



# THE CONSEQUENCES OF RENEWABLES

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# The consequences of renewables



Patrick Sheehan

"Just as nimble new innovative companies emerged as winners during the internet revolution, we see new innovative companies emerging in the energy revolution."

Since the start of the decade and with little fanfare – understandably, given a global financial crisis, populist politics, and the rise of Netflix – renewable energy has become cheap.

Solar and wind are now the same price or cheaper than fossil fuels in more than 30 countries, and within a few years, two-thirds of countries will reach grid parity without subsidies<sup>1</sup>. At this rate, renewable energy is conservatively predicted to be half the price of coal or gas power within a couple of decades, and it is already cheaper to install new solar or wind than adding coal capacity in a large number of countries. There is even a Moore's Law for solar energy, called Swanson's Law, which is an observation that with every doubling of solar panels produced, its price drops 20%.

At the same time, battery storage costs have plummeted, down 50 per cent in the past 12 months, and there are reasons to believe storage technology is at an inflection point. That would be the final piece of the renewable energy generation jigsaw – eliminating intermittency. In the words of one senior utility executive, with whom we recently shared a panel, we are on the verge of free energy.

So that's it, we've done it. Problems solved. End of white paper.

However, with respect to the aforementioned executive, most power companies are still entirely unprepared to make a success of it. This is also understandable. State subsidy came to be seen as an inherent characteristic of renewable energy. To suddenly awake and find renewables are an economically viable solution changes the game. It requires a complete re-imagining of energy distribution, usage, security, ownership and business models.

From the perspective of those seeking to address climate change, all this qualifies as a very nice problem to have. But, for incumbent utilities, the situation is serious and pressing.

1. World Economic Forum, November 2016

How serious? Let's put it this way. In the mid-1990s, telecom was seen as a classic natural monopoly, just like energy. It then went through a decade of change, with regulatory liberalisation allowing new entrants to upset a status quo that had prevailed for generations. However, we would argue that the weight given in this story to deregulation is misleading.

The fundamental disruption actually came from technological innovation. The internet, a technology that had been around for decades, and which by 1996, had 50,000 network connections, was about to change everything. The introduction of wireless, first postulated by the likes of Nikola Tesla at the same time Edison invented the lightbulb, then served to "untether" the customer.

Many telecom providers "fumbled" the early opportunities that those technologies presented. In Silicon Valley in the late 90s, we were summoned to the august Boardroom of one such telco, to give a presentation on: "What is IP, and how it will affect us?" - No, not intellectual property, but internet protocol. While the world was quickly changing, many telecom providers were slow or unable to react.

Similarly, the building blocks of solar technology have been around for decades. Ten years ago, the threat to incumbents from renewables was seen primarily as a policy threat. Renewables were assessed and frankly dismissed as unlikely economic threats to the status quo. Today, the impact of distributed and democratised renewable energy assets is hard to ignore (although of course, some still do). As with the telecom revolution of old, the rate of industrial change is taking off as the agent of that change shifts from government deregulation and subsidy to a technology-enabled commercial imperative.

For ETF Partners, as an optimistic private-market investor focused on 'sustainability through innovation', this is a once-in-a-generation opportunity to benefit from the metamorphosis



Rob Genieser

"Cheap renewables are prompting a complete re-imagining of energy distribution, usage, security, ownership and business models."

"The restructuring of the power industry will unleash creative forces that have previously been 'contained and constrained' within monoliths."

of a trillion-dollar industry. In this new world, slow-to-change energy providers will increasingly make marginal returns, while the "smart" energy provider, liberated by intelligent networks, will achieve outsized returns. Just as nimble new innovative companies emerged as winners during the internet revolution, we see new innovative companies emerging in the energy revolution. Like today's internet giants, which exist by virtue of the massive investment by governments and R&D centres of long-defunct monopolies, so too will next-generation energy providers stand to realise the compounded gains of Europe's many years of fundamental, technology investment.

Many of our companies are not only well placed to profit from this transition but are actually driving it. Take our most recent investment, into QOS Energy. It uses big data, machine learning and the internet of things to radically improve renewable energy, asset management productivity. The combination of our experience of investing in innovation and our focus on sustainability has put us at a significant advantage, in seeing opportunities long before they are generally apparent. Since our investment in MWR InfoSecurity, for example, securing the smart grid has gone from being a non-issue to priority number one.

We are also optimistic about the increasing rate of innovation we see in the energy sector itself. The restructuring of the power industry will unleash creative forces that have previously been "contained and constrained" within monoliths.

"This is a once-in-a-generation opportunity to benefit from the metamorphosis of a trillion-dollar industry."



The importance of such cultural change cannot be underestimated because, unlike research or invention, innovation is above all, a radical shift in mind-set.

When Lawrence Roberts and the computer scientists working on ARPANET, the internet's forerunner, first met "creative" telecom industry engineers, they were seen as crazy, not because their ideas were new, but because they weren't. According to Roberts:

*"In the early 1960s, [circuit-switching] was so clearly the proven accepted technique that no communications engineer ever seriously considered reverting to what was considered an obsolete technique, dynamic allocation. Such techniques had been proven both uneconomic and unresponsive 20-80 years previously... The very fact no great technological breakthrough was required to implement packet switching [weighed against] its acceptance."*

The path of innovation is not linear and never obvious. Navigating it requires experience and knowledge. The future belongs to those that can.

Patrick Sheehan, Managing Partner

Rob Genieser, Managing Partner

# Here comes the sun...and wind, hydro, geo-thermal, et al

When it comes to harvesting power from the sun, humans are finally cutting out the middle man. The cost of burning ancient organic matter to create energy is, in a growing number of areas, now more expensive than directly converting light into electricity using cells of man's devising. As a result, vast plantations of photovoltaic silicon panels are altering the earth's very topography. If you couple this with advances in wind, hydro and geo-thermal technologies, we have cause to be optimistic.

While we are still some way from removing entirely mankind's dependency on fossil fuels, the rate of progress in recent years has been staggering. For a week during May 2016, Portugal ran solely on renewable energy sources. In Germany, a country that has arguably done more than any other to make solar energy viable, over 30% of consumed electricity comes from renewable sources, while even in the UK, often seen as a laggard, generates 22%.

Corporate leaders are also leading the charge. IKEA has targeted that 100% of its energy should come from renewables by 2020. Similarly, the tech giants – Facebook, Google, Apple and Amazon – are all vying to go 100% renewable, a target that Google reckons it will reach this year. As in many places, Silicon Valley embraced solar for ideological or ethical reasons, and have ended up adopting it based on cold commercial logic.

But Europe and the US are less than half the story. Since 2015, non-OECD countries have been investing more capital and building more capacity in renewables than developed nations<sup>2</sup>. China, frequently portrayed as a climate change villain, recently committed to spend £290 billion on renewable power generation by 2020 – more than any other nation. It is unlikely that it has done so because of some sudden ethical epiphany, but more likely because it has become more viable, at least when also weighed against the palpable externalities of burning dirty fuel.

Viewed that way, it becomes clear that political agreements, such as COP21, are not a cause of cheap renewable energy, but a result of it.

2. Bloomberg New Energy Finance, 2015

“Except during the nine months before he draws his first breath, no man manages his affairs as well as a tree does.” *George Bernard Shaw*

That also means that the sustainability agenda can no longer be derailed by a few politicians (however powerful they may be) or climate sceptics.

The surprises don't end there. As a proportion of GDP expenditure, the renewables leaders are countries such as Mauritania, Honduras, Uruguay, Morocco and Jamaica<sup>3</sup>. Costa Rica claims to have run on renewables for 94 successive days. Indeed, the world's largest solar energy project is in India and is set for completion this year. The name of this giant 750-megawatt power station says it all – 'The Rewa Ultra Mega Solar'.

As a result, worldwide demand for photovoltaic solar is growing rapidly, from around 180-200GW today, to up to 500GW in three years' time. Wind looks set to double over the same period, from around 400GW to 800GW. This is high growth at a large-scale, and represents huge opportunity. Already, ETF Partners' latest portfolio company, QOS, manages the largest solar farm in Europe, 300MW, owned by France's Neoen.

Any way you cut it, renewables are a big deal.



**The business:** Greenbird

**Founded:** Norway, 2010

**ETF Investment:** November 2016

## Making sense of smart meters

Smart meters software is complex and the data they transmit are difficult for utilities to interpret and act upon.

Greenbird manages this data and intelligently connects it to smart meter applications.

# The business-as-usual utility death spiral

When it comes to the consequences of renewables, traditional utilities within the power industry tend to oscillate from complacency, to outright panic, and back again.

Despite society's best efforts, even with today's massive expansion in solar, many pundits believe that the majority of the planet's energy requirements will still need to be fueled by coal and natural gas in 2040<sup>4</sup>. Such predictions offer incumbent utilities a rationale for business-as-usual, if-a-bit-more-efficient. Evidence like this, that some fossil fuels will remain, encourages some traditional utilities to keep their heads in the sand. As is the case with one European utility, they "happily" pay fines to regulators, admitting to the slow deployment of new technologies, rather than looking to fundamentally transform their business.

They do not see the fate that awaits them, or do not have a clear strategy to address it, other than to do as little as possible.

It might sound hyperbolic, but the concept of a 'death spiral' for incumbent, non-changing power companies is becoming accepted wisdom, and not just among renewable energy advocates. The theory was born from the power industry itself, in a paper published by the Edison Electric Institute, called 'Disruptive Challenges'<sup>5</sup>.

The concept is that as the cost of renewables continues to fall, more customers will switch to distributed energy resources, particularly solar panels. From this, two factors will disproportionately erode utilities' revenues, accelerating the spiral of decline. Firstly, those customers that choose to move early are likely to be those with the greatest power usage. Secondly, off-grid solar knocks out peak day-time energy usage, for which utilities historically charge the most, thereby pumping up the remaining customers' average prices.

Despite falling revenues, costs for maintaining the grid will remain static, squeezing margins. This cost is therefore borne by ever fewer customers, ones who are likely to be the lighter energy users, and who therefore face an ever greater incentive to go solar.

The seemingly simple solution of charging a flat grid connection fee is impractical because it hits the poorest customers the hardest and is likely to precipitate an even faster transition to solar. On top of this, renewable energy places a disproportionate strain on the grid because it must be two-way, as customers become 'prosumers' and produce power that must be bought (and prioritized) by the grid. This requires upgrades to sub-stations and the introduction of ever more sophisticated energy management software.

4. Looking ahead: the 50 Global Trends that Matters

5. Disruptive Challenges: Financial Implications and Strategic Responses to a Changing Retail Electric Business, Edison Electric Institute, January 2013

But at least this gives incumbent utilities a role to play. Given the rapid rate of innovation, some are now wondering how long distributed energy will even require grid support. In its seminal 2013 paper, the Edison Institute imagined a day 'when battery storage technology or micro turbines could allow customers to be electric grid independent.' To put this in perspective, who would have believed 20 years ago that traditional wireline telephone customers could economically "cut the cord?"

For incumbent power companies with a vertically integrated model of power generation, storage and distribution, there are no simple fixes or silver bullets. But there remains some reason for optimism, as the best operators are looking to adjust their business models.



**The business:** Wirepas

**Founded:** Finland, 2010

**ETF Investment:** September 2016

## Connecting the EnergyWeb

Wirepas has solved a major Internet of Things and smart grid connectivity challenge - that of reliable, scalable and efficient connectivity. Its cost efficient, reliable, low-power and scalable information protocol is applicable particularly to large-scale industrial IoT applications such as smart metering, beaconing, logistics, asset tracking and lighting.

# Energy business models – the hunt is on

While the way forward is not easy to chart for incumbent utilities, some things seem likely. Economies of scale will give way to the advantages of intelligence. Hardware-domination will give way to software. In the near-term, efficiency is critical. Progressive incumbents are searching for ways of ‘unbundling’ the vertical utility; avoiding exposure or further investment in assets that may become stranded down the line; and increasing their focus on areas of promise.

They understand that the electron is a commodity.

There are two choices for them going forward. They can become the lowest cost producer/supplier of that commodity, much like a budget airline. With a rapidly changing landscape, that will be difficult to do. Alternatively, they can become a value-added supplier of new services and offerings as the market shifts, supported by the introduction of new technologies. By offering these value-added services, they will hope to lock-in long-term, profitable customers.

A sensible starting point would be to deploy new technologies that increase operational efficiencies of the grid. Key to this is data and analytics, a competency that sits comfortably with innovative, entrepreneurial businesses.

There is also an opportunity to develop products and services that cater to new markets, such as by supporting distributed energy resources, found in micro-grids or local energy networks. These are markets that are predicted to be worth \$3.5bn by 2020<sup>6</sup>. Micro-grids work in dense energy clusters, like university campuses and factories, but potentially on a much larger scale. New York State, for example, has initiatives such as ‘Reforming the Energy Vision’ and offers a major prize to encourage organizations and communities to create their own stand-alone energy systems.

Power companies could therefore become much more directly service oriented. Customers going off-grid could remain customers, as they will face complex on-site energy requirements and will require support for installation, maintenance and management.

It will be interesting to see how far some traditional utilities will adapt. One European utility is even looking to offer a broadband, optical ring to support traditional telecom services. Perhaps, it is inevitable that the electric utility will look to offer other utility-like services, like telecom, as they seek to offer a bundled offering.

6. GTM Research

It is also true that a number of these telecom providers are looking at serving their customers' energy needs, thanks to the introduction of new technologies.

One only wonders whether the combined delivery of what is now a second commodity today, "the digital bit" in addition to the electron, will add significant value. The answer can only be yes, if new technologies are used in new ways to accomplish this and benefit the customer.

In some markets, the battle is on.



**The business:** MWR InfoSecurity

**Founded:** UK, 2003

**ETF Investment:** June 2014

## Securing the EnergyWeb

MWR InfoSecurity is a leading cyber security firm that helps utilities and infrastructure providers secure their connected energy generation sites, smart meters, demand response systems and home automation solutions.

# Bright sparks

Our portfolio companies play into many of these emerging themes and opportunities. They recognize that energy must become available at new points of use, be provided at a lower cost, be more efficiently used and, of course, be “cleaner.” The explosive use of technology in both the consumer realm (think the emerging middle class) and in industry (such as with the growth of the internet of things – IoT) leads to different and more distributed, energy consumption.

Simply put, energy will be supplied and used like never before.

At ETF Partners, we focus on enabling technologies, that allow the rapid deployment of new services, reducing energy waste, lowering operating costs and introducing new revenue opportunities for our portfolio companies’ customers.

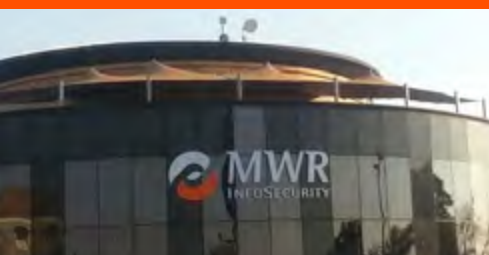
For example, Wirepas, a Nordic innovator in our portfolio has, with its decentralized self-healing software for networking large numbers of devices, solved one of the big internet of things communications challenges.

In particular, Wirepas’ software enables utility smart meters and distributed sensors to more reliably and cheaply communicate with each other, to move information seamlessly across the network and back to the core utility hub.

Once that data is at the hub, software is needed to process it and distribute it across a variety of utility systems (billing, provisioning, maintenance, etc.). Another ETF Partners’ portfolio company, Greenbird, translates scores of different energy measures and readings taken from smart meters, into actionable information for the energy company. With this, utilities can seamlessly provide new and improved services like never before. This one spark of brilliance thus animates the entire smart energy architecture.

And finally, did we mention security? Someone has to secure those distributed endpoints, as well as safeguard the utility’s critical core operating systems. That would be another one of our companies, MWR InfoSecurity, as highlighted below.

The next generation utility. Intelligent like never before.



“A good hockey player plays where the puck is. A great hockey player plays where the puck is going to be.”

Wayne Gretzky

## Securing the Smart Grid

Five years ago, the importance of securing the smart grid was not on anyone’s radar. So when we invested in MWR InfoSecurity in 2014, after meeting their CEO at a football (not hockey) match.

‘What’s the sustainability angle?’ Today, of course, securing the smart grid is key to making renewable energy a dependable and safe source of power. More than half of cybersecurity incidents reported and investigated by the US Department of Homeland Security in 2013 were related to the energy industry. Since then, we have witnessed largescale international

hacking of energy grids, such as the targeting of Ukrainian assets by Russia in 2015 and 2016.

Moreover, without confidence in the security of the smart grid, energy providers would be less able to deploy new technologies such as smart metering, integration with the internet of things and ultra-responsive grid switching and management.

MWR is now an emerging leader in smart cybersecurity solutions for the energy industry, and we don’t get those early questions any more.

# The power of venture capital

What are the characteristics of those companies most likely to survive and flourish in this new energy world? We believe it comes down to the ability to adapt and innovate. That doesn't sound like a big ask.

But real innovation in the 'big energy' industry has until recently been more talked of than encountered. The last time the energy industry seriously embraced radical thinking, it gave the world Enron. Enron's slogan was: 'Ask why?' Unfortunately, a number of their investors and rank and file employees learned the importance of questioning. Dubious, financial engineering is a long way from fundamental technological change. While the path of innovation is not obvious, and there will be challenges along the way, it leads to increasing prosperity over time.

Technological change will drive the real energy revolution.

Investing in innovation takes time, experience and an exceptionally strong network. At ETF Partners, we have drawn together a club of global technology corporations, who invest in our funds, and with whom we share our learnings. As the utility industry transforms over the coming decade, such strategic relationships will prove a powerful advantage in spotting trends and opportunities early. We have, by way of example, two of the most progressive utilities in the world as our investors; Singapore Power and CEZ (the Central European Utility) through their related company, INVEN Capital. Learning from others of course makes you smarter, especially if they are in the forefront of change.

For ETF Partners, we believe this is the ideal time for smart private investment into technology companies enabling the energy revolution. Not only are structural changes both imminent and inevitable, but we can benefit from a unique market opportunity.

Firstly, we come across very few investment managers with the mandate or appetite for making sustainability-related, technology investments at size in Europe today. Secondly, renewables infrastructure, a prerequisite for any of this to work, is becoming increasingly pervasive, and the building block on which the intelligent grid can be built. And finally, after years of expensive trial and error, many of the necessary enabling technologies are now ready for prime time, with a number of entrepreneurial companies showing rapid acceleration in their underlying businesses.

We are still a long way from realizing the full potential of the future energy grid, but by dealing with change boldly and head-on, and through the smart and informed allocation of capital, the prospects of achieving cheap, clean, reliable and plentiful power are looking increasingly bright.

# The EnergyWeb

*"It is always wise to look ahead, but difficult to look further than you can see."* Winston Churchill.

It is too easy to say, 'the world is changing', so we would like to share our vision of tomorrow.

When it comes to mankind's use of power, we see the emergence of an 'EnergyWeb', an interconnected and intelligent network that will push electrons to places of our choosing, much like the internet, but at scales ranging from those used for information (tiny) to those used to move and heat things (huge).

If you think of this evolution dimensionally, the first dimension is the sun heating things directly (like a dog's back) The second is burning organic matter (a camp fire). The third is harnessing energy and distributing it (the power industry today). And the fourth dimension is harnessing, storing, using and distributing power across a non-hierarchical, self-healing, democratised EnergyWeb.

In geological terms, the EnergyWeb is therefore a change as profound as when an intelligent ape first rubbed two sticks together and made fire.

As an investor that is focused on 'sustainability through innovation' we see the emergence of the EnergyWeb ever more clearly. This is because the companies we invest in are both responding to this new world, and making it happen.



**The business:** QOS Energy

**Founded:** France, 2010

**ETF Investment:** January 2017

## Data for Renewables

QOS Energy provides analytics from millions of sensors and devices across solar, wind, biogas, hydro, storage and hybrid assets, helping to ensure sustained high performance across both renewables and the grid.

# Macro-consequences of renewables

What are some of the future big picture consequences of renewables – on behavior, society, other industries? Your guess is as good as ours, but here goes:

**1. The choice of renewable energy will become decoupled from ethical behavior.** As renewable energy makes unambiguous commercial sense, its ethical credentials will become less pronounced. Burning dirty fuel will become as rational as lighting a fire with £20 notes. Concepts of 'impact' and environmental credentials will therefore become more nuanced in the coming years.

**2. All incumbent power companies will undergo radical restructuring over the next decade.** There will be a small handful of big winners, some big losers, and a proliferation of spin-off ventures. Those that embrace technology and new business models are most likely to succeed.

**3. The winners will be experts in innovation and customer service, not energy.** Because it's not what you think, it's how you think. The most important job in a utility might well be that of the Chief Innovation Officer.

**4. Startups will become upstarts.** As the advantage of scale turns to a burden of legacy for some slow-to-change incumbents, intelligent and nimble companies will leap on this opportunity in the emerging distributed market and become important energy players.

**5. Energy will become free in some contexts.** Like most things that can seem free (clean drinking water, public internet access, commuter newspapers) this perception is more a function of timing or abstraction. There may be a hook into the consumer that justifies the provision of "free" electricity. Watch for it.

**6. The emergence of 'the energy web'.** Today's one-way push of electrons from centralized production sites out to users will be gradually replaced. We expect, within a decade, to see the emergence of interconnected networks of distributed power generation and consumption.

This 'energy web' will be self-balancing, intelligently and automatically, as it deals with demand variations as well as variations in power from distributed renewables. It will not only be able to deliver high-power to industrial users, but also to deliver (and harvest) 'micro-power' for a wide range of new applications.

As these applications face novel challenges (as well as now traditional ones such as security) it will lead to the 'energy web' rapidly incorporating new technologies from the internet and financial sectors (among others), such as 'blockchain'.

## INV/E/N CAPITAL | Guest comment

“Utilities such as CEZ must take drastic measures if they want to stay relevant 10 years from now.”

*Petr Mikovec, Chairman of INVEN CAPITAL, a venture capital fund set up by CEZ.*

Last year the wholesale base load price in Germany was at its lowest level in 14 years. This is not cyclicity, but a deep systemic change driven by a continuous influx of renewables with zero variable cost into the merit order system. This has combined with low commodity prices of coal and gas, the collapse of the EU Emissions Trading System, and continuous technological development in energy storage.

The overall impact of all this on wholesale prices is unclear. On one hand renewables are reducing off-peak prices and increasing volatility, but on the other, the flexibility given by storage solutions can allow us to switch off conventional power plants and mitigate the sources less responsive to demand. Depending which force will be stronger, the result could be either higher volatility of energy prices, with more spikes and troughs, or a flatter short term price curve as enough storage eventually leads towards a uniform price over time.

On a macro level, the regulatory environment surrounding the power sector is also still unclear and seems to be a low political priority. A recent suggestion by EON chairman, Johannes Teyssen, to introduce an obligatory CO<sub>2</sub> floor price at 20-30 EUR per tonne (which would lead to lower CO<sub>2</sub> emissions in the power sector), has gone all but unnoticed in the EU's corridors of power. Moreover, ongoing uncertainty around Germany's influential 'Energiewende' renewables agenda could be compounded if President Trump walks out of the Paris Treaty.

For utilities, a wait-and-see strategy is risky. Instead, three general strategies should be considered:

- “ENGIE style” – preparing for the power sector of the 21st century by investing in new technologies.
- “Verbund style” – maximizing the value from existing legacy assets, to focus on superiority when it comes to the efficiency of its operations and maintenance, to keep a low cost of capital and to pay out dividends to its shareholders whenever possible.
- “EPH style” – opportunistically investing in distressed situations.

No particular strategy has yet proven superior, so CEZ Group takes the best from all three simultaneously, through a three-pronged approach. INVEN focuses on Smart Energy – where ICT and energy meet. INVEN CAPITAL, is a newly established venture capital fund with available capital of EUR 180 million, giving it the ability to support its portfolio companies from initial investment round, all the way through to a successful exit.

CEZ, like any other utility today, must act in an informed, fast and skillful way through all three of these horizons. So let's keep our fingers crossed.



The power industry is encountering disruption in multiple dimensions. In addition, the transformative forces of digitisation, the drive for sustainability, technology advancement in renewable sources, and storage are poised to change how power is produced and consumed.

Industry transformation, even disruption, could bring opportunities. As a networks company, SP Group is building new capabilities and engaging partners and stakeholders to develop solutions that will enable the high-quality, sustainable lifestyle desired by customers.

For SP Group, the transformation starts from within. The Group is converting its fleet of 400 service vehicles to Electric Vehicles. In 2015, every employee was given an iPad, and encouraged to suggest ways to enhance their working lives using technology.

Even as we digitise to enhance asset performance to our networks, we are developing technology platforms, leveraging renewables, storage and data, to better match demand and supply and improve load factors. At the end of the day, the objective is to deliver superior value proposition while empowering the consumer to attain their desired lifestyle.

SP Group strongly believes that innovation is the key to unlocking the potential of renewables. The need to be finely in tune with innovation has also prompted SP's strategic partnership with ETF Partners. The first-hand access to its dynamic portfolio companies and deal flow, gives us a flavour of what technologies are moulding and being moulded by customer behaviour - an essential ingredient to remaining relevant in an ever-changing environment.

#### About SP Group

SP Group is a leading energy utilities group in the Asia Pacific. It owns and operates electricity and gas transmission and distribution businesses in Singapore and Australia, and district cooling businesses in Singapore and China. SP Group is committed to providing customers with reliable and efficient energy utilities services. More than 1.4 million industrial, commercial and residential customers in Singapore benefit from SP Group's world-class transmission, distribution and market support services. These networks are amongst the most reliable and cost-effective world-wide. For more information, please visit [spgroup.com.sg](http://spgroup.com.sg) or follow us on Facebook at [fb.com/SPGroupSG](https://www.facebook.com/SPGroupSG).



**Sustainability through Innovation**

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