{2024}

New Energy Thesis

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Future of...

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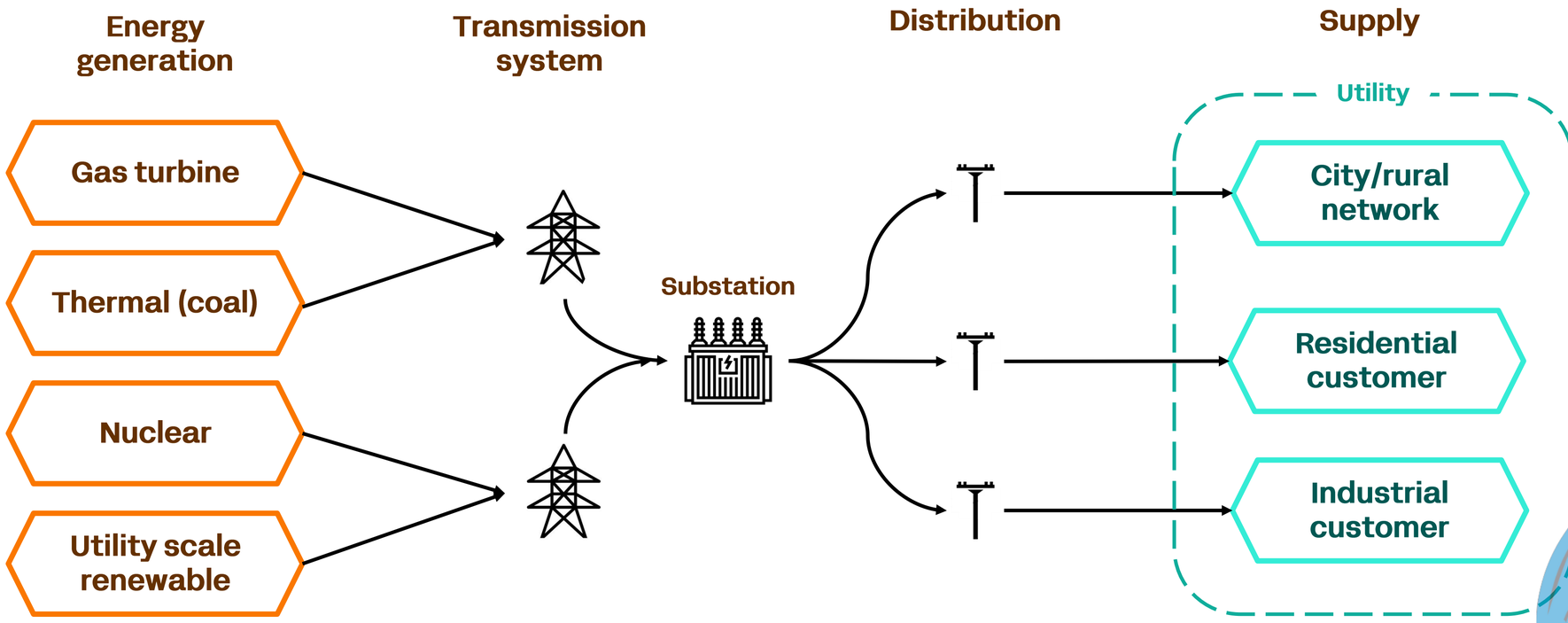
Future of...
- [•] The power flow
- [ ] Generation
- [ ] Transmission
- [ ] Distribution
- [ ] Flexibility and storage
- [ ] Supply

The power flow



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Generation

Renewable generation has consistently surpassed all expectations, but the path to net-zero by 2050 is still steep. To meet this goal, we must triple our renewable capacity by 2030 while seeking scalable solutions to decarbonize tough industries like steelmaking and aviation.

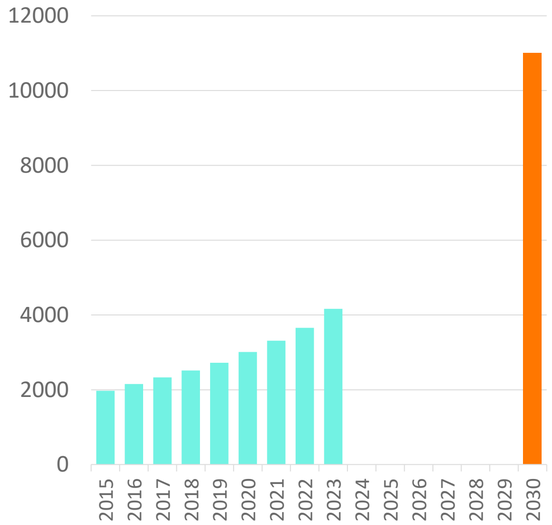
There's no denying the progress we've made, though. Over the last decade, wind and solar have emerged as the cheapest sources of power generation virtually everywhere. The levelized cost of electricity (LCOE) for solar PV has dropped so sharply that today, solar modules cost just 1% of what they did 30 years ago. And we're getting better at it, too. Two decades ago, installing one gigawatt of solar PV took a full year. Fast forward to 2024, and we can achieve that in a single day.

The pace of deployment is staggering. But, as is often the case, new challenges arise. The biggest one is grid interconnection. The queues are painfully long—sometimes stretching 7 to 10 years or more—and the costs associated have skyrocketed, increasing by two to eight times. In fact, last year, there was more capacity in the queue than online both in the U.S and in the EU. This is a problem we need to solve. We can't afford to let bureaucracy and outdated processes slow us down. We need to streamline everything, from siting and permitting to financing, so we can get these projects online faster.

The demand for energy isn't slowing down; it's only going up. And with that comes a massive opportunity so we need to think creatively about how we generate and distribute power. Decentralised generation is going to play a big role here. That's how we'll unlock the potential of smaller, local participants and create a more resilient energy system. The future of energy is decentralised, distributed, and digital.

And if we get it right, it'll also be clean and abundant.

Global renewable energy capacity and Net Zero Pathway (GW)



Source: IEA – International Energy Agency

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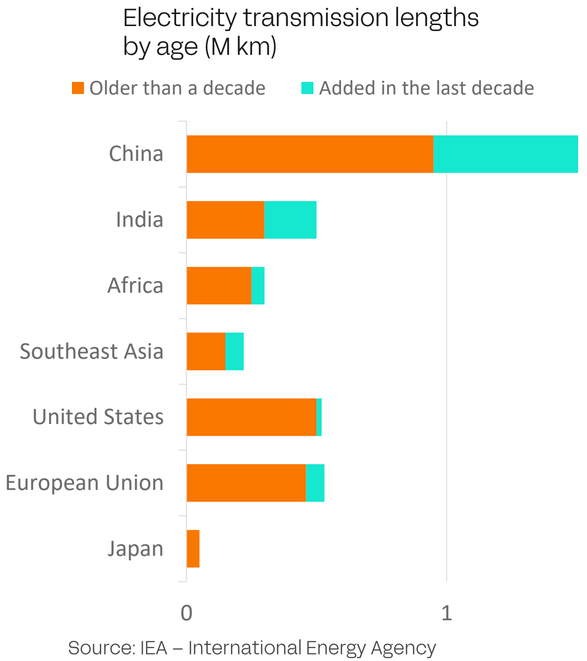
Transmission

The grid is the backbone of today's electricity systems. Originally built during the industrial revolution, it has seen minimal evolution over the decades due to its status as a natural monopoly, which stifles innovation.

But now, it is at a breaking point. Transmission System Operators (TSOs), who once managed a handful of big, reliable power plants, are now juggling an unpredictable mix of renewable projects. And they are not handling it well. There is a staggering 3,000 gigawatts of renewable energy—five times what was added just last year—stuck in grid connection queues.

Under pressure, TSOs are trialling new technologies to innovate. Advances in semiconductors are enabling modular upgrades, such as Smart Wires and Transformers for Advanced Power Flow Control. Although convincing TSOs to switch from trusted suppliers is challenging, the grid is slowly getting smarter. Dynamic line ratings are giving real-time data on capacity, a big upgrade from the old conservative estimates. Besides, novel tendering marketplaces help TSOs better balance supply and demand by procuring flexibility services.

Overall, TSOs have been notoriously slow to embrace new technologies mainly because of their monopolistic nature and lack of incentives to innovate.. However, the transmission market is a $46 billion opportunity with a growing need for disruption that's just waiting to be seized.



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Distribution

Traditionally, power used to flow in a straightforward manner: it moved from the high-voltage transmission grid to the lower-voltage distribution network, and finally to the end consumer. In this context, Distribution System Operators (DSOs) played a passive role. But now, this is rapidly changing.

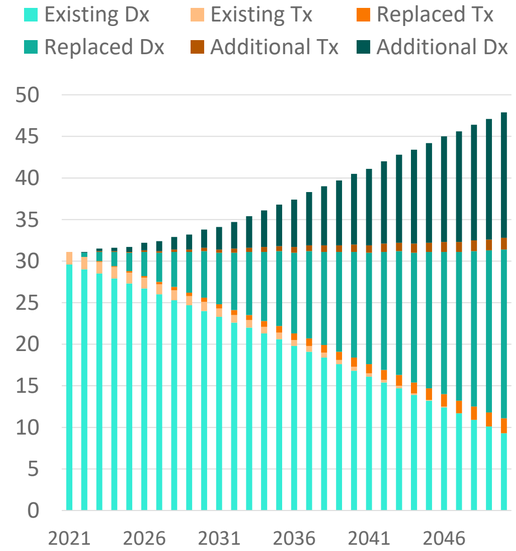
With the widespread installation of heat pumps, residential solar panels, and vehicle-to-grid (V2G) chargers, power flows are becoming bidirectional and much more variable.

The distribution network functions as the capillary system of the grid—more extensive, scattered, and complex than the transmission network. In fact, 93% of grid expansion has occurred on the distribution side. To manage this, platforms like SMPnetworks and Plexigrid provide visibility over distributed energy resources (DERs) and even help control their operations.

DSOs also need flexibility services, similar to Transmission System Operators (TSOs). However, DSOs focus on local issues such as local congestion, as DERs like EVs or heat pumps require more active management within their service areas. Marketplaces like Piclo (UK), Electron (UK), NODES (Norway), and GOPACS (Netherlands) help procure these services, bringing liquidity into the market. Piclo is the largest player, handling 60% of flexibility tenders and expanding into Italy and Portugal, though it still needs to demonstrate wider adoption and traction.

The distribution network is increasingly becoming decentralized, bidirectional, and unpredictable. Unlike TSOs, DSOs are proving to be more adaptable by embracing new technologies. This creates a vast, untapped market for new software infrastructure founders to explore.

Grid length in advanced economies according to pledges (M km)



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Flexibility and storage

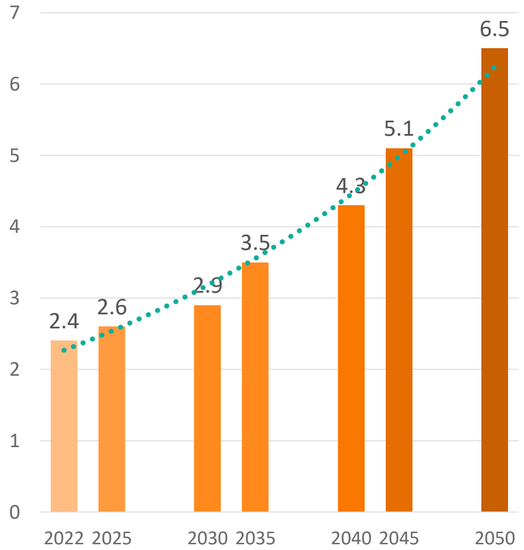
Flexibility services are crucial for balancing the grid. They can come from the supply side through dispatchable generation sources like hydro, biomass, biogas, geothermal, or potentially from V2G services in the future. On the demand side, flexibility is provided by demand-side response (DSR) from electrified devices such as heat pumps, EV chargers, and rooftop PV, or through stationary storage solutions like batteries, hydrogen, pumped hydro, and thermal storage.

This sector is seeing rapid innovation as the need for flexibility grows. Companies like Tiko, Leap, Flip, Virtual Peaker, Fever, Fusebox, and GridX are helping aggregators manage distributed energy resources (DERs) and control Virtual Power Plants (VPPs). APIs from firms such as Electryone, Arcadia and Enode enhance device connectivity, offering data visibility and control.

Storage, particularly in the battery sector, is booming. Years of R&D are translating into new battery chemistries that are less dependent on rare materials, as well as being safer and cheaper. As batteries become ubiquitous, solutions for their end of life are needed. Stricter policies like the battery passport, which enforce compliance and traceability, are emerging. Understanding their residual value after a first or even second life opens up new markets for recycling, repurposing for new use cases, or reselling.

In a nutshell, flexibility and storage are hotbeds of innovation right now, teeming with opportunities for tech-driven solutions and novel business models. Expect to see significant growth and innovation in this arena.

Global flexible capacity, current trajectory (k GW)



Source: McKinsey & Co.

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Supply

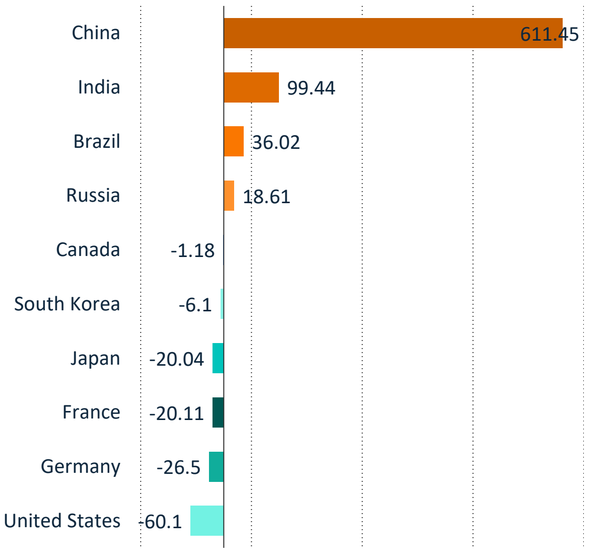
Energy supply was once a straightforward business, with suppliers earning steady, modest margins by selling and delivering electricity. However, new regulations, price volatility, and shifting consumer preferences are rapidly disrupting this traditional model, making the landscape far more complex.

The global push to decrease energy consumption clashes with the old-school revenue model of suppliers. That's where neo-utilities like Arbor, Fuse and Ostrom come in. They're rethinking the business model for residential customers, aiming to better align incentives. On the commercial and industrial (C&I) side, companies like Renewafi and David Energy are stepping up to help businesses secure more reliable clean energy. And then there are players like Reel Energy and Trawa, who are working to make Power Purchase Agreements (PPAs) more accessible to a broader range of buyers, not just large corporations.

Suppliers, who still hold the customer relationship, must adapt to new regulations and changing consumer preferences. Here, companies like Granular Energy and Renewabl are providing timestamps for 24/7 renewable energy matching and improving traceability for RECs. Meanwhile, vertical ERPs like Quixotic360 are enabling utilities to experiment with new pricing models while automating billing and invoicing.

As customer loyalty wanes in electricity retail and major players face growing competition, we're seeking solutions that help them adapt. We're particularly focused on alternative business models that better serve customers and align incentives. This market is primed for innovation, and we anticipate significant growth and transformation in the coming decade.

Year-on-year changes in electricity demand 2022-2023 (TWh)



Source: Ember Climate