Santander Private Banking

The transition to a low-carbon economy, the biggest challenge of this century

Transitioning to a low-carbon economy requires a sweeping transformation of production, consumption, and transport. Energy accounts for more than three-quarters of greenhouse gas (GHG) emissions globally and holds the key to avoiding the worst effects of climate change[1]. Climate change poses policy, legal, technology, and market risks worldwide. These risks may create financial and reputational problems for organisations. However, companies that participate in the energy transition can benefit from a wide array of market opportunities.

Global investment in the energy transition increased by 17% YoY in 2023, hitting a record USD 1.77 trn, driven by electrified transport and renewable energy.

Achieving Net Zero by 2050 is estimated to require an average investment of USD 4.84 trn per year through 2030, almost triple current levels[2].

This mobilisation of capital will be fuelled by increased policy support, a change in the energy mix towards renewables, and growing use of low-carbon technologies[3].

Based on data from NASA, the Earth's average temperature was the warmest on record in 2023. The global average temperature was 1.2 degrees Celsius above the average in NASA's baseline period (1951-80). According to 'Nature', about USD 140 bn of the costs of extreme weather events are attributed to climate change[4].

01

Why transition to a low-carbon economy?

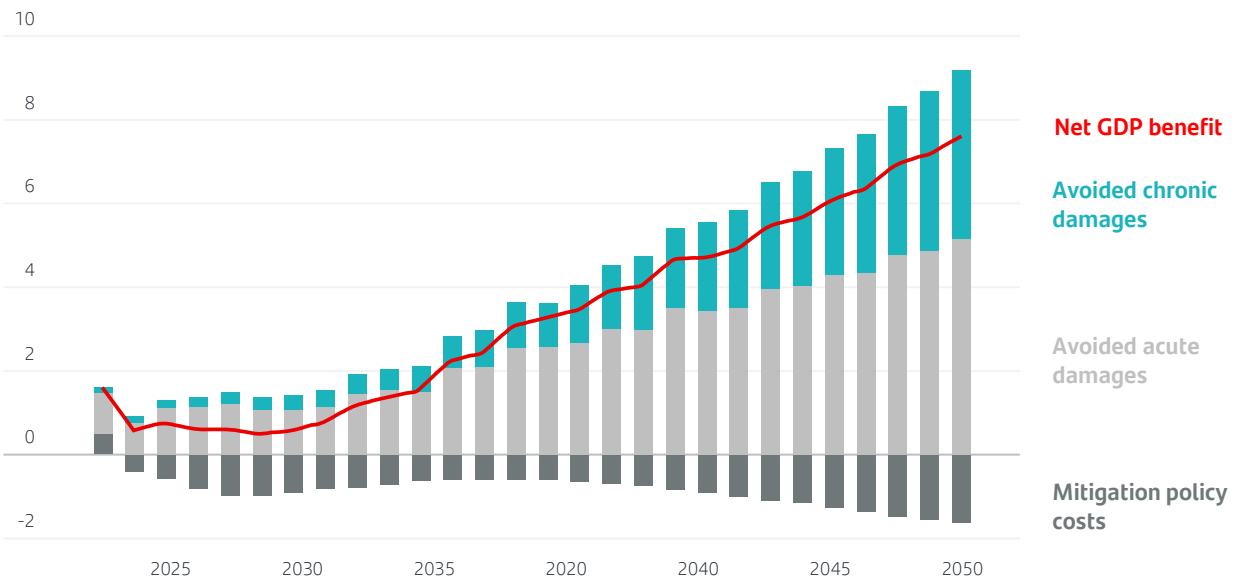
Tackling climate change through an **orderly and just transition to net zero by 2050** could result in a **7% increase in GDP** compared to GDP forecasts under current policies[5].

Figure 1

World potential GDP benefit under zero carbon emissions by 2050

(percent deviation from reference scenario)

Source: IMF



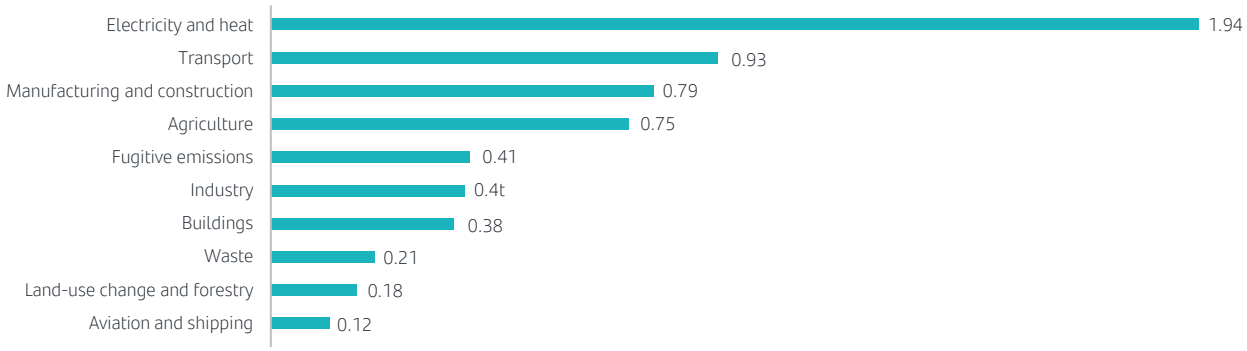
Climate change is set to have a deep economic impact, affecting **macro-economic stability**, and putting a large number of low-income countries at risk. Moreover, many industries may face **supply chain disruptions** and could have **stranded assets that may become uneconomic** as a result of carbon pricing, which would affect their credit quality[6].

Figure 2

Global per capita greenhouse gas emissions by sector, 2020

(tonnes of carbon dioxide-equivalents)

Data source: Climate Watch (2023)



The new energy paradigm

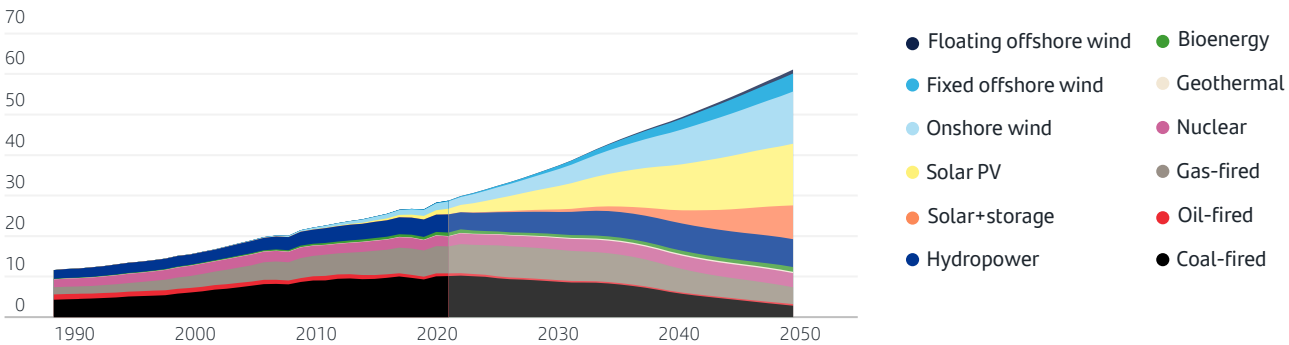
After the mid-2030s, **renewables** are expected to increase their contribution to meeting electricity demand considerably and will start to **replace fossil fuel reliance**. In 2022, the share of renewables in the global energy mix was around 31% and it is expected to rise to 82% by 2050, driven by **declining costs of solar, wind, and storage technologies**[7]. Solar and wind are projected to account for 69% of that share.

Figure 3

World grid-connected electricity generation by power station type

PWh/yr

Source: IEA (2023), GlobalData (2023)



Fossil fuel spending has been increasing slowly after a sharp drop in 2020, but it remains almost where it was five years ago, so the increase in global energy investment has been mainly in **clean energy**[8]. For every **USD 1 spent on fossil fuels, USD 1.8 is being spent on clean energy**. Investment in clean energy is likely to increase considerably in the coming years and decades, spurred on by **enhanced policy support, alignment of climate and energy security goals, and more economic incentives**[13].

Clean electrification is being accompanied by a **strong focus on energy efficiency**. According to the 2023 Energy Efficiency Report by the International Energy Agency (IEA), countries that represent more than 70% of global energy consumption have introduced new or improved energy efficiency policies since the start of the energy crisis.

02

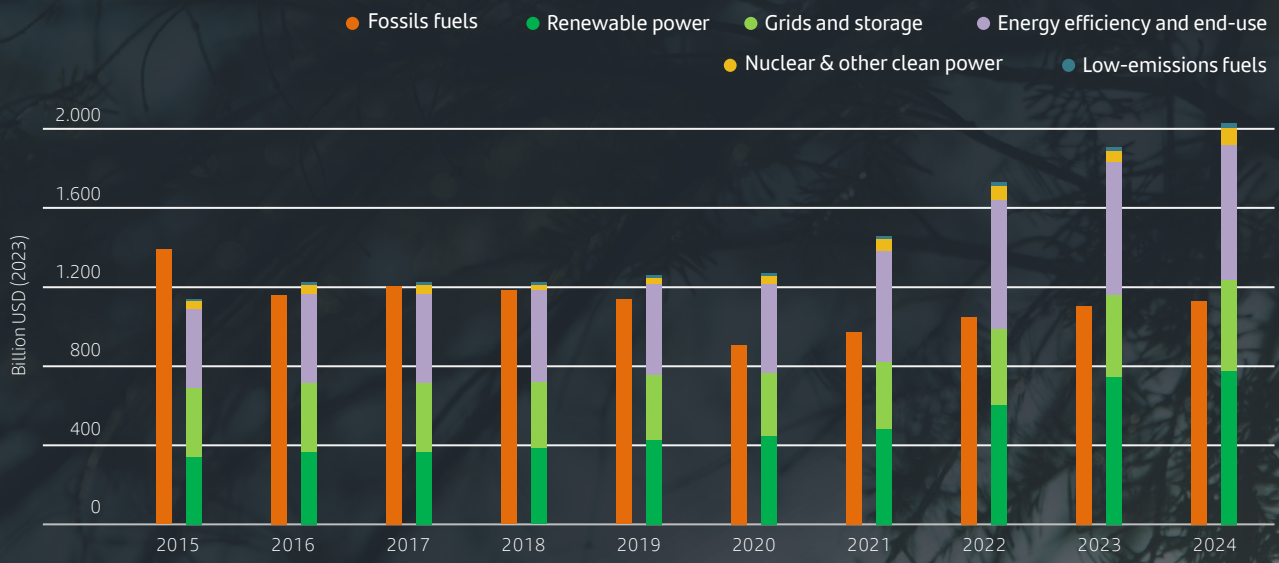
The opportunity of the low-carbon economy

One of the main drivers of the energy transition is the growth of clean energy in the energy mix. Total spending on renewable power, grids and storage is currently higher than on fossil fuels[9]. Global investment in energy transition technologies reached a record USD 1.77 trn in 2023. Going forward it is set to reach USD 2 trn in 2024, driven by emission reduction goals, technology and efficiency gains, energy security (particularly in the EU), and the ambition to establish stronger market positions.

Figure 4

The world now invests almost twice as much in clean energy as it does in fossil fuels

Source: International Energy Agency



2.1. The situation in individual industries

A wide array of industries will benefit from the transition to a low-carbon economy, especially those that currently account for a larger portion of CO2-related emissions.

Electricity production

Power generation is the biggest contributor to global greenhouse gas emissions. Global **spending on renewables** hit a new record in 2023, USD 735 bn, driven by solar photovoltaics (PV) and wind[9]. Other opportunities in the sector include increasing the efficiency of existing fossil fuel-fired[10].

Transport

In 2022, over 94% of the fuel used in transportation was petroleum-based (mainly gasoline and diesel), producing direct emissions[10]. As the industry advances toward a low-carbon economy, **new light-duty vehicles** are expected to be almost **fully electric** by 2050.

Buildings

Retrofitting and making buildings **more energy efficient** can help new and existing buildings to use less energy to perform the same functions, reducing greenhouse gas emissions[10]. Techniques to improve energy efficiency in buildings include efficient **LED lighting, passive heating, and energy-efficient heating, ventilation, and air conditioning**.

Industry

Over **80% of energy-related industrial emissions in the US** could be reduced by 2050 using strategies and technologies already available today, which include **energy and material efficiency**, plus shifting the power grid from fossil fuels to zero-carbon electricity where appropriate[11].

Agriculture

Nature-based solutions, including restoration and conservation, have the capacity to abate 6.7 Gigatons of CO2e in 2050—approximately 80 percent of the total abatement potential in the sector[12].

2.2. The net zero challenge

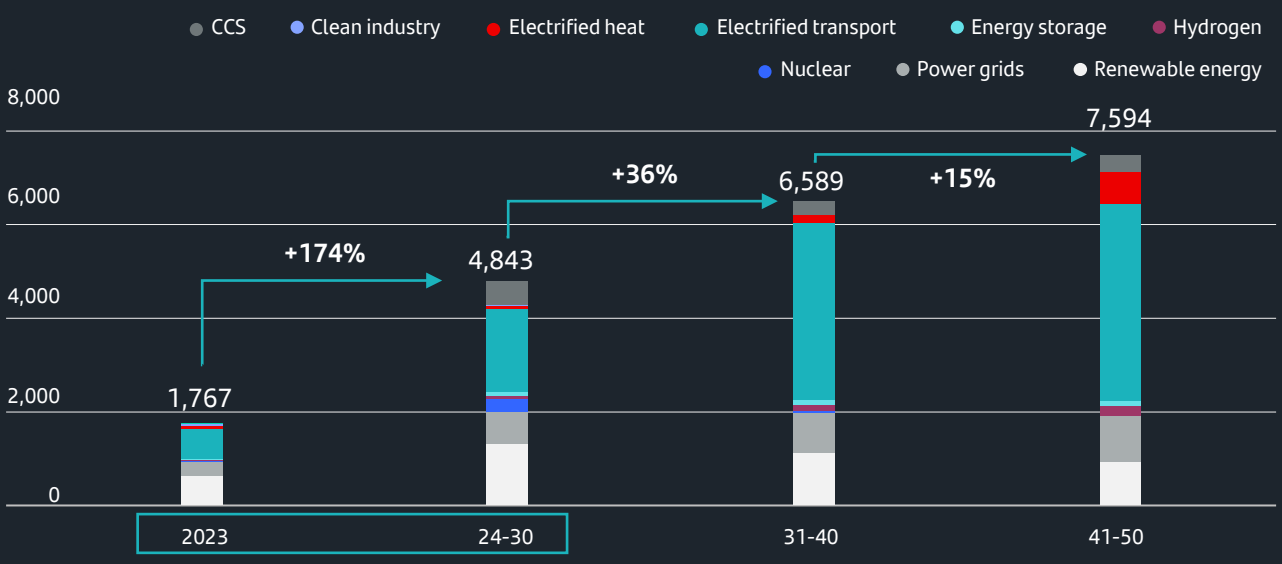
As the figure below shows, The Net Zero by 2050 goal needs estimated investments of USD 4.84 trn per year on average through 2030, three times what was invested in 2023[2].

Figure 5

Comparison: 2023 energy transition investment versus required annualized levels in NEO 2022 Net Zero Scenario

$ billions (2023)

Source: BNEF. NEO: New Energy Outlook.



Electrified transport is set to become the largest contributor to energy transition investment, at USD 1.81 trn per year (37% of the total), followed by renewable energy (USD 1.32 trn per year) and power grids (USD 700 bn).

Renewable energy investment is rapidly gaining momentum and, if this trend continues, it will account for two-thirds of the total investment needed to triple renewable energy capacity by 2030[9].

Furthermore, in the 2040s, low-carbon investment is expected to account for 80% of total energy system investment, up from c. 60% now[3].

However, by 2050, an extra USD 500 bn per year is required to fully fill the gap in the International Energy Agency (IEA)'s Net Zero Emissions Scenario (which includes spending on renewables, grids, and battery storage).

03

The catalysts and policy drive

There are four main factors that need further development to ensure sufficient capital is directed towards the low-carbon economy[3]:

1. Policy support

Policy support expected to be stepped up, driven by the accelerated physical damage to the economy caused by climate factors and the falling costs of low-carbon technologies.

2. Technological innovation

The cost of mature low-carbon technologies is projected to continue falling thanks to innovations and enhanced scale economies.

3. Consumer and investor preferences

Expected to gradually shift toward sustainable services, assets, and products over the next decades.

4. Efficiency increase

Energy efficiency is one of the fastest and most cost-effective ways of mitigating CO2 while cutting energy bills and reinforcing energy security[13].

Some examples of policies driving the low-carbon transition:

Inflation Reduction Act (USA)

USD 370 bn for measures to improve energy security and drive the clean energy transition[15].

EU Innovation Fund

The fund amounts to EUR 40 billion between 2020 and 2030. It focuses on highly innovative clean technologies that can reduce emissions considerably within the EU[14].

China 4th Five-Year Plan (FYP) on Renewable Energy Development

Targets a 50% increase in renewable energy generation by 2025 and for renewable energy to meet 33% of energy demand by 2025, among others[17].

European Green Deal and European Climate Law

The European Climate Law enshrines all the goals set out in the European Green Deal, including an intermediate target of reducing net emissions by 55% by 2030 vs. the 1990 levels[16].

04

Case study of a company transitioning: Ørsted

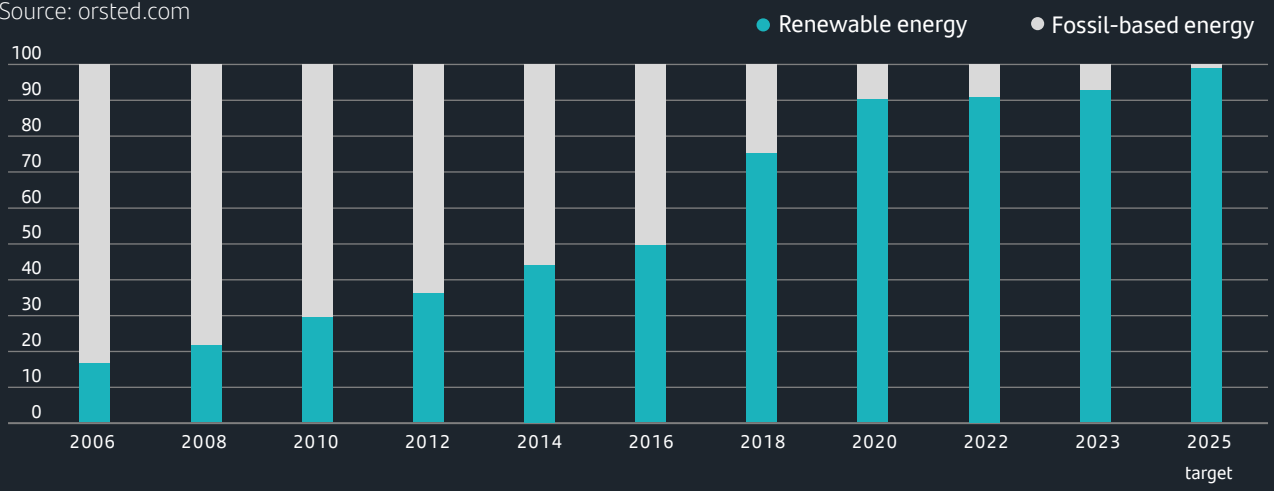
Ørsted is a company that has effectively switched its business model towards the low-carbon economy. By doing so, the company aims to help countries and companies transition to green energy with its wind, solar, biomass, and energy storage solutions, and it is well positioned to drive growth over the long term.

One of their most ambitious targets is for 99% of their power production to be green by 2025[18]. Although a small percentage of its output will still be fossil fuel-based in 2025, this will only be where it cannot be avoided, such as when the system needs extra capacity.

Renewable share of heat and power production

As a percentage of total production

Source: orsted.com



Ørsted has adopted industry-leading practices, including[19]:

Targets

Ørsted set ambitious science-based targets for emission reduction. By 2040, it aims to achieve net-zero emissions across its value chain, one decade earlier than in the 1.5 °C pathway. It plans to achieve this by cutting emissions from energy trading and from their supply chain.

Investment

Ørsted's future emissions intensity is set to continue falling to a low-carbon-aligned rate, driven by the shutdown of fossil fuel assets and the addition of large wind farms.

Business model

Over the last 10 years, Ørsted has repositioned itself from a conventional power generator to a low-carbon generator. By the end of 2023, more than 90% of Ørsted's EBITDA came from onshore and offshore wind[19].

05 Conclusions

The surge of a **new clean energy economy**, led by solar PV and electric vehicles (EVs), gives us momentum for a systemic societal shift in how we consume and produce. **Investment in clean energy** has increased by 40% since 2020, and the economic case for mature green energy technologies is strong. In 2020, one in twenty-five cars sold worldwide was electric; by 2023, that figure was one in five[20]. This **shift towards low-carbon technologies** is accompanied by the rapid expansion of manufacturing capacity for key components of a clean energy system, such as **PV modules and EV batteries**.

Policymakers are increasingly enacting laws focused on reducing greenhouse gas emissions while providing **incentives for low-carbon technologies**. Ground-breaking regulations, such as the **Inflation Reduction Act in the US and the European Union Climate Law**, are paving the way for clean technologies to thrive in a clean economy.

Despite the increase in clean energy investment and the shift away from fossil fuels, the world needs to **transition to a low-carbon future** in an orderly manner so that no one is left behind. To ensure a **just energy transition**, it is vital to invest in reskilling and upskilling workers and communities. Consequently, the transition is partly reliant on investment in training to provide new skills to meet the requirements of the new green jobs.

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