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Clean Energy: what's driving the growth and where is the sector headed?

Executive Summary

01. Across the globe governments are setting ambitious targets to reduce their carbon emissions. Underpinning many of these targets is the Paris Agreement, struck in December 2015. Its goal is to limit global warming to 2°C, and preferably under 1.5°C by 2050.

02. The science of climate change has been agreed by the scientific community for many years. However, the cost of doing so has often been prohibitive. This is now changing, as renewables are becoming the most cost-effective way to produce electricity.

03. Converting the world to clean energy is going to require unprecedented levels of investment. Some estimate that just to meet the Paris agreement target will require USD 800 billion of investment. But this is just the start: the total investment required is therefore likely to be multiple trillions of dollars.

04. The next 30 years is clearly going to be an exciting time of significant change in the way we live, and the way energy is generated. There remain some questions; What part will wind power play in our energy generation, will electric cars become the norm, is hydrogen set to become the new oil and what will be the influence of solar power?

Introduction: what do we mean by 'clean energy'?

What comes to mind when you hear the term 'clean energy'? You might think about a lot of different words, from popular ones like solar power or electric vehicles to more niche concepts like smart grid, green hydrogen or biomass. But how can you define clean energy?

First of all, clean energy means decarbonisation: it focuses on businesses that contribute to, or stand to benefit from, a societal transition toward the use of energy sources that release less carbon and prevent pollution.

This includes technologies such as wind or solar energy, which come from natural sources, are naturally replenished and help produce renewable power. It also includes coming technologies which aim to remove greenhouse gases from air, like carbon capture or methane capture.

It is also important to understand what is not considered Clean Energy: nuclear power is excluded from this theme, together with so-called 'clean coal'. Natural gas is not considered clean energy, nor are past CO_2 uses such as for 'enhanced oil recovery' as they continue to rely on traditional fossil fuels.

So, we can see clean energy encompasses a lot of different technologies and concepts – but how are these technologies likely to evolve in the future? Where is the clean energy sector headed?

In this paper, we will explore the three key catalysts driving the shift towards clean energy:

- the political and external drivers;
- the improving economics of renewable energy;
- the increasing investment in the sector.

We conclude by looking at some of the key open questions for the future evolution of the sector.

01. Catalyst #1 is external: The political imperative

Achieving such a seismic shift will impact all sectors of the economy, but none more so than the energy sector.

Across the globe governments are setting ambitious targets to reduce their carbon emissions. Underpinning many of these targets is the Paris Agreement, struck in December 2015. The agreement was a watershed moment for global action to tackle climate change. Its goal is to limit global warming to 2°C, and preferably under 1.5°C by 2050.

A global shift towards Net Zero...
The first major milestone in delivering against the ambitions of the Paris Agreement will take place in November 2021 at the next major Climate Change summit, known as COP26, by which time members of the Accord will have submitted their climate action plans.

In the run up to this global event, numerous countries have been announcing plans to transition to Net Zero, meaning that any carbon emissions are balanced by absorbing an equivalent amount from the atmosphere, including commitments from the UK, the EU, China and Japan.

Further momentum is likely to be seen with the election of President Biden, who's first order as President was to re-join the Paris Agreement, and further action on climate is expected by the Biden Administration in the run up to the November summit.

Achieving such a seismic shift will impact all sectors of the economy, but none more so than the energy sector, which accounts for around 75% of carbon emissions worldwide.

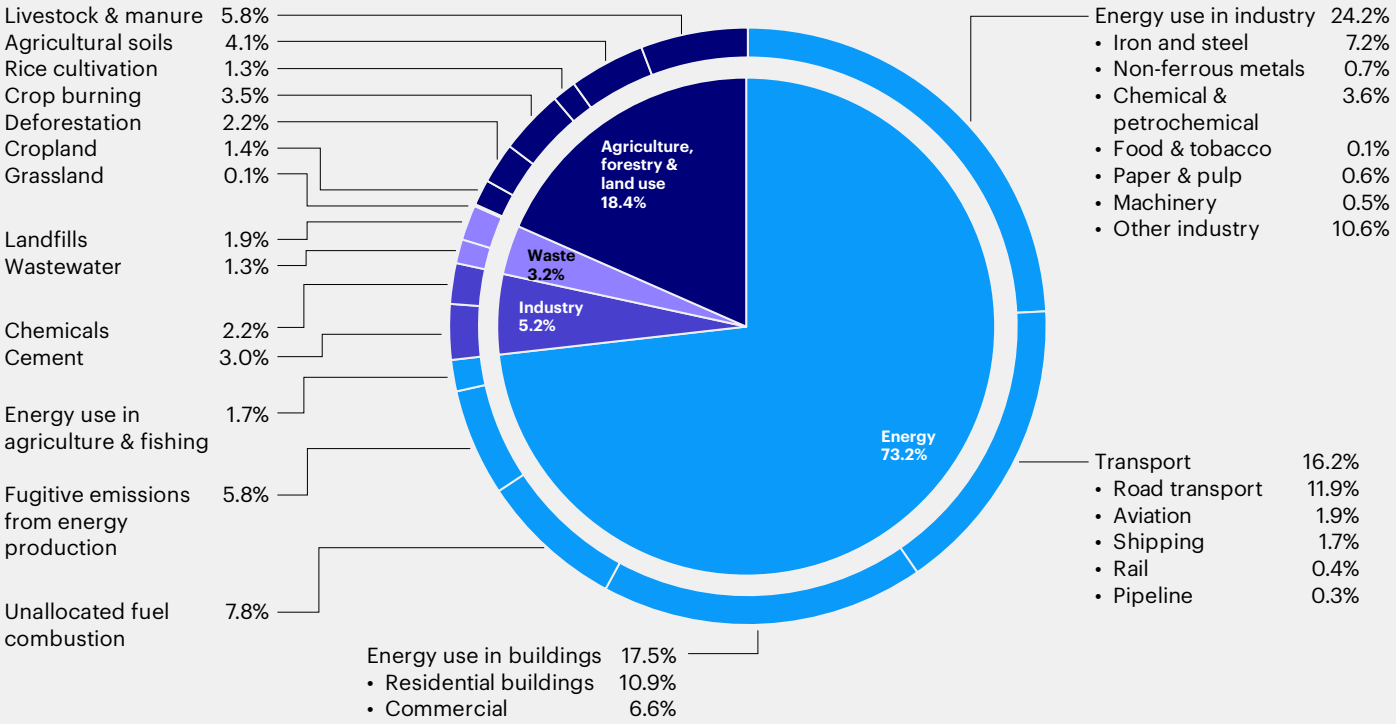
Focus on the EU Green Deal
The EU Green Deal is one of the EU's top political priorities, with the aim of making the continent climate neutral by 2050, as well as positioning the EU as a world leader in clean technology.

While the attainment of Net Zero is a longer-term aspiration, the EU has announced an intermediate target to reduce carbon emissions by 55% by 2030, representing a substantial increase from the bloc's current target of 40%.

Achievement of the Green Deal is expected to require the decarbonisation of the energy, building, transport, land and forestry sectors. The EU will also need to invest EUR 350 billion more annually between 2021-2030 than it did between 2011-2020. This is an increase of around EUR 90 billion per annum compared to the investments needed to achieve current 2030 climate and energy targets.[1]

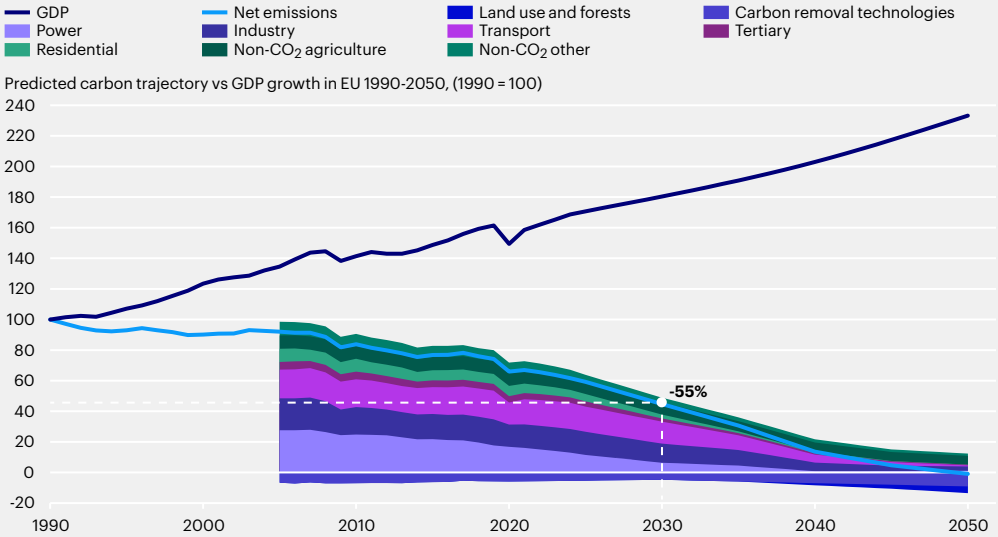
Promoting the deployment of renewable energy will play an important role in reaching the EU's climate goals. According to the European Commission's impact assessment, renewable energy is expected to rise to 40% of the total

Figure 1
Global greenhouse gas emissions by sector
Shown for the year 2016 – global greenhouse gas emissions were 49.4 billion tonnes per CO_2eq.



Source: Our World in Data; Climate Watch, the World Resources Insitute 2020 (data shown at 2016).

Figure 2
European Commission has proposed a 2030 target of -55%
Substantial increase from current target of -40%



Source: European Commission.

Main sectors:

Buildings account for **36%** of final energy use

Transport needs to increase its renewable energy share by **24%** by 2030

Energy account for **75%** of carbon emissions

Land and forestry needed to increase carbon sinks by **300 m t/CO_2e**

energy mix by 2030, including significant increases in wind, solar, heat pumps and energy storage solutions such as battery technology.

Legislative proposals are expected in mid-2021 to amend the EU's renewable energy framework, which may include raising the formal target of renewable energy from 32% to closer to the 40% modelled in the impact assessment.

Within the renewable energy space, the European Commission has signalled two areas where it will look to make a significant push: offshore renewable energy and hydrogen.

The EU's Offshore Renewable Energy strategy seeks to promote not only established offshore technologies such as wind but also emerging technologies such as tidal and offshore solar. This will require an estimated investment of EUR 800 billion between now and 2050 in offshore renewable technologies.[2] To encourage investors the EU aims increase certainty as well as smooth the path to investments, ease bottlenecks, and optimise the mix of public and private finance.

The development of clean hydrogen is seen as another key area of development in order to decarbonise the economy, and in particular as a means of energy storage.

The EU's priority is to develop clean, renewable hydrogen (often referred to as green hydrogen). In the long-term the ambition is that the gas will be produced mainly using wind and solar energy. However, the EU recognises that in the short-to-medium-term, other forms of low-carbon hydrogen, often referred to as blue hydrogen, are rapidly needed to reduce emissions from existing hydrogen production and support the development of a viable market at scale.

To target support at the cleanest available technologies, the Commission will work to introduce a comprehensive terminology and certification, to define renewable and other forms of hydrogen. It will be based on life-cycle carbon emissions, anchored in existing climate and energy legislation, and in line with the EU taxonomy for sustainable investments.

The UK's path to Net Zero
Having inherited from his predecessor a commitment in law for the UK to reach Net Zero emissions by 2050, Prime Minister Boris Johnson has thrown his political weight behind making demonstrable progress towards that

Figure 3
UK policies to deliver Net Zero
'10-point Plan for a Green Industrial Revolution'

"The utmost focus is required from government over the next ten years. If policy is not scaled up across every sector... the UK will not deliver Net Zero by 2050. The 2020s must be the decisive decade of progress and action."
(CCC, December 2020)

- Offshore wind
- Low carbon hydrogen
- New & advanced nuclear
- Zero emission vehicles
- Green public transport
- 'Jet Zero and Green ships'
- Greener buildings
- Carbon capture & storage
- Natural environment protection
- Green finance & innovation

Source: HMG, The Ten Point Plan for a Green Industrial Revolution, November 2020.

goal, recognising the requirement for UK leadership as the host of COP26.

Following reductions to date in carbon emissions to 43% below the 1990 baseline, last year, Johnson announced that the UK's 2030 interim target would be set at a 68% reduction, reflecting the independent advice submitted by the UK's Committee on Climate Change.[3]

Such a target is consistent with an aggressive reduction in carbon emissions over the next decade; and achieving it would represent a significant departure from the current trajectory, requiring considerable new policy intervention to decarbonise key sectors at the same time as demand for electricity is expected to increase.

Consequently, in November, Johnson published a 10-point Plan for a Green Revolution, setting out the Government's intention to invest in a range of existing and new green technologies to drive further emissions' reductions.[4]

At the heart of the plan lie ambitious measures to further cut emissions in the surface transport industry, buildings and power generation sectors. It contains pledges for all new cars sold in the UK to have zero tailpipe emissions by 2035, to invest in green hydrogen, to target the annual installation of some 600,000 electric heat pumps for buildings by 2028, and to quadruple the UK's offshore wind generating capacity by 2040.

Further announcements are expected in the run-up to the November Summit as the UK Government seeks to transform a series of high-ambition announcements into a coherent plan to achieve Net Zero.

Beyond Europe, all eyes on the US and China...
While the EU and UK have both committed to Net Zero and begun the process of turning such pledges into action, attention in increasingly turning to the two largest global economies, who together account for a significant proportion of global carbon emissions (China accounts for 28% of emissions and the US accounts for 15%).[5]

In October 2020, President Xi set a target for China to achieve carbon neutrality by 2060. While various Chinese government departments have since issued broad policy statements in support of green finance/achieving carbon neutrality, as of today, substantive details have not been released. However, we expect that further details (along with other aspects of China's 14th Five Year Plan) will be more formally articulated after the National People's Congress parliamentary session in March 2021.

The election of President Biden has raised hope for a change in US climate policy. As part of his campaign, President Biden committed to a 100% clean energy economy with net-zero emissions no later than 2050, as well as a target to decarbonize all US power generation by 2035.

While this commitment has yet to be formalized, on his first day in office, President Biden formally re-committed the US to the Paris Accord (which President Trump had withdrawn from) and signed a number of executive orders that signal a change in approach when to comes to climate and energy policy.

The most notable of these executive orders was to revoke the permit for the Keystone XP pipeline and to introduce a moratorium on oil and gas exploration in the Arctic. In doing so, President Biden stated that such projects were not in the long-term interest of the US economy, which should instead focus on the development of clean energy.

As we move closer to the COP26 Summit in November, we expect continued momentum in this space as additional countries commit to Net Zero and those already committed begin fleshing out how their goals will be achieved.

"As we move closer to the COP26 Summit in November, we expect continued momentum in this space.

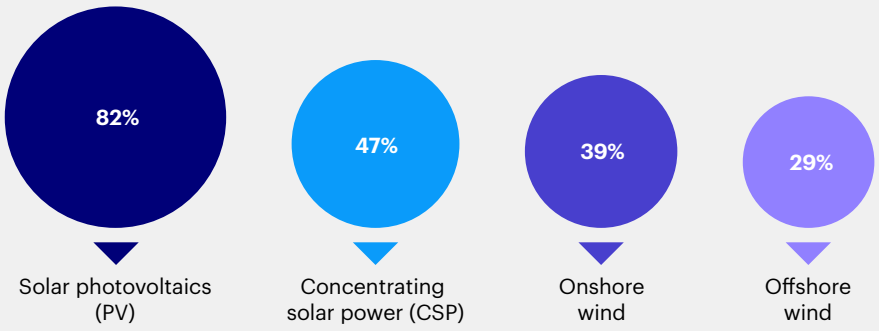
02. Catalyst #2: improving economics for renewable energy

The science of climate change has been agreed by the scientific community for many years. However, while the science may have pointed the way to how things needed to change, the cost of doing so has often been prohibitive. This is now changing. The economics are now starting to make sense. Indeed, in some cases, such as with solar panels, renewables are the most cost-effective way to produce electricity.

A cost competitive industry
Another catalyst that has been a game changer for the renewable energy industry is the improvement in economics. Once considered expensive to produce, renewable energy is now catching up on fossil fuel generation. As a matter of fact, 56% of additional renewable power in 2019 achieved lower electricity cost than the cheapest new coal plant.[6]

A striking example is the solar photovoltaic (PV) industry, which has accounted for approximately one-third of the world's total

Figure 4
Falling power generation costs
Renewable energy costs declined rapidly over the last 10 years (2010-2019)



Source: IRENA, 2019.

> Renewable energy like solar and wind will become even cheaper than oil, natural gas, and coal thermal power, well before 2040.

power generation in newbuilds every year since 2017. Solar photovoltaics has seen the sharpest cost decline of any electricity technology over the last decade.[7]

Looking back at 2010, Solar PV energy was about 6 times more expensive than coal. Now it is close to cost parity with fossil fuel, and due to go even cheaper: according to the International Agency for Renewable Energies (IRENA), over the long term, renewable energy like solar and wind will become even cheaper than oil, natural gas, and coal thermal power, well before 2040.[8]

This improvement in cost competitiveness affects both the corporate world as well as households. For instance, the cost of producing 1 watt for US residential PV systems has gone down from USD 3.55 in 2015 to USD 2.45 in 2022.

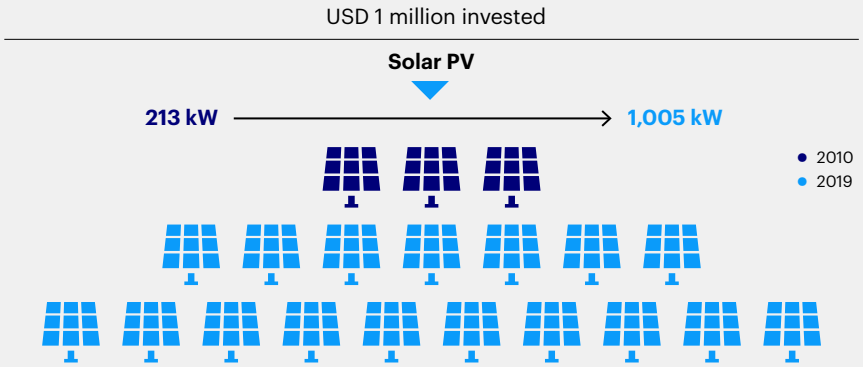
A competitiveness due to 2 combined factors
These falling costs can be explained by two combined factors:

- Technological progress has enabled the development of energy conversion and storage technologies from renewable sources such as wind, wave, solar, and thermal. For instance, progress in wind turbine production has come from better-engineered and larger turbine designs. Present-day turbines are more productive than in the past, with capacity factors[9] for U.S. newbuilds at 40% to 50%, now approaching the power level of traditional gas plants.[10] These advances have lowered the cost of capital for the wind sector, as fewer turbines are needed to create as much energy, leading to further reductions in cost. (ripple effect on foundation, installation costs etc.).

- Renewable energies benefit from subsidies. National and sub-national entities have created numerous subsidies to help improve the efficiency of capital allocation across the energy sector and reduce carbon footprint globally. Subsidies to renewable power generation technologies account for around USD 128 billion globally (20% of total energy sector subsidies).[11]

As a result , investments in renewable energy facilities have become much more efficient. The International Renewable Energy Agency calculated that investment in PV has increased dramatically in value. For EUR 1 million invested, the electricity output increased fivefold between 2010 and 2019.

Figure 5
Falling costs make renewables a cost-effective investment
With the same amount of money, the investment value increases



Source: IRENA.

03. Catalyst #3: investment planned in the energy sector – from governments to the corporate world across industries and region

One thing is clear, regardless of the improving economics, converting the world to clean energy is going to require unprecedented levels of investment. Some estimate that just to meet the Paris agreement target will require USD 800 billion of investment.[12] But this is just the start as the energy infrastructure will also need to be upgraded. The total investment required is therefore likely to be multiple trillions of dollars.

Investments needed to meet the Paris agreement
Another key catalyst for Clean Energy is the amount of investment planned in the coming years.

First of all, following the Paris agreement, the almost 200 signatory countries agreed to limit global warming to below 2°C and pursue efforts to limit it to 1.5°C. In order to meet these targets, annual investment worldwide in renewables would need to rise significantly. Renewable energy investment averaged USD 300 billion globally in 2013-2018 – but this amount would need to almost triple to USD 800 billion through 2050.

Limiting global warming to the 2°C threshold will require not only the investment in renewable energy to be scaled up but also the whole technology eco-system around it.

One example is the electrification of end-use sectors like electric vehicles or railways, which will also require investments in sectors like energy resources, batteries and energy storage to enable the integration of new capacity into energy systems and meet growing electricity demand.[13] All of this calls for sustained efforts in Research & Development and a scaling up of renewable energy investments which need to be funded.

For instance, according to IRENA, to meet the Paris agreement, USD 37 trillion would be required for investment in energy efficiency solutions only, and USD 13 trillion for power grids and energy flexibility measures, such as smart meters, energy distribution or storage systems.

Where will investments come from?
Investments may come from 2 sources: governments and international organisations, as well as private capital.

First of all, national governments and supra national entities (like the European Union) have started supporting increasingly ambitious targets for renewables across all sectors, reinforcing the importance of energy efficiency in a post-Covid world.

In the European Union, 30% of financing from the EU Budget and 37% from the Recovery Facility will be channelled towards green investment, which means that a lot of investments will go into technologies that contribute to at least one of six pre-defined environmental objectives as defined by the EU.[14]

Furthermore, the totality of the projects financed by the EU budget are subject to the "do no significant harm" principle. This means that all projects funded by the EU must support the climate and environmental priorities of the European Union.

Environmental investment can also be encourageded by free market economics. We believe the private sector will respond to shifts in demand and play a pivotal role in financing the transition to Net Zero.[15]

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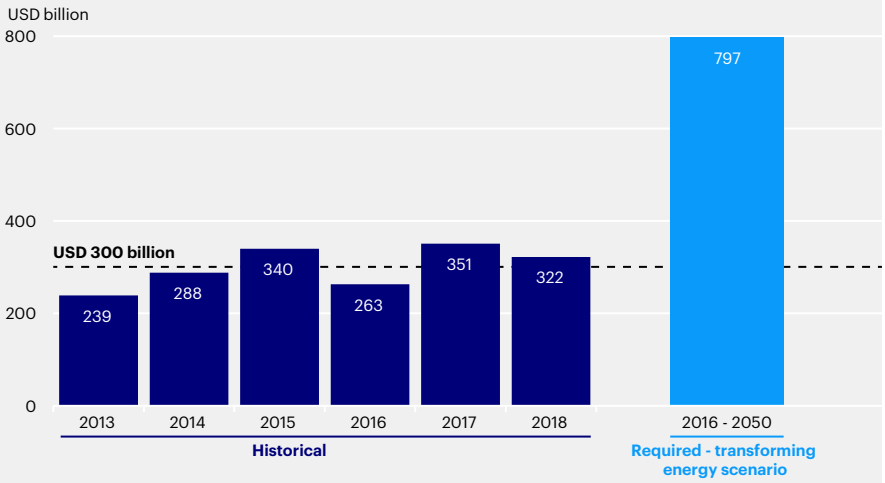
Figure 6
Annual renewable energy investment during 2013-2018 vs annual requirement investment by 2050 under IRENA's Transforming Energy Scenario



Source: IRENA, 2019d and CPI analysis.

Changes in consumer spending and political voting patterns suggest that society is focusing more on climate change than ever before. This trend has been picked up by the investment community. Sustainability, or ESG[16], has become a much more prominent input for investment decisions, this can be seen by the amount of capital flowing into sustainability or climate-change based investment strategies and products.

New investment instruments are also being developed such as green and sustainability bonds as well as tailored financial instruments designed to involve the private sector in a greener economy. In October 2020, the EU kicked-off its SURE Bonds issuance with record breaking demand. These bonds are aimed at financing member states' national short-time response to the pandemic and will be issued as social bonds.[17]

Corporate decision makers have, in turn, responded to pressure from consumers and the investment community by setting out company level decarbonization plans.

For instance, 260 large global corporations (as of September 2020) – up from 150 two years earlier – were part of the Renewable Energy 100% initiative (RE100), pledging to source 100% of their electricity consumption from renewable energy.[18]

These types of corporate actions give the energy and utility sectors the confidence to invest in climate-change based capex projects.

In our view, the utility and energy industries will play a big role in Clean energy. They have the cashflow and technical know-how to lead the innovation, and they have already started investing heavily. There are three key areas of growth: renewable electricity generation, biofuels and hydrogen.

All three of these areas are going through a period of high innovation and all three are vital for governments to hit near and longer-term climate change objectives.

Private sources are expected to be the main source of financing for renewable investments. Indeed, this is already the case: the private sector (non-energy-producing corporations, commercial financial institutions, households, institutional investors and private equity, etc.) has accounted for over 80% of total investments over the last few years, while less than 20% of investments are attributed to public finance.[19]

04. Looking ahead: a handful of questions on the path to Clean Energy

The next 30 years is clearly going to be an exciting time of significant change in the way we live, and the way energy is generated. As we reach toward these goals there remain some questions: What part will wind power play in our energy generation, will electric cars become the norm, is hydrogen set to become the new oil and what will be the influence of solar power?

a. Will wind power become mainstream?
Wind power has developed rapidly over the last 20 years. We can divide the industry into two components; onshore and offshore.

Onshore wind is more mature and can already compete with fossil fuels from a cost perspective. Offshore wind is more expensive but comes with more optionality. The recent innovation in floating offshore wind turbines will open up many new potential locations as it allows for wind farms to be built off the continental shelf. Subsequently, offshore wind is likely to be embraced by governments and international institutions as the next game-changer in energy transition.

The wind power sector is gaining momentum. That said, it is still concentrated within its top five markets. As of 2019, China, the US, Germany, India and Spain accounted for 72% of global capacity. In 2019 the global wind power capacity surpassed 60 GigaWatts (GW). Capacity grew 19% in 2019, the second highest annual growth rate we have ever seen.[20]

The trend is continuing even with Covid-19: China increased its production by +40% over 2019 and the Netherlands annual growth rate hit 250% in the first half of 2020.[21]

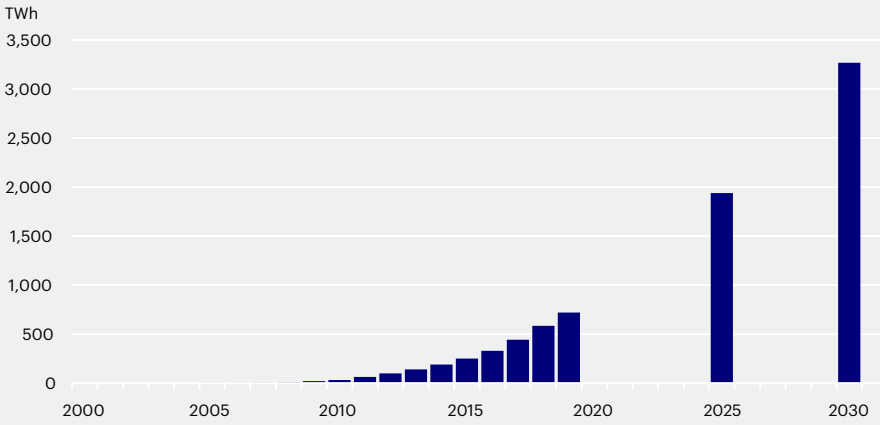
Looking ahead, the industry prospects seem fairly positive. In a world where leading countries are supporting the transition into a low-carbon or even net zero economy, the wind power economy will likely play a leading role in creating carbon-free energy.

The Global Wind Energy Council (GWeC) is planning a steady 4% annual growth of the sector over the next 5 years. This will mean that over 355GW of new capacity will be added between 2020-2024, that is over 70 GW of new installations each year until 2024 (compared to 60 GW produced globally in 2019).[22]

Another report by IRENA states that a 1.5-degree compliant pathway by 2030 calls for a threefold increase of global onshore wind power capacity, a 10-fold increase of offshore wind power capacity and widescale electrification.[23]

"In a world where leading countries are supporting the transition into a low-carbon or even net zero economy, the wind power economy will likely play a leading role in creating carbon-free energy.

Figure 7
Solar PV power generation in the Sustainable Development Scenario, 2000-2030



Source: https://www.iea.org/datfuture oa-and-statistics/charts/solar-pv-power-generation-in-the-sustainable-development-scenario-2000-2030

Despite the challenges posed by policy volatility and the speed of scaling up production, we believe wind power has a bright future. It already has mainstream status within the minds of policy makers and advocates of clean energy production.

b. Will electric vehicles be the norm?
Powering more of the cars we drive with electricity is vital for reducing greenhouse gas emissions.

Electric vehicle (EV) sales have expanded significantly over the last decade. This has been prompted by regulation and innovation by automobile manufacturers. EVs will continue to take more market share from gasoline and diesel with every new generation of vehicle.[24]

In 2019, sales of electric cars topped 2.1 million globally, surpassing 2018 – already a record year – to boost the stock to 7.2 million electric cars (according to the International Electricity Agency or IEA).

Although electric vehicles only accounted for about 1% of the global fleet in 2019, they registered a 40% year-on-year increase. As an example, there were 82 distinct EV models available in the U.S. during the 2020 model year, nearly tripling from the level available in 2015.[25]

Battery costs and battery materials are two obstacles standing in the way of mass EV adoption. The price of batteries mean EVs are more expensive than their internal combustion equivalents. This is in part caused by the battery components, such as nickel and cobalt. Policy incentives such as tax credits or rebates can help stimulate demand whilst we wait for new innovations in battery components.

These obstacles are not insurmountable, so it could be possible that by 2050 passenger vehicle sales will be largely electric.

c. Will hydrogen be the new oil?
Green hydrogen, a carbon-free fuel made from water, is gaining support around the globe.[26]

Its proponents claim it could play an important role in decarbonisation. Even Saudi Arabia is investing into green hydrogen plants, seeing it as having a key role in the future of energy.[27]

While wind and solar energy can provide the electricity to power homes and electric cars, green hydrogen could be a potential power source for energy-intensive industries, as well as parts of the transportation sector that are more difficult to electrify (long-haul trucking, freight shipping or long-haul air travel).

Hydrogen has other potential interesting uses. It could be used to replace natural gas in chemical processes. New green ammonia from hydrogen may be transported more readily, and this also helps to decarbonise the fertiliser industry. Hydrogen could also be used as a store of energy. This would involve creating and storing green hydrogen when there is excess wind or solar power then consuming it when the system needs more power.

The major hurdle for now is the economics: producing hydrogen from low-carbon energy is a costly process. However, with declining costs for renewable electricity, in particular from solar PV and wind, IEA analysis finds that the cost of producing hydrogen from renewable electricity could fall 30% by 2030.

Green hydrogen uses renewable electricity in its production. The growth of green hydrogen may therefore be another source of demand for wind and solar power generation.

Despite the obstacles ahead, Green hydrogen has the potential to address many climate-change issues. For instance, companies like Airbus are optimistic that hydrogen-powered aircraft might be flying by 2035.[28]

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d. How much energy will be powered through solar panels in 10 years?

Solar energy has advanced a long way in short space of time. Once a small and highly subsidy dependent sector, it is now the largest clean technology: in 2020, it produced over 100 GigaWatts, 6 times higher than in 2010 and more than 2 times higher than in 2015.[29]

Production is driven mainly by China, followed by the US, Europe and in recent years South America. COVID disrupted installation activity throughout the world in 2020, but 2021 should enable solar generation to catch up as demand grows.

Recent innovation shows renewable energy providers are looking into combining solar with other renewable energy sources. Certain projects have experimented with floating solar in conjunction with hydro and even offshore wind. The benefits are linked to increased system efficiency.

The cost of producing solar energy is going down, especially in sunnier regions where it has already become the cheapest form of new electricity generation.[30]

So where is the sector headed? According to the International Energy Agency (IEA), power generation through Solar PV should increase dramatically over the next 10 years, growing 5 times from 720 Terawatt-hour (TWh) to 3,300 TWh in 2030.[31]

Solar PV now accounts for about 3% of global electricity generation – with the increase in production, solar would see its share of global power generation rise to 13% by 2030.

Conclusion

The clean energy transition is now on its way because it's no longer an option but a necessity to tackle the climate emergency. Climate policy around the world is driving the shift to clean energy with very ambitious targets: over the past year we've seen unprecedented commitments from major economies to reach for carbon neutrality.

These targets will require significant investment in renewable energy, leading to potential strong growth opportunities for the clean energy sector across the entire supply chain.

Notes:

1 Source: European Commission, "Stepping up Europe's 2030 climate ambition", published in September 2020.
2 Source: Offshore Renewable Energy Strategy (ORES), published by the European Commission on 19 November 2020.
3 Source: https://www.theguardian.com/environment/2020/dec/03/uk-vows-outdo-other-major-economies-emissions-cuts-by-2030
4 Source: "Ten Point Plan for a Green Industrial Revolution", November 2020.
5 Source: https://www.ucsusa.org/resources/each-countrys-share-co2-emissions
6 Source: IRENA, 2019.
7 Source: IRENA 2019 Report "How falling costs make renewables a cost-effective investment".
8 Source: IRENA 2019 Report "How falling costs make renewables a cost-effective investment".
9 The capacity factor of a wind turbine is its average power output divided by its maximum power capability.
10 Source: Raymond James, "Renewable energy and clean technology", October 2020.
11 Source: IRENA, Energy Subsidies Report 2020.
12 Source: IRENA, Global Landscape of Renewable Energy Finance 2020.
13 Source: IRENA, Global Landscape of Renewable Energy Finance 2020.
14 The six environmental objectives as defined in the proposed Regulation are: (1) climate change mitigation; (2) climate change adaptation; (3) sustainable use and protection of water and marine resources; (4) transition to a circular economy, waste prevention and recycling; (5) pollution prevention and control; (6) protection of healthy ecosystems.
15 Source: IRENA, Global Landscape of Renewable Energy Finance 2020.
16 Environmental, Social and Governance
17 SURE stands for Support to mitigate Unemployment Risks in an Emergency (SURE). EU bonds programme aimed at financing member states' national short-time work schemes put in place as a response to the pandemic. SURE bonds will be issued as social bonds.
18 Source: Raymond James, "Renewable energy and clean technology", October 2020. RE100 is a global initiative bringing together the world's most influential businesses committed to 100% renewable electricity.
19 Source: IRENA, Global Landscape of Renewable Energy Finance, 2020. Private investments accounted for 86% of renewable energy investment between 2013 and 2018.
20 Source: Global Wind Energy Council' 2019 report.
21 Source: Wilderhill, as of Q1 2021.
22 Source: Global Wind Report 2019.
23 Source: Global Wind Energy Council, Annual Wind Report 2019.
24 Source: IEA, Global EV outlook 2020 report.
25 Source: Raymond James, Renewable Energy and Clean Technology whitepaper, October 2020.
26 Green hydrogen is a clean burning fuel that eliminates emissions by using renewable energy to electrolyse water, separating the hydrogen atom within it from its molecular twin oxygen.
27 https://www.bbc.com/future/article/20201112-the-green-hydrogen-revolution-in-renewable-energy
28 https://www.bbc.com/future/article/20201112-the-green-hydrogen-revolution-in-renewable-energy
29 Source: Raymond James, "Renewable energy and clean technology", October 2020.
30 Source: Raymond James, "Renewable energy and clean technology", October 2020.
31 Source: International Energy Agency (IEA), Tracking report, June 2020.

Risk warnings
The value of investments and any income will fluctuate (this may partly be the result of exchange rate fluctuations) and investors may not get back the full amount invested.

Important Information

Data as at 24 February 2021 , unless otherwise stated.

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