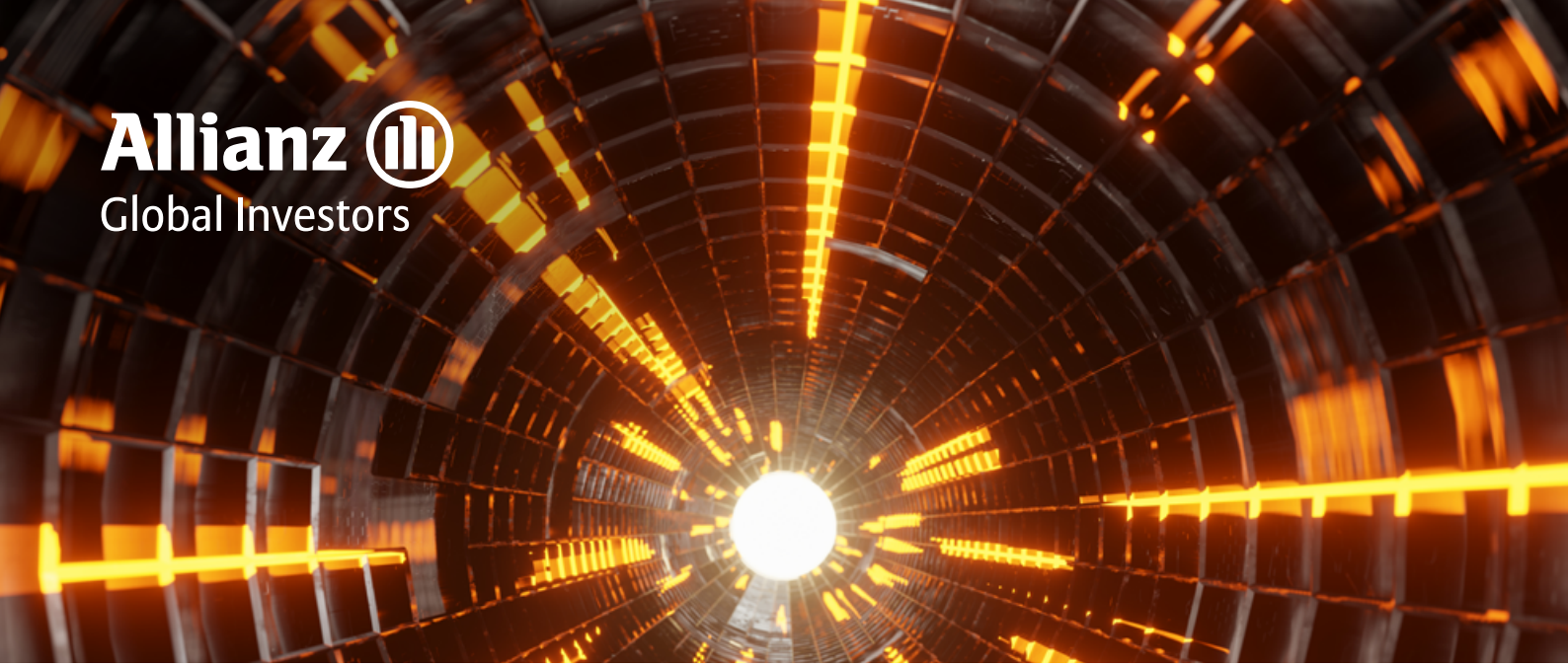

Allianz Global Investors

Why infrastructure is the key to our energy transition

The existing infrastructure in many countries is often decades old which is one factor leading to 27% of the global population being dissatisfied with their national infrastructure. And while satisfaction levels are around 40% there is still room to increase this level through measures such as modernising the current infrastructure.[1]

In recent years, the global push towards sustainable energy solutions has gained significant momentum. Despite shifting levels of political support, many countries around the world are continuing to invest in renewable energy sources such as solar, wind, hydroelectric power, and green hydrogen and are promoting research in disruptive green technologies. This shift however also requires significant investments in infrastructure.

Driving decarbonisation

The energy crisis caused by the Russian invasion of Ukraine has emphasised the importance of security of supply not just for Europe, but for the whole world. The energy transition has the potential to significantly reduce Europe's dependence on (fossil) energy imports and replace them with green electricity and green gases produced in Europe. Furthermore, it contributes to the climate neutrality goal of many countries worldwide. According to the International Renewable Energy Agency, investments of USD 150 trillion in transition technologies and infrastructure by 2050 are needed in the 1.5°C Scenario, which amount to USD 5.3 trillion per year on average.[2]

Marta Perez
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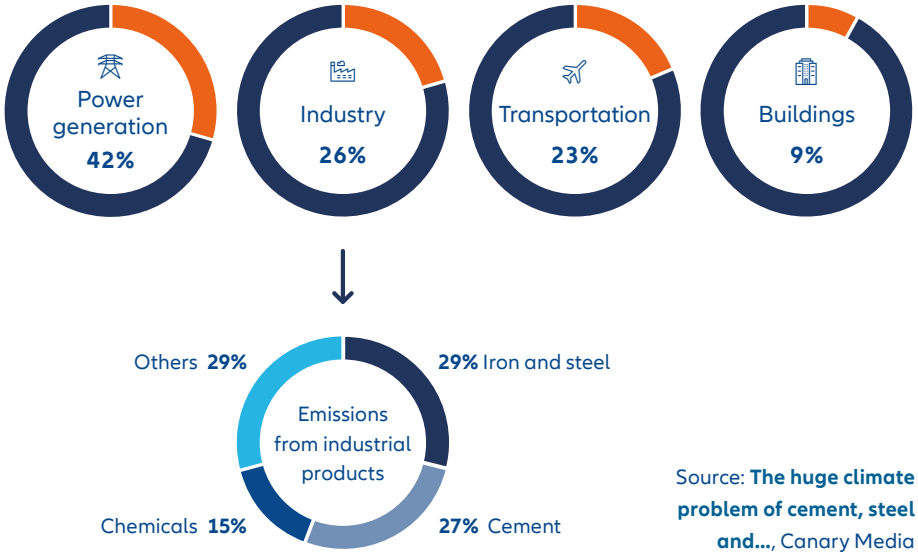
Transforming Infrastructure

Alongside energy generation, the decarbonisation of the transport sector is an important pillar on the path to climate neutrality, which envisages the substitution of fossil fuels with green gases and electricity. The transportation sector accounts for ca 20-25% of all greenhouse emissions worldwide. If this is not tackled, transport-related emissions will double by 2050, which shows the need and opportunity to make a fundamental change in this sector.[3] With the help of sustainable private capital, such as from Allianz and other long-term institutional infrastructure investors, many projects can be undertaken that will have a meaningful impact on emissions reductions.

At the end of 2023, for example, the world's first battery-powered trains were put into regular service in the North of Germany. These battery-electric multiple-unit trains are replacing the diesel trains that were previously in operation due to a lack of electrified lines. This could save ten million litres of diesel and around 26,000 tonnes of CO_2 per year.[4]

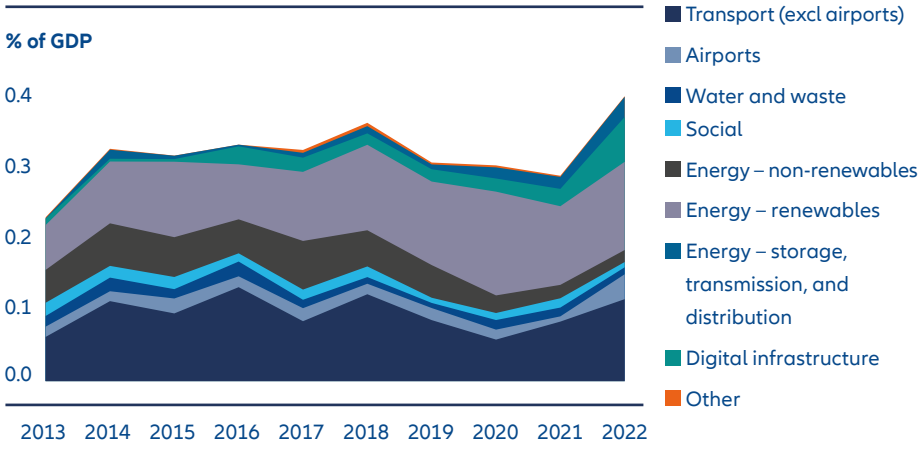
Global energy consumption is projected to grow by 50% by 2050, with developing countries and emerging economies seeing an increase of up to 70%.[5] To ensure this growth is environmentally sustainable and climate-neutral, a comprehensive energy transition is essential. Green hydrogen next to "green electrons", and other green molecules such as biogas and biomethane, which are climate-neutral and versatile for hard-to-abate sectors such as cement, steel, and fertilizers which make up ca 25% of global CO_2 emission[6] and energy storage, could all play an important role in this transition. Many governments are already developing hydrogen strategies, recognising hydrogen's potential in energy supply, heavy goods transport, aviation, and shipping. Producing hydrogen requires electricity, and there is a general consensus that this increased demand should be met by renewable energy sources to create green hydrogen or its derivatives.

Figure 1: Global annual carbon emission (2022)



Source: **The huge climate problem of cement, steel and...**, Canary Media

Private investment in infrastructure projects by sector
% of GDP



Note: 'Other' includes environment and infrastructure (general) sectors.
Source: **cdn.gihub.org/umbraco/media/5416/infrastructure-monitor-report-2023.pdf**

More energy needs more grids

Of course, the rising energy consumption needs more green energy production. More green power plants – largely solar and wind farms – need to be built or repowered. But that will not be sufficient without adapting the transmission and distribution grids too. Without

the expansion of electricity grids, charging stations, but also storage technologies and gas grids, eg, for the transport of green gases such as green hydrogen, the system will not be able to accommodate these new and more intermittent forms of power generation. To meet national climate targets, grid investment needs to nearly double by 2030 to over USD 600 billion per year after over a decade of stagnation at the global level, with an emphasis in particular on digitalising and modernising the distribution grids,[7] as well as new high-voltage power lines to connect offshore facilities, transport onshore to industrial centres, and ensure interconnectivity between countries.

In order to build the infrastructure of tomorrow, projects need to be initiated now. Given the increasing pressures on national budgets, private capital sources will be essential to finance these developments. Besides just the financial investment, a more rapid planning approval process and a reliable and stable regulatory framework to support these investments are crucial to bring these projects to life. Partnering with experienced long-term infrastructure investors, who can coalesce other sources of institutional capital around them, can significantly enhance the success of these initiatives.

One example is the NeuConnect interconnector, which will be the first submarine electricity connection between Germany and the UK that celebrated its ground-breaking ceremony in the first half of 2024. Launched in 2017, its completion is planned for 2028.[8] The owners include institutional investors such as Allianz, who invest their policyholders' pensions and life insurance policy holders' money with a long-term investment horizon. The regulatory frameworks put in place by both the UK and German energy regulators enabled this project to be investable by such long-term low-cost capital.

Hydrogen as an important part of the green energy mix

Many hopes are pinned on green molecules such as hydrogen and its derivatives in terms of energy security, the energy transition, and competitiveness, especially for hard-to-abate sectors. Thanks to its storage capacity, hydrogen can also secure the power supply in times of low feed-in from renewable energies. However, we will not be able to produce all the green hydrogen we need ourselves. Some regions of the world that can rely on cheap renewable sources such as solar, wind, and hydropower are more advantaged for the cost-effective production of green hydrogen while other countries will need to import if they cannot produce it themselves.

In 2021, hydrogen demand was around 94 million tons, primarily grey hydrogen (hydrogen produced from natural gas with no CO_2 abatement). By 2050, the demand for low-carbon hydrogen is expected to rise dramatically to between 350 and 530 million tons per year. To meet this demand, governments and companies need to invest approximately USD 6 trillion to USD 12 trillion from 2025 to 2050 for the production and transportation of low-carbon hydrogen, according to BCG estimates.[9]

As part of this process, not only storage infrastructure, but also electrolysis capacities and pipelines are currently being planned where institutional investors can play a vital role to accelerate these developments as for example Allianz, who is already investing in green hydrogen projects in Norway and Finland to advance the transition.

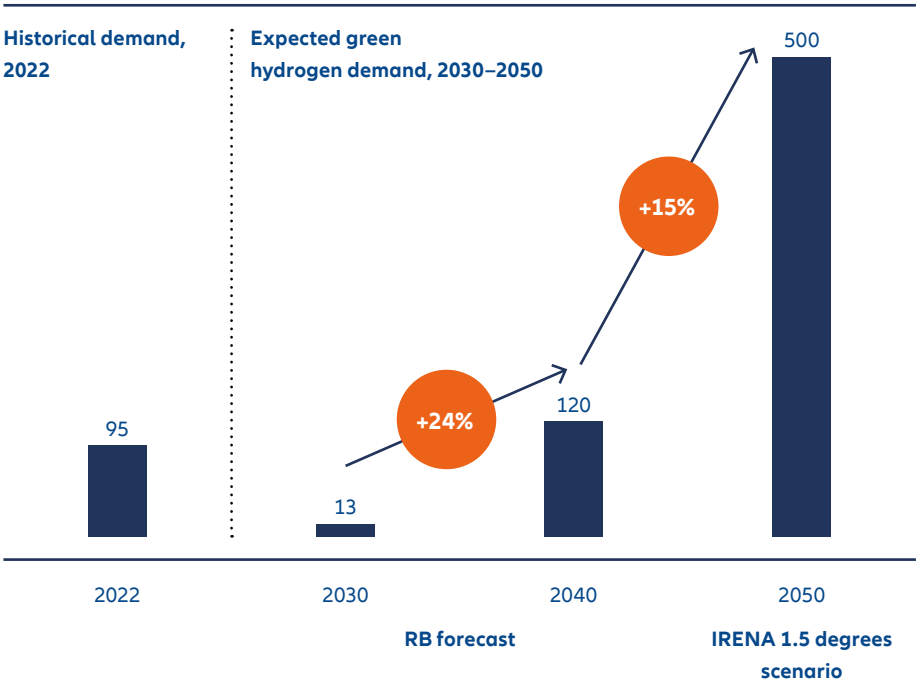
No transition without scale up capital

Most new energy transition technologies are capex-heavy with investment requirements estimated around EUR 2-3 trillion just in Europe by 2050. Europe in particular suffers from relatively underdeveloped capital markets and a lack of scale-up capital.[10] Many energy transition business models such as production of green molecules, energy storage, EV charging battery, carbon capture and storage, industrial heat, and even circular economy processes can be structured as infrastructure-like and be financed with cost-competitive long-term institutional money.

Private capital from long-term institutional investors can therefore be crucial for the implementation of the energy infrastructure transition and to provide scale-up capital for energy transition companies.

The energy transition remains on top of the agenda of many countries. With national budget deficits on the rise and the demand for investments to accelerate the modernisation of infrastructure against the backdrop of driving the energy transition will require private capital. Institutional investors with a long-standing track record in infrastructure and a long-term view can be the drivers of future financial and economic performance.

Figure 3: Expected global demand for green hydrogen (mtpa)



Source: **Green hydrogen as new growth pocket for desalination – Once it takes off at scale**, Roland Berger

Did you know that...?

- 40% of Europe's distribution grids are over 40 years old[11]
- Cross-border energy infrastructure projects can decrease generation costs by EUR 9 billion annually until 2040[11]
- At least 3 000 gigawatts (GW) of renewable power projects, of which 1,500 GW are in advanced stages, are waiting in grid connection queues[7]
- Electricity outages already cost around USD 100 billion a year, or 0.1% of global GDP[7]
- Europe is global leader in energy transition patents, ahead of Japan and the US

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