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Developing Data driven tool based on Life Cycle Assessment for computing Carbon Footprint across Electricity Value Chain

Presented By

Presenter

INTRODUCTION

- Climate Change, erratic weather patterns, environmental erosion, ecological imbalance
- Tightening of regulatory compliances as well as incentivizing policies to encourage adaptation of environmentally-supportive actions,
- Journey of Net Zero and Carbon Neutral as a global mission.
- Electricity Utility industry is transforming too in this era of sustainability-focused business at global level.
- Third largest industry sector contributing to Global Warming Potential (GWP-KgCO2e) and an environmental impact
- Adapting life cycle thinking approach in analyzing the embodied carbon as well as operational carbon across value chain spanned over a life of assets
- The paper demonstrates the indicative Global Warming Potential (GWP) trend across the value chain.

CONTEXT

- Climate Change has unlocked potential opportunities in the space of energy transition, decarbonization, energy conservation & optimization, and circular economy.

- Today, the value chain is cognisant about role of green energy, green product, and opportunity to minimize primarily scope 1, scope 2 emission.

- Life Cycle Assessment (LCA) – industry tool to compute embodied carbon as well as operational carbon across value chain.

- Provides a distributed view on emission footprint, ecological impact, impact of aqua-life, species, water-usage, land-usage etc.

RELEVANCE

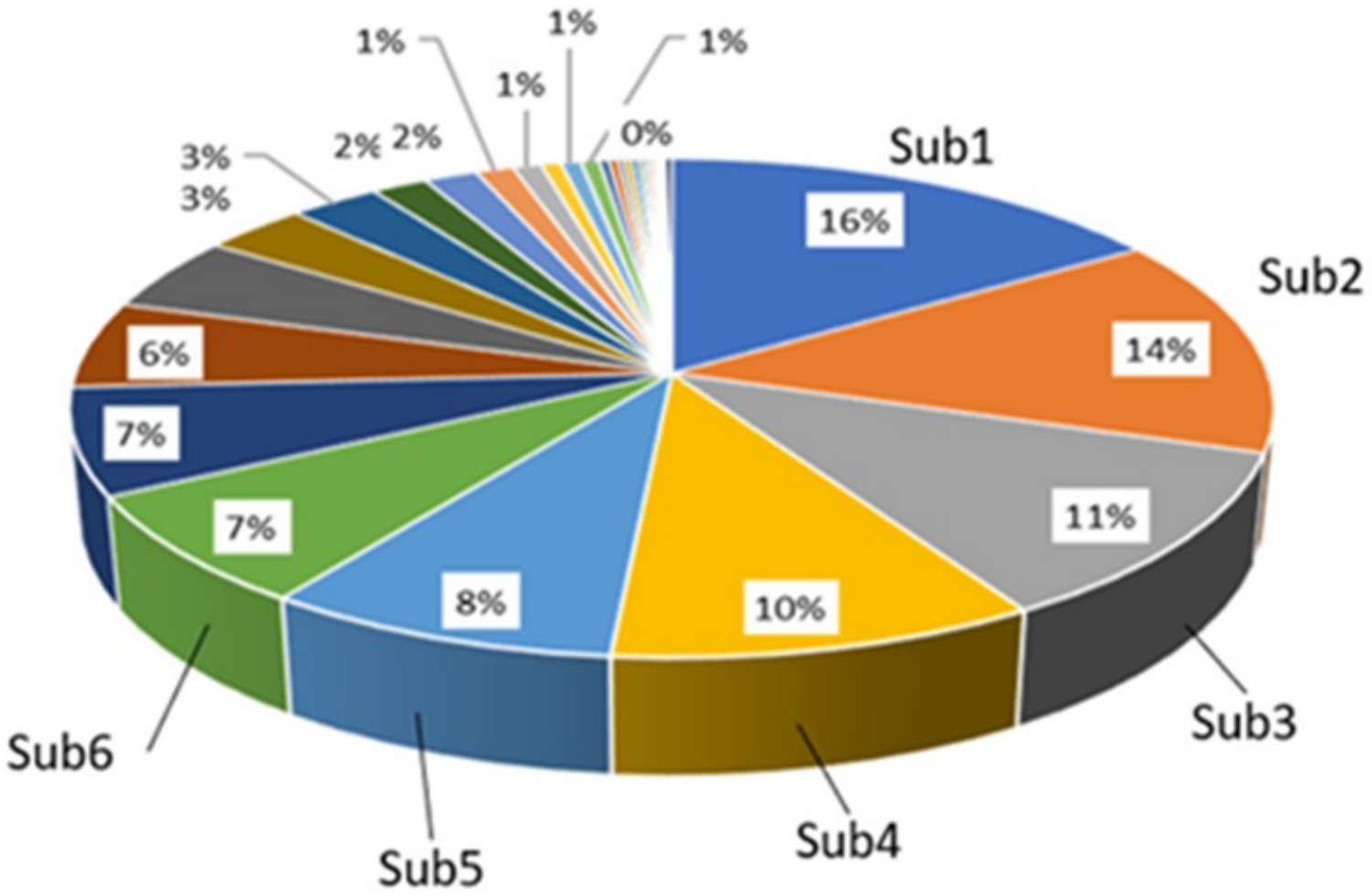
- Imperative for Electricity industry
  - To account and disclose Scope1, Scop2 and Scope 3 emission
  - To explore opportunities to decarbonise functions
  - To minimise emission and environmental impact

- Paper provides an indicative view on Carbon footprint

- As an asset-heavy industry the examples of substation, transformer, supply-chain, civil works are considered

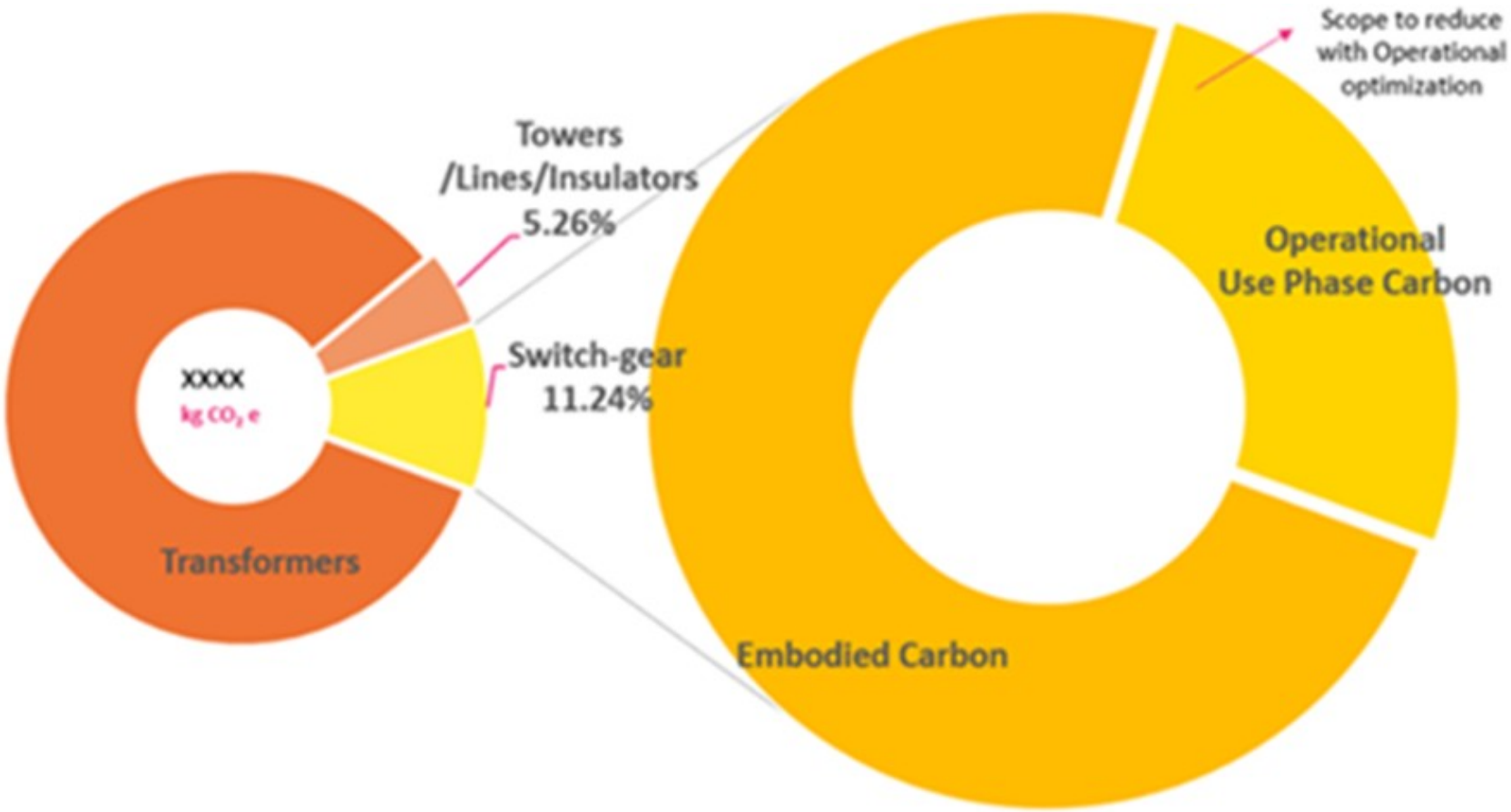
- Based on the contextual domain expertise , the high-level trend of Global Warming Potential (GWP) is presented.

EMISSION ASSESSMENT AT SUBSTATION



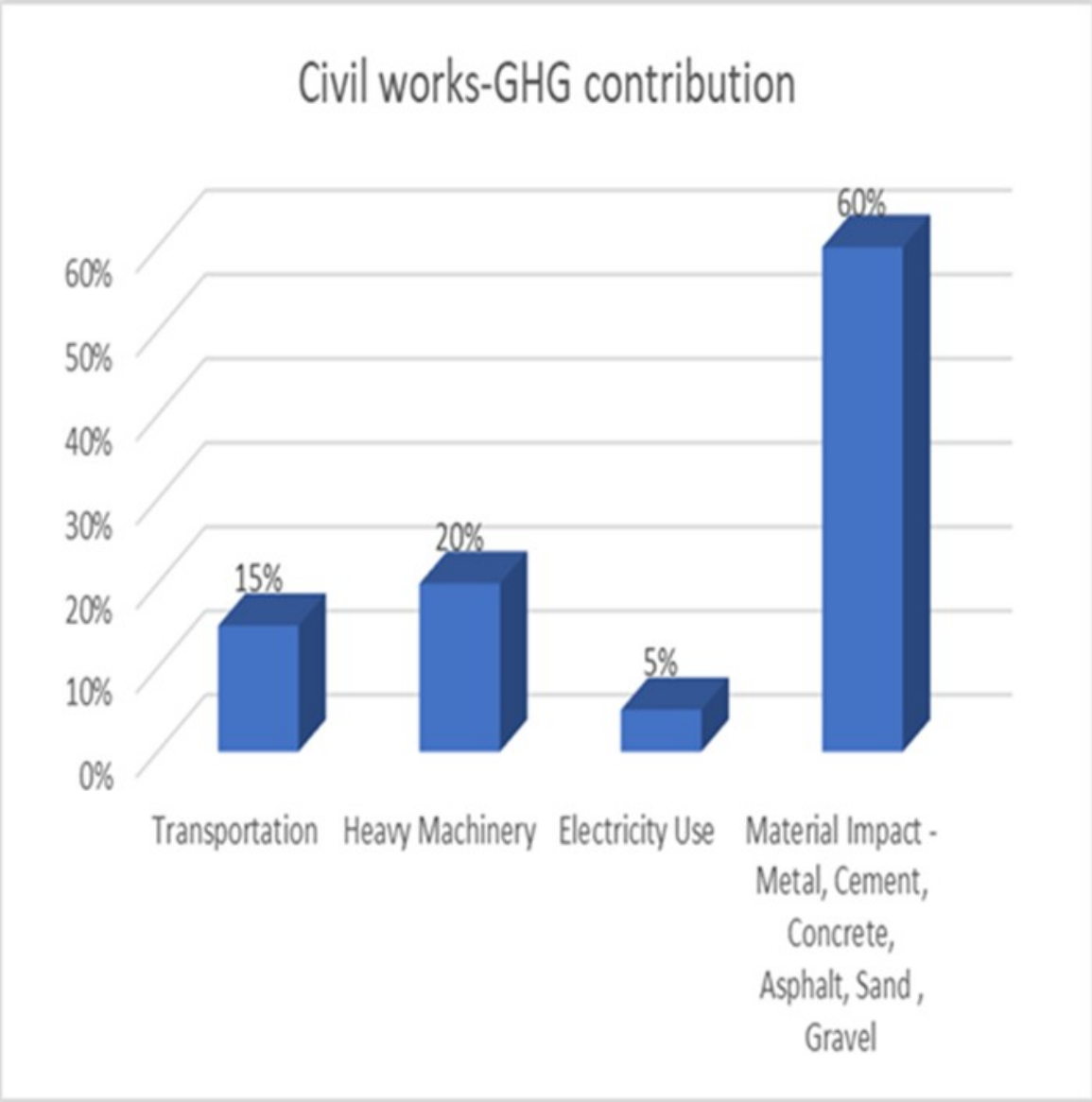
- T & D Utility owns large number of HT , LT substations
- Carbon footprint and carbon intensity
- Comparative view across all substations
- Environmental indices
  - Change of Land use
  - GWP = kgCO2e
  - Bio-diversity

Deep Dive at SUBSTATION



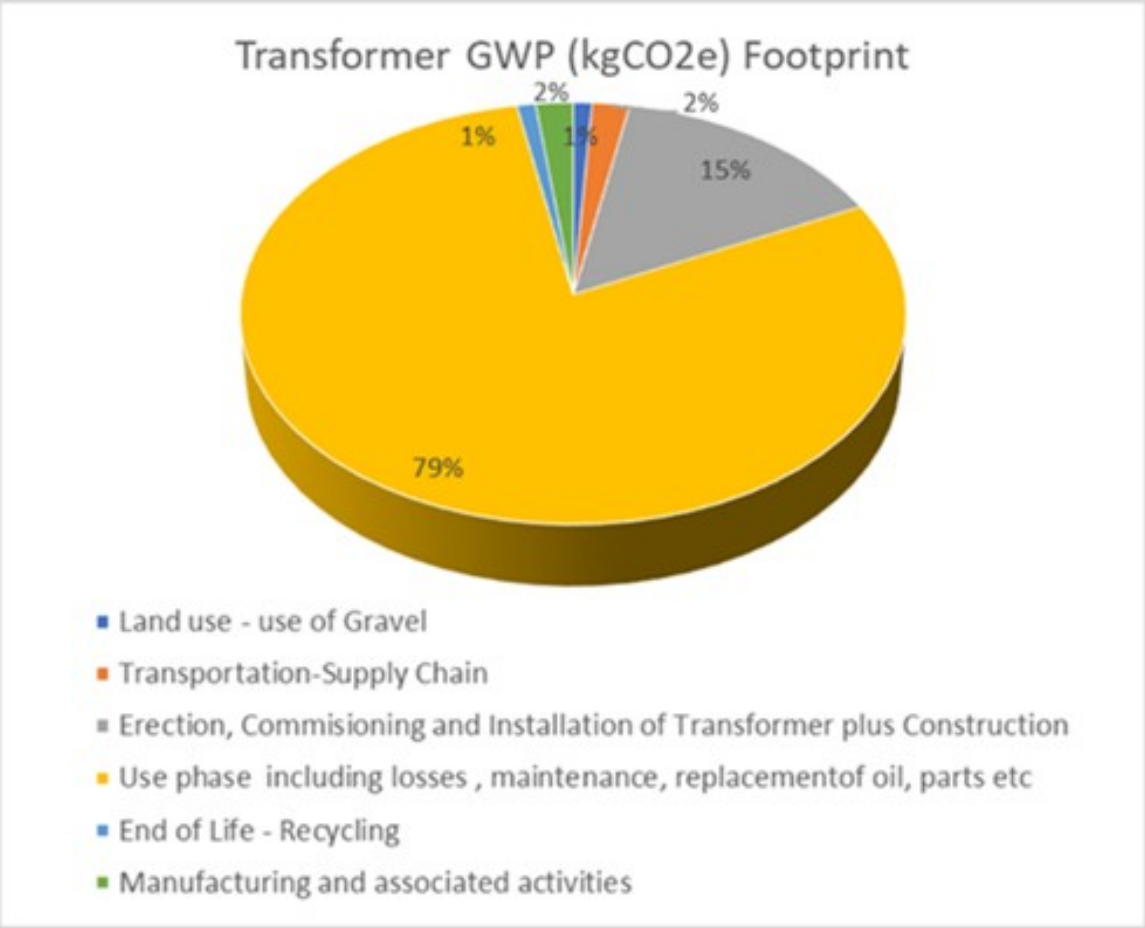
- Asset –specific kgCO2e
- High carbon intense equipment
- Corelation with embodied carbon with aging
- Linkage with EoL and decommissioning or buy-back
- Operational carbon footprint
- Asset-maintenance

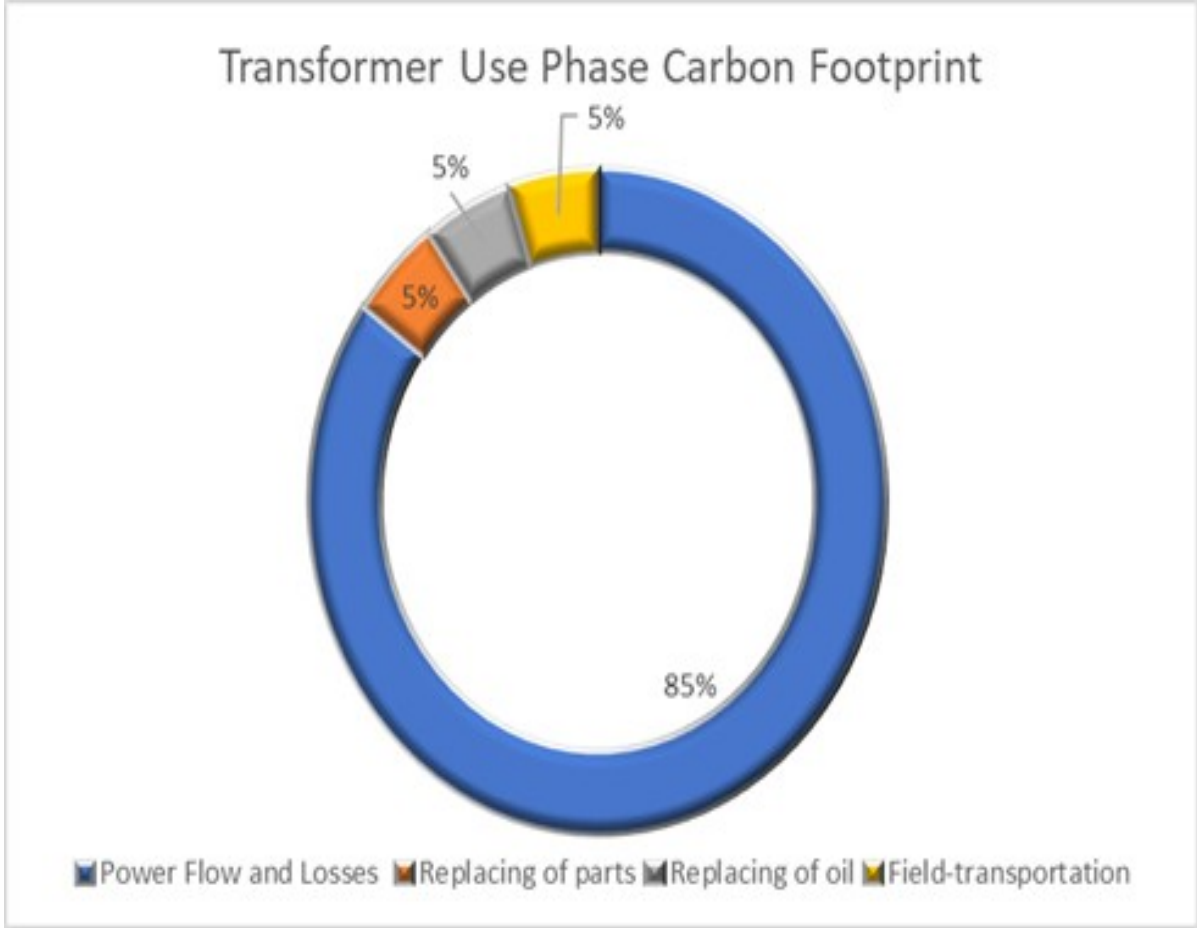
ENVIRONMENTAL IMPACT DUE TO CIVIL WORKS



- High-impact materials supplied across board, including power plants, sub stations, standalone asset-installations, etc.
- Material impact
- Transportation impact
- Electricity, water usage
- Heavy machinery usage
- eco-friendly approach in construction
- Creating opportunities for more traceability and reusability.
- Core materials are also explored to be replaced with less pollution-creating materials
- Metallic structure in terms of transmission , distribution towers resulting in a significant embodied carbon.

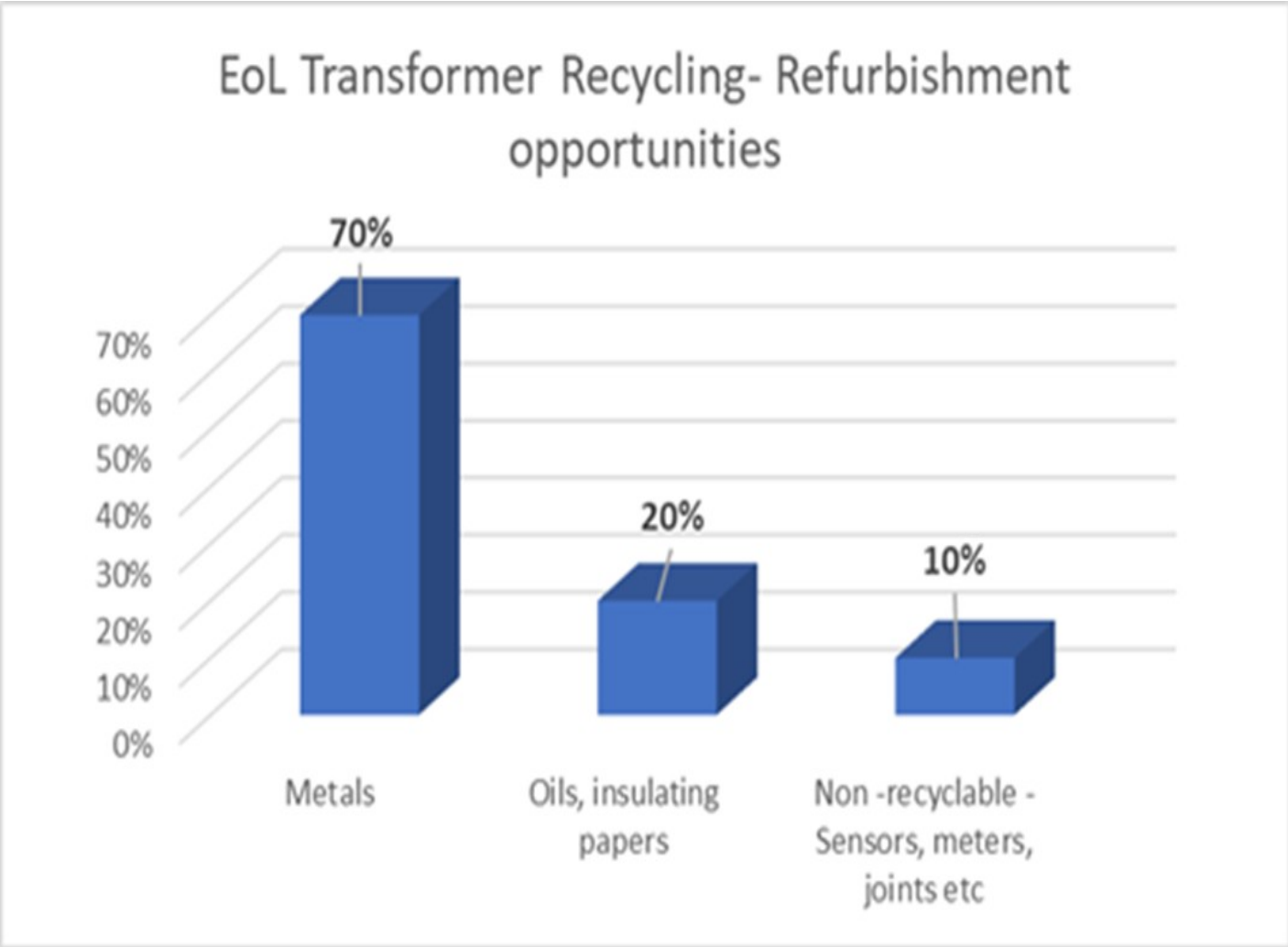
ENVIRONMENTAL IMPACT ASSOCIATED WITH TRANSFORMER





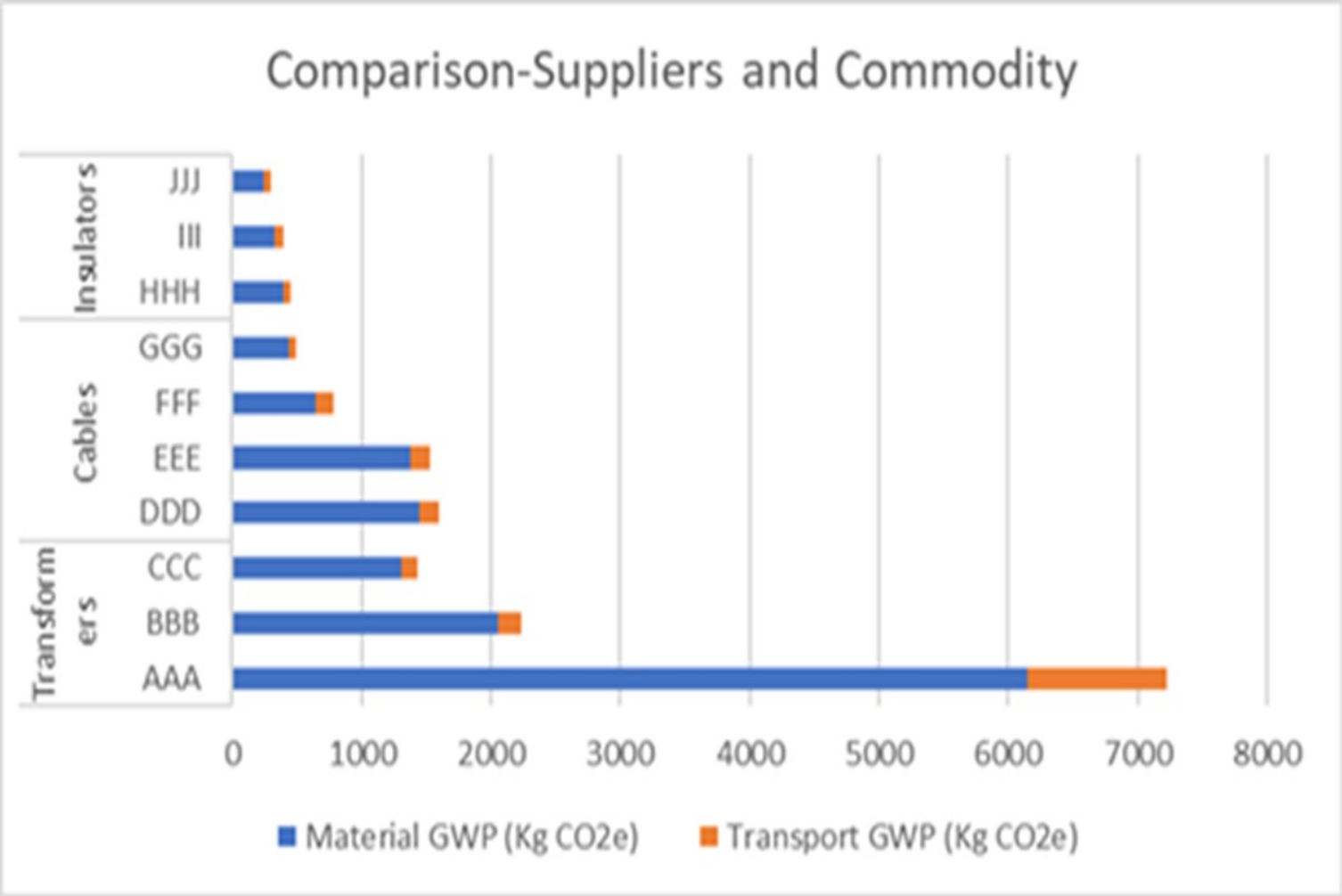
Carbon footprint during its use phase is due to power loss, replacement of parts, refilling of dielectric oil, supply-chain associated with procurement of parts etc.

CIRCULAR ECONOMY



- Debated, and deliberated topic cum opportunity across globe, today
- Onboarding of all the stakeholders playing a part in the value chain.
- Cross-leveraging of data on the high impact materials, parts, equipment, may be available post repair- maintenance activity
- Technically advisable to be reused at some other location as per the specification-matching etc.
- Possible reusing of high impact materials, parts etc would certainly enhance the utilization of extended use -phase of each material or part to its full potential.
- Result into the minimal waste for disposal.
- Exploring refurbishment, re-purpose etc.

SUPPLY CHAIN DECARBONIZATION

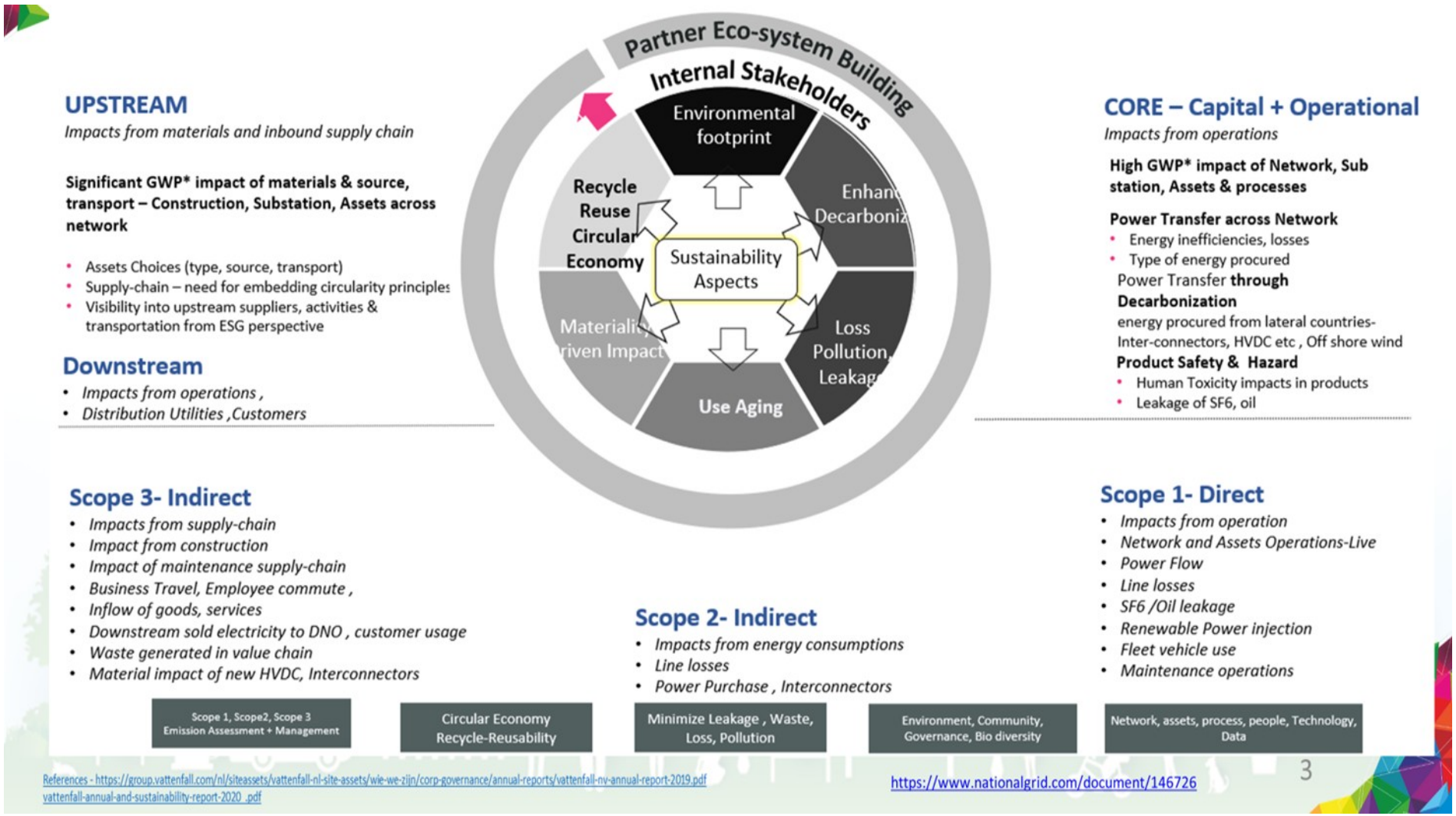


- Encouraging tier1 , tier 2 suppliers to follow the best practices towards
  - Optimizing commute-specific options
  - Type of vehicle, type of way ,
  - Distance travelled,
  - Sourcing of materials etc .
- Comparative view –
  - Transport impact
  - Material impact.
- Identify those suppliers having high carbon footprint
- Educate them on how they can bring down this GWP impact.
- Scope 3 emission is important to report, but practically very complex to compute as involved external stakeholders.

MATERIALITY ASPECTS ACHIEVED WITH DIGITAL CAPABILITIES

- Materiality aspect- Safety, governance, affordability of power, skilled and happy workforce, innovation, and customer centric approach.
- Customer-base- Leverage solar PV installations, energy efficient equipment, machineries, HVAC, etc , Electric vehicle
- Regulatory policies- Peer to peer trading, small scale and micro level power systems are the key drivers in creating larger level impact when it comes to harnessing potential of renewable energy.
- Decarbonize network -Green power injection, grid modernization, adapting to e-fleet, use of bio fuels possible for DG back up during critical shut down of power.
- Digital interventions- Smart metering infrastructure, IOT, sensors etc, effectively provide the real time operational information, enabling the better understanding of system.
- Data- This rich information becomes a basis of what-if scenario modelling in exploring possible ways of decarbonization
- Innovative breakthroughs and agile operational models

REPORTING and DISCLOSURE



- Global Reporting Initiative (GRI)
- Sustainability Accounting Standards Board (SASB)
- Task force on Climate-related Financial Disclosures (TCFD
- Task force on Nature Related Financial disclosures (TNFD)
- SBTi approval

KEY TAKEAWAYS / RECOMMENDATIONS

- The paper presents an approach of applying Life Cycle Assessment to compute carbon footprint of Electricity industry

- Would enable identifying hotspots, a mechanism to prioritize on the opportunities of decarbonization, energy transition, circular business using data driven tool and life cycle assessment.

- The positive impact of such practice is proved in minimizing the carbon footprint and support techno-economical operational balancing.

- Digitalization, Decarbonization, Deregulation and De-risking of cyber-threat

- Sustainability focus- unlocked potential opportunities to innovate , explore out-of-box business models, collaborative-engagements, use of green-tech and deep tech-technology etc.

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- [3] https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_enPress Information Bureau, Delhi, 14 November 2022

THANK YOU

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