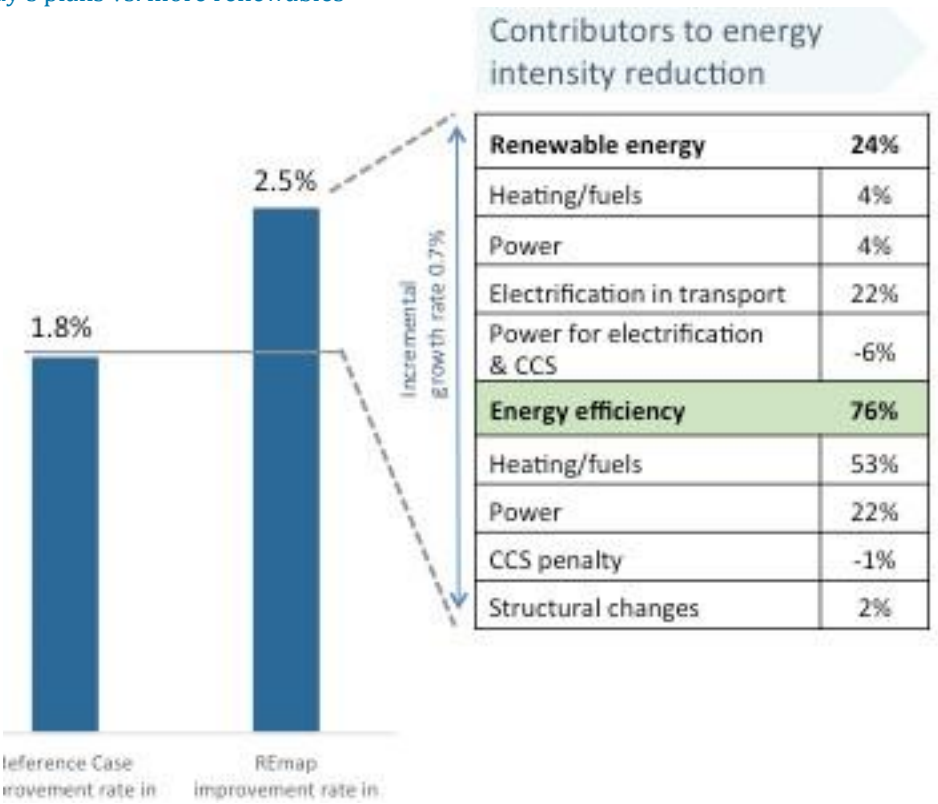
SYNERGIES BOOST RENEWABLES AND ENERGY EFFICIENCY

Renewable energy and energy efficiency work in synergy. When pursued together, they result in higher shares of renewable energy and a faster reduction in energy intensity that enables decarbonisation of the energy system.

A combined approach offers the most timely and feasible route to decarbonising the global energy system. Renewable energy and energy efficiency offer roughly the same amount of carbon mitigation potential through to 2050, but only when working in synergy. In isolation, the results achieved are less substantial. Under the REmap case,[1] energy demand in 2050 is similar to today's level thanks to significant energy efficiency improvements. The supply mix, however, changes substantially with the share of renewable energy in total primary energy supply increasing to two-thirds by 2050.

Figure 1: Annual rate of improvement in energy intensity, 2015-2050: today's plans vs. more renewables



[1] The Reference Case is the most likely case based on current and planned policies and expected market developments. The REmap case is a low-carbon technology pathway that goes beyond the Reference Case for an energy transition to decarbonise the energy system in line with the goal in the Paris Agreement of limiting global temperature rise to less than 2°C above pre-industrial levels with a 66% probability.

Increased energy intensity

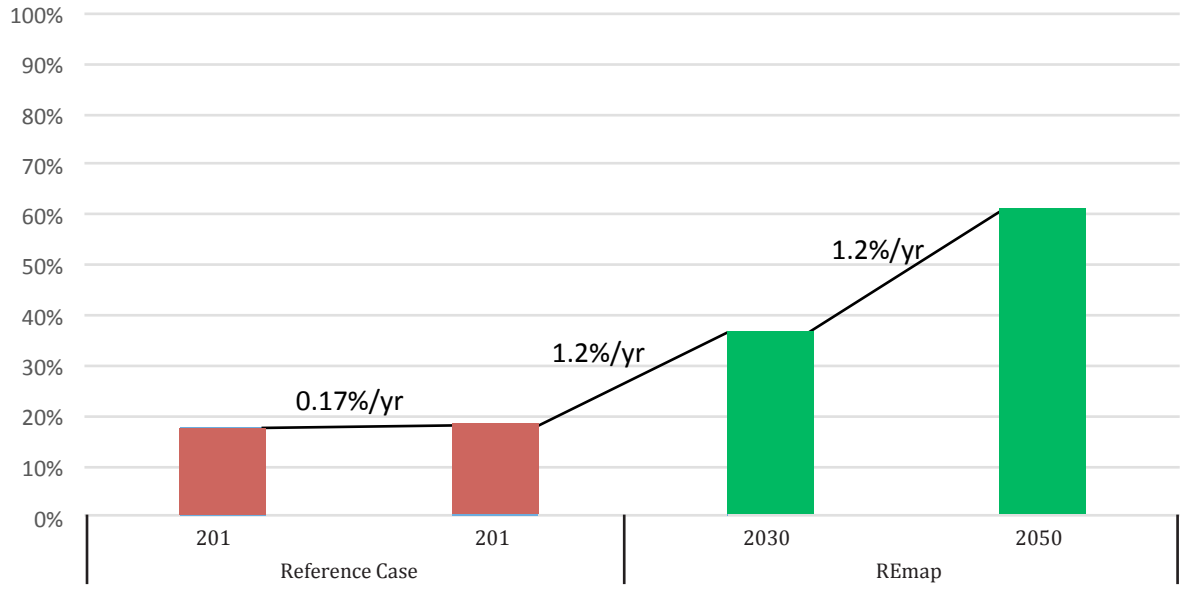
The rate of improvement in energy intensity needs to increase to around 2.5% per year by 2030, and continue at this level until 2050.

Between 2010 and 2015, global energy intensity – the amount of energy required to produce one unit of economic activity – decreased by an average of 1.8% per year, up from the 1.3% per year seen from 1990 to 2010. Under business as usual, the rate of improvement in energy intensity will remain stagnant at approximately 1.8%; however, international objectives aim to increase this to nearly 2.5% through to 2050 (Figure 1). Pursuing the options available under REmap would raise the rate of improvement to the level required to meet these international objectives between 2015 and 2050. Lower energy demand results in the same amount of renewable energy providing a higher share of total energy supply.

Accelerated energy efficiency raises the renewable energy share by 20%

As of 2015, the share of renewable energy in total final energy consumption was 19%. This could reach 60% by 2050 with accelerated uptake of renewable energy technologies and ambitious deployment of energy efficiency measures (Figure 2). Without the deployment of energy efficiency measures, the share of renewable energy in total final consumption would remain below 50%. Simply put, with greater energy efficiency, total demand for energy drops and the same amount of renewable energy covers a 20% larger share of demand in relative terms.

Figure 2: Renewable energy share in global total final energy consumption, 2015-2050



Notes: Includes electricity and district heat; yr = year.

Accelerated uptake of renewables

With the right policies put in place now, the renewable share of total final energy consumption could rise from 19% to over 60% by 2050, a threefold increase. The rate of growth in the renewable share per year will need to increase sevenfold over pastrates.

Renewable energy can contribute one-third of the incremental improvement in energy intensity between now and 2050.

Under REmap, energy and materials efficiency improvements account for around 70% of the emission reductions needed in 2050, while renewable energy and electrification coupled with renewable power supply options, identified from the bottom-up analysis of the G20 countries and scaled to the global level, account for an additional 30%.

Renewable power generation from hydro, solar photovoltaics and wind avoids thermal losses. A shift to renewable power therefore reduces the conversion losses associated with conventional fossil-fired thermal power plants, which translates into a lower energy intensity of economic activity. Moreover, a shift from fossil fuels to renewables-based electricity in end-use sectors increases this efficiency further. For example, an electric vehicle is two to three times more energy efficient than a conventional gasoline- or diesel-powered vehicle. A heat pump is typically two to five times as efficient as the most efficient condensing gas boiler.

As a consequence, accelerated deployment of renewable energy in line with the REmap case contributes one-third of the incremental improvement in energy intensity.

Cost-effective decarbonisation requires a holistic approach where all options, including renewable energy and energy efficiency, are pursued simultaneously in order to maximise potential synergies.

A combination of lowest-cost energy efficiency options and lowest-cost renewables options minimises the overall cost of the energy transition. In fact, it is only the combination of the two that can yield the emissions reductions that will be needed in the coming 35 years at an affordable cost.

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