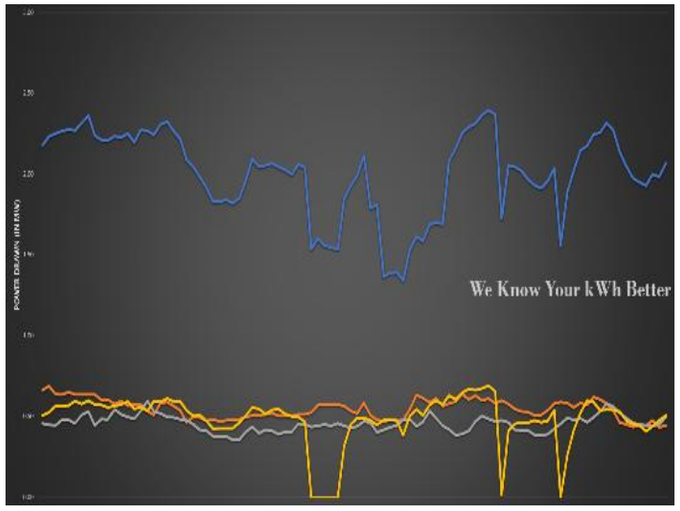
Road Map on

Reduction of Carbon Footprint in Indian Railway



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Arun Kumar, Group CEO

Agenda

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- About us
- Transportation Sector & Greenhouse Gas
- Railways – *Less Carbon Intensive Transportation*
- *Possible Option for Carbon Footprint Reduction*

About Us

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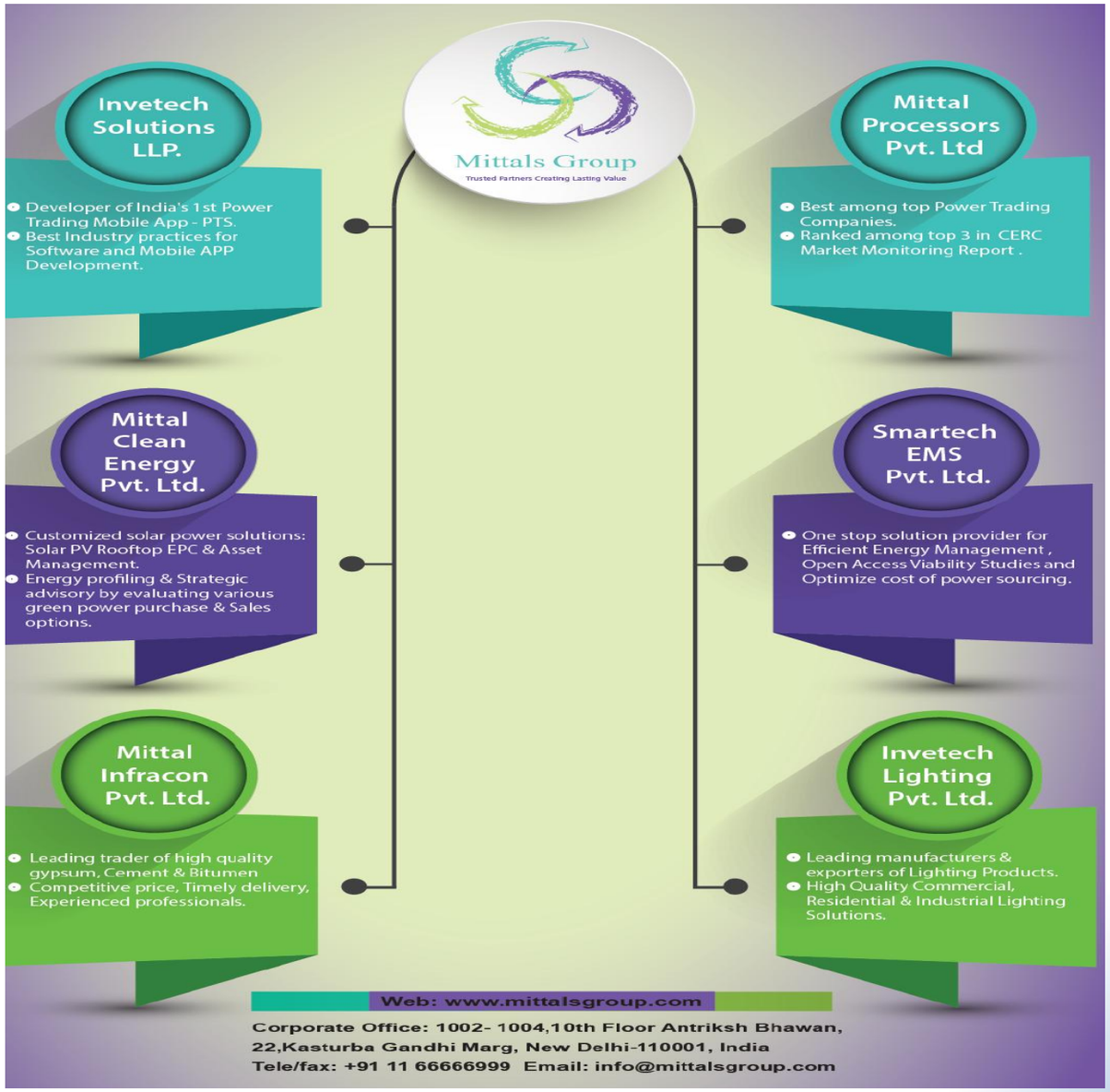
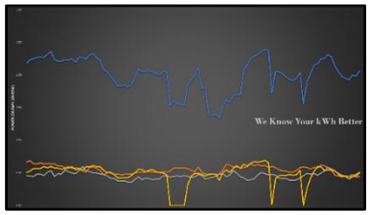
Mittals Group, established in 1977, is an Integrated Energy Solution provider to the Power/Energy/Utility Companies, Industrial, Commercial and Residential clients.

Group turnover of more than INR 2,900 Crores for the FY 2016-17.

PAN India presence and Client base of +500.

Provide Energy Management Consulting Services, Energy Metering Solutions, System Integrations, Smart Grid solutions in IT & ITES, Renewables (Solar and Hydro), Energy efficient LED Lights, Infrastructure and Textile verticals.





Expertise | Passion | Positive Attitude | Social Responsibility | Solution Driven | Value Adding | Reliable

Transportation contributes 23% of GHG Emission

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- As per IPCC; the total contribution of Transport sector 7.0 GtCO2 equivalent direct GHG emission (Including non-CO2 gases)

- Climate deliberation often focuses on energy and industrial activity, whereas transport sector is responsible for 23% of energy-related greenhouse gas (GHG) emissions worldwide

- Without aggressive and sustained mitigation policies, transport emissions will increase at a faster rate than emissions from the other energy end-use sectors and reach around 12 Gt CO2eq/yr by 2050

- It is quite evident and established facts that Railways transit system is one of the less carbon intensive transportation mode

- ***Taking evidence of research studies Northern Countries, CO2 emission (g-CO2/Person-Km) for Railway system (19) is the lowest in comparison with Bus (51), Aviation (109) and Automobile (147)***

Transportation Sector & GHG Emission

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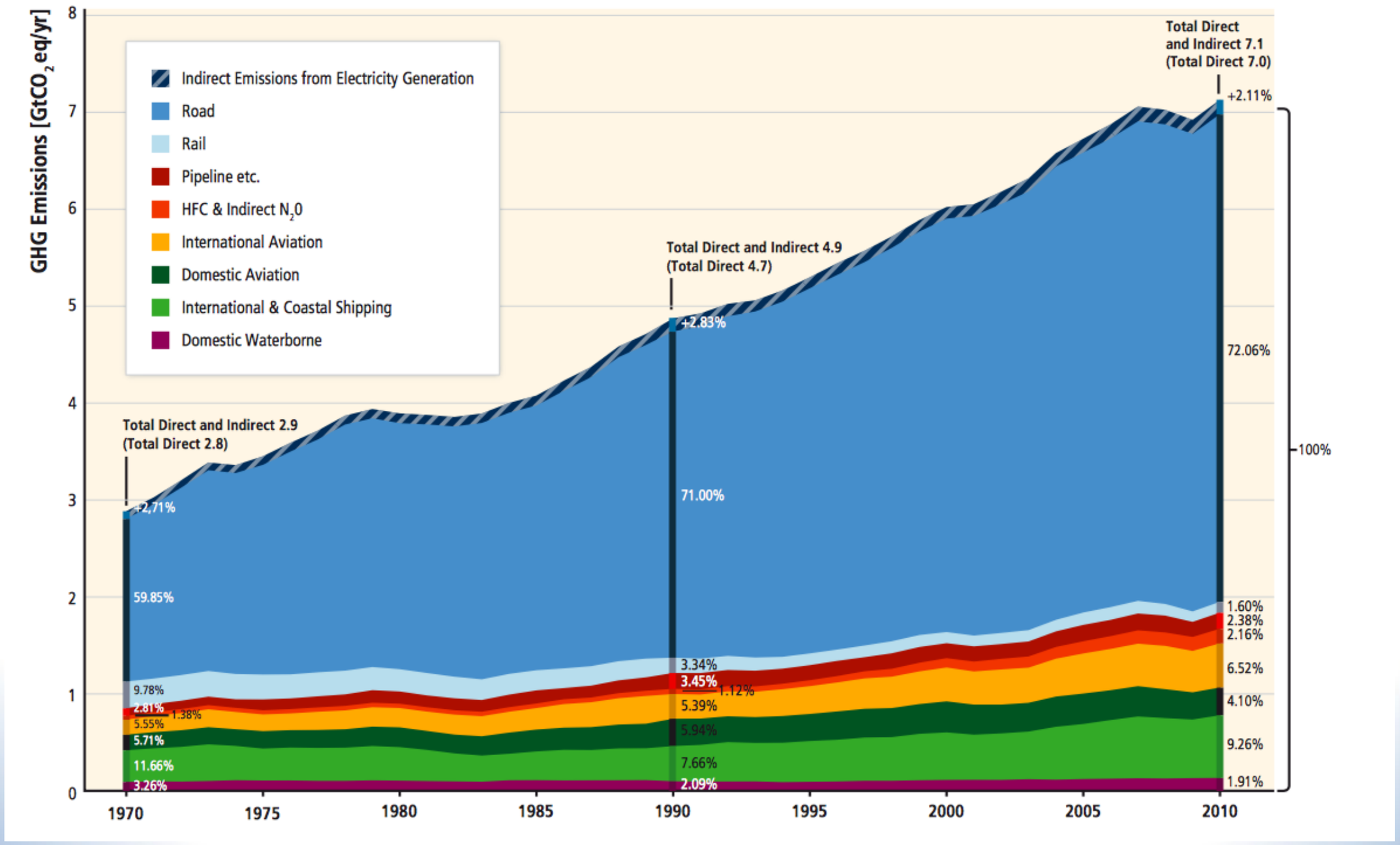

Direct GHG emissions of the transport sector (shown here by transport mode) rose 250 % from 2.8 Gt CO2eq worldwide in 1970 to 7.0 Gt CO2eq in 2010 (IEA, 2012a; JRC / PBL, 2013; see Annex II.8).

Indian Railway is most efficient in GHG Emission terms

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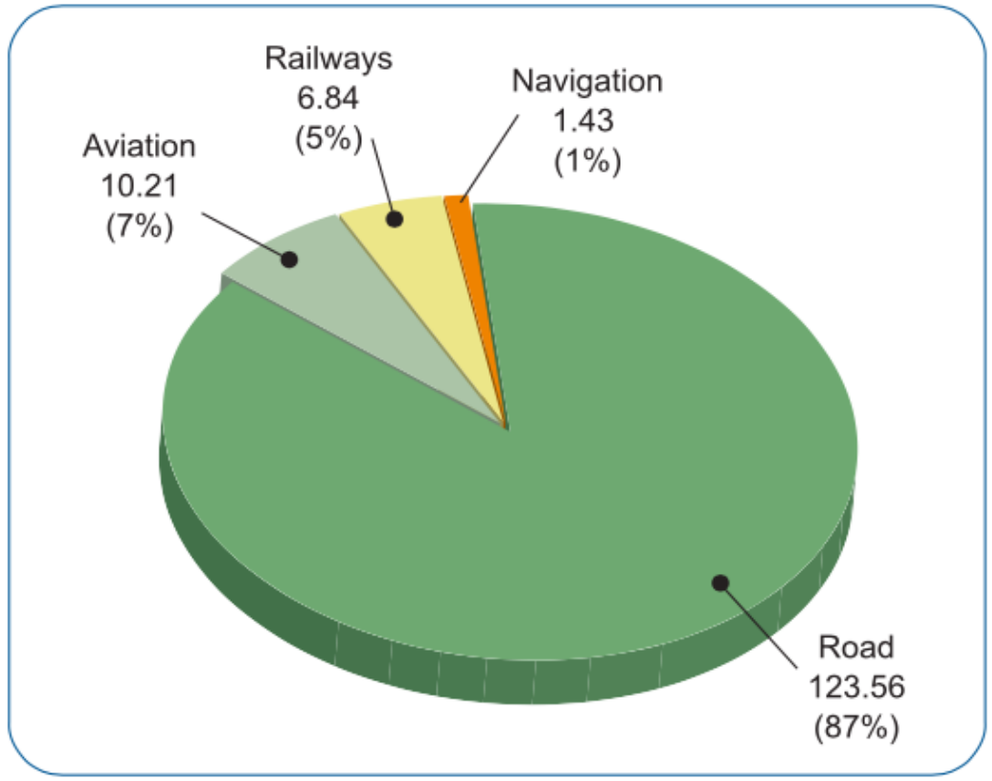
- As per data published by Planning Commission / NITI Aayog (2014), CO2 emission from Indian Railway is ~6.84 million tons while road transport contributes 123.55 million tones (18 times)

- Emission intensity of Indian Railway:
  - Passenger Traffic (kgCO2/Passenger-Km)
    - Non-Suburban 0.007837
    - Suburban 0.007976
  - Freight Traffic (kgCO2/Ton-Km)
    - 0.00996



Indian Railway actively reducing CF, can do much more through some out of box approach

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- It is evident that Indian Railway is been active in planning and taking measures towards a less carbon intensive system
  - It has set an target to add 200 MW of Wind and 1000 MW of Solar by 2022; As of March 17, Indian railway has already installed 37MW of wind and 16MW of Solar
  - Some researchers has express the possibility of meeting 25% of electric power from Renewables
  - These efforts will help in addressing the supply side aspects towards Carbon Footprint Reduction

- But, Indian Railway should a take from break from past approach and adopt a more aggressive efficient Carbon friendly transportation policies

Out of the Box! Dramatic ….Yes it may be feasible

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- Europe declaring an ***Carbon neutral power sector by 2050*** ! And replacing ***95% of its road transportation into electric vehicle***!

- Recent report from Morgan Stanley shows that the ***Energy Storage will be at least 75% cheaper in next 4 years, will lead to develop a commercially viable 100% RE power grid***

- So…….
- **India Railway**, should come up with their aggressive targets like

  - 100% electrification of all its traction by ……..?

  - At least ~~50 / 60 /~~ 75 % of electricity source from Renewables by……2032?

  - Can MNRE and Railway jointly launch programme to make storage a affordable technological options ?? (like LED programme)

    - It will push down the cost of energy storage technology more quickly than what predicted by Morgan Stanley
    - And 175 GW RE Targets may look more practical achievable limit!!!

More Structured Approach for Future

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Mainstreaming, ***Lifecycle Carbon Footprint Assessment*** in Decision making procedure for new development

- Lifecycle Carbon accounting and reduction strategies should be integrated at the planning stage for new development towards

  - Material Planning
  - Identification of Technology
  - Operative efficiency
  - Carbon Friendly Energy sources
  - Energy Security

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Thank You

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