

# THE ENERGY TRANSITION: OPPORTUNITIES & CHALLENGES IN A NET ZERO CARBON WORLD

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## An introduction to the energy transition

Energy plays a vital role in our society and economy. For hundreds of years, energy advancements have spurred innovation, increased productivity and improved the standard of living. However, the same energy resources that have propelled us forward are now degrading our environment and fueling a global climate crisis.

Citizens, companies and governments alike realize that the current path is not sustainable. Coupled with increasing energy demands from an ever-growing world population, this is prompting a monumental shift toward zero-carbon, sustainable energy sources.

Advancements in renewable energy technology are accelerating the energy transition as zero-carbon sources become more cost-competitive. But the current energy transition is much more than just solar panels and wind turbines; it is a wholesale global change in the way we generate, store, distribute and use energy. Despite the progress, challenges still remain.

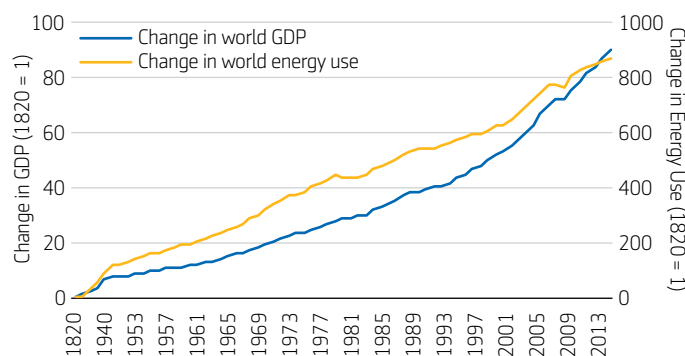
Enabled by emerging technologies and rapidly declining costs, the transition from fossil-based to zero-carbon energy is transforming the global energy sector and presenting interesting opportunities for investors. Over this multi-part series, we will explore the opportunities and challenges related to the energy transition with a focus on five key areas: energy efficiency, renewables, storage, low-carbon fuels and carbon capture.

## Catalysts for change

Historically, energy has been a key requirement for global economic development. Following a mutually reinforcing cycle, an increasing population has spurred economic growth which increases demand for energy and, in turn, enables further growth (Exhibit 1).

The world has gone through two previous transitions that structurally remade society and opened tremendous opportunities for growth. The industrial revolution in the eighteenth and nineteenth centuries transformed the world from a largely agrarian society into one built by steel and fired by coal. This was followed in the mid-twentieth century by the shift to oil and gas which laid the foundations for our current level of progress and wealth.

Exhibit 1: Change in world GDP and total energy consumption from 1820 – 2015



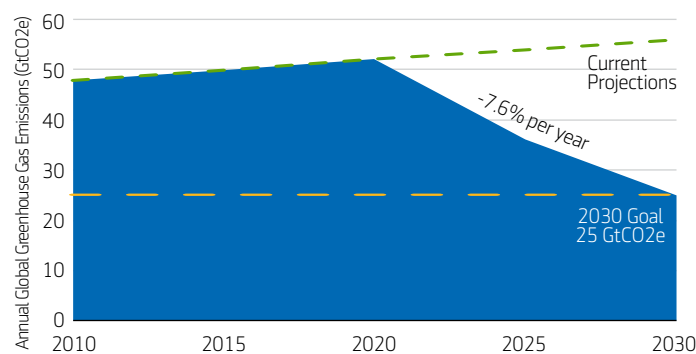
Source: Our World Data based on World Bank and Maddison; PBL Netherlands Environment Assessment Agency, BP Statistical Review of World Energy; Aegon Asset Management calculations

Spurred by climate and environmental concerns, and accelerated by technology development, the current transition has the potential to revolutionize the world away from a fossil fuel-based economy toward a zero carbon future at a pace never seen before.

## Environmental and economic implications

The current energy transition will have implications for the economy—and the climate. And not a moment too soon. A recent report from the UN Environment Program (UNEP) warned that global carbon emissions must decline by more than seven percent annually over the next ten years in order to keep the world on track to meet the goals of the Paris Agreement<sup>1</sup>—in sharp contrast to the 1.5% annual growth in emissions we've seen over the past decade (Exhibit 2).<sup>2</sup>

Exhibit 2: Global Emissions Trajectory to achieve Paris Agreement

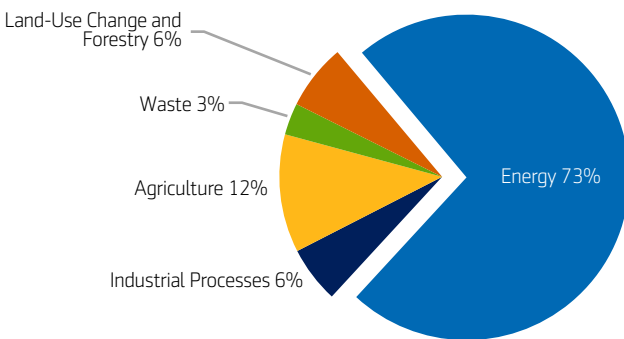


Source: UN Environment Program (UNEP) 2019 Emissions Gap Report

While the impacts of climate change might seem far off, research from the McKinsey Global Institute estimates that absent focused decarbonization efforts, countries representing some 90% of global GDP will be likely to suffer economic losses from physical changes such as increased water stress, flooding or extreme heat by 2030.<sup>3</sup>

The good news, however, is that energy production and use is responsible for almost three-quarters of global greenhouse gas emissions (Exhibit 3). Transitioning to zero-carbon or renewable generation sources along with improved energy efficiency can achieve 90% of the reductions needed to fulfil the Paris Agreement and minimize damage from climate change. The International Renewable Energy Agency (IRENA) estimates that this would require a net incremental investment of US\$830 billion per year<sup>4</sup>—less than five percent of the total global long-term bond issuances in 2018<sup>5</sup>—potentially yielding some US\$19 trillion in cumulative economic gains to 2050.

Exhibit 3: Global Greenhouse Gas Emissions by Source



Source: World Resources Institute (WRI) Climate Watch as of 2016

## Industry disruption and opportunity

As the energy transition unfolds, the shift to zero- or low-carbon sources could expose risk on corporations' balance sheets as the value of coal, oil and gas reserves diminish. These stranded assets represent a financial risk to companies and consequently, investors. Carbon Tracker, an independent financial think tank, estimates that oil and gas majors will need to reduce production by 35% to 2040 in order to align themselves with the energy transition.<sup>6</sup> This should come as no surprise to anyone following the energy industry; over the past few years, oil and gas companies have already announced significant write-downs due to lowered long-term price expectations—most recently Shell and Chevron announcing write-downs for some \$2 billion and \$11 billion respectively in late 2019.<sup>7</sup> Anticipated regulation on greenhouse gas emissions could further exacerbate financial risk as companies with carbon-intensive operations and higher capital costs struggle to navigate through the transition.

On the other hand, many energy companies are transforming their business models to adapt to the transition to renewable sources. For example, Ørsted was initially founded as an oil and gas company but,

over the past decade, has transitioned to the world's largest offshore wind developer while growing its market capitalization by 64%—greater than the gains seen by the six largest European independent oil companies.<sup>8</sup>






## Despite opportunities, challenges remain

While the energy transition presents tremendous opportunities, there remain a number of barriers to success. Traditional fossil fuels—coal, oil and gas—continue to dominate the global energy system; of the \$1.8 trillion invested in the energy sector in 2018, only \$300 billion went to renewables.<sup>9</sup> Capital markets are largely reluctant to finance the energy transition—especially with agreements and coordinating actions needed from the public sector largely not in place. The energy market is highly competitive, frequently driven by short-term incentives and often highly regulated where rapidly declining prices can put pressure on margins; estimated to be 5-8% for renewable projects versus 15% or more on oil and gas.<sup>10</sup>

## Key transition themes and investment considerations

The energy transition is expected to be driven by an array of existing and emerging technologies – from energy efficiency and renewables to storage, low-carbon fuels and carbon capture. Over this multi-part series, we will explore the opportunities and challenges related to the energy transition with a focus on these five key areas (Exhibit 4).

Exhibit 4: Five Key Energy Transition Themes

	<b>Energy efficiency</b>	Doing the same with less
	<b>Renewables</b>	Generating energy without carbon emissions
	<b>Storage</b>	Decoupling energy demand from generation
	<b>Low-carbon fuels</b>	Using alternatives to common fossil fuels
	<b>Carbon capture</b>	Capturing, storing and using carbon

Each transition theme presents a unique set of opportunities and risks to investors. Companies that adapt and move away from fossil fuel energy sources, improve their energy efficiency or develop new zero- or low-carbon technologies are more likely to capitalize on the energy transition to drive revenue growth and lower operating costs, thus producing sustainable cash flows and more resilient business models. For bondholders, companies with more stable cash flows are more likely to repay their obligations, providing the potential for alpha generation for investors. For equity investors, companies disrupting the status quo and driving innovation within the energy

transition may present attractive upside growth potential. On the flip side, those ignoring the energy transition and failing to pivot to a net zero carbon future may be at a higher risk of default and deteriorating market value as investors reallocate capital to better-aligned options.

The current combination of technology innovation and climate change is disrupting long-held ideas of energy. Each new technology cost reduction or extreme weather event works to accelerate the transition to a net zero carbon energy system. This transition is poised to revolutionize the way we source, store and consume energy—reshaping the global economy while providing both opportunities and challenges for investors to align with and benefit from the shift to a zero carbon world.

<sup>1</sup>The Paris Agreement is an environmental accord that was adopted by almost every country in 2015 to strengthen the global response to climate change with the primary objective of keeping a global temperature rise to well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 degrees Celsius

<sup>2</sup>UN Environment Program (UNEP) 2019 Emissions Gap Report

<sup>3</sup>McKinsey Global Institute Climate Risk and Response – physical hazards and socioeconomic impacts (January 2020)

<sup>4</sup>International Renewable Energy Agency (IRENA) Perspectives for the energy transition – investment needs for a low-carbon energy system (March 2017)

<sup>5</sup>SIFMA 2019 Capital Markets Fact Book

<sup>6</sup>Carbon Tracker Balancing the Budget: Why deflating the carbon bubble requires oil & gas companies to shrink (November 2019)

<sup>7</sup>McFarlane, Sarah “Energy Giants Confront Glut With Wave of Write-Downs” The Wall Street Journal (20 December 2019)

<sup>8</sup>BloombergNEF for the Powering Past Coal Alliance “Orsted’s profitable transformation from oil, gas and coal to renewables” (12 December 2018)

<sup>9</sup>Butler, Nick “The private sector alone will not deliver the energy transition” Financial Times (28 October 2019)

<sup>10</sup>ibid

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