

Preamble

“Earth provides enough to satisfy every man's need but not any man's greed” - Mahatma Gandhi

According to UN estimates, between now and 2050 the global population is expected to increase from 6.9 billion to more than 9 billion and 98% of this growth happening in the developing and emerging world, For business, the good news is that this growth will deliver billions of new consumers who want Food, shelter, good health & transportation other amenities and energy to establish and operate the foresaid. The bad news is that shrinking resources and potentially changing climates will limit the ability of all 9 billion of us to attain and maintain the consumptive lifestyle, because; today our societies are on a dangerously unsustainable path.

Climate scientist around the world believes that reasons for increasing extreme weather incidents are due to greenhouse effect linked climate change. Even the richest countries in the world can't control widespread fires. Deadly flooding in Europe during July 2021 and Aug./Sep. 2021 in USA completely washed away buildings and cars and other infrastructures leaving many people dead. Similarly, hundreds died in flooding in China. The U.S. Pacific Northwest, known for its cool climate, hit over 100 °F for several days and the Arctic lost an area of sea ice equivalent to the size of Florida between June and mid-July 2021.

These changes are happening with average warming of just 1.1 °C over pre-industrial levels. The recent 6th assessment report from the Intergovernmental Panel on Climate Change, world's most authoritative body on climate science, finds that *“this is just a taste of what's to come”*. The report shows that the world will probably reach or exceed 1.5 °C of warming within next two decades. Limiting warming to this level and prevent the most severe climate impacts depends on the actions we take in this decade.

Only with ambitious emissions cuts or reduction in carbon footprint can keep global temperature rise to 1.5 °C, the ultimate limit scientists say is necessary for preventing the worst climate impacts. Under a high emissions scenario or business as usual, the world may warm by up to 5.7 °C by 2100 with catastrophic results.

Carbon footprint

Carbon footprint is broadly defined as total Green House Gases (GHG), such as, Carbon-di- Oxide, Methane, Nitrous Oxide and Chlorofluorocarbons(CFCs), emissions from all activities of person, manufacturing process and services etc. It involves amount of all GHG emissions equivalent to carbon dioxide namely tonnes of Carbon-di-Oxide equivalent (tCO₂e). It includes emissions, from fossil-fuel combustion in manufacturing, heating, and transportation, as well as emissions from fossil carbonate etc.



Nationally Determined Contributions (NDC)

By 2020, countries submit their plans for climate action known as Nationally Determined Contributions (NDCs). The NDCs are non-binding national plans highlighting climate action

including climate related targets for GHG reductions, policies and measures governments aim to implement in response to climate change to achieve the global targets set out in the Paris Agreement of United Nations Framework Convention on Climate Change (UNFCCC). The NDCs put forward their agreements in the context of their own national circumstances, capabilities, and priorities, with the goal of reducing global GHG emissions to limit anthropogenic temperature rise to well below 2 °C from pre-industrial levels and to pursue efforts to limit the increase to 1.5 °C.

Carbon Offset/Net Zero Carbon

Net Zero Carbon - is a term used to describe the state of an entity where the carbon emissions caused by them have been balanced out by adopting GHG mitigation efforts within the organisation as well as funding an equivalent amount of carbon savings elsewhere(offset). These GHG emission reduction are achieved by implementation of renewable energy and energy efficiency projects, many of which bring additional financial, social and community benefits a bottom line of sustainability.

Increasing number of companies are now travelling towards carbon neutral. They recognise that being carbon neutral can play a key part of their sustainability and Corporate Social & Environmental Responsibility strategy whilst enabling them to do their bit for global climate change. In addition to climate change, carbon offsetting projects help local communities by providing much needed employment, health improvement, biodiversity, reforestation and broad social benefits to improve the quality of life. They also realise that individuals and corporate customers prefer to buy products and service from environmentally conscious suppliers.

TNPL CDM & Carbon Footprint

TNPL, leader in implementing the environmentally friendly technologies, implemented many projects to reduce the GHG emission. TNPL ventured into renewable energy sectors by putting-up 35.5 MW windmill. TNPL is the first paper mill to register the Recovery Boiler 3 - TG 5 Cogeneration system under Renewable Energy Certificates (REC). TNPL is also the first paper mill in India to register a project under Clean Development Mechanism of UNFCCC. Total two CDM project under renewable energy (wind farm projects) and one under waste management (biogas project). About 2.60 lakh (Certified Emission Reductions) CERs have been issued by the CDM Executive Board of UNFCCC for the above projects. Though the TNPL CDM projects are unable to generate revenue due to collapse of carbon market, these projects continue to contribute to environmental credibility in terms of greenhouse gas emission reduction and help to reduce climate change impact.





Other major Innovations are 1;Utilization of Renewable fuel in the power boiler, 2; Replacement of CFC based air-conditioners, 2; Blow heat recovery system, 3; Energy efficient aerators in wastewater treatment plant, 4; Commissioning of state-of-the-art energy efficient Paper Machine No: 3, 5; Biogas Reactor for utilization bagasse wash

wastewater, Industrial Canteen and Guest House Waste and, 6; Revamping Steam and Power System project to put-up high-pressure boilers and TG in Unit 1.

Carbon Offset / sequestration

Developed green belt by planting 9,58,840 evergreen trees in an area of 739 acres in both the units. Developed Pulpwood plantation in a cumulative area of about 1,87,680 acres from 2004-2020 under farm forestry and captive plantation schemes. The major plantation activities started after 2004 and increased step by step. The carbon sequestration also increased along with increased plantation area. For the year 2020 - 21 it is about 5.26 lakh tCO₂e. Further, separate study will be conducted through external consultant to document the amount of carbon sequestered by the green belt plantations of TNPL.

TNPL installed 35.5 MW wind mill to generate renewable energy and export the green energy to replace fossil fuel intensive grid power and aid GHG reduction and mitigate the climate change. This is considered under GHG offset source. Windmill with 15 MW capacity was put-up during 1993 and increased to 35.5 MW in phased manner. The GHG offset has increased from 26,551 tCO₂e in the year 2001-02 to 42,694 in 2006-07 tCO₂e due to capacity addition and then continued with minor variations depending on power export.



Mitigation



TNPL put-up closed high rate bio-methanation reactors (biogas plant) in phased manner during 2003, 2008, and 2017 to treat high COD bagasse wash wastewater under waste to energy concept. In the reactor organic pollutants present in the wastewater are converted into methane and captured & used as in-house renewable fuel in lime kiln to replace furnace oil.

This avoided methane emission, second largest GHG, from the anaerobic lagoon and fossil CO₂ emission reduction from furnace oil saving in lime

kiln. The GHG reduction increased from 43,016 tCO₂e in the year 2006-07 to 72,015 in 2006-07 and then to 90155 in 2016-17 tCO₂e due to capacity addition and then continued with minor variations depending wastewater treated and COD available.

TNPL uses carbon neutral fuels, such as, Black liquor solids, bagasse pith and other agro-fuels where the CO₂ emitted from these sources are taken from atmosphere through photosynthesis by plants and do not contribute to net GHG emissions but reduce fossil fuel use and associated GHG emission and climate change.

One MW of power saving or renewable energy generation will reduce about 0.92 tCO₂e GHG emission. Therefore, further improvement in energy saving and increasing the renewable energy use and capacity like biomass, wind and solar will contribute to reduction of TNPL carbon footprint in future and to meet the India's NDC commitment to UNFCCC.