Can technology act as a catalyst to a just climate transition?

Digital technologies offer immense leverage to achieve resource efficiency and decarbonisation

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Without digital technologies and combined ecosystems, we have little chance of embracing climate action | Photo Credit: ipopba

While state actors and non-state actors debate at COP 30, organisations, whether not-for-profits, listed companies or SMEs, are staying invested in determining a just and smooth transition. The climate clock is ticking away. We are 3 years, 246 days away from the 1.5 degree rise in temperature. According to the Lancet Countdown report, we were exposed, between 2019-2023, on average to 46 more days of health-threatening heat than expected without climate change, reaching a record high of 50 more days of health-threatening heat in 2023. Economic damages from climate-related extreme weather in 2024 is pegged at $318 billion — from $280 billion in 2023, with insured losses on trend to $145 billion in 2025.

Climate change, bio-diversity loss will require companies to embrace energy transition and circular transition aggressively. Circularity helps in up to 45 per cent of emissions reduction from material usage. Eighty per cent of EU material use, for instance, could be supplied from end-of-life sources by 2040. Circular models offer resilience and competitiveness. Resource

efficiency and circularity is thus an important lever towards net zero and circular transformation towards security and geopolitical trade resilience.

Digital technologies offer immense leverage to achieve resource efficiency and decarbonisation. Partner ecosystems broaden the industry scope. Together, they are force multipliers. Through this article we provide a few good digital and ecosystem showcases that are powerful industry enablers towards circular transition.

The combination of rising power of chips and scope of cloud is potent to elevate the scope of digital technologies and democratising their usage. Industrial AI — a once-of-century opportunity — is a strategic inflection that compounds what digital technologies can achieve. The top 3 digital technologies impacting DeCarb are AI driven — data analysis, prediction and autonomous systems. Industrial AI enables up to 30 per cent savings in infra platforms, and 24 per cent CO2 reduction in manufacturing. They potentially can help to cut 0.9-2.4 Gt emissions by 2030. Technology leaders like Siemens, with their strong domain expertise, converge these enablers to create lasting circularity impact. Siemens, in a few of its own factories, have witnessed up to 40 per cent waste reduction, 42 per cent energy savings from embedded AI.

Distribution grid in the Netherlands: Serving over 3 million consumers, and with rising demand, grid congestion is not uncommon. Use of digital twin and autonomous AI powered grid scale platform has enabled autonomous grid management, improving utilisation by 30 per cent

Additive manufacturing for battery pack handling: Industry typically used complex, heavy end effectors to handle relatively light components. Designed in the digital twin and made through additive manufacturing, 3D printed Robot Gripper, with simplified parts, created up to 90 per cent reduction in CO2, and 50 per cent energy savings

Waste reduction in glass manufacturing: : Traditional mould cleaning methods caused damage, leading to increased raw material usage and energy waste. AI-driven robotic cleaning system that optimises the cleaning process using 2D and 3D imaging data, utilising advanced automation components for precise mould handling, integrating a data analytics platform to improve optimisation reduced cleaning time from 5 hours to just 2 seconds, saving 700,000 tonnes of raw materials per year, cutting 1 billion kg of CO2 each year in emissions

Power usage in most-energy efficient data centre at Estonia: : Industry is breaking new energy saving frontiers. With use of building management software (BMS), white space cooling optimisation (WSCO), energy and power management software (EPMS), power usage effectiveness (PUE) of 1.2 was achieved against industry average 1.6.

While these are some of the examples that are sector-specific, cross-sector collaboration offers unique pathways to further entrench the mindset of circularity.

Ecosystems partnering

Siemens generates thermoset plastic waste from its production facilities for LV switchgear. This waste could not be recycled within its own process. Through collaboration with a leading cement manufacturing company, recycling was achieved. The partner could valorise waste by grinding the body plastic, blending them with cement to create a variant. About 80 per cent reduction in waste-landfill was thus achieved through cross-sector loop closing.

Another example is concerned with SF6 gas, used in MV switchgear. When switchgear reaches the end of life, in many cases, gas is released. SF6 has a global warming potential of some 3,200 years. Siemens developed a reliable extraction apparatus, and ecosystem partners for safe transport/recycling. By conservative estimates, this initiative has a potential to save about 17 kt of emissions until 2030.

Organisations are co-stakeholders along with other stakeholders, namely, governments, consumers, and multilateral bodies in the larger scheme of climate action. Therefore, with an innovation mindset and a genuine love for the planet, businesses must embrace such technologies at scale to create value. Without digital technologies and combined ecosystems, we have little chance of embracing climate action. It is surprising how with such innovative business ideas the possibilities can be immense. Yet, we have achieved only 30 per cent of the UN SDGs globally. Innovative and impactful climate solutions are core to survive. We must show climate leadership to not only spearhead such initiatives, but also create a just transition for an equitable future.

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