Global Warming and Impact in Transport Sector.

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The sun is the Earth's primary energy source, a burning star so hot that we can feel its heat from over 50 million kilometers away. Its rays enter our atmosphere and shower upon on our planet. About one third of this solar energy is reflected back into the universe by shimmering glaciers, water and other bright surfaces. Two thirds, however, are absorbed by the Earth, warming land, oceans, and atmosphere.

Much of this heat radiates back out into space, but some of it is stored in the atmosphere. This process is called the greenhouse effect. Without it, the Earth's average temperature would be a chilling -18 degrees Celsius, even despite the sun's constant energy supply. In a world like this, life on Earth would probably have never emerged from the sea. Thanks to the greenhouse effect, however, heat emitted from the Earth is trapped in the atmosphere, providing us with a comfortable average temperature of 14 degrees.

Sunrays enter the glass roof and walls of a greenhouse. But once they heat up the ground, which, in turn, heats up the air inside the greenhouse, the glass panels trap that warm air and temperatures increase. But our planet has no glass walls; the only thing that comes close to acting as such is our atmosphere. But unfortunately, in here, processes are way more complicated. Only about half of all solar energy that reaches the Earth is infrared radiation and causes immediate warming when passing the atmosphere. The other half is of a higher frequency, and only translates into heat once it hits Earth and is later reflected back into space as waves of infrared radiation. This transformation of solar radiation in to infrared radiation is crucial, because infrared radiation can be absorbed by the atmosphere. So, on a cold and clear night, parts of this infrared radiation that would normally dissipate into space gets caught up in the Earth's atmosphere. And like a radiator in the middle of a room, our atmosphere radiates this heat into all directions.

Parts of this heat are finally sent out in the frozen nothingness of space, parts of it are sent back to Earth where they step up global temperatures. Just how much warmer it gets down here depends on how much energy is absorbed up there– and this, in turn, depends on the atmosphere's composition.

Nitrogen, oxygen, and argon make up 98 percent of the Earth's atmosphere. But they do not absorb significant amounts of infrared radiation, and thus do not contribute to the greenhouse effect. It is the more exotic components like water vapour, carbon dioxide, ozone, methane, nitrous oxide, and chlorofluorocarbons that absorb heat and thus increase atmospheric temperatures.

Since the beginning of the industrial revolution, the average amount of carbon dioxide in the atmosphere has increased by nearly 40 percent from an estimated 280 to more than 380 ppm. Measurements of carbon dioxide amounts from Mauna Loa Observatory in Hawaii show that CO2 has increased from about 313 ppm in 1960 to about 375 ppm in 2005. This increase in CO2's share of the atmosphere is mostly due to anthropogenic (man-induced) factors, such as burning fossil fuels, deforestation and industrial production.

In total, humans emit around 32 gigatons of carbon dioxide each year. Half of this stays in the atmosphere; the rest is absorbed by oceans and vegetation. With sharp increases in man-made CO2 emissions, the natural CO2 cycle gets thrown out of balance: vegetation can no longer transform the increased amount of CO2 into oxygen, and oceans are steadily reaching saturation level. The result of the increasing amount of carbon dioxide in the atmosphere is an enhanced greenhouse effect and, subsequently, climate change. CO2 is responsible for 60 percent of the anthropogenic greenhouse effect that is causing the latest wave of global warming.

Carbon dioxide has always been with us. Scientists say Earth's earliest atmosphere was made up mostly of steam, carbon dioxide, and ammonia from volcanic eruptions. Today, carbon dioxide is mostly produced by the combustion of organic matter like coal, oil, and wood, the fermentation, and the respiration processes of living organisms. Even slight changes in the concentrations of CO2 in our atmosphere can alter the way our celestial heating system works. Even if the term "greenhouse effect" is somewhat of a misnomer, it still might be a useful handle from which the public can grasp an otherwise intricate natural process. Most people can relate to how hot and stuffy a greenhouse can get. Now that the Earth has

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started to heat up, we realize that our own global greenhouse has no window that we can open to catch some fresh air.

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Transport faces an increasingly difficult challenge – how to meet the needs of businesses and people for more and better transport services while mitigating congestion, reducing the number of road accidents and victims, and limiting CO2 emissions and climate change. And climate change is the most critical challenge. Transport accounts for about 20% of total CO2 emissions, and the problem is that – with motorisation growing rapidly – while in other sectors such emissions are expected to decline, the transport sector is the only one in which they are expected to increase.

A proper strategy to address these challenges should aim to maximise the efficiency, including carbon efficiency, of all transport modes. Promoting a greater use of rail and inland water transport, now under-utilised, and improving their connectivity with road and maritime transport so that all modes can work in a much more integrated manner than today, should be a priority.

Within transport the three major modes are rail, road and water; water way mode being the least polluting. One litre of fuel is known to generate 24 ton/km by road, 85ton/km by rail and105 ton/km by inland water mode. One horse power of energy can move 150 Kg by road, 500 Kg by rail and 4000Kg by water/IWT. For every ton/km movement of cargo by road the Carbon dioxide (CO2) produced is 120 gm. The corresponding figures for IWT is 30gms. A shift of one billion ton/km of inland cargo from road to IWT can result in a reduction of "green house effect" by about 90000 tons of CO2 or to generate 90000 carbon credit.

India has an extensive network of inland waters consisting of rivers, canals and lakes, natural and manmade and a coast line of over 6000 kilometers, dotted with a number of major and minor ports. Inland Water Transport (IWT) represents a significant resource for India. The total length of navigable waterways in India is about 14500 kms, of which 5700 kms are navigable by mechanically propelled vessels. The major benefits of the IWT are the achievable fuel savings, reduction in environmental cost, reduction in overall cost of transportation and line cost savings.

The IWT system in India has suffered from under investment and financial constraints not only in absolute terms but also in comparison to other modes of transportation. Conscious and bold investment is needed for the systematic development of fairway, fleet, terminals and navigational aids. Institutional set up is needed to be put directly by public – private partnership with a long-term objective of minimizing the public money and maximizing the share of private investment. The Government, as a facilitator, should also step in to reduce the investor's risk.

In general, to make the IWT a viable and acceptable mode, certain conditions are to be fulfilled. These relate to rationalizing tariff structures, ensuring sufficient reductions in line haul, travel time, improved safety of goods in transit and providing sufficient financial incentives to consignees and end users of the transport product by providing:

Fairway development with sufficient depth and width, 24 hour's navigation, Terminals and mechanical loading facilities, access and egress of cargo, cargo assurance to improve the load factor and hence profitability are some of the basic requirements. The basic policy objectives of Indian IWT have 'short term' and 'long term' components. The short term objective is to affect a sizeable increase in the traffic volume, from the present level of around 1 billion tonne km to at least 20 billion ton-km within a five year period. The long term objective is to develop the full IWT potential of the country which – going by successful examples of other countries - could be as much as a 5 to 8 per cent of the total national transport output. A veritable IWT revolution is thus a key component of plans to improve India's competitiveness among the leading industrial nations of the world. A major spin-off benefit will be its contribution in reduction of fossil fuel consumption and reduction in CO2 emission.

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