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EXPLAINED

The world must electrify rapidly to meet climate goals. The challenge is bigger than you think

Electricity meets only a small fraction of the world's energy needs. And most of this electricity comes from fossil fuels. A radical shift to renewables is required.

A complete energy transition from fossil fuels to cleaner sources such as solar is not possible without full electrification. (Unsplash)

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The mid-year climate talks in Bonn, Germany, that ended this week failed to make much headway on any contentious issue, but did throw up one interesting proposal.

Turkey, which will host the year-ending climate conference COP31 this year, proposed that the world should aim to meet at least a third of its energy needs from electricity by 2035 **to reduce emissions**. As of now, only about 20% of the world's final energy consumption is met through electricity.

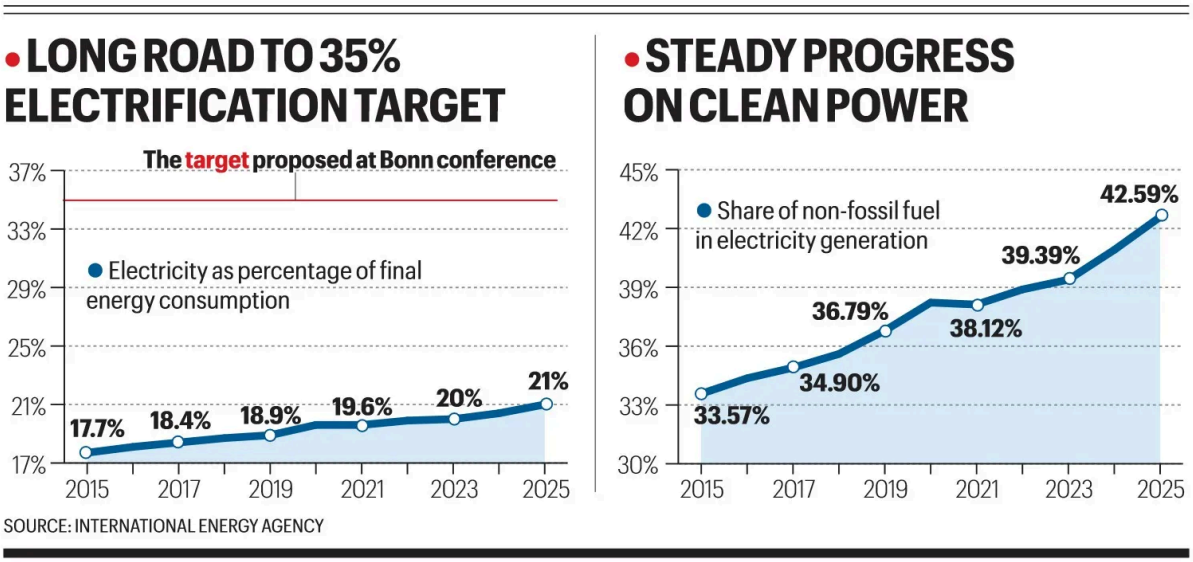
Turkey has suggested that all countries agree to adopt this goal as one of the outcomes from the COP31 conference, which it is hosting together with Australia in the Turkish city of Antalya in November.

The electrification target, if agreed upon, would be one more addition to several other climate-related global goals that are already in place, the foremost being the temperature targets contained in the Paris Agreement. The 2015 Paris Agreement says the world must strive to limit the rise in global temperatures within 2 degrees Celsius, preferably 1.5 degrees Celsius, from pre-industrial times.

The **COP (Conference of Parties) climate meetings** that are held every year have yielded a few more of these targets. COP28 in Dubai in 2023, for instance, decided that countries should work towards tripling the global installed capacity of renewable energy by 2030 from its existing levels in 2023.

Countries have also endorsed targets for achieving a global net-zero emissions status, for mobilisation of climate finance, and for accelerating the rate of energy efficiency improvements. These are all aimed at reducing the world's dependence on fossil fuels and speeding up the process of energy transition, which is the only effective long-term solution for climate change.

Electrification is at the heart of this energy transition. In fact, a complete energy transition, from fossil fuels such as oil, gas and coal, to cleaner sources such as wind and solar, is not even possible without full electrification. Tracking the electrification rate, therefore, is a good measure of the progress on energy transition. It also encapsulates the enormity of the climate challenge better than any other metric.



The electrification challenge

Climate change is the result of global warming which is caused by greenhouse gas emissions. Emissions come primarily from burning fossil fuels such as coal, oil, gas and wood, which are the main sources of energy. A solution to the climate crisis,

therefore, involves replacing these traditional sources of energy with newer and cleaner sources such as solar, wind, nuclear or hydropower, which have a much smaller carbon footprint. This is the great energy transition that the world has to go through to deal with the climate crisis.

It is not immediately obvious, but there is a fundamental difference between fossil fuels and the newer energy sources that have to replace them.

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Fossil fuels are direct sources of energy. They only require to be burnt to produce energy. Renewables, however, have to be converted into electricity before they can be put to use.

Replacing fossil fuels with the cleaner sources means that the only way energy would eventually be available would be in the form of electricity. That, in turns, means that every final use of energy would have to be electrified.

Considering how ubiquitous electricity has become, and the transformative impact it has had on the world in the last century and a half, it sometimes comes as a surprise that as of now, electricity meets only a small fraction of the world's total energy needs. According to the International Energy Agency (IEA), electricity accounted for only 21% of the total final energy consumption (TFEC) in the year 2025. In India, the corresponding figure is about 23%, according to government data.

TFEC, or FEC, is a measure of energy that is ultimately used. It excludes all the energy that is consumed in producing, transforming or transporting energy itself. The coal that is burnt to produce electricity, or the energy used for refining petroleum, the diesel burnt for transporting fuel trucks, or the transmission and distribution losses in electricity, are not counted in FEC. All these are included in

another metric called Total Primary Energy Supply, or TPES, which is a measure of total energy available for use.

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Over the years, the amount of electricity being generated, globally, has increased from about 24 terrawatt-hours (TWh) in 2015 to over 32 TWh in 2025, a rise of nearly 33%. But the share of electricity in FEC has had a more modest rise during this period, from 17.7% in 2015 to 21% in 2025.

This is because a large number of sectors and processes are still difficult to electrify. Shipping and aviation, heavy-duty and long-haul trucks, many high-temperature processes in industries like iron and steel, cement, glass and ceramics, and even many residential needs like heating have remained largely unelectrified. This means these processes still cannot run on renewable energy.

Staring at a crisis

But this is not all. Electricity itself continues to be generated primarily by fossil fuels. In 2025, only about 42% of all the electricity in the world was generated by non-fossil fuel sources — renewables, hydro and nuclear — according to the latest IEA numbers.

So, here is the stark reality. Only about 21% of total final energy consumption happens in the form of electricity. And only about 42% of electricity is generated through clean sources. That means that just a little over 8% of the total energy consumed in the world now is clean. After nearly three decades of efforts to promote cleaner fuels, through favourable policies, financial incentives, and technology innovation, more than 90% of the current global use of energy continues to depend on fossil fuels.

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This is the enormity of the challenge that is not always evident in climate change or energy transition discussions.

The road ahead is not smooth. Renewables are expected to continue to expand at a fast rate, no doubt, but the share of electricity in FEC is not projected to increase dramatically. According to the latest estimates from IEA, non-fossils (renewables plus hydro and nuclear) are likely to begin producing nearly half of the world's electricity by 2030. But the share of electricity in global FEC is expected to go up to only about 24% by 2030 from the current 21%.

Ambitious electrification target

That is why Turkey's proposal to make efforts to increase it to 35% by 2035 is an ambitious target. The proposal is based on a recent roadmap prepared by the International Renewable Energy Agency (IRENA), which incidentally puts the current electrification level at 23%, slightly higher than IEA's figure of 21%.

IRENA says a 35% electrification rate by 2035 is the minimum needed to entertain any hopes of keeping the world on the 1.5-degrees Celsius pathway. But to achieve that level of electrification, an investment of about $1.2 trillion needs to be pumped into electricity systems every year. A number of other things, including rapid expansion in renewables, and battery storage systems, also need to happen.

It is not very clear how the current wars and geopolitical tensions would affect this process of energy transition.

Greater uncertainty in supplies of fossil fuels, and rising oil prices, may force the countries to give a greater push for renewable deployment, including decentralised

systems. But the economic fallout of these wars might squeeze out the budgets available for investing in new technologies and infrastructure. Countries might be tempted to use whatever energy source is easily available to them, regardless of its climate impact.

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