
THE 1.5 DEGREE GOAL DRIVING THE ENERGY TRANSITION

Wood Mackenzie – Wood Mackenzie
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Rising to the challenge

The world has a massive challenge to limit global warming to 1.5 degrees Celsius, in line with the Paris Agreement. At COP26 in November 2021, countries responsible for 88% of emissions made net zero pledges; and Article 6 was finally included in the Paris Rulebook, paving the way for the wider development of carbon markets. A year later, at COP27 in Sharm el-Sheikh, countries came together in Egypt to advance the Paris Agreement goals with a groundbreaking decision on loss and damage associated with climate change. When these global pledges are taken together, they will only achieve a 1.8 degrees pathway. We need to go much further, and much faster.

The value in ‘scenarios’ is in the power of perspective gained from exploring high consequence futures. To get to a 1.5 degrees scenario, which is consistent with the ‘net zero emissions commitments by 2050’ made by governments (and with the remaining carbon budget assessments made by the Intergovernmental Panel on Climate Change (IPCC), corporates and investors), we will have to employ multiple solutions over the next few decades, perhaps some not yet even in the frame. Electrification is central to the shift away from fossil fuels, with renewables and electric vehicles (EVs) important disruptors in the early phases of the transition. Later, emerging technologies, including carbon capture and storage and hydrogen at industrial scale, will become critical for decarbonising hard-to-abate sectors.

Global carbon prices, today averaging under US\$25/tonne, will need to rise seven-fold by 2050 to incentivise technology development and adoption. If stabilising climate change is the primary goal, the 1.5 degree scenario also presents boundless opportunities for energy and natural resources companies. Wood Mackenzie estimates that there is US\$70 trillion of capex investment needed by 2050 to get to net zero in low-carbon technologies and infrastructure; mining commodities; and fossil fuels (on which the world will continue to rely for decades yet).

How realistic is the 1.5 degree scenario

The invasion of Ukraine has highlighted how dependent the world is on oil, gas, and coal. Energy security is suddenly at the very top of the political agenda and, with gas prices inflated, coal is back in the energy mix. Some governments, the UK included, are offering the oil and gas industry new incentives to invest in supply. The consequence is that global carbon emissions won't fall as rapidly as hoped in the immediate aftermath of COP26 or COP27; indeed, they may hold up longer as economies navigate through the crisis.

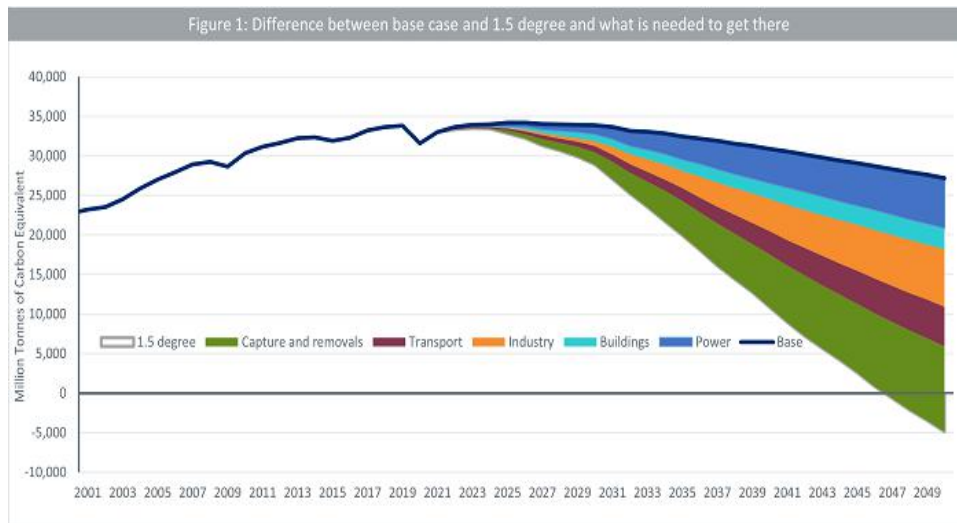
However, decarbonisation also has a crucial role in meeting energy security goals. We are seeing a simultaneous acceleration of policy to get the world onto a 1.5 degree pathway. Europe has doubled down on low-carbon targets with REPowerEU; the Biden administration's Inflation Reduction Act (IRA) promises to position the US as a transition leader in low-carbon technologies; and there is significant progress across Asia. China is electrifying passenger road transport at a rapid pace, although gasoline demand is still rising, for now.

Wood Mackenzie research indicates that the aspiration to achieve net zero remains intact. If progress this decade is a little slower, the pace of change next decade may be much faster. The following key themes are driving the energy transition towards the Paris Agreement goal of a 1.5 degree future.

- **Energy security in the transition:** record commodity prices have highlighted the challenges in navigating the energy transition. Markets most exposed to global commodity markets double down on plans to decarbonise through electrification and other emerging, net zero-enabling technologies.
- **Sustaining political momentum:** the Glasgow Climate Pact has set the stage for a global carbon market. As countries legislate net zero into law, Wood Mackenzie expects carbon prices to rise, reaching a global average of \$175/t by 2050.
- **Electric vehicles and the materials transition:** battery pack prices will continue to fall as regulatory support grows and technologies advance. But an unprecedented growth in mine supply is required to deliver the raw materials to underpin electrification of the transport sector.
- **Hydrogen and carbon capture:** low-carbon hydrogen and CCUS (carbon capture, utilisation and storage) deliver the last mile on emissions reductions and provide the solution for the difficult-to-abate end-use sectors and for reliable, flexible, dispatchable generation.
- **New industries and business models:** though niche today, emerging technologies will become mainstream.

Figure 1: Multiple decarbonisation solutions are required to deliver net zero by 2050

Electrification and renewables underpin the reduction, delivering large efficiency gains and restoring balance. This graph shows the difference in CO2 emissions from Wood Mackenzie's base case vs 1.5 degree aligned scenario:



Source: Wood Mackenzie.

Forecasts are not an indicator of future performance and any investments are subject to risks and uncertainties.

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