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Towards sustainable energy

The challenges facing delivering secure, affordable and sustainable energy in a time of transition

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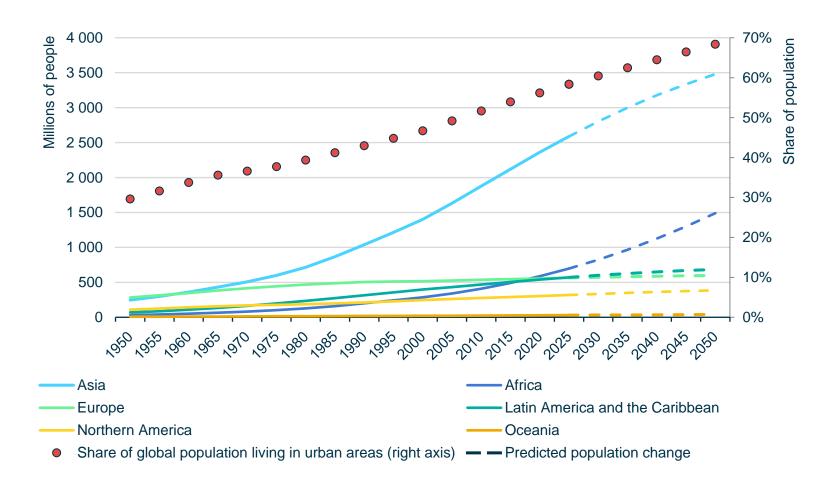
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Energy challenges in a changing world



Historic and projected urban population change over time per region, 1950-2050



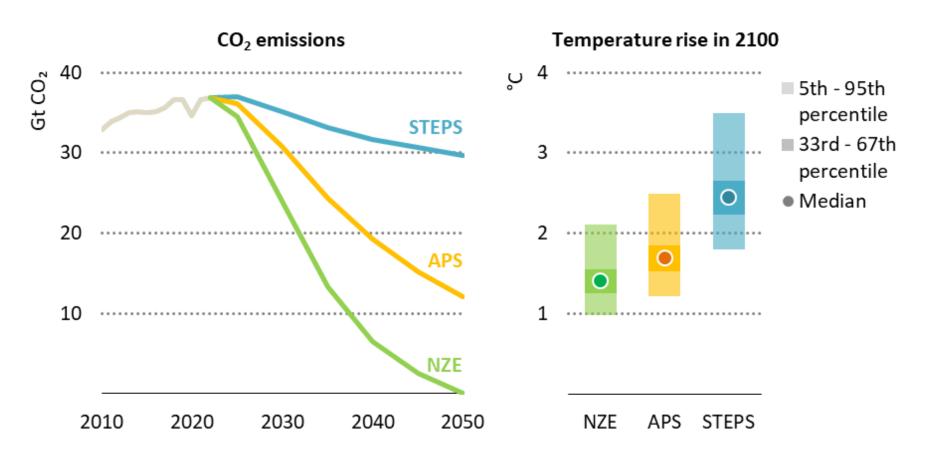


By 2050, there will be almost 2 billion additional people living in cities around the world than today, with the urban area increasing around 1 million km2

Changes need to be made to avoid climate disaster



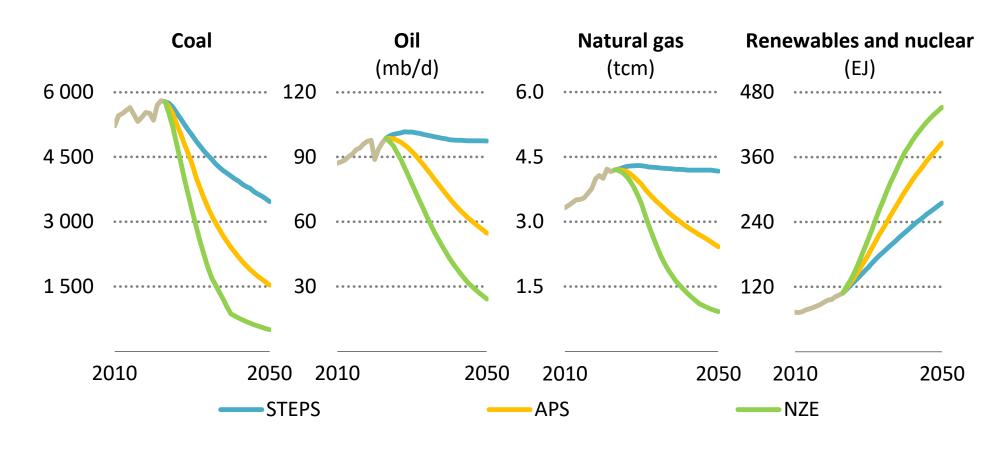
Global energy-related and industrial process CO2 emissions by scenario and temperature rise above pre-industrial levels in 2100



Getting the balance right is critical



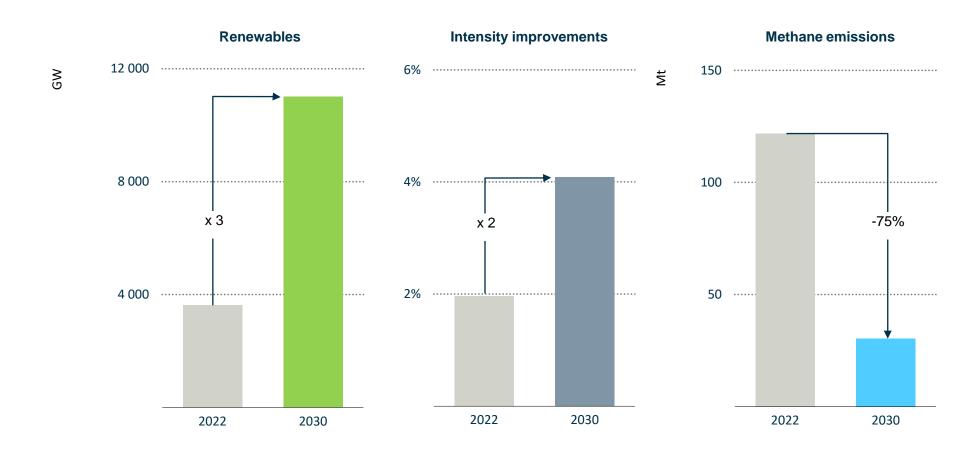
Global total energy demand by fuel and scenario, 2010-2050



Tripling up, doubling down, and curbing methane



The changes needed to achieve net zero pathway by 2050 by segment















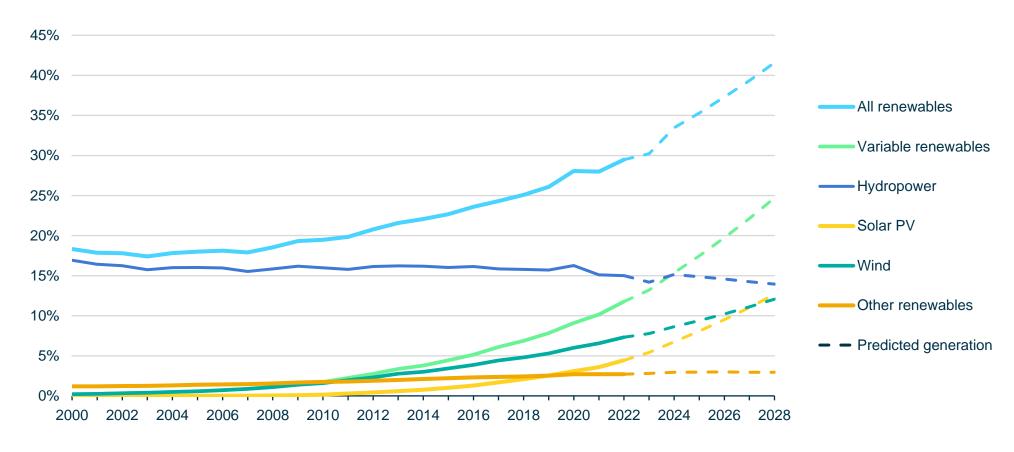




Tripling up renewable energy capacity



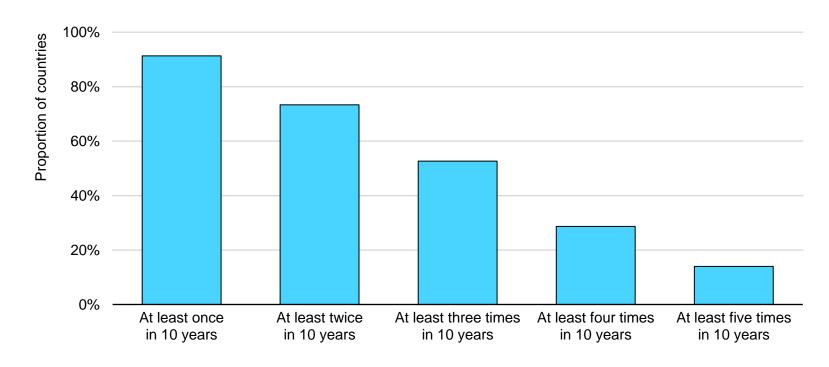
Electricity generation by technology, 2000-2028



Ambition needed to double down on energy efficiency



Proportion of countries to surpass a 4% annual energy intensity improvement one or more times, 2012-2021



Over the past 10 years, almost every country has hit the 4% doubling rate at least once.

The challenge will be to consistently achieve it on average over this decade

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Around 35% of emissions reductions needed by 2050 come from technologies that are still in development, and not at commercial scale

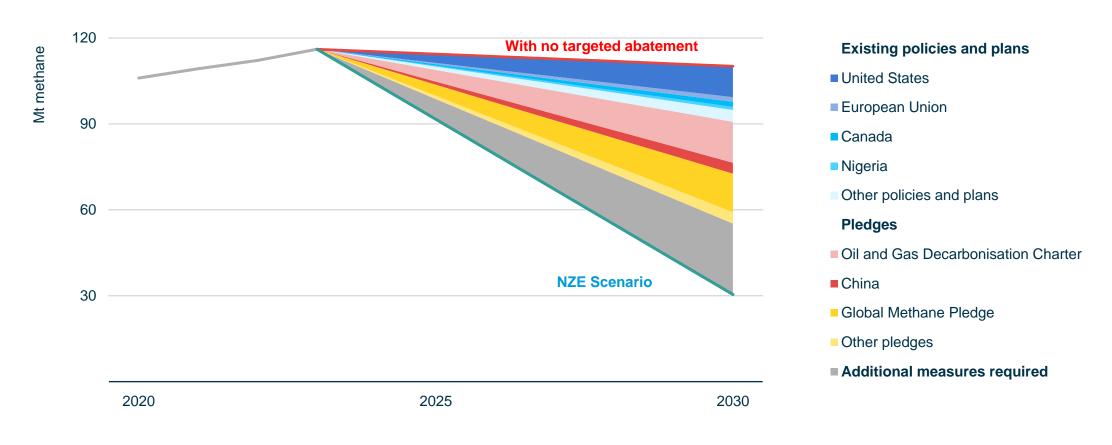


In 2023, production of fossil fuels resulted in around 120 million tonnes of methane emissions

Urgent improvement needed to lower methane



Methane emissions from fossil fuel operations





Need for increased visibility, observability, and predictability



Thank you