Flooding following heavy rainfall during the monsoon season in Kolkata, West Bengal, India

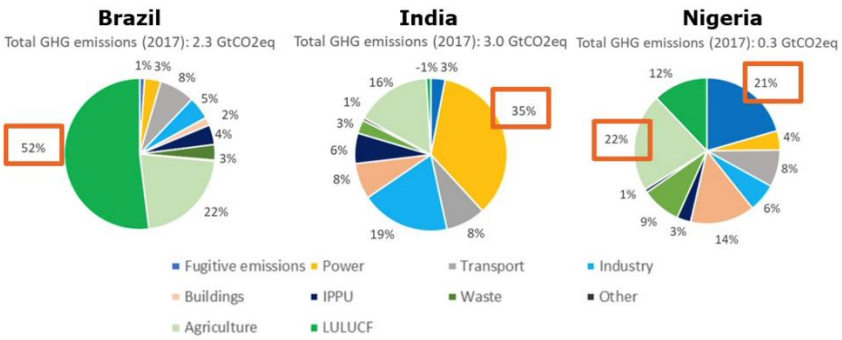
Climate change is the greatest existential threat we face

It is global in scope and unprecedented in scale. Cities produce the majority of global emissions and are also the areas primarily affected by climate change. Some 70 - 80% of greenhouse gas (GHG) emissions come from cities. CO_2 is emitted mainly through our use of fossil fuels that significantly power the global economy.

Drastic action is urgently required if we are to avoid runaway climate change. This could happen with the melting of the Siberian permafrost that will release massive amounts of methane into the atmosphere. Methane is some 23 times more potent as a greenhouse gas than CO_2.

After some 150 years of industrialisation, deforestation, and mechanised large-scale agriculture, quantities of GHGs in the atmosphere have risen to levels not seen in three million years.

The attribution of CO_2 emissions between countries and cities varies depending on the structure of the economy, the endowment of natural resources and the investment into key infrastructure. This is demonstrated in the diagram below that compares the GHG emissions of Brazil, India and Nigeria. In Brazil changed land use is the biggest emitter of GHG, while in India it is the power sector which has invested heavily in coal. In Nigeria gas flaring is one of the largest contributors to emissions.



Source: https://www.enerdata.net/publications/executive-briefing/ghg-emissions-trends-developing-countries-cop26.html

This series of city related policy and information briefs draws on lessons learned from cities and infrastructure work carried out by Triple Line over the past five years. It is intended to contribute to more sustainable, inclusive and climate-resilient cities that generate equitable economic growth opportunities for all by identifying market-driven solutions to urbanisation challenges and strengthening democracy and decentralisation processes through capacity building of government agencies at national, regional and city levels.

Climate related challenges for cities

A warming planet affects numerous ecosystems that are essential for our survival, particularly in cities. These include:

1. **Changed weather systems**, all of which impact cities, manifest the increase in temperatures as the following:
    - Flooding and droughts
    - Hotter weather and the need for air conditioning
    - Hurricanes and their destructive power
    - Failed crops which affect food security
2. **Rising sea levels** have the following consequences:
    - Flooding of coastal cities and agricultural land
    - Damage to coastal infrastructure
    - The large-scale migration of people to safer areas
3. **Warming oceans** lead to the collapse of coral reefs and food chains
4. **Wildfires** are spread by the increase in temperatures that cause organic matter to dry, making it easy to burn forests and their inhabitants, including plants, insects and animals.
5. **Inability of plants to adapt quickly** enough to changing climate. Implications include:
    - A risk of food insecurity as traditional crops fail
    - In many cases the lead times for producing new agricultural products is long, particularly when conditions themselves are constantly changing
6. **New diseases** are likely as conditions more favourable to their growth emerge.
7. **Mass migration** of people fleeing areas that are no longer able to support them.
8. **Emissions from buildings** account for the greatest volume of urban GHG emissions, due mainly to poor environmental design. Emissions come from the embedded energy contained in building materials as well as from operational uses.
9. **Emissions from vehicles** contribute to air pollution and to respiratory diseases. Investment in mass public transport is needed to alleviate this problem.

Massive investment in renewable energy infrastructure is required to make the transition to a new energy paradigm over the next 20 years or so. It is important to note that the manufacture and installation of renewable energy plant is not fossil fuel free. Fossil fuel energy is needed for the extraction of the materials, the process of manufacture and installation of renewable energy sources.

Halting and reversing global warming is a colossal task requiring a global effort made up of many mitigation and adaptation actions, of cities, individuals, companies, and governments.

What actions are cities taking?

Bogota

The city of Bogota in Colombia has invested heavily in low carbon public transport. It is an integrated system that includes a BRT system of 1,392 buses that cover 87 km of trunk ways and 663 km of dedicated feeder bus routes. It services 1.8 million people per day. In addition, the system includes walkways, bridges and plazas. This system links with 467km of mobility corridors for bicycles including a free bicycle use system. The city also has a large fleet of taxis.

Average travel times have been reduced by 32%, GHG emissions have decreased by 40%, while accident rates have decreased by 90%.

Bogota's model has been replicated in different ways in cities across the world.

New Delhi, India

The Government of New Delhi has initiated a scheme to pay owners of solar panels a feed-in tariff for the electricity they export to the grid. The scheme provides capital subsidies for solar panels. It has also decreed that government buildings source their power from renewable sources so as to lead by example.

A variety of business models are being tried in order to reach low-income households. One project that serves 200 households. Each solar panel costs USD66, while adding 9.7MW of electricity generated, 12 metric tons of CO_2 are avoided, and 240 jobs have been created.

What should cities do?

- **Set stringent regulations in place to transition away from fossil fuel energy sources towards renewable energy sources. Create incentives to speed up this effort.**
- **Set stringent energy saving regulations for transport, industry, new buildings, and infrastructure and introduce incentives for retrofitting existing buildings.**
- **Employ a skilled and well-paid inspectorate to enforce these regulations.**
- **Develop a long-term strategic outlook for the city, anticipating likely scenarios resulting from global warming risks accompanied by mitigation and adaptation measures.**

TRIPLELINE

PLEASE CONTACT:

Mathis Primdal: mathis.primdal@tripleline.com
Richard Slater: richard.slater@tripleline.com