**For immediate release**

**Renewables in electricity must increase 55-fold for India to achieve net-zero emissions by 2050: CEEW**

**New Delhi, 22 March 2021**: India would need to generate at least 83% of its electricity from (non-hydropower) renewable energy sources by 2050, if it were to commit to achieving net-zero greenhouse gas emissions by mid-century, according to an independent study released today by the Council on Energy, Environment and Water (CEEW). This would mean a massive 55-fold increase in use of non-hydro renewables in electricity generation within the coming three decades, from only 160 Terawatt-hour (TWh) (10%) in 2019. Further, to achieve net-zero by 2050 the share of electricity in India's industrial energy use must rise three-fold, from 20.3% in 2018 to 70% in 2050. The share of electric vehicles in passenger car sales would also have to rise to 76% in 2050 from just 0.1% in 2019. These estimates are based on CEEW's best understanding of progress on mitigation technologies. To meet net-zero, India would need to either completely eliminate greenhouse gas (GHG) emissions, or balance these by sequestering GHG emissions.

The CEEW study is the first exercise to outline multiple pathways for India to attain net-zero emissions, rather than fixating on a single scenario or a single year. It highlighted that India would need to reach peak emissions within this decade if it were to achieve net-zero emissions by mid-century, a pace of transition unlike anything the world has seen before. This would give India an extremely narrow window to ensure a smooth and equitable transition from a peaking year to a net-zero year. Advanced economies, including China, Japan, the UK, and the USA, will have taken at least 30, and at times well over 40 years for this transition. Advanced economies peaked emissions at much higher levels of development, slower rates of growth and would have had longer transition periods.

Dr Vaibhav Chaturvedi, Fellow, CEEW, and author of the study, said, "Our first-of-its-kind analysis is intended to provide policymakers with different options in making a critical decision for India's future. We find that India would need to undergo a double transition, through faster electrification of sectors and an increasing share of renewables in power generation, if it were to announce an ambitious net-zero target. Policymakers would also need to identify manufacturing sectors where electricity could replace fossil fuels. Reducing the cost of electricity to make it competitive would be equally critical. Finally, the rate of decline in India's emission intensity of primary energy would have to be ramped up drastically to peak within the coming two decades."

Dr Arunabha Ghosh, CEO, CEEW, said, "India has already demonstrated climate leadership and is the only G20 nation on track to surpass its Paris Agreement targets. However, if India were to announce a net-zero target, it must choose a year that not only minimises climate impacts but also gives it enough space to develop. Achieving net-zero emissions by 2050 or 2060 would need rapid systemic changes across all sectors and sections of society. This, in turn, would require significant international financial investments and technological transfer from or technology co-development with the developed world. It would be equally important for India to closely examine trade-offs such as increasing cost of household electricity, increasing railways passenger fares, fiscal challenges for coal-dependent states, job losses for over half a million coal mining workers, and the shifting geopolitics around energy trade and the energy transition before announcing its net-zero targets. We need an informed debate based on analytics, not just heuristics."

The CEEW study explains why India's case is different from the net-zero pathways of China, the EU, Japan, the United Kingdom and the United States of America. First, the per capita emissions for all other economies in their respective peaking years would be much higher than India's, even if India were to peak in 2050. Secondly, India's real GDP growth rate would be much higher than any other country post their peaking years. This indicates that India would need to put in significantly more effort to peak and subsequently reduce emissions. Thirdly, India would have a much lower per capita income to support the transition, even if it began the post-peak transition in 2050, let alone 2030.

The CEEW study also found that if India were to peak in 2030 and reach net-zero in 2060 like China, its cumulative carbon emissions for 2021-2100 would be 80 $GtCO_2$. For the same period, China and the USA's cumulative carbon emissions, even after incorporating their net-zero ambitions, would be 349 $GtCO_2$and 104 $GtCO_2$, respectively.

According to the World Bank, India's per capita carbon dioxide emissions stood at 1.82 $tCO_2$ in 2016, much lower than the global average of 4.55 $tCO_2$.

The study, "Peaking and Net-Zero for India's Energy Sector CO2 Emissions: An Analytical Exposition," can be accessed here.

*Contact: Riddhima Sethi (CEEW) - riddhima.sethi@ceew.in; +91 9902039054 / Mihir Shah (CEEW) - mihir.shah@ceew.in*

---

**Methodology**

The CEEW study examines key variables that would influence India's choice of peaking year and net-zero year for its energy sector-related carbon dioxide emissions, which account for 88% of the country's total greenhouse gas (GHG) emissions, including land-use change emissions. It examines four scenarios: 2030 peak - 2050 net-zero, 2030 peak - 2060 net-zero, 2040 peak - 2070 net-zero and 2050 peak - 2080 net-zero. The objective of the study is to offer a simply analytical formulation to better understand the challenges associated with each combination.

---

**Key tables**

Comparison of some key variables for countries with net-zero ambition and India

| | China | EU | Japan | UK | US | India Sc1 | India Sc2 | India Sc3 | India Sc4 |
|---|---|---|---|---|---|---|---|---|---|
| Peaking year* | 2030 | 1979 | 2004 | 1973 | 2007 | 2030 | 2030 | 2040 | 2050 |
| Per capita $CO_2$ emissions in peaking year ($MtCO_2$) | 9.3 | 9.84 | 9.88 | 11.74 | 19.2 | 1.96 | 2.29 | 3.02 | 3.71 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Five-year real GDP CAGR post-peaking year | 3% | 1.5% | -0.4%[#] | 1.1% | 0.7%[#] | 7.1% | 7.1% | 5.6% | 4.1% |
| Per capita income (2017 US$, PPP) in peaking year[##] | 29438 | NA | 36994 | NA | 55916 | 8779 | 8779 | 15979 | 25682 |
| Net-zero Year | 2060 | 2050 | 2050 | 2050 | 2050** | 2050 | 2060 | 2070 | 2080 |
| Years between peaking and net-zero | 30 | 71 | 46 | 77 | 43 | 20 | 30 | 30 | 30 |
| Five-year real GDP CAGR post net-zero year | 0.5% | 1.3% | 0.6% | NA | 1.0% | 4.1% | 3.1% | 2.2% | 1.5% |
| Per capita income (2017 US$, PPP) in net-zero year[##] | 57139 | 64753 | 64558 | NA | 88459 | 25682 | 37172 | 49974 | 63135 |

Source: Author's analysis based on World Bank data (World Bank 2021) and Global Change Analysis Model (GCAM-CEEW version). All historical data points related to emissions and GDP were obtained from the World Bank database. All future year numbers were taken from the GCAM database. CAGR implies a compounded annual growth rate.

*Based on historical emissions data for the EU, Japan, the UK, and the US. Apart from China, no other country has announced a peaking year. While for all other countries there appears to be a decisive decline in emissions post-peaking year, Korea has been excluded from this table as it is unclear if its emissions have already peaked or will peak in the future.

[#] In the case of Japan and the US, negative/low CAGR is due to the global economic recession during this period. In subsequent years, the CAGR of real GDP between 2009 and 2019 was 1.3 per cent for Japan and 2.3 per cent for the US.

** US net-zero emissions year has not been formally announced yet.

[##] For India, the real GDP growth rate assumption (market exchange rate) has been aligned with the NITI Aayog IESS assumptions. For all other countries, SSP2 GDP growth rates were assumed. The UK has not been modelled separately in the GCAM-CEEW version used in this exercise.

Key progress indicators across alternative peaking and net-zero year combinations in with and without Carbon Capture and Storage (CCS) scenarios

| | 2050 | | | |
|---|---|---|---|---|
| | 2030peak 2050 | 2030peak 2060 | 2040peak 2070 | 2050peak 2080 |

| | | | net-zero sc | net-zero sc | net-zero sc | net-zero sc |
|---|---|---|---|---|---|---|
| Rate of decline in emission intensity of GDP (2005-2050) | 24% (2005-16)[a] | With CCS | 100% | 95% | 85% | 72% |
| | | W/o CCS | 100% | 95% | 85% | 72% |
| Share of non-hydro RE in electricity generation | 10.1% (2019)[b] | With CCS | 70% | 68% | 57% | 28% |
| | | W/o CCS | 83% | 82% | 65% | 28% |
| Share of electricity in industrial energy use | 20.3% (2018)[b] | With CCS | 55% | 52% | 41% | 30% |
| | | W/o CCS | 70% | 61% | 43% | 30% |
| Share of electric cars in passenger car sales | 0.1% (2019)[c] | With CCS | 76% | 76% | 76% | 75% |
| | | W/o CCS | 78% | 77% | 75% | 75% |
| Share of electric trucks in freight truck sales | ~0% (2019)[c] | With CCS | 21% | 21% | 11% | 6.7% |
| | | W/o CCS | 67% | 50% | 12% | 6.7% |
| Share of biofuels in liquid fuel | NA | With CCS | 62% | 30% | 9% | 6% |
| | | W/o CCS | 98% | 30% | 9% | 6% |
| Share of fossil energy in primary energy | 73.8% (2015)[d] | With CCS | 31% | 44% | 65% | 84% |
| | | W/o CCS | 5% | 29% | 60% | 84% |
| Share of CCS in primary energy | NA | With CCS | 37% | 24% | 9% | 0% |
| | | W/o CCS | 0% | 0% | 0% | 0% |

Source: Authors analysis based on GCAM-CEEW for 2050 numbers.
[a] GoI (2021); [b] IEA (2021b); [c] IEA (2020); [d] IEA (2017)

**About CEEW**

The Council on Energy, Environment and Water (CEEW) is one of Asia's leading not-for-profit policy research institutions. The Council uses data, integrated analysis, and strategic outreach to explain – and change – the use, reuse, and misuse of resources. It prides itself on the independence of its high-quality research, develops partnerships with public and private institutions, and engages with wider public. In 2021, CEEW once again featured extensively across ten categories in the *2020 Global Go To Think Tank Index Report*. The Council has also been consistently ranked among the world's top climate change think tanks. Follow us on Twitter @CEEWIndia for the latest updates.