Europäisches Patentamt
European Patent Office
Office européen des brevets

PRESS RELEASE

Electricity grid patents surging as countries target artificial intelligence solutions

Europe, Japan and the US lead in power network patents, with China emerging as a strong player in smart grids

Munich, 10 December 2024 – New patents to integrate artificial intelligence into power grids have grown sixfold in recent years, with the United States and China leading the way in AI for smart grid development**,** according to a new study by the European Patent Office (EPO) and the International Energy Agency (IEA).

The report, *Patents for Enhanced Electricity Grids,* shows how patents for electricity grid technologies have surged over the past two decades as advances in digital integration and the rollout of clean energy sources are driving innovation across the energy sector. Software innovations boosted smart features in physical grid patents by 50% between 2010 and 2022, with supply-demand forecasting tools and electric vehicle charging representing the two largest areas of growth in this category.

Innovation in electricity infrastructure is one of the fastest growing technology fields in the world today. To illustrate the scale of growth, the report pinpoints the period between 2009-2013 when innovation in electricity grids grew by 30% a year, seven times faster than the average for all other technology fields. The report uses global patent data to map innovation in both physical and smart grid technologies from 2001 to 2022, based on international patent families (IPFs)[i]. It shows momentum gradually stabilising, but new applications remain at a consistently high level in most major regions.

"As emphasised in Mario Draghi's recent report, to secure its economic competitiveness, Europe must take the lead in new clean technologies and accelerate the energy transition away from fossil fuels," said **EPO President, António Campinos***. "Significant progress has already been made, highlighting the urgency of investing in smarter, more flexible electricity networks to balance growing power demand with variable energy sources. This study offers a unique view of patenting trends, serving as a map for our transition to a new energy system."*

"Inadequate electricity grids are a barrier to economic activity and energy access while also making deployment of clean energy technologies more costly and complex," **said IEA Executive Director Fatih Birol.** *"This study shows that innovators are responding to the need for more competitive and flexible grid technologies, an issue that is too often overlooked. The data show encouraging growth in innovations to expand and maintain critical network infrastructure. This growth is now led by China, raising the competitive stakes for other regions. We will continue to help governments spur innovation for secure and sustainable energy transitions."*

Europe and Japan at the forefront, China races ahead

The EU and Japan lead in grid innovation, each region accounting for 22% of all grid-related patents from 2011 to 2022, with the US at 20%. Within Europe, Germany (11%), Switzerland (5%), France (4%), the UK (2%) and Italy (1%) are the top countries of origin of grid patents. Meanwhile, China has emerged as the fastest-growing region for grid-related patents. Its share rose from 7% in 2013 to 25% in 2022, overtaking the EU in 2022 to become the top patenting region in this field for the first time.

Role of grid-tech startups

The study finds that universities, research institutes and smaller companies also play a significant role in electricity grid innovation. Most grid-technology startups are based in Europe and the US; 37% of them have applied for a patent, which is significantly higher than the 6% average for European startups and suggests strong potential for attracting venture capital.

Further information

- Full report
- EPO's Observatory on Patents and Technology
- EPO's Deep Tech Finder
- Past joint studies from the EPO and IEA on innovation in hydrogen technologies (January 2023), clean energy (April 2021) and batteries and electricity storage (September 2020).

Media contacts European Patent Office

Luis Berenguer Giménez
Principal Director Communication / EPO spokesperson

EPO press desk
press@epo.org
Tel.: +49 89 2399-1833
Mobile: +49 151 5440 3997

About the EPO

With some 6 300 staff members, the European Patent Office (EPO) is one of the largest public service institutions in Europe. Headquartered in Munich with offices in Berlin, Brussels, The Hague and Vienna, the EPO was founded with the aim of strengthening co-operation on patents in Europe. Through the EPO's centralised patent granting procedure, inventors are able to obtain high-quality patent protection in up to 45 countries, covering a market of some 700 million people. The EPO is also the world's leading authority in patent information and patent searching.

About the IEA

The International Energy Agency (IEA) is at the heart of global dialogue on energy, providing authoritative analysis, data, policy recommendations, and real-world solutions to help countries bring about secure and sustainable energy for all. Taking an all-fuels, all-technologies approach, the IEA advocates policies that enhance the reliability, affordability and sustainability of energy. The IEA is

supporting clean energy transitions all over the world in order to help achieve global sustainability goals.

[i] Each international patent family (IPF) represents a unique invention for which patent applications have been filed at a regional patent office or at two or more patent offices worldwide.