

LEARNING FROM THE PAST, LOOKING INTO THE FUTURE

Thematic investing



SEPTEMBER 2022



BNP PARIBAS
ASSET MANAGEMENT

The sustainable investor for a changing world



LOOKING BACK FOR FUTURE INVESTMENT THEMES

At BNP Paribas Asset Management, our Environmental Strategies Group believes it is vital to consider the past as well as the present when evaluating the long-term investment opportunities of the future.

Examining the interconnections between the drivers of previous industrial revolutions, and previous technological advances, can help us assess the role and value of those of today: are they independent quick fixes or vital components in a new environmental infrastructure?

Will they be a flash in the pan or instead lasting game-changers that will grow and deliver sustainable returns into the future?



EQUITY-BASED THEMATIC FUNDS HAVE TRIPLED THEIR SHARE OF THE GLOBAL INVESTMENT MARKET IN THE PAST DECADE AND NOW ACCOUNT FOR

US\$800 bn

OF INVESTMENT

Source: <https://www.ft.com/content/1db0f968-2175-4434-ba65-c57632b51e02>
Accessed: August 2022



THE NEW SUSTAINABLE AGE

The world is on the cusp of a new industrial revolution that promises a greener future through a revitalised biosphere.

Alongside energy and food security, we can look forward to an upsurge in productivity growth that will boost living standards and employment opportunities around the globe.

The revolution will also usher in a sharing economy that could help us use capacity more efficiently, as well as repair fragmented societies.

As with previous industrial revolutions, it will emerge on the back of an infrastructure platform. In this case, technological advances in areas such as artificial intelligence (AI), 3D printing and the gathering of big data will fuse with cheap energy supplied by renewable power.

Ending our reliance on fossil fuels is key. Renewable energy will boost economic growth, in the same way that petroleum's replacement of whale oil in the 19th century accelerated growth. This is the interconnected lens through which we assess the potential of enduring investment opportunities.





REASONS TO BE CHEERFUL

While it is easy to be pessimistic about the outlook for the world, given shocks such as the global financial crisis, COVID-19, climate change and geopolitical upheavals, there are sound reasons to be optimistic about the future.

That is because a new industrial revolution is now underway that promises to deliver abundant cheap and green energy.

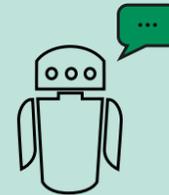
Combined with the fusion of new technologies such as AI, digitalisation, electric and driverless vehicles, big data, 3D printing and the Internet of Things, this will drive significant advances in productivity – the key driver of economic growth and living standards.

Moreover, there will be an abundance of employment opportunities generated by this next industrial revolution.

The process will also involve the decarbonisation of the economy, bringing hope that the challenge of climate change can be addressed, abetted by a new focus on the replenishment of our biosphere.

The interconnected nature of these developments, driven by the Internet of Things, will usher in a sharing economy, bringing society closer together. The monopoly of knowledge will no longer bring power. Instead, shared 'open source' approaches to information and innovation can accelerate the advance of change – empowering everyone.

As a practical example, people will rarely own cars; they will simply hire a vehicle (likely an autonomous electric vehicle) whenever required.



AI COULD CONTRIBUTE UP TO

US\$15.7 tn

TO THE GLOBAL ECONOMY IN 2030,
MORE THAN THE CURRENT OUTPUT
OF CHINA AND INDIA COMBINED

Source: <https://www.pwc.com/gx/en/issues/data-and-analytics/publications/artificial-intelligence-study.html>
Accessed: August 2022



GLOBAL ELECTRICAL VEHICLE SALES MORE
THAN DOUBLED IN 2021, COMPARED TO THE
PREVIOUS YEAR, TO REACH

6.75

MILLION UNITS

Source: <https://www.ev-volumes.com>
Accessed: August 2022



THE GLOBAL MARKET FOR 3D PRINTING
PRODUCTS AND SERVICES IS EXPECTED
TO REACH A VALUE OF

US\$37.2 bn

IN 2026, UP FROM US\$12.6 BILLION IN 2020

Source: <https://www.statista.com/statistics/315386/global-market-for-3d-printers/>
Accessed: August 2022



LESSONS FROM HISTORY

To see how our lives could be revolutionised over the next few decades, we should look back to previous revolutions.

The original industrial revolution in England, between 1760 and 1860, was driven by technological progress, education, and an increasing capital stock. It turned the country into “the workshop of the world” and brought about a sustained rise in real income per person.

The second industrial revolution, which began in the US in the 1850s and was driven by factors such as electrification, crude oil, the rapid spread of the telephone and assembly-line manufacturing of the automobile, ignited the country’s ascent to global superpower status. By 1890, the US had overtaken the UK as the largest economy in the world.

The availability of factory-produced goods, such as clothing, made the trappings of success affordable to the middle class in industrialised countries with living standards improving rapidly.

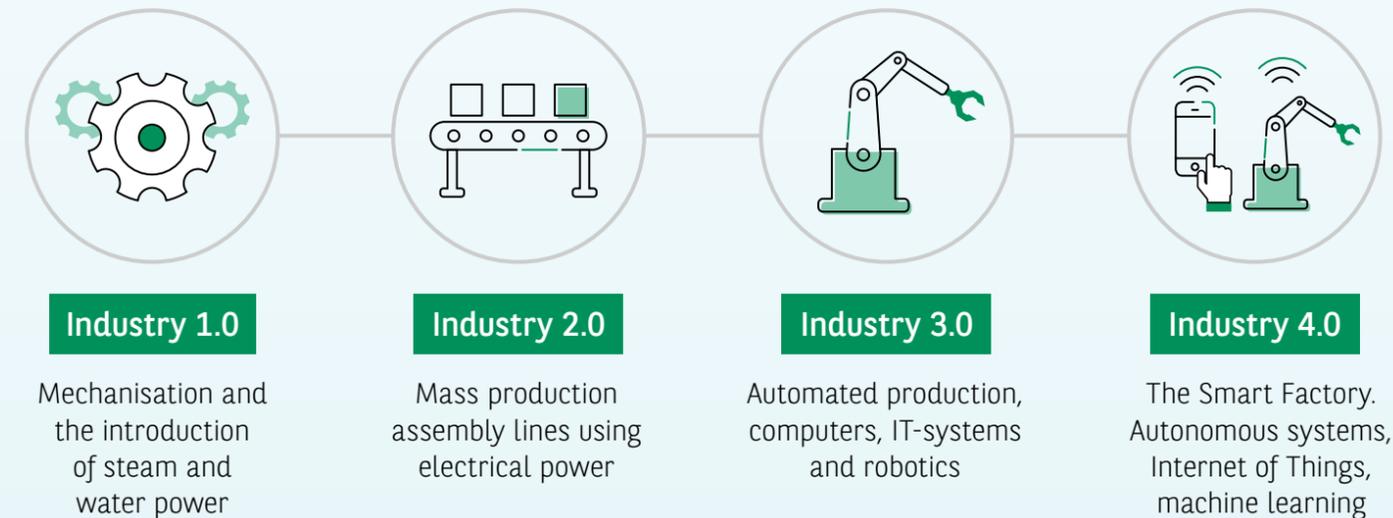
“ The longer you can look back,
the farther you can look forward. ”

Winston Churchill

Figure 1: The four industrial revolutions

The speed of current technological breakthroughs has no historical precedent, according to the World Economic Forum. It argues that compared with previous industrial revolutions, the Fourth is evolving at an exponential rather than a linear pace and is disrupting almost every industry in every country.

The breadth and depth of the changes underway herald the transformation of entire systems of production, management, and governance, and hold the potential to boost living standards and the quality of life across the globe.



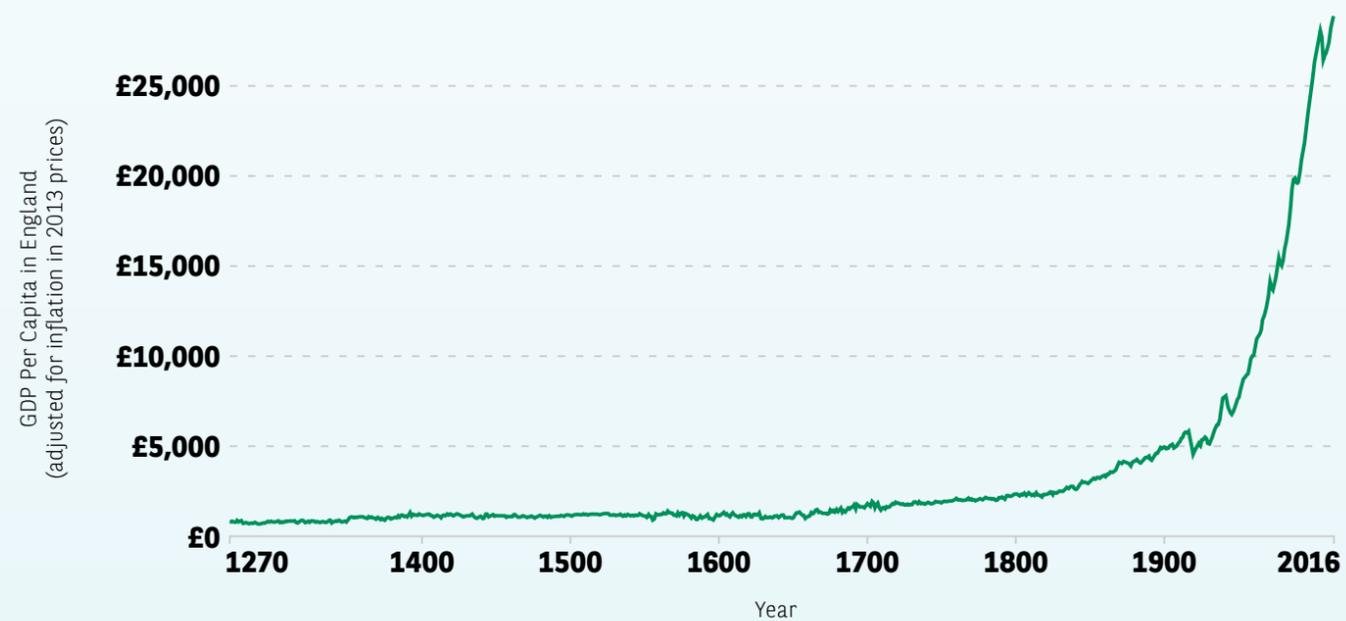
Source: <https://www.spectralengines.com/articles/industry-4-0-and-how-smart-sensors-make-the-difference>
Accessed: August 2022



LESSONS FROM HISTORY

Figure 2: GDP per capita in England

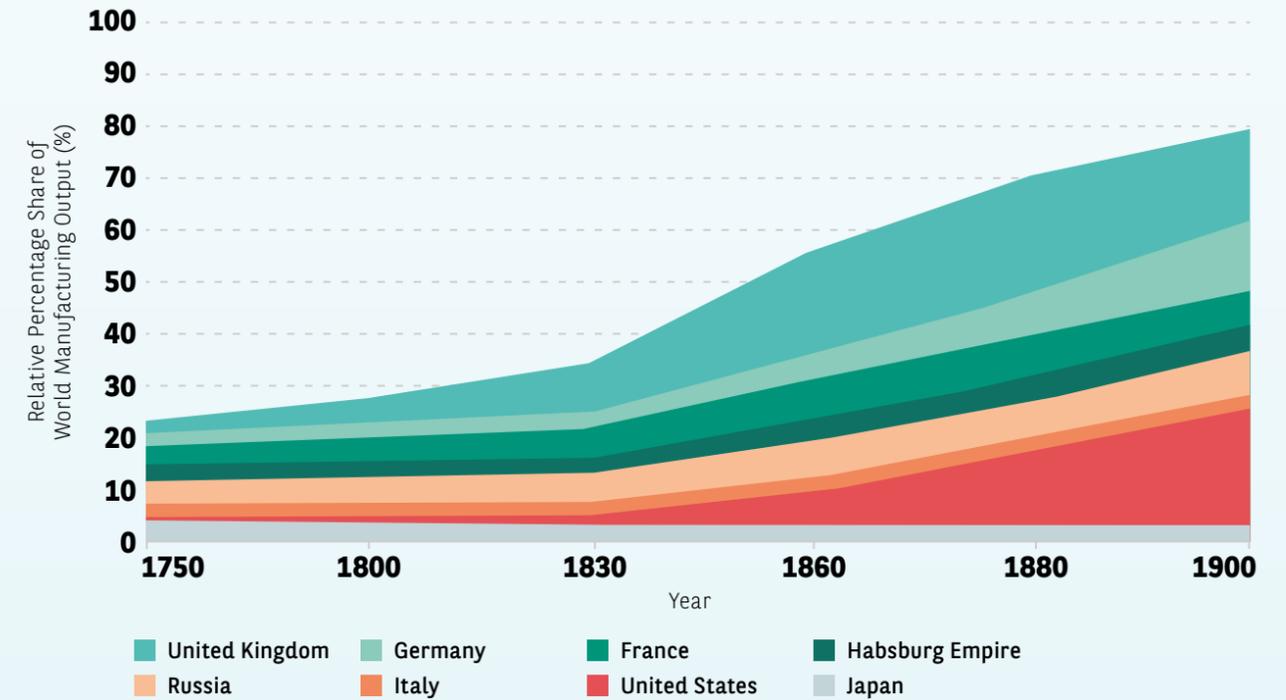
GDP per capita in England remained largely stagnant for centuries before the first industrial revolution.



Note: Data refers to England until 1700 and the UK from then onwards.
 Source: <https://ourworldindata.org/grapher/gdp-per-capita-in-the-uk-since-1270>
 Accessed: August 2022

Figure 3: Relative share of world manufacturing output, 1750-1900

By 1900, the US had already overtaken the UK as the world's largest source of manufactured goods.



Source: <https://industrialrevolutionth.weebly.com/statistics.html>
 Accessed: August 2022



TAKING A HOLISTIC APPROACH

The economist and author Jeremy Rifkin, who has advised the governments of Germany and China, among others, argues that the new revolution currently underway could be equally transformative, not just for economies but for the environment and the way societies are organised too.

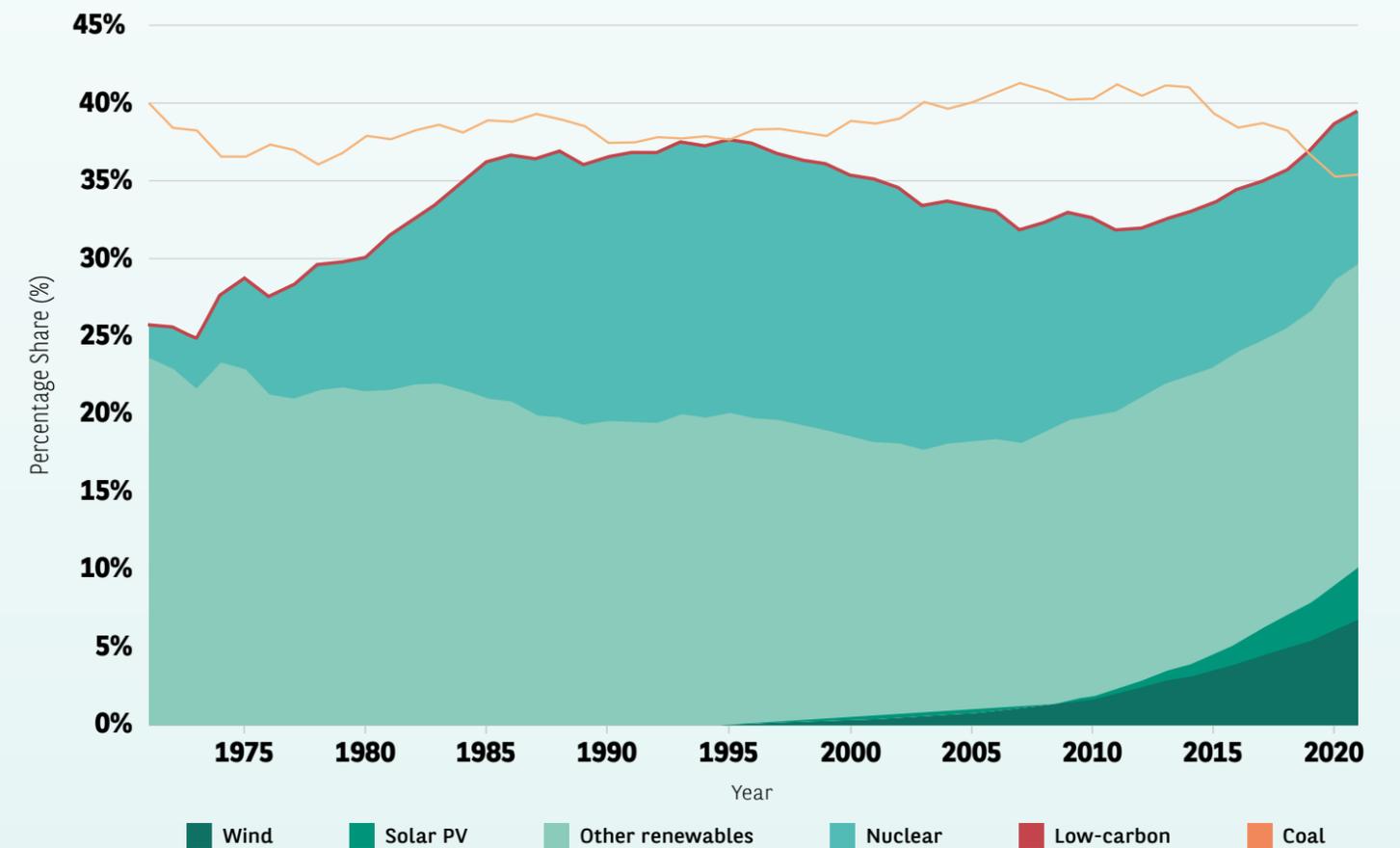
While many people are aware of the potential impact of new technologies such as AI and 3D printing, Rifkin is one of the few who have thought and written intensively about how all these technological changes will combine.

He believes the cost of producing and delivering an increasing array of goods and services will dwindle to near zero. Rifkin points out that technological advances have already taken the marginal cost of producing goods and services in certain areas to near zero, including in publishing and the media. So, how did this come about, and what does it mean?



Figure 4: Share of low-carbon sources and coal in world electricity generation, 1971-2021

The contribution of renewables to power generation is growing rapidly while that of coal tumbles.



Source: <https://www.iea.org/data-and-statistics/charts/share-of-low-carbon-sources-and-coal-in-world-electricity-generation-1971-2021>
Accessed: August 2022



THE NEW INFRASTRUCTURE

Rifkin argues that each industrial revolution created a new architecture that drove the overwhelming majority of productivity gains.

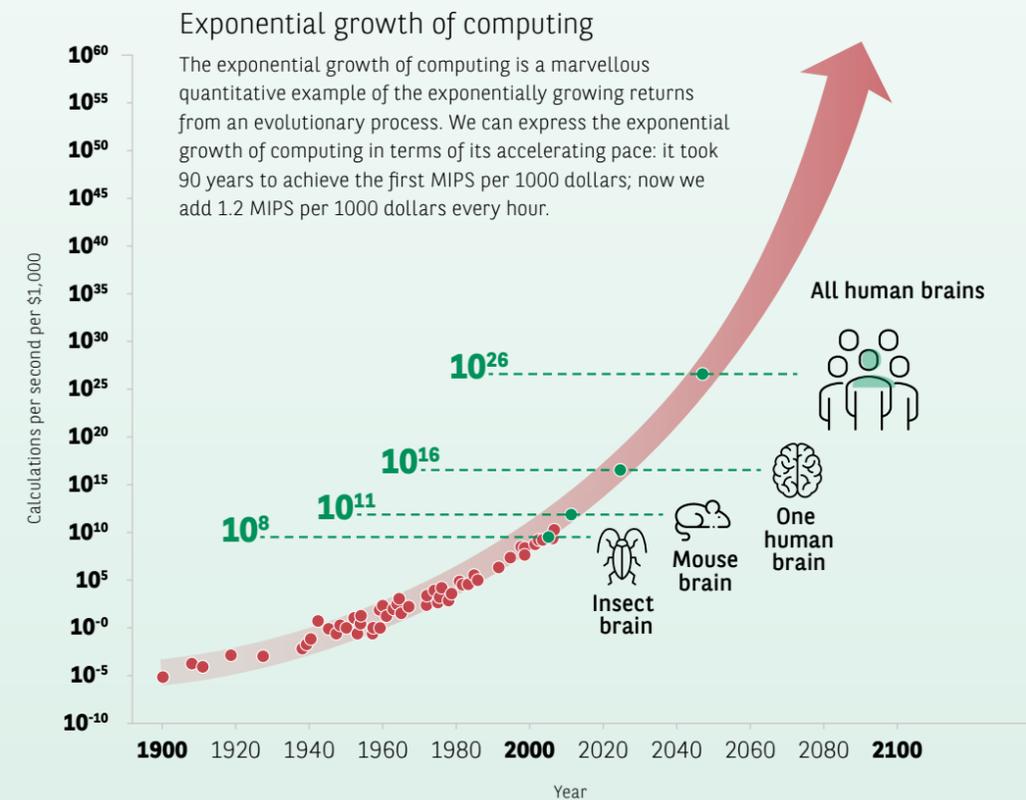
By the early 2000s, the productivity potential of the infrastructure upon which the second industrial revolution was built was exhausted. However, a new technological infrastructure is now emerging, driven by digitalisation.

This is enabling the creation of a digital power grid, stretching across continents, which allows millions to produce their own wind and solar electricity and send excess power back into the system.

Over the next decade, this infrastructure will expand to include autonomous electric and fuel-cell vehicles operated by near-zero marginal-cost renewable energy on smart road, rail, water, and air 'internets'.

This new infrastructure will allow people to share communication, energy and mobility, partially in the capitalist market and in the emerging sharing economy.

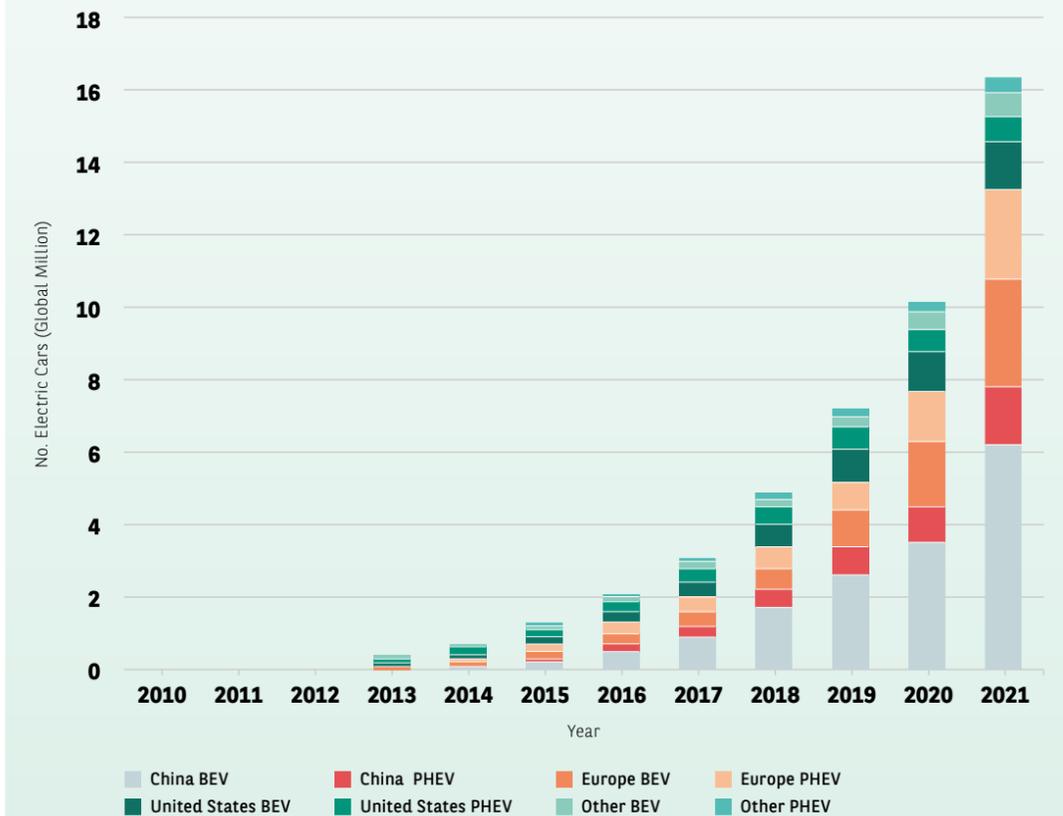
Figure 5: The growth of computing power is fuelling technological advances



Note: MIPS = A unit of computing speed equivalent to a million instructions per second.

Source: <https://bit-tech.net/news/the-future-of-artificial-intelligence/7/>
 Accessed: August 2022

Figure 6: Global electric car stock, 2010-2021
 Last updated 18 May 2022



Notes: BEV = battery electric vehicle; PHEV = plug-in hybrid electric vehicle. Electric car stock in this figure refers to passenger light-duty vehicles. Other includes Australia, Brazil, Canada, Chile, India, Japan, Korea, Malaysia, Mexico, New Zealand, South Africa and Thailand. Europe in this figure includes the EU27, Norway, Iceland, Switzerland and United Kingdom.

Source: <https://www.iea.org/data-and-statistics/charts/global-electric-car-stock-2010-2021>
 Accessed: August 2022



IDENTIFYING THEMES ALONE DOES NOT GUARANTEE RETURNS FOR INVESTORS

Warren Buffet, arguably the world's most successful investor, points out that investors do not necessarily benefit when a technological development transforms society and powers economic growth.

He believes that if he had been investing back in 1903, the potential of the motor car would have already been clear.

Yet if he had invested in carmakers back then, he would almost certainly have lost money. That's because out of the 2000 or so companies that entered the US automobile industry in the following decades, only three are now left.

That is the great challenge facing investors: it is extremely difficult to identify those companies that will be able to survive and prosper for the next ten to 20 years.



WHEN THE DOT.COM BUBBLE OF THE 1990S,
BASED ON THE EXPLOSION OF THE INTERNET,
BURST IN 2000, SHAREHOLDERS
LOST APPROXIMATELY

US\$5 tn

Source: <https://www.theneweconomy.com/technology/dotbomb-are-tech-investments-about-to-destabilise-the-economy>
Accessed: August 2022



SURVIVORS OF THE DOT.COM CRASH
INCLUDE THE LIKES OF AMAZON. \$1000
INVESTMENT (55 SHARES) IN 1997
WOULD BE VALUED AT

US\$2,340,635

AS OF 2020

Source: <https://timesofindia.indiatimes.com/business/international-business/what-if-you-had-invested-in-1000-amazons-ipo-in-may-1997/articleshow/84173075.cms>
Accessed: August 2022



IN 1991, EIGHT OUT OF THE

top 20

US COMPANIES BY MARKET CAPITALISATION
WERE OIL COMPANIES. THERE WERE JUST TWO
OIL BUSINESSES LEFT BY 2021

Source: https://money.cnn.com/magazines/fortune/fortune500_archive/full/1991/
Accessed: August 2022

Source: <https://companiesmarketcap.com/usa/largest-companies-in-the-usa-by-market-cap>
Accessed: August 2022





HOW DOES OUR ENVIRONMENTAL STRATEGIES GROUP APPROACH THEMATIC INVESTING?

At BNP Paribas Asset Management, we are confident that using an expert and holistic historical lens, as well as detailed fundamental projections in the context of thematic trend analysis, helps us to target those businesses that could prove to be the long-term winners.

We find that throughout history, the growth of disruptive products and services has been significantly underestimated. This is true not only for growth, but also fundamentals. For example, the rate of technological change and of cost declines have often surpassed projections. Environmental solution alternatives such as green hydrogen, solar energy, electric cars or bio-plastics, to name a few, are changing and disrupting manufacturing and supply chains and transforming consumer behaviours around the world. What has this accelerated consumers' adoption meant for the related industries and could this help inform our investment decisions? We believe so.

Understanding the effect of the accelerated adoption of new technologies by consumers on related industries could help us make better investment decisions.

Our approach involves detailed proprietary modelling. Building these models requires monitoring inflection points that can drive industry returns and adaptation. First, we analyse the impact and pace of the growth of historical industrial innovations, for example what was the market penetration for mobile phones, the radio, or the internet? We look at global growth forecasts and determine how certain markets behave relative to economic growth, with estimates for how big it is now and how enabling technologies are going to grow it over time. These lessons help us judge where in the growth cycle we are for various current novel technologies. When combined with our sector research, they also help us consider the potential of current companies to generate revenues from these innovative and scaling opportunities by having better estimates of addressable size and penetration rates looking out into the future. No forecast will be perfect, but we think that by trying to base our forecasts in what has happened historically, we should hopefully avoid some biases and obtain more likely results.

The key output is a twenty-year discounted cash flow that aims to minimise the influence of terminal values and terminal growth rates in favour of granular cash flow projections. This is flexed to generate multiple scenarios based on a range of different assumptions and is cross referenced with sum-of-the-parts and multiple analysis that is put into historical context. Opportunities are monitored through comprehensive sub-sector stock lists that enable us to spot relative outliers and absolute divergences from fundamental targets. These are reviewed weekly both for current and previously owned positions. Together, they provide us with a good framework to think about the themes we pursue in terms of "the bigger picture" as well as spot specific opportunities.

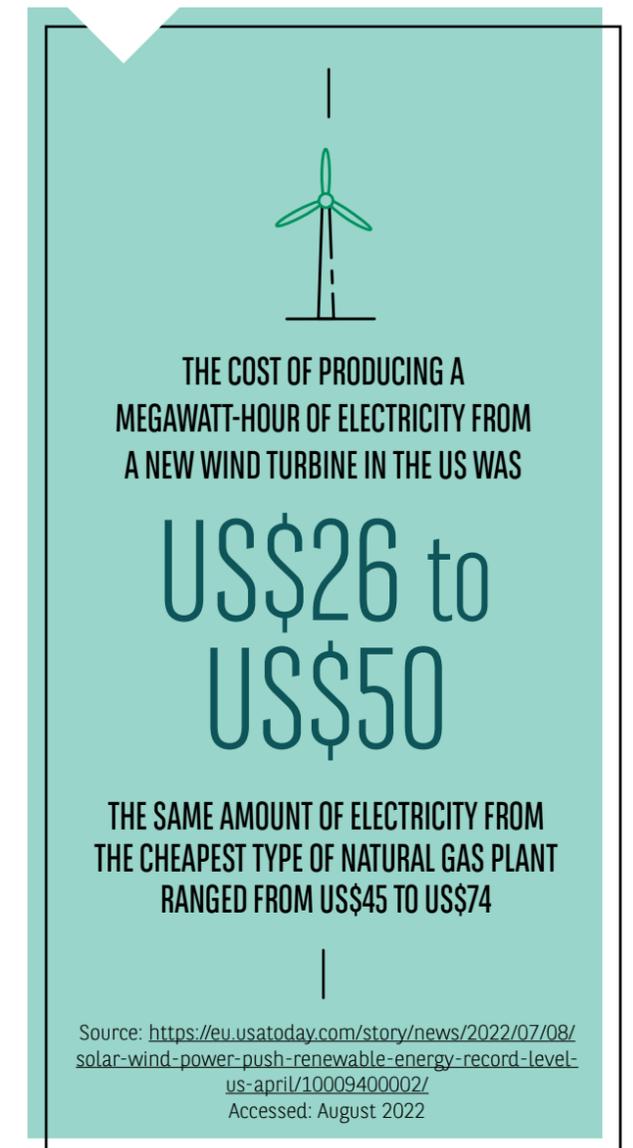
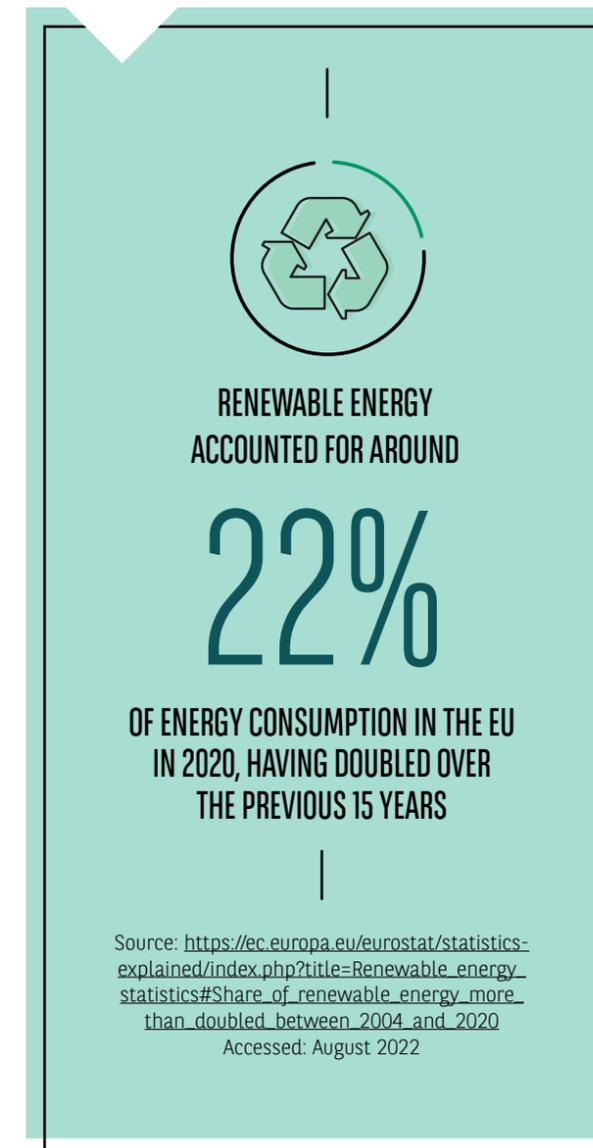
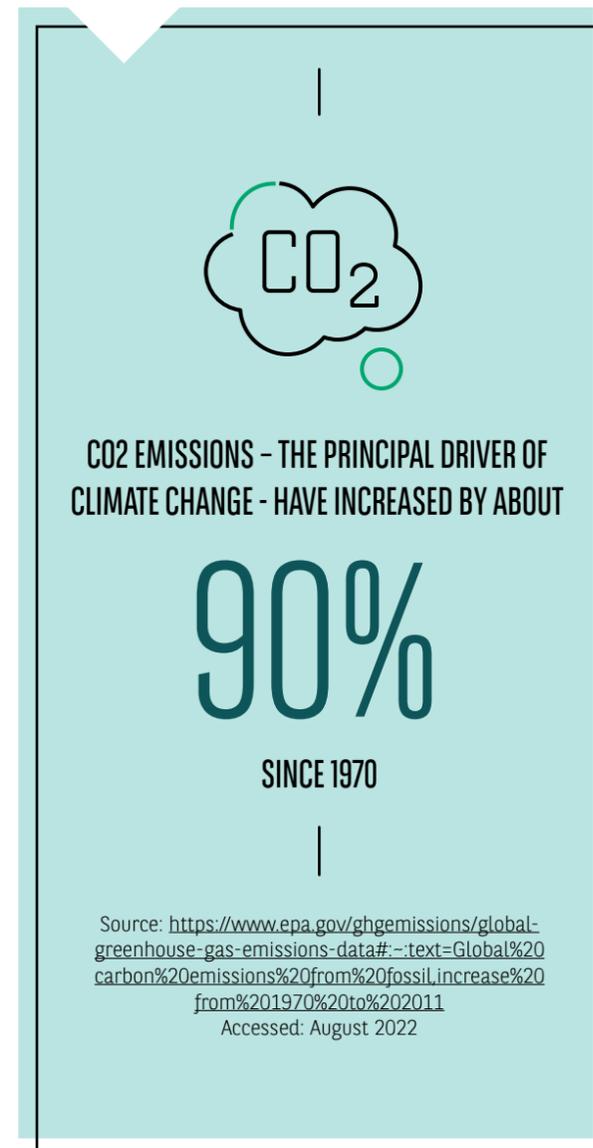
It gives us the confidence to invest in selected businesses that are key to either existing or emerging new infrastructure platforms as we can track their average adaptation curve and pinpoint where on the curve the technology pursued by each business in our universe is. Finding winners takes research, an open mind, and the ability to examine challenges and opportunities from multiple perspectives, as well as having the conviction to invest purely with an unconstrained approach that targets positive environmental outcomes.



HOW TO IDENTIFY THE INVESTMENT WINNERS

At BNP Paribas Asset Management, our Environmental Strategies Group believes that simply looking at individual trends, however transformative, is no guarantee of investment success. Rather, a wider understanding of the enormity of the challenges and opportunities the world faces is required. That involves taking a rigorous holistic approach to see how the evolving infrastructural platform creates business opportunities and to identify which companies are best placed to exploit it.

The Group also believes that a thorough understanding of previous periods of disruption can help identify the potential investment winners of this new carbon-free age. Finally, we are convinced that active management is the key to identifying companies that can outperform.





ARE YOU READY TO INVEST WITH A PURE THEMATIC APPROACH?

There is no denying that the emergence of the next industrial revolution will create significant investment opportunities but the speed at which transformational developments are taking place presents challenges for fund selectors. As well as the well-known incumbents, small nimble, innovative and disruptive companies are emerging and any of these businesses could become the superstars of tomorrow. Finding effective, Industry 4.0 themed businesses will take research and an open mind, and will require the conviction to invest with an unconstrained approach, targeting best ideas across a range of interconnected sectors.

At BNP Paribas Asset Management, we have developed a range of thematic strategies which proactively invest in companies that embrace the new technologies, champion greener policies, and implement environmentally-positive practices, as well as the energy transition. Our portfolios are constructed carefully and contain risk by building in robust layers of diversification across geographies, sizes and styles while incorporating ESG (Environmental, Social and Governance) considerations. We believe fund managers, fund selectors and investors alike have an opportunity to use their position and influence to shape a better world. We all can and should play our part by investing together for a better future.



Ulrik Fugmann

Co-Head & Senior PM
Environmental Strategies Group



Edward Lees

Co-Head & Senior PM
Environmental Strategies Group

BNP PARIBAS ASSET MANAGEMENT UK Limited, "the investment company", is authorised and regulated by the Financial Conduct Authority. Registered in England No: 02474627, registered office: 5 Aldermanbury Square, London, England, EC2V 7BP, United Kingdom.

This material is issued and has been prepared by the investment management company.

This material is produced for information purposes only and does not constitute:

1. an offer to buy nor a solicitation to sell, nor shall it form the basis of or be relied upon in connection with any contract or commitment whatsoever or
2. investment advice.

Opinions included in this material constitute the judgment of the investment management company at the time specified and may be subject to change without notice. The investment management company is not obliged to update or alter the information or opinions contained within this material. Investors should consult their own legal and tax advisors in respect of legal, accounting, domicile and tax advice prior to investing in the financial instrument(s) in order to make an independent determination of the suitability and consequences of an investment therein, if permitted. Please note that different types of investments, if contained within this material, involve varying degrees of risk and there can be no assurance that any specific investment may either be suitable, appropriate or profitable for an investor's investment portfolio.

Given the economic and market risks, there can be no assurance that the financial instrument(s) will achieve its/their investment objectives. Returns may be affected by, amongst other things, investment strategies or objectives of the financial instrument(s) and material market and economic conditions, including interest rates, market terms and general market conditions. The different strategies applied to the financial instruments may have a significant effect on the results portrayed in this material.

This document is directed only at person(s) who have professional experience in matters relating to investments ("relevant persons"). Any investment or investment activity to which this document relates is available only to and will be engaged in only with Professional Clients as defined in the rules of the Financial Conduct Authority. Any person who is not a relevant person should not act or rely on this document or any of its contents.

All information referred to in the present document is available on www.bnpparibas-am.com

VIEWPOINT



BNP PARIBAS
ASSET MANAGEMENT

The sustainable investor for a changing world