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Climate: Investing to combat global warming

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- **Investment in energy infrastructure will be a major determinant for future greenhouse gas emissions.**
- **The International Energy Agency (IEA) estimates that for moving the world economy to a 2°C path a cumulative investment of around USD 53 trillion is needed between 2014 and 2035.**
- **Some European countries, including France, have already put ambitious programmes in place to reduce carbon emissions by stimulating the deployment of renewable energy.**

Investment in energy infrastructure will be a major determinant whether the world economy succeed in keeping global warming below 2°C. As energy installations typically operate for decades, they may "lock in" future emission levels.

In the period 2011-2013, global investment in energy supply installations amounted to around USD 1600 billion annually, or 2.2% of GDP. In real terms, this is more than twice the amount than at the beginning of the decade. This trend has been partly driven by the growing demand for energy in the developing countries. In the OECD countries, the replacement of ageing infrastructure by more energy-efficient equipment has played an important role. Investment in non-fossil fuel energy supply has experienced remarkably strong growth by quadrupling since 2000. Nevertheless, energy supply investment has remained heavily skewed towards fossil fuels (82% of total energy investment) (chart 1).

Without policy change, this situation may not change drastically in the coming decades. According to the IEA's New Policy Scenario, which includes all the countries' stated emissions reductions targets, global energy supply investment will amount to USD 48 trillion over the period 2014-2035, of which USD 8 trillion to improve energy efficiency. It will be dominated by the power sector (fossil fuels, nuclear, and renewables, USD 16.4 trillion, including transmission and distribution) followed by oil (USD 13.7 trillion) and gas (USD 8.8 trillion). More than half of this is needed to maintain energy supply at today's level. Investment in nuclear energy and renewables is expected to rise quickly, but the share of fossil-

Share of renewable energy in electricity
% of total electricity production

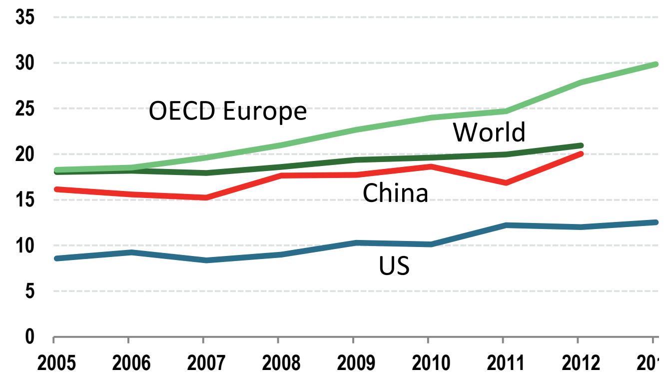

Chart 1 Source: OECD

Investment in energy infrastructure
New Policy Scenario (bn USD in 2012 prices, annual average)
coal oil gas fossil fuels for electricity generation
nuclear renewables transmission and distribution

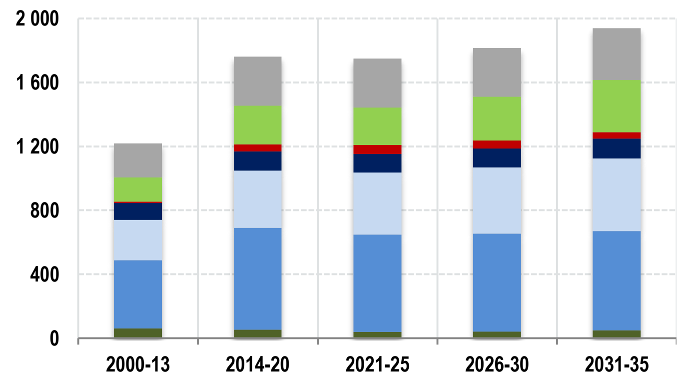

Chart 2 Source: IEA

fuel based investment will only slightly decline to 76% by 2035 (chart 2).

In this scenario, global carbon emissions will grow by 0.7% on average per annum, which is not consistent with the UN climate objective. It would imply a 50 per cent chance that global temperatures will be 3.5°C above pre-industrial

temperatures and about a 10 per cent chance of eventual global warming exceeding 6°C.

The IEA estimates that for moving the world economy to a 2°C path a cumulative investment of around USD 53 trillion is needed between 2014 and 2035, which is only USD 5 trillion more than in the New Policies Scenario. Much of the reduction in energy use is achieved by higher investment in energy efficiency (USD 13.5 trillion compared with USD 8 trillion in the New Policies Scenario) and less investment in fossil fuel supply (UDS 19 trillion against USD 23.3 trillion in the New Policy Scenario). These additional investment costs surely outweigh the risk of potential damages related to the New Policy Scenario.

However, a change to a low-carbon growth path is not automatic. An important element is the formulation of a long-term transition strategy. Such strategy should provide emission reduction targets for the medium-term and policies to reach them. These policies could be a combination of carbon pricing, either through taxes or carbon markets, and the setting of performance standards and efficiency targets in certain industry and transport. Ideally, these plans should provide clear signals to enterprises, for example on carbon prices, on which to base their investment decisions. In that case, the risk of stranded investment assets could be minimized. The IEA estimates that in the power sector, 60% of currently installed coal-fired capacity is retired before reaching the end of their lifetime; resulting in an unrecovered sunk cost of around USD 120 billion, or 40% of the initial investment. The lifetime of these assets could be prolonged by retrofitting them with CCS technology.

Some European countries have already put ambitious programmes in place to reduce carbon emissions by stimulating the deployment of renewable energy technologies and cutting energy consumption through efficiency measures. In the UK, the 2008 Climate Change Act sets legally binding emissions reduction goals. The objective is to reduce carbon emissions by 34% by 2020 and 80% by 2050 compared to 1990 levels. The decarbonisation of electricity generation forms the major part of this reduction. A carbon price floor at GBP18 per tonne, going up to GBP 70 by 2030 for installations covered by the EU Emission Trading Scheme, and feed-in tariffs for low carbon generators are the main policy tools. The UK is on track to meet the EU target to produce 15% of its energy from renewable sources by 2020.

Germany's energy policy was initially driven by a phasing out of nuclear power plants following the disasters in Chernobyl and Fukushima. All nuclear plants should be closed 2022. To compensate the loss in capacity, the country started to

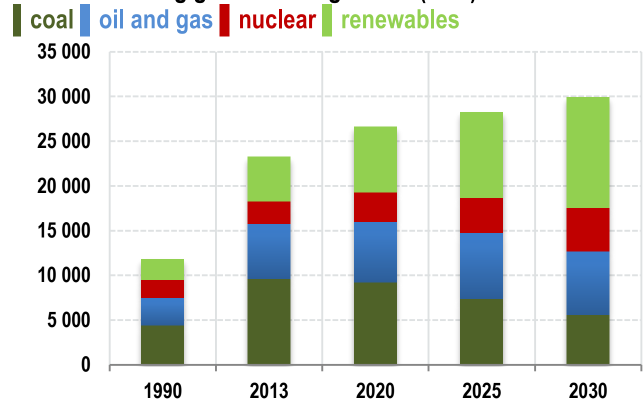

Chart 3 Source: IEA

developed renewable energy sources. Supported by generous feed-in tariffs, these account for about 30% of electricity production. The share of renewables should reach 60% by 2050. Greenhouse gases should be reduced by 80-95% by 2050 from the 1990 level.

In France, the energy transition law was recently adopted. The law aims to reduce GHG emissions by 40% by 2030 (from the 1990 level). Energy consumption should decline by 20% in 2030 and by 50% in 2050 and the part of fossil fuels by 30%. The part of renewable energies should increase to 32% while the part of nuclear energy in electricity generation should be reduced to 50% from the current 75%. Important measures are the gradual increase in the carbon tax (contribution climat-énergie) from EUR 14.50 to EUR 100 in 2030, and the reduction of energy in buildings and reducing emissions in the transport sector.

However, the deployment of renewable energy has created its own problems. The main one is the need of back-up generation capacity that can be switched on when wind and solar energy are not available. These back-up facilities, which only operate for limited periods, are expensive. In Germany, electricity producers have turned to very polluting lignite-fired power stations. The need for backup capacity can be reduced by improving grid connections and the development of smart grid technologies.

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