
exponential energy

FORTUNES

Perfect storm: three catalysts accelerating the exponential energy revolution



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The Perfect Storm: three catalysts accelerating the exponential energy revolution

The traditional energy market is ripe for disruption...

And three key trends are emerging at the same time to – finally – turn the industry on its head.

The collapse in renewable energy costs, scaling up of the green grid and blockchain technology to bring it all together make this a near unstoppable trend.

An exponential energy opportunity which may never again be repeated in our lifetimes.

James Allen
Publisher and Editor, *Exponential Energy Fortunes*

I've written previously about how outdated the electric power industry's centralised model has become over the last few years.

I've also explained why I'm so convinced the entire utilities sector will become the latest case study in business disruption over the next few years.

As I wrote, this disruption will result in a radically different energy system that will transform utility business models and open up a dizzying array of new opportunities.

You'll know now that I'm convinced the power industry's business model, which has remained fundamentally unaltered over the last century, is dying.

It's a model that emerged out of the Edison age, where the utility was responsible for generating power and selling it to the customer.

The same model is essentially still in existence today.

Customers are simply energy consumers, power flows one way from generation to load, and demand is fairly predictable.

And it worked. The global electric market is now worth around \$2.2 trillion.

But the market is now being fragmented as the utility model undergoes a paradigm shift.

All this you know.

But what I want to share in this report are the *specific changes* that pose such a mortal threat to the existing utility system. These are changes that will see this entirely new electric ecosystem evolve.

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You see, a perfect storm of factors have emerged that are tearing down the business models of the incumbent utility firms.

The traditional, centralised electrical system is shifting toward a more distributed, responsive grid driven by technology innovation and evolving customer demands.

This process, which has been underway for the last few years, is accelerating at an ever faster rate, driven by several technological, regulatory and competitive forces.

Grids are becoming “smarter” and cleaner, while technology is lowering the barrier of entry into the energy markets as a whole.

What is this perfect storm? I boil it down to three key trends that are combining to accelerate the shift to exponential energy: collapsing cost of energy, the scaling up of renewables and the smart grid to connect it all together.

Renewables are coming

What keeps the traditional energy company exec up at night?

In a word: renewables.

And lots of them.

Global renewable power generation capacity rose by 9% in 2017, a fourfold increase from the start of this century, while renewable energy – for the second year in a row – accounted for more than half the new power generation capacity added worldwide.

The UK now sources over 28% of its power generation from renewable sources (excluding large hydro), up from just 2% a decade ago, according to Bloomberg New Energy Finance. Over the same timeframe, the proportion of renewables in the German power mix has risen from 9% to 29%.

Wind farms alone produced a record 18% of Britain’s electricity in 2018, up from 10% in 2016, according to a report by Drax Electric Insights.

In fact, wind power in the UK set a new record in March 2018 by generating 14 GW for the first time – nearly 37% of the country’s electricity. That was the highest metered wind output ever recorded, the National Grid said.

And not just wind. Solar PV plants produced more electricity for one week in May 2016 than coal-fired power plants right here in cloudy Britain.

In 2016, global solar energy installations jumped 50%... in a single year, and by 2017, global solar capacity was already double its figure from 2015.

China and the US both doubled their solar capacity, while the numbers of solar panels increased 12 times over in a single year in Australia, between 2015 and 2016.

Back in Europe, Portugal met its electricity demand entirely with renewable energy sources for five days in May 2016, according to Bloomberg.

On May 15 2016, renewable resources met nearly 100% of electricity demand in Germany, Europe's largest economy.

Why is this so important?

Well, the rapid rise of renewables on to the grid has crushed wholesale power prices and decimated utility margins, meaning it no longer profitable to own generation assets.

Europe's 12 biggest utilities, failing to foresee the shift to clean power, have written off more than €100 billion of assets since 2010, as nuclear, coal and gas-fired plants have been closed, mothballed or – if still running – fallen in value.

The Stoxx Eurozone utilities index fell by as much as 60% over the last decade.

The switch to green energy is not reversible, with forecasts suggesting the global capacity of renewables rise 50% in the next five years alone.

Wind and solar parks are being built at unprecedented rates, while demand for electric cars is seeing exponential growth, driving down the price of batteries and further unleashing new levels of green growth.

In fact, energy costs are collapsing across the board...

Collapsing cost of energy

The cost of solar has dropped 67% since 2011... and 99% since the early days of the industry.

Not only that, it's expected to drop another 59% by 2025.

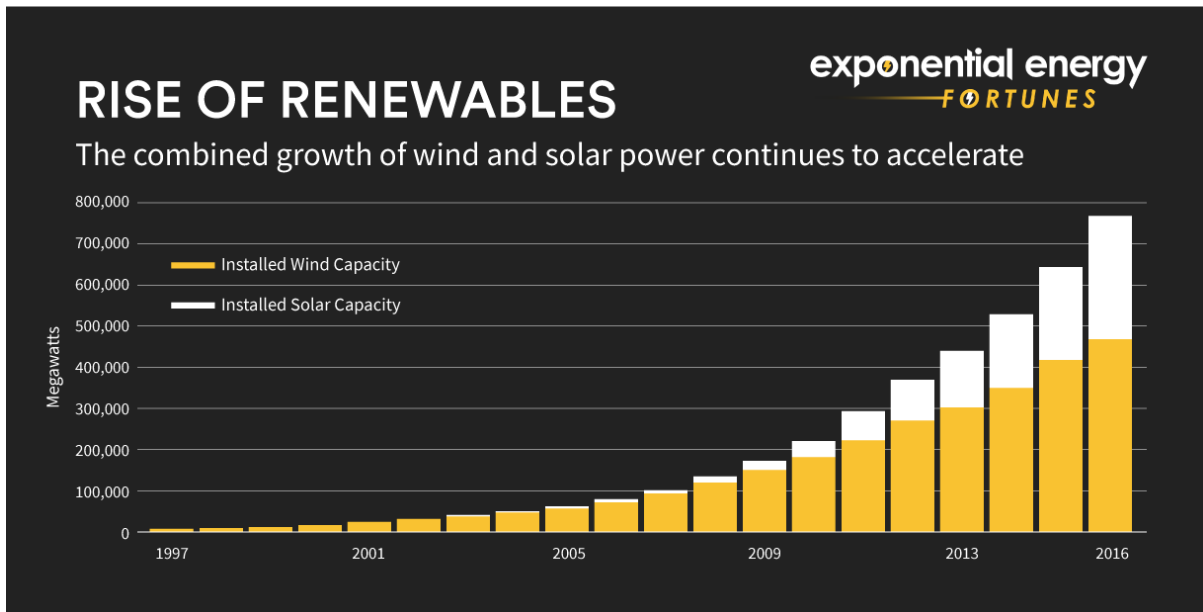
Wind power is the same... costs are expected to drop by 71% over the next 20 years.

Battery costs are collapsing, as said above. By 2020, about 1 million homes could have batteries, according to Morgan Stanley analysts.

The falling cost of energy will lead to a further explosion of new energy sources.

It's a revolution all right.

And right now it looks unstoppable.



As the Financial Times put it:

“It is early, but the evidence is mounting. Wind and solar parks are being built at unprecedented rates, threatening the business models of established power companies.”

As explained, the renewables growth allied to low power prices has meant a significant amount of conventional generation is up for closure as it is no longer profitable.

Market forces and national and EU-level regulations will continue to drive coal off the grid, largely replaced by wind and solar capacity.

But renewables are just one part of this transformation.

Utilities are facing an existential challenge from smaller and more decentralised, distributed energy systems.

More and more homes and businesses are seeking to save money by using locally sourced power, sidestepping utilities and sparking a global market for decentralised energy.

In 2012, \$150 billion was invested in distributed power technologies globally, while approximately 142 GW of distributed power capacity was ordered and installed.

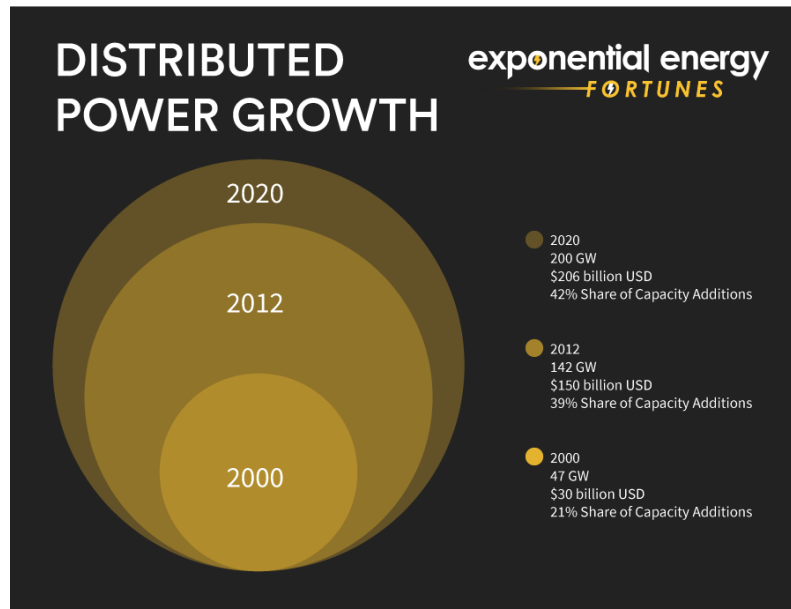
During the same year, 218 GW of central power capacity was ordered, according to General Electric (GE) figures. This means that distributed power capacity additions accounted for about 39% of total global capacity additions.

By 2020 distributed power will play a much larger role. Annual distributed power capacity additions will grow from 142 GW in 2012 to 200 GW in 2020, GE said.

During this period, investment in distributed power technologies will rise from \$150 billion to \$206 billion. As a point of reference, during this same period, global electricity

consumption will rise from 20.8 to 26.9 terawatt hours (TWh).

That means through the end of the decade, distributed power capacity additions will grow at a rate that is nearly 40% faster than global power demand.



Decentralised energy is the future

Keep in mind, all of these trends are reshaping the energy world. They're wresting wealth, power and control away from the centralised models of the 20th century and creating a new kind of energy business that presents a huge opportunity for investors.

Decentralised power generation – when a few homeowners go rogue, go off the grid with home-grown energy – is a legitimate disruption.

Think about people installing solar panels on their rooftops, tapping into the base load of the energy grid for a little “hit” of power when it's cloudy, and you will get the idea about just how nervous the traditional utility should be.

That's because decentralised power generation will further cut revenue at the biggest traditional power providers, which typically control everything from generation to distribution.

This kind of grassroots disruption “could shrink the role of unwary power utility companies to operators of back-up infrastructure”, according to PwC.

Changing, more empowered consumer behaviour is also shifting how we produce, use, value and trade electricity, undermining the dominant position of large energy enterprises.

As their traditional model becomes increasingly unprofitable, utilities are being forced to embrace an increasingly digital market that will eventually connect consumers' demands for increased flexibility and cost control to new services and charging models based on green energy and emerging technologies.

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Which brings me to my third key trend.

The smart, connected grid

Distributed ledger technologies (DLTs) such as blockchain and smart contracts will underpin this new transactive energy ecosystem.

...In fact, blockchain will enable decentralised energy and help us balance an increasingly decentralised power grid.

Originally used to support the currency bitcoin, blockchain chronologically records and links every transaction made across networks, making such deals secure and decentralised via encryption technology – properties that will certainly facilitate energy trading transactions in a distributed world.

As energy markets liberalise and renewable energy grows, blockchain offers a way to better handle the increasingly complex and decentralised transactions between users, large- and small-scale producers, retailers and even traders and utilities, cutting costs and increasing efficiency in the process.

In practical terms, blockchain technologies will eliminate the need for all manner of paper documents – letters of credit, bills of lading and inventory receipts – by moving to a digital equivalent, potentially saving billions of dollars for firms across the supply chain.

By making a trading chain fully transparent, blockchain is able to verify transactions and reduce counterparty risk without the need of a broker or clearing house, enabling participants to save on market access and transaction fees via an automated system.

In fact, without the need of an intermediary, the role of the energy trader, broker or clearing house may be bypassed entirely as suppliers can connect directly with end-users.

That won't happen next year, of course – it will probably take another five to ten years before the transaction technology fully disrupts how power and fuel products are traded – but blockchain technology could start to make inroads into power markets in 2018.

Several European energy firms, including Uniper, Vattenfall, Endesa and Engie have already started testing a peer-to-peer trading tool that uses blockchain.

In 2017, US firm LO3 Energy and Paris-based power exchange Epex Spot pledged to look at ways to connect local micro grids to the wholesale market using blockchain technology and LO3 has recently just signed a similar deal with Japanese company Marubeni.

The companies will launch pilot projects in Europe, deploying LO3 technology in community peer-to-peer micro grids that will connect to the Epex Spot wholesale markets.

This will mean any owners of solar power units can feed excess electricity from their panels back into the grid and consumers can purchase shortfalls at a market price.

But blockchain is also perfect for the integration of decentralised, distributed energy, which will grow from 5% of the market today to 25% in 2025.

Blockchain meets the energy grid

The technology can allow millions of energy devices such as water heaters, electric vehicles, batteries and solar installations to transact with each other at the distribution level. It can also provide support to utilities and grid operators to integrate more utility-scale variable renewable energy capacity at much lower cost.

In particular, the blockchain software Ethereum can deal with the buying and selling of electricity generated by renewable energy, such as solar panels. It can design “smart” contracts, whereby funds are only transferred if both sides of the transaction sign off a deal.

Blockchain, or distributed ledger technology, could also help balance out intermittent renewables in real time with batteries, for example.

The CEO and Founder of LO3 Energy, Lawrence Orsini, has described blockchain as “one of the most disruptive applications of technologies in the power markets”.

The company has already developed a blockchain-based microgrid in Brooklyn, New York, which effectively enables neighbours to trade electricity.

Late last year it also teamed up with south German utility AÜW to set up a blockchain-based, peer-to-peer energy trading system to begin in the first quarter of 2018.

A few other peer-to-peer energy trading system will launch in 2018 on the microgrid level in Europe, though plans are afoot to facilitate trading on a much larger scale.

Peer-to-peer systems and companies threaten the market dominance of traditional utilities in both retail and wholesale markets as they directly link producers and consumers without an intermediary.

No wonder utilities across Europe are trying to get a slice of the action.

Vattenfall, SSE and Essent are among the major utilities that have so far backed the technology, with more likely to follow suit in 2018.

Peer-to-peer trading is just one step in a multi-stage digital transformation sweeping across the industry that, according to consultancy Deloitte, will ultimately help utilities “predict, manage, and control increasingly decentralised and complex networks, make more informed decisions, and enhance customer relationships”.

New opportunities await those companies that can see the lie of the land

For the heavyweights that are willing to adapt, change needn't be a threat. The new energy ecosystem offers the opportunities for reinvention that many energy companies have been seeking, after years of eroding revenues.

But incredible opportunities also lie in wait for a new breed of utility, as well as the tech-like firms that are nibbling away at bits of utilities' traditional business models through innovations in grid optimisation and smart-home management systems.

As generation continues to evolve toward a more diverse and decentralised network of intelligent flexible units, energy companies can help build community microgrids, connecting and managing the energy inputs from many different self-generating households.

Building a connected, digitised grid also has the potential to become a platform for applications offered by third party providers. These apps could include services to manage the appliances in a connected home, charge electric vehicles (EVs) or conduct peer-to-peer transactions to trade solar energy with neighbours.

Utilities may not develop or run these services but instead host the platform (ie, the digital grid) on which they are held.

Utilities could take a bigger role in the EV industry, investing in infrastructure that allows EV batteries to help stabilise the grid.

Further opportunities – some as yet unforeseen – will undoubtedly emerge.

The potential for new paths to growth are waiting – for those that get ready in time...