation. The full list is generated by screening those organizations with the most inventions published across the enabling technologies from start of 2021 to date and where recent innovation is relatively more weighted to those technologies over others.

The World's Leading Air Quality Weighted Innovators To Watch

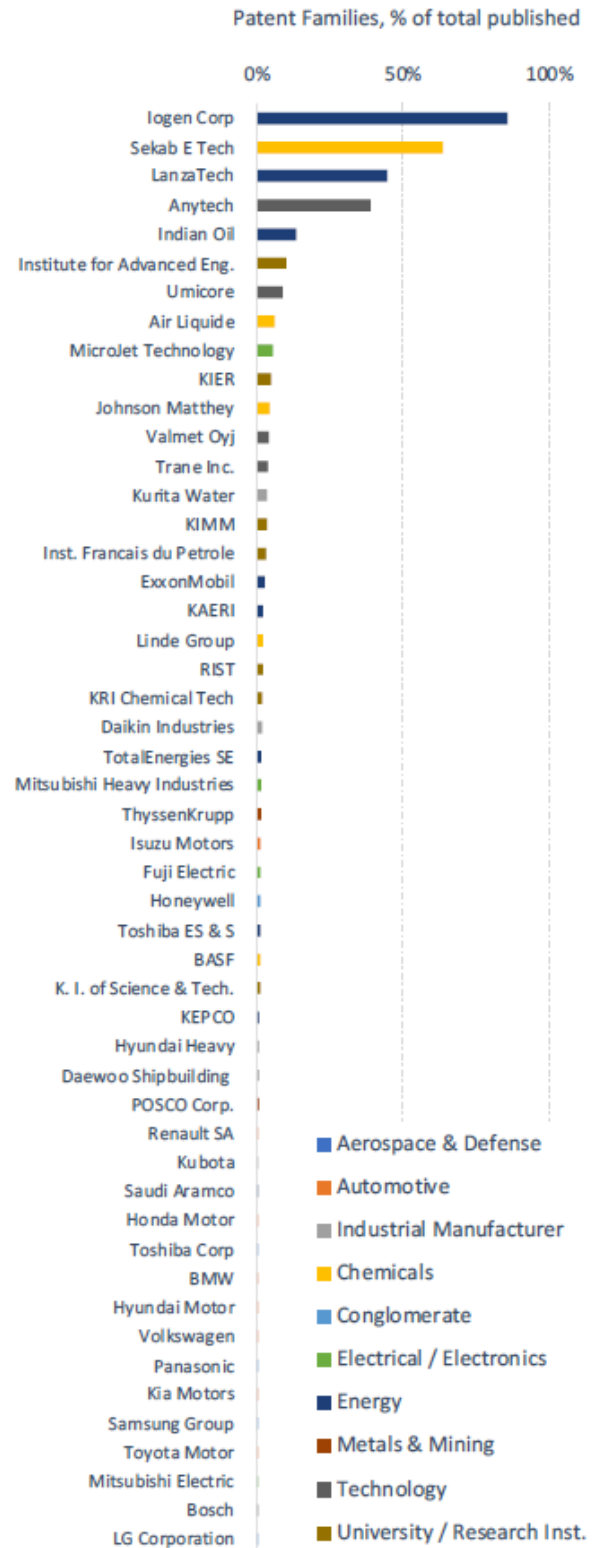
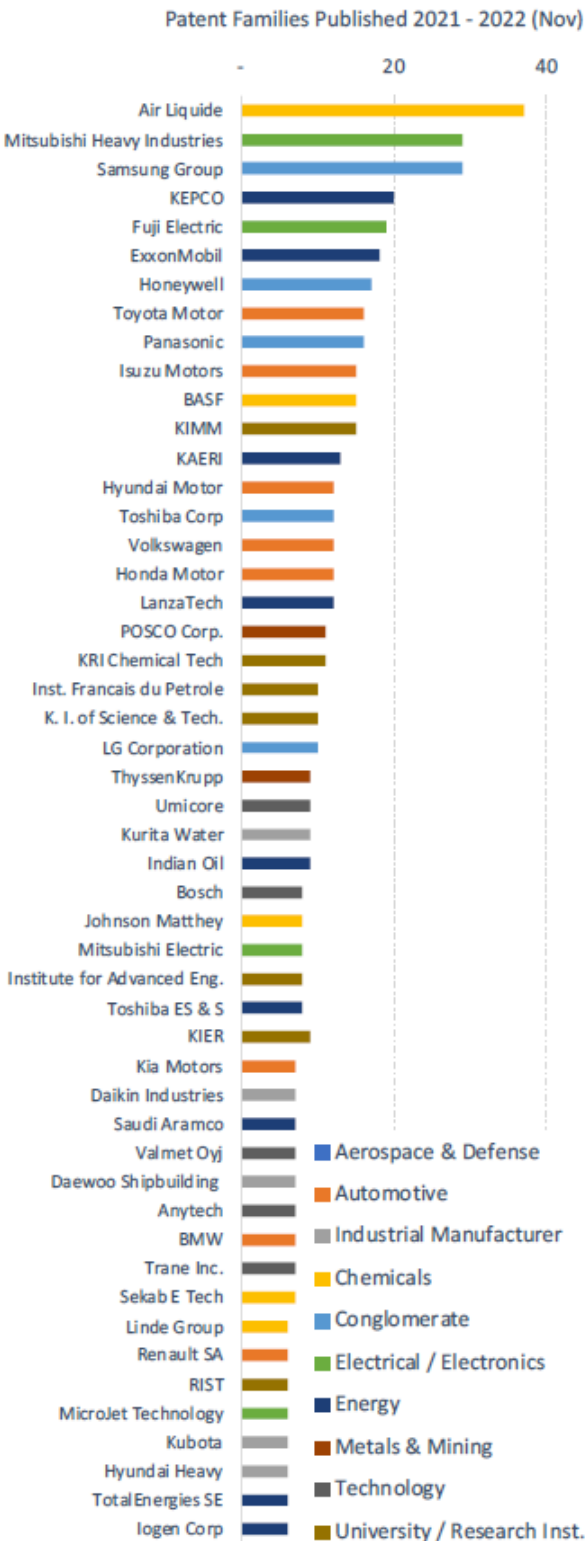
Technology breakdown of published inventions 2021 – 2022 (Nov)



Cipher view of the world's leading innovators to watch based on recent publications and overall weighting of inventions to enabling air quality technologies: Air Scrubbers, Oxidation Catalysts, Biofuels, Diesel Particulate Filters and Multi-Pollutant Monitoring Devices. The extended list of 50 top innovators and their energy transition tech weighting is included on page 6.

Top Innovation Owners: Air Quality Tech
patent families owned

Top Invention Owners: Air Quality Tech Weighting
patent families owned as a percent of the total number of patent families for each organization



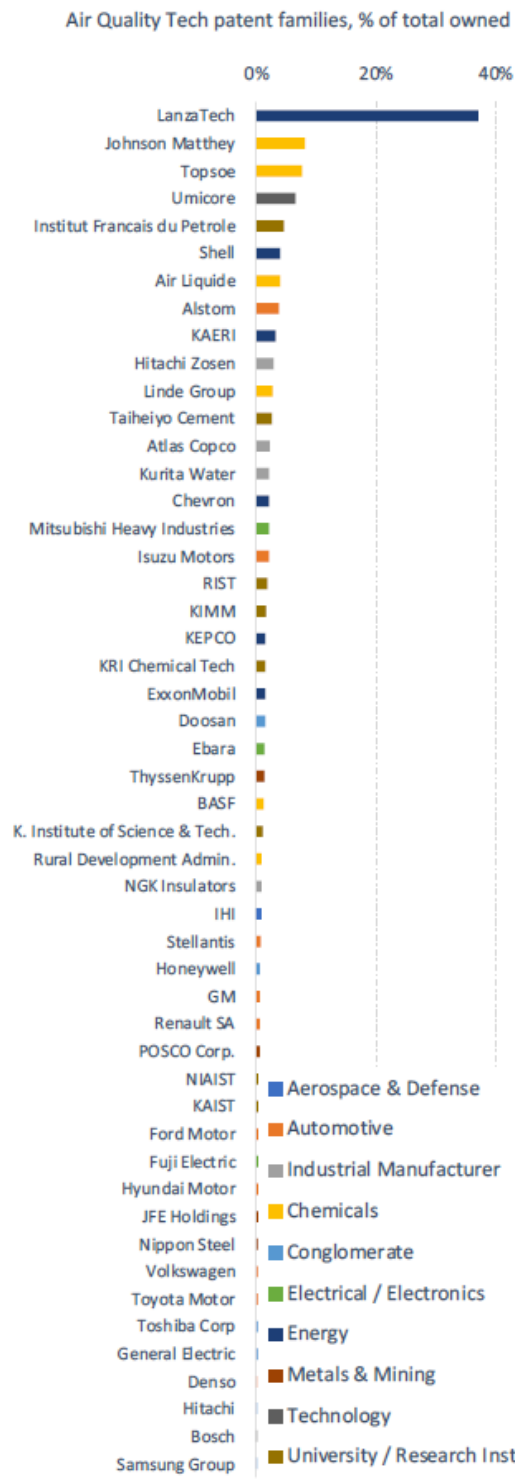
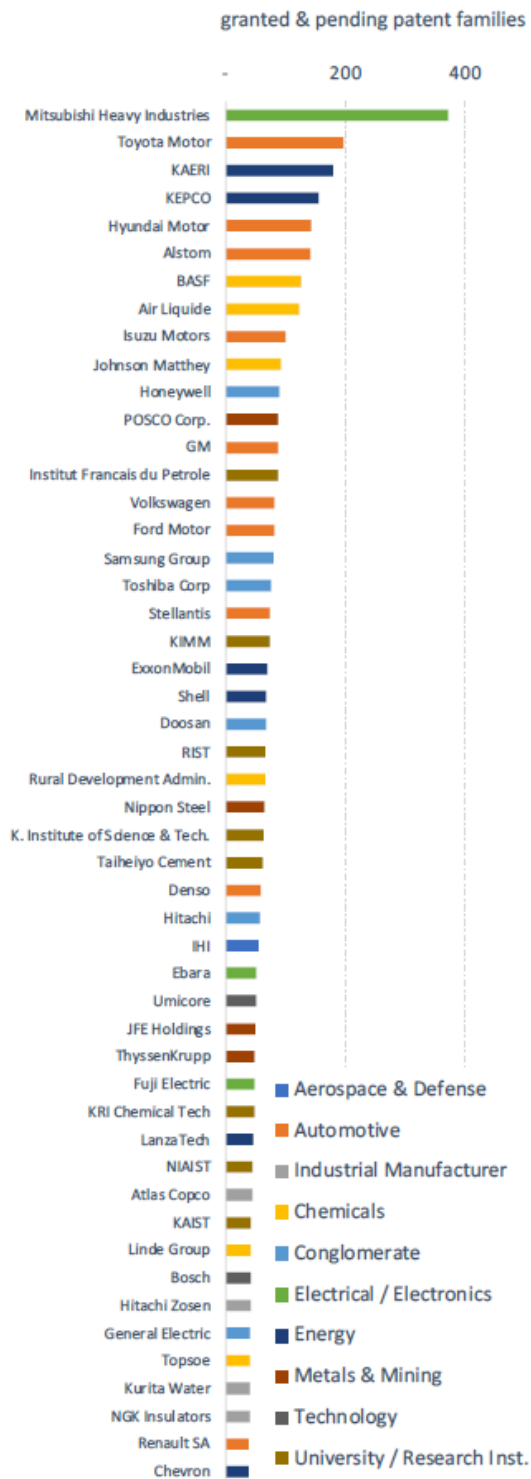
Global excluding China-only patent families.

Top Innovators : Air Quality Tech

patent families published 2021 – 2022 (Nov)

Top Innovators Owners, Air Quality Tech Weighting

patent families published as a percent of the total published 2021 – 2022 (Nov) for each organization



Global excluding China-only patent families.

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