

Energy Intensity Inks India's Advanced Economies



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“Energy Intensity is potential gradient to ride over transient time zone and attaining to marching on radical regime shift as Advanced Economies from Emerging Market Economies”

Content “Life is Energy” is the truth as evident in all aspects which gives exercising room to Efficiency in creating Economics to be harmony with Ecology bringing co-existence of human with nature forever. Now ‘E’ reveals extinct on severity of Climate Change exposure to mankind after extinguish of many species. Our belly needs have brought the pause to below equation:

Overall carbon emissions = Population x GDP per capita x Energy Intensity of GDP x Carbon Intensity of Energy

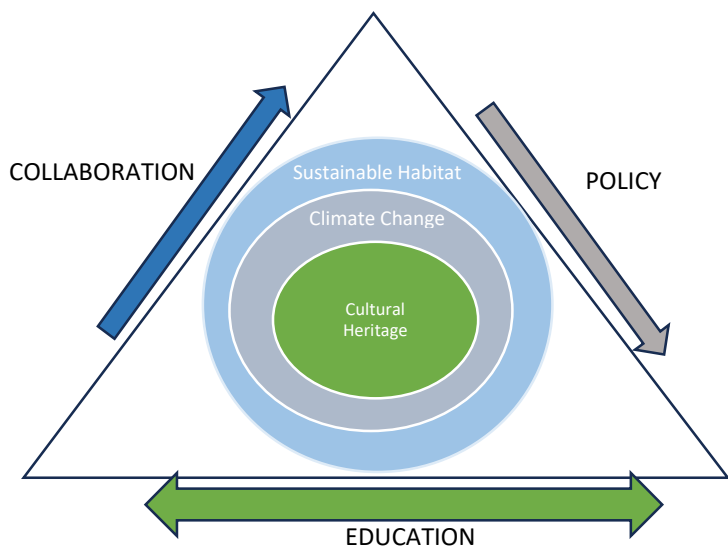
Growth in Indian economy has fuelled the demand for energy and the growing supply of energy has fuelled India's economic growth. Thus, India's energy intensity of GDP has improved reflecting the required less energy over time to produce an additional unit of economic output. Energy intensity is measured as primary energy consumption per unit of gross domestic product. Whereas energy efficiency refers to the activity or product that can be produced with a given amount of energy. Generally, declines in energy intensity are a proxy for efficiency improvements. Energy efficiency doesn't give a meaningful concept since being heterogeneous nature of output at an aggregate level. Thereby, energy intensity based on gross domestic product gives certain trend & pattern.

Twin long-term objective of India's in becoming an Advanced Economies by 2047 and achieving the net zero target by 2070 requires annual rate of decline in energy intensity to increase to 5.4%. This vital aspect is the emphasis of ‘Energy Intensity Inks India's Advanced Economies’. India's total energy demand is expected to be six folds by 2070 from the 2020 level, considering aggressive energy efficiency. Adoption of new technologies expect to bring

carbon intensity of India's power sector at par with a global average. India's Energy Transition ‘Pillars’ of Grid Decarbonisation, Industrial Decarbonisation and Transport Transition drives carbon intensity of energy towards the goal. Its journey has to embark from derivatives and imperatives of Advanced Economies’ blue print in touching, climbing to stabilise on sustainability to give space in bringing pace to affordability to be in effectiveness of Energy Intensity of GDP.

Energy intensity is a continual programme that gets realise over period of years depending on outcome of new government policies, regulations, energy saving momentum imposed by severity of climate change. Bringing dual energy controls policy is effective way that placed limits on growth in energy consumption and required reductions in energy intensity for high energy consuming entities. The evolution on Cultural Heritage is continuously bringing disruption, eruption and adversity to be in Climate Change and therefore, questionable Sustainable Habitat. Way, we evolve, now invites exercising levers of Education (eager driving unending competency accomplishing task inside out to sink in nature), Collaboration and Policy to be in harmonious to each other.

Humans are always reluctant to move inside-out and thus, compulsion outside-in strategy and approach is evident in each walk of life. Collaboration lever gets momentum from circular economy which facilitates better environment shaping among the participants. Thus, levers of education, policy & collaboration are vital in imparting sustainable habitat. The congruence of these three levers shall definitely drive India's National Mission on Sustainable Habitat and at the same time sinusoidal will make cultural heritage pivotal.



Economic growth's aspiration calls for a sustainable supply of energy to drive the ambition. The energy intensity of India's economy is far too high in comparison to other economies that it must surpass in order to become the world's third largest, both in terms of total final energy and electricity consumption.

United States sees a strong degree of decoupling of its energy consumption from its economy in 2023, with GDP expected to grow by 2.4% and energy demand expected at a lower 1.7%, yielding an energy intensity improvement of 4%. In comparison, the energy intensity of India's economy (based on data for 2020-21) is about two times that of Germany's economy, which has a gross domestic product (GDP) 1.5 times higher than India.

India's electricity consumption was 1,230 Bn units in 2021 (1749 Bn units in 2024), with an intensity of about 450 units of electricity per \$1,000 of its GDP. At the same time, Germany consumed only about 520 Bn units, with an intensity of 120 units per \$1,000 of its GDP. Japan exhibits similar characteristics as for an economy twice as big as India's, with an intensity of about 155 units of electricity per \$1,000 of its GDP. Germany's electricity intensity is 1/4th of India's against 1.5 times the industrial contribution to its GDP. However, global energy intensity improved by 1.3% in period 2021-24 whereas, India stands improvement by 1.6%.

This signifies that the electricity intensity of India's industry contribution to its GDP is the highest among the front ranking economies. India's electricity system is well placed to achieve two folds of its GDP without the need for much capacity addition. This is because the increase in demand from the electrification of end uses can be offset by overall efficiency gains. Strong policy packages comprising information, regulations, incentives and robust investment towards building resilience from global adversity of climate change is bound to make fundamental changes and a source of thrust in continual rhythm to energy intensity of the country.

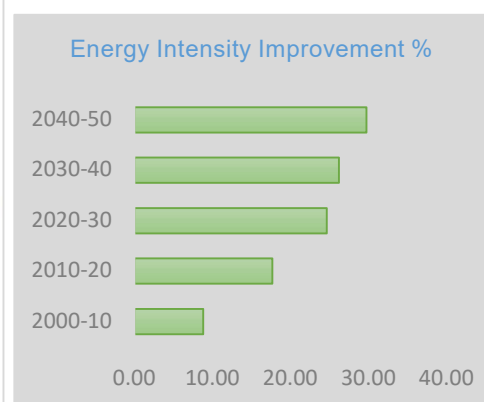
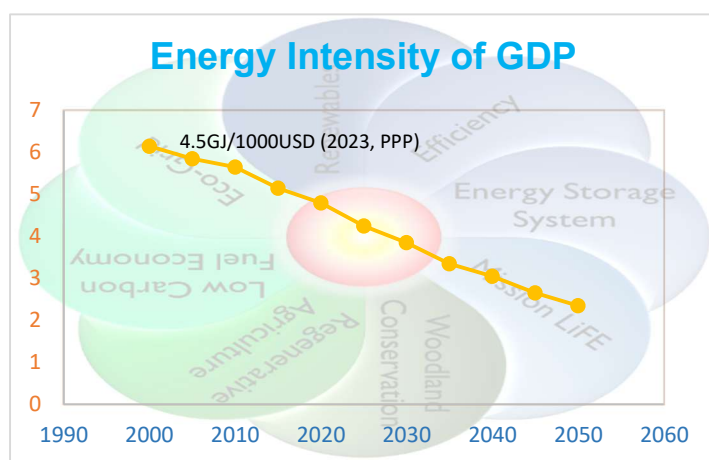
Reducing amount of energy required to produce a unit of output is a priority in efforts to slow climate change. Energy intensity is important at all income levels whereas energy efficiency is more important at higher income levels. One can expect relatively rapid improvement in energy intensity as economies in today's poor countries grow. However, as moves beyond lower middle, role for energy efficiency policies become more critical.

Although, some efforts towards improving energy and resource efficiency made through PAT programme (Perform, Achieve and Trade). Whereas energy savings targets envisaged for each cycle have been overachieved, the overall savings only constitute less than a percent of total final energy consumption for April 2012-March 2020 periods.

A report by non-profit American Council for an Energy-Efficient Economy, 2022 International Efficiency Scorecard, which clearly highlights India's areas of concern. Key action highlighted being lack of spending on energy efficiency and research and development (R&D) at the level of national efforts. Similarly, industry needs to pay urgent attention and mobilise spending towards reducing energy intensity through investment in manufacturing R&D. PAT's energy savings need to improve beyond current level in order to improve energy intensity of industrial activities and overall, addressing inherent issues highlighted above.

The energy intensity is determined by various determinants and working on relationship between energy intensity and its determinants helps in developing effective policy measures for the sustainable development of the energy sector of the country. The traditional biomass use for primary energy supply in India is ubiquitous and abundant where traditional biomass has very low technical and economic efficiency and thus does not have a significant contribution to the economy. A sectoral disaggregation of energy intensity is useful to diagnose in analysing actual situation of energy efficiency.

We know, too, that different types of energy will capture expanding slices of the pie. Thereby, the aggregate energy intensity of global economies will fall. Since the mid-19th century, fossil fuels have been an engine of economic development. Looking toward 2050, they still will be. But their growth will slow dramatically. Even as populations soar and economies continue to develop, the global rate of energy demand will rise at a notably flatter trajectory. Energy intensity is decreasing, new sources of power are poised to ascend, and remarkable efficiencies are coming to bear.



A steep decline in energy intensity of GDP, primarily the consequence of a continuing shift from industrial to service economies. As well response to cultural heritage on exercising belongingness to environment by acting on awareness of energy conservation in taking actions from till time ignorance of simple actions such as adjusting settings for air conditioners, turning off domestic water heating systems during a prolonged absence, improving the insulation of houses, and buying energy-efficient appliances. These changes are foundational to bring readiness of much needed resilient. Within the global buildings segment, energy intensity will decline as new, energy-efficient technologies are adopted. Nonetheless, new technologies and larger trends should cause the energy demand curve to flatten. Thereby, energy intensity decouples the rate of economic growth (climbing steadily) and energy demand growth (ascending, but less steeply).

It's established fact that sinusoidal wave always travels and now centuries-old linkage between economic growth and primary energy demand is beginning to decouple. We're beginning to see a decoupling between the rates of economic growth and energy demand, which in the decades ahead will become even more pronounced. After a century of rapid growth, energy demand is likely to plateau around after couple of decades, primarily driven by the penetration of renewable energy sources into the energy mix. By around two decades from now, new-build renewable energy sources will cost less than existing fossil-fuel generation. As a result, the energy needs per capita at a global level will be 10 percent less in 3 decades, despite the rapid rise in demand from the many households entering the middle class in emerging economies. Thus, energy intensity is taking the centric & pivotal role on arriving point of inflexion to pass the baton to efficiency in inking India's Advanced Economies.