Going Green: How India can gradually shift to renewable energy

Unprecedented changes in the weather pattern due to human induced climate change have become a primary focus for policy makers and businesses around the world. Remaining below 1.5°C has become the No 1 target for everyone on this planet. Induced by these factors, the manufacturing world is also undergoing a significant shift.

Generally, heavy industry (cement, steel, chemicals and aluminum) besides heavy-duty transport (shipping, commercial road transport and aviation), which are categorized as ‘hard-to-abate’ sectors, contribute significantly to India’s total greenhouse gas emissions. Considering India is a developing country, there will continue to be high growth in industrial sectors such as steel and cement in the next few decades.

Emissions from steel and cement are hard to abate because fossil fuel is required for production processes (for instance, carbon from coal is used as a reductant in iron making) as well as to generate high heat while cement has high embedded CO2. It is, therefore, difficult to use renewables for such requirements. The challenge is to change the manufacturing process and use alternatives such as green hydrogen in place of carbon.

For usage of green hydrogen there is another problem that needs resolution. This is to enable grid capacity at scale for sourcing solar energy to power electrolysers that can generate hydrogen at scale and replace coal to a significant extent. Experiments are also underway for carbon capture and sequestration, which can supplement the use of green hydrogen.

There is a need for effective public-private partnerships to drive demand and supply of hydrogen. A big challenge is to organise funding for the abatement of heavy industries. A system of incentives can be set up, linking tax breaks and low-cost finance to levels of abatement achieved through new technologies.

A journey has begun but patience will be crucial in the next few years for technology to mature in a commercial sense and grid scalability effective enough to enable high transmission industries to use green hydrogen at scale.

This is closely tied to India’s strategy unveiled at COP26 in Glasgow. While the first target is to install non-fossil fuel electricity of 500 GW capacity by 2030, for which India’s Central Electricity Authority (CEA) has done an energy mix projection for 2030, the second goal is to source 50 percent energy requirement from renewables by the same time.

The third target is to reduce 1 billion tonne (1 Gt) of projected emissions from the current CO2 levels (2.9 Gt) even as one projection indicates, in a business-as-usual-scenario, it will be 4.5 Gt in 2030.

The fourth aim is to achieve 45% carbon intensity reduction over 2005 levels by 2030. India has already achieved 25% emission intensity reduction of GDP between 2005 and 2016 and is well on the path to achieve more than 40% by 2030. Lastly, India will have to achieve net zero (balance between emissions produced and reduced) by 2070. While these are ambitious but realizable targets there is a need for massive deployment of clean energy technologies such as renewables, EVs and energy efficient building retrofits.

A strong network of storage battery is required to ensure full utilisation of captured solar energy. So, costs need to come down and the trend of the last five years or so indicates that this could happen in the next three to five years.

However, a related problem with solar energy is the large land area required. Acquiring large parcels of land is a challenge in India and will be more so in the next 10-20 years as the population grows, urbanization expands, and more and more land becomes arable. This can be mitigated to some extent if the efficiency of solar panels improves from the current 19-21%.

Significant focus on innovation in these areas will boost new and cost-effective technology development. There should be collaboration between private R&D, engineering institutes and the solar panel manufacturing industry should be encouraged and incentivized.

Besides, a key enabler for the 500 GW target is upgradation and expansion of grid capacity. The cost of electrolysers needs to reduce to achieve the goal of green hydrogen cost parity with natural gas.

The overall financing challenge is also massive – solar generation plants, storage battery network, hydrogen electrolysers, EV charging infrastructure, grid upgradation. Working in consonance, there should be serious moves to attract sizeable long-term funding at low interest. Promotion and adoption of green finance is the way forward. Already significant interest has been developed around ‘green bonds’. As we implement technologies that continue to develop and get more efficient, there is a need for viability gap funding – to bridge the gap between what a user can pay as a fair price and what is viable from point of justifying the investment or at least cover the cost of capital.

As a developing country, India’s per capita energy consumption is very low: it is one-fourth of China and one-tenth of the US. In our efforts to reduce emission, we must ensure that the basic and growing energy needs of the common man are met through clean but affordable sources. Besides, as India transitions to a low-carbon economy, workforce transition will need to be managed in fossil fuel-based industries with social safety nets, as also to ensure that the green opportunity provides avenues for economic prosperity.

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