Articles + Publications | July 21, 2025

Navigating IP Risks in Emerging Clean Energy Technologies

WRITTEN BY

Gregory D. Len | Dustin N. Ferzacca

This article was republished in IP Litigator *on September 1, 2025.*

I. INTRODUCTION

The evolution of grid management strategies to accommodate the increased adoption of renewable energy sources has led to a significant rise in both patent filings and patent disputes. An increased proportion of a grid's power originating from variable energy sources, *e.g.*, wind and solar, whose generation capacity fluctuates with weather, can pose challenges to grid stability and reliability. For example, intermittent energy sources like wind and solar can create "dips" in grid capacity that must be filled if demand simultaneously peaks. Issues include maintaining frequency and voltage stability as generation increases or decreases with conditions, leading to reduced grid inertia — the ability of an electrical power grid to resist changes in frequency due to sudden imbalances between electricity supply and demand. As a result, the grid management and control systems that balance supply and demand must be increasingly sophisticated to accommodate the difficulties in grid regulation.

The widespread power outages in Spain and Portugal during the spring of 2025 highlight concerns with energy grids, both in the U.S. and abroad, that increasingly incorporate renewable energy sources like solar and wind. While some blame Spain's blackouts on the penetration of renewable energy sources, which has grown in recent years — from 43% in the 2010s to 56% in 2024[1] — others argue that grid management is to blame.[2] Rather than place the blame wholly on renewable energy penetration, these commenters suggest the more nuanced position that "investments in power storage and grid upgrades must go hand in hand with the expansion of renewables generation." Increased investment in patent filings goes hand in hand with 21st-century grid upgrades, and recent litigation case studies demonstrate that patent disputes naturally follow increases in patent investment.

The core business models of energy producers and providers are traditionally not associated with significant IP ownership disputes and litigation risk. However, these core business models are facing new challenges related to IP while integrating new technologies. Two exemplary case studies of patent litigation illustrate these new challenges related to emerging renewable energy technologies. The cases relate to solar-related grid technologies and electrical energy storage. Each of these technologies contributes to overall grid management strategies; solar-related grid technologies aim to locally manage individual solar modules' variable energy generation, and electrical energy storage technologies improve grid inertia by fulfilling demand when power generation from variable sources is limited. Innovation in these technologies is creating a complex IP landscape, fraught with potential litigation risks. Companies in these industries should take steps to proactively mitigate legal exposure.

II. CASE STUDY: SOLAR-RELATED GRID TECHNOLOGIES

Residential solar panels allow homeowners to reduce their electric bill both by reducing their reliance on the grid and by selling excess power back to the grid. But with increased residential solar, grid management becomes exponentially more complex — rather than managing one central powerplant, every solar-generating house becomes a potential power source.

A. IP Landscape

The increasing complexity of residential power grids has generated a boom in patent filings covering technologies related to grid management. For example, patent filings on solar-related grid technologies, like grid-tied photovoltaic systems, backup power control, and load leveling functions have increased substantially in the past 25 years. The resulting patent landscape creates infringement risk for companies operating in this space and highlights the need for these companies to carve out their own IP protections.

Fig. 1: Yearly average patent publications filed under CPC codes for solar related grid technologies, per five-year period from 2000-2025. Compiled from USPTO patent database.[3]

B. Litigation Example

In one recent case, Relink US LLC sued a supplier of residential solar inverters over alleged infringement of Relink's U.S. Patent No. 9,793,755. Originally filed in 2023, the case was stayed pending an *inter partes* review by the USPTO and had that stay lifted in April 2025.[4] At issue is Relink's '755 patent, directed to an uninterruptible power supply (UPS) and method for managing grid-tied solar system.[5] The patent describes control of a solar system UPS with grid-tie, backup power control, and load-leveling functions.[6] As residential solar becomes increasingly prevalent, localized solutions are necessary to manage the needs of the complex grid. For example, load-leveling technology — which is described in the '755 Patent[7] — balances the supply and demand of power by storing produced energy when demand is low and distributing stored energy back to the grid when demand is high. For example, the '755 states:

The proliferation of distributed power generation has caused some problems in maintaining the stability of the utility grid. As a result, many electric utilities world-wide are seeking increased functionality in grid-tied inverters to help stabilize the grid. For example, some require grid-tied photovoltaic inverters to gradually reduce output power when the grid frequency deviates beyond a set limit[8]

The patent goes on to detail control strategies for improving grid stability, including measuring grid frequency and using string inverters to limit power output when grid frequency increases.[9]

Technologies like load leveling are critical to managing a complex, 21st-century grid, and these new technologies will be added to new products and utilized in new grid management techniques. While the *Relink* case is ongoing, it further demonstrates the IP risks on both sides for companies introducing and utilizing new technologies in the grid-management and residential solar industries.

III. CASE STUDY: ELECTRICAL ENERGY STORAGE

Electrical energy storage technologies are becoming increasingly vital as the world transitions to renewable energy sources. These technologies, which include batteries, supercapacitors, and other storage systems, enable the efficient capture and use of energy generated from intermittent sources like solar and wind. As the demand for reliable and sustainable energy storage solutions grows, so too does the demand for investment and innovation in this field.

A. IP Landscape

This surge in technological advancements has led to a significant increase in the number of patents filed related to electrical energy storage technologies, covering various aspects such as materials, design, and methods of energy storage and retrieval. The rapid growth in patent filings has created a crowded IP landscape in the electrical energy storage sector. Companies looking to innovate must navigate a dense patent thicket, which can be a daunting and risky endeavor. The likelihood of inadvertently infringing on another company's patent may be high, given the extensive and diverse range of patented technologies.

Fig. 2: Yearly average patent publications filed under CPC codes related to electrical energy storage technologies, per five-year period from 2000-2025. Compiled from USPTO patent database.[10]

B. Litigation Example

Two cases highlight the litigation risks associated with operating in this technology and IP-dense environment. In the first, a major lithium-ion battery manufacturer filed a $1 billion lawsuit against its supplier, accusing the company of misappropriating trade secrets related to electric vehicle battery manufacturing and incorporating them into patent filings.[11] Similarly, SK Innovation reached a settlement with LG Energy Solutions to avoid a U.S. import ban on its electric vehicle batteries, agreeing to pay LG Energy Solutions $1.8 billion.[12] While both those cases involve electric vehicle battery technology, the increase in patent infringement flings is not so limited. For example, LG Energy Solution recently alleged an increase in infringement of its battery-related patent portfolio and committed to taking "strict measures against unlawful infringements."[13] These cases highlight the acceleration of both innovation and litigation in the battery sector and the high monetary value of IP assets.

IV. MITIGATING RISKS

To mitigate the risks associated with potential IP disputes, companies operating in renewable energy and grid-management industries should consider conducting thorough patent searches and seek expert legal advice. Identifying potential patent conflicts early in the development process can help companies avoid costly litigation and focus on innovation.

Additionally, companies should consider patenting their own technological advancements to protect their IP and establish a competitive edge. By building a robust patent portfolio, companies can create opportunities for cross-licensing and strategic partnerships, which can be beneficial in navigating the complex patent landscape.

V. CONCLUSION

The investment and IP growth associated with the surge in renewable energy penetration and increased grid complexity presents significant opportunities as well as risks. Companies can manage these risks through comprehensive patent searches, consulting legal counsel, and strategic patenting of their innovations. By doing so, they can safeguard their investments and contribute to the advancement of these technologies. As the industry continues to evolve, proactive management of patent exposure will be crucial for companies aiming to succeed in these promising yet challenging fields.

---

[1] Spain's grid denies dependence on solar power to blame for blackout, Reuters, April 30, 2025 (available at https://www.reuters.com/world/europe/sanchez-pressed-explain-spains-blackout-grid-says-solar-not-blame-2025-04-30/#:~:text=The%20share%20of%20renewables%20as,is%20targeting%2081%25%20by%202030.).

[2] Don't blame renewables for Spain's power outage, Reuters, April 30, 2025 (available at https://www.reuters.com/business/energy/dont-blame-renewables-spains-power-outage-bousso-2025-04-30/).

[3] This data for this graph was generated using the USPTO's Patent Public Search website (https://ppubs.uspto.gov/pubwebapp/). A set of CPC codes were selected based on their inclusion in WIPO's "IPC Green Inventory" (https://www.wipo.int/classifications/ipc/green-inventory/home) and relation to solar-related power supply and grid management devices and methods.

[4] W.D. Tx. Case No. 1:23-cv-1093-DAE, Order (1) Lifting Stay of Case; (2) Granting Motion to Transfer Venue (April 3, 2025); after transfer, N.D. Ca. Case No. 3:25-cv-03365-RFL.

[5] U.S. Patent No. 9,793,755.

[6] *Id.*

[7] '755 Patent at 2:58-65 ("The controller may compare a net power being consumed by the load and produced by the current-source inverters to an allowable peak load power. If the net power is lower than the allowable peak load power, the controller may direct power from the AC voltage source to the battery. If the net power is higher than the allowable peak load power, the controller may direct power from the battery into the AC voltage source.").

[8] '755 Patent at 1:24-30.

[9] '755 Patent at 6:28-34 ("the system may employ string inverters or substantially any other current-source inverters designed to limit power when the frequency of the grid 100 varies by a predetermined amount from the nominal grid frequency. For example, the current-source inverters may be designed to linearly decrease their power output from 100% to 40% when the frequency increases from 50.2 Hz to 50.5 Hz.").

[10] This data for this graph was generated using the USPTO's Patent Public Search website (https://ppubs.uspto.gov/pubwebapp/). A set of CPC codes were selected based on their inclusion in WIPO's "IPC Green Inventory" (https://www.wipo.int/classifications/ipc/green-inventory/home) and relation to electrical energy storage systems and methods.

[11] https://www.law360.com/articles/1848668/tesla-slaps-supplier-with-1b-ev-battery-trade-secrets-suit.

[12] https://www.bloomberg.com/news/articles/2021-04-10/ford-vw-battery-supplier-said-to-reach-deal-to-avoid-import-ban.

[13] https://news.lgensol.com/company-news/press-releases/2636/.

RELATED INDUSTRIES + PRACTICES

- Energy
- Intellectual Property
- Patent Litigation