

# ADDRESSING THE 'NEW ENERGY AND TRANSPORT NORM': SOME VIEWS ON A GREENHOUSE EMISSIONS INNOVATIVE APPROACH IN THE TRANSPORT SECTOR OF SOUTH AFRICA

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## ABSTRACT

This paper is a conceptual in nature and draws its analysis and findings from a desktop study. The paper explores the nexus between climate change, energy, and the transport sector with a focus on greenhouse gas emissions. The paper suggests that in responding to climate change, the transport sector can adopt avoid - shift - improve (ASI) approach as both an adaptation and mitigation strategy. While acknowledging the complexities, diversity, and differences between and among places, the paper suggests that the implementation and management of aligned, co-ordinated, integrated, and comprehensive climate change adaptation efforts covering all sectors of the economy is key since each sector behaves differently and is affected differently by climate change suggesting that different sectors of the economy exhibit different vulnerabilities to climate change.

**Keywords:** Climate change, greenhouse gas emissions, transport mitigation and adaptation, energy, avoid - shift - improve approach, South Africa.

## 1. INTRODUCTION – SETTING THE SCENE

In the South African context, climate change is considered a great threat to the environment and regions within South Africa. Wherein in these contemporary times, Climate change disasters have worsened and are highly occurring in South Africa, with an approximate rate of urbanization which is 2.85% (Census, 2011). South Africa is one of the countries which produces greenhouse gas emissions into the atmosphere, which is remarkably the highest in the African continent. The essay will also give insights and a reflection on how climate change affects the planning of the country in this case South Africa in these contemporary times. It is acknowledged that, climate change in South Africa reflects on the impact it is producing on the 'circular economy' with implications for the energy and transport sectors in the development trajectory of the country. In this task I will critically reflect on addressing the new normal through highlighting the climate change impact on the energy and transport sectors and to reflect on how South Africa can be able to adapt to these conditions in contemporary times and to the future. This topic is raised, because of the implications and the threats that climate change poses on the environment. Reflecting on how the impacts of climate change will have on the energy and transport sectors. In the South African context is it important to create and adopt mitigation measures for disaster risk management mechanisms and planning interventions. The energy sector on its own has a high concentration of greenhouse gas emissions into the atmosphere, as well as the transport sector which is trying to minimise the rise of gas emissions into the atmosphere.

This conceptual paper that is based on a desktop study is organised into *six (6) sections*. *Section one (1)* has introduced the context in discussing climate change and seeking to address greenhouse gas emissions. *Section two (2)* is dedicated to an exploration of key concepts and terms that frame climate change and greenhouse emissions debates. *Section three (3)* presents a critical review of the nexus between energy and the transport sector with specific focus on greenhouse gas (GHG) emissions. *Section four (4)* assesses the imperatives for climate change adaptation in the context of South Africa. *Section five (5)* considers the mitigation measures in respect of climate change focusing on the energy and transport sector of South Africa. *Section six (6)* reflects on the lessons for climate change and transportation adaptation making use of the province of the Western cape as a case study. Finally, *section seven (7)*, presents concluding ideas and remarks on moving ahead with attempts to fix climate change and transportation adaptation challenges in South Africa. The next section explores the key terms and definitions used in this paper.

## 2. DEFINITION OF KEY TERMS AND CONCEPTS

To appreciate better, the climate change and transport adaptation debate with a focus on greenhouse emissions, it is critical upfront to present working definitions. These following adopted working definitions act as reference departure point and interpretation lenses in understanding and exploring how nexus between climate change and the transport sector play out with respect to greenhouse emissions. The key terms and concepts discussed herein include climate change, transport, and energy, and are thus defined as follows.

- **Climate change:** it is “any long-term variation in the ‘average weather’ that a given region experiences” and which is due to the increase in the concentration of greenhouse gases (GHGs), notably carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and chlorofluorocarbon gases (CFCs) (Hansen, 2008; Earthlife, 2009; Salehi et al, 2019).
- **Transport:** a system of conveying people or goods from place to place, wherein there are various modes of transport including air, rail, sea, and road. It’s regarded as the heartbeat of South Africa’s economic growth and social development (South African oxford dictionary 2<sup>nd</sup> ed., 2005; Mulley et al., 2018).
- **Energy:** is a quantity that is transferred from system to system. Energy is the ability of a system to do work. A system has done work if it has exerted a force on another system over some distance. When this happens, energy is transferred from one system to another. At least some of the energy is also transformed from one type to another during this process (A Framework for Energy Education for Learners of All Ages, 2014; Kueppers et al., 2021).

The ‘*new energy and transport normal*’ is defined as a set of action and measures (policy, planning and technological) innovations that can be implemented in the energy and transport sector as a way of fighting climate change and ensuring that greenhouse gas emissions can be reduced or brought to a net zero carbon emissions if necessary (Regufe et al., 2021).

Having discussed the key terms and concepts of this paper, the next section reflects key energy and transport sector greenhouse gas issues that require attention and action.

### **3. REFLECTING ON ENERGY AND TRANSPORT SECTOR GREENHOUSE GASES FOOTPRINT**

In as far as transport sector is concerned, the energy-saving policies need to be adopted and implemented on how to reduce the impact of gas emissions occurring through transportation and energy use. Although we can try to reduce the effects that transportation sector contributes from the environment into the atmosphere, there will still be gases remaining from the atmosphere which were emitted long time ago that will increase the high risk of climate change on the earth's atmosphere. The energy sources used in daily activities, contributes to the production of gaseous phases such as, Carbon Dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Carbon Monoxide (CO), Chlorofluorocarbons (CFC) and other flammable gases. These gases produced during energy transition from an industrial hub to a mining field pose a great threat to the South African transportation and energy sector as it can become difficult to adapt to the changes that these gases are posing to it. The transportation sector can adapt to climatic conditions by implementing five types of policies and mitigation measures to help save energy and reduce greenhouse gas emissions to secure sustainable surface transportation. The range of intervention measures and solution types include:

- Land-use and transport planning.
- Appropriate taxation and policies.
- Regulatory and operational measures.
- Fuel economy standards in road transport.
- Transport demand management.

In the transportation sector, the emissions it produces are a function of the volume of the transport activities; examples include vehicle movements, carriageway traffic congestions and air transportation, which amount on energy by each type of activity, even the type of fuel used to generate that energy and the mix of all transport modes (Ribeiro et al., 2007).

The next section seeks to situate the climate change and transport adaptation discourse within context. This is necessary so that policy and planning measures and actions are scaled and sensitive to the contextual realities of the country, provinces and local areas considering different spaces, places, cultures and transport history and ideologies prevalent in such areas.

### **4. ADAPTING TO CLIMATE CHANGE – THE SOUTH AFRICAN CONTEXT**

According to the Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report, (2001) it has been reflected that climate change is already happening in many parts of the world as this is a global issue, just as the guiding referenced and quoted statement of the assignment reflects on the United States having the most affected regions through climatic conditions. This is the case even in South Africa as it is also grappling with adapting to climate change, it is also experiencing high level of economic crisis as there is high unemployment rate and it is regarded as a water scarce country/region. South Africa is trying to manage the impacts that climate change is posing to the environment, and this will continue to happen if global greenhouse gas emissions are curtailed significantly in the short to medium term. As South Africa is one of the developing countries on the continent, it is faced with serious climate change threats towards its sustainable development intervention and initiatives. As far as we know that South Africa is one of the major emitters of greenhouse gas (GHG) emissions in the continent we can acknowledge the fact that the overall vulnerability of the country to climate change

impacts, will thus be necessary to carry out adaptation measures in the country. Areas that we can reflect on which are clearly vulnerable to climatic conditions, includes examples such as health sector, energy and transport sector, maize production, plant and animal biodiversity, water resources, and rangelands. As much as they are highlighted these areas need to be targeted for adaptation measures purposes. On the energy sector, industrial vitality, the mining, and manufacturing hubs are particularly vulnerable areas of concern to climate change mitigation measures (Department of Environmental Affairs and Tourism, 2004).

Given that the preceding section has highlighted the importance of context in informing transport design, planning and policy, the following section discusses the possible mitigation measures that the energy and transport sector can adopt in fighting climate change negative consequences and impacts.

## **5. MITIGATION MEASURES ON CLIMATE CHANGE FOR THE ENERGY AND TRANSPORT SECTOR OF SOUTH AFRICA**

On the reduction and measures of mitigating climate change in the energy and transport sector emissions, the avoid - shift - improve (ASI) approach can be applied (Chakwizira et al., 2014). The following sub-sections elaborate on these mixes of possible solutions in reducing emissions in South Africa.

### 5.1 Non-Motorised Transport

The reduction of unnecessary travel trip generations can be reconsidered and reiterated through land-use planning. The land-use planning management strategy is introduced in terms of subdivision regulations and street layouts in grid patterns and this can contribute to reduction of the number of accidents and depict safety and reduction in gas emissions of carbon monoxide emitted by vehicle. Land-use zoning can also pose the unnecessary travel trips as it has pros and cons when planning for the neighbourhood. Under congestion charges, traffic calming measures can be impacted on the streets and contributes to the reduction of greenhouse gas that climate change has on the energy and transport sector (Institute for Global Environmental Strategies, 2010).

### 5.2 Shifting or Retaining Mode Share of Mass Transport

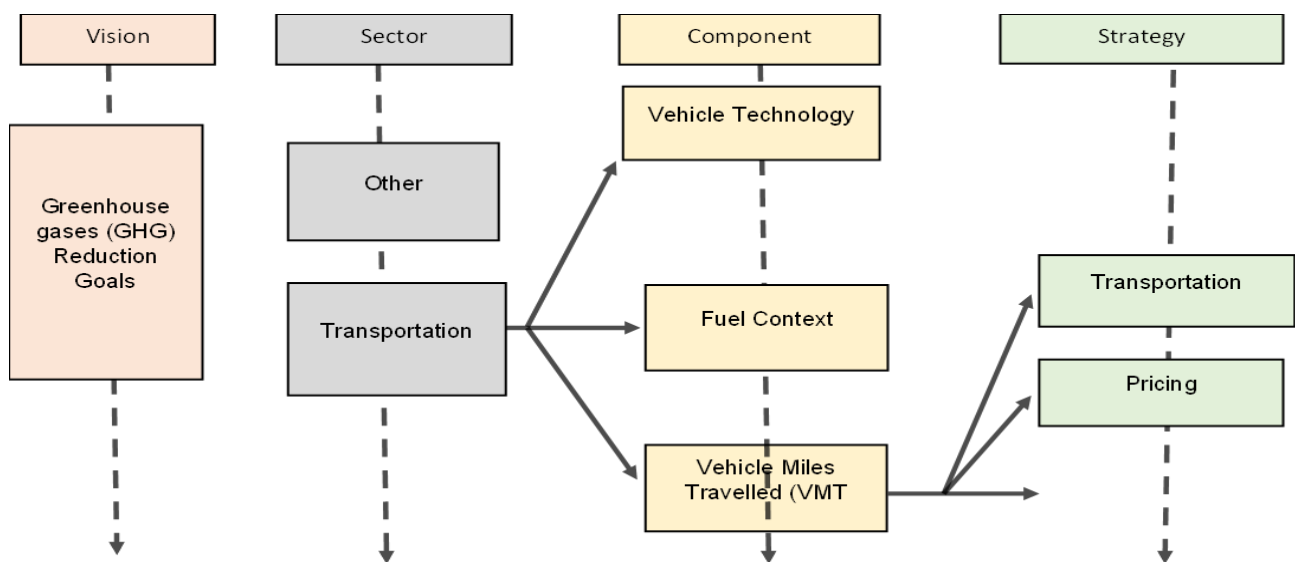
By shifting from mass transportation to minimised mode share of non-motorised and sustainable transport development it can create room for mitigation opportunities in the transport sector. In reducing distance travel and energy use, it can contribute to the reduction in transport energy use with land-use planning involved (Institute for Global Environmental Strategies, 2010).

### 5.3 Reducing Greenhouse Gas Emissions (GHGs) From the Transport Sector

In Figure 1, a range of measures and actions to reduce greenhouse gas emissions are presented. These relate to for example switching to cleaner energy sources such as bicycling, using solar and hydrogen powered public buses, use of electric cars, electric freight trucks among others.

The suggested interventions imply that the government is serious in implementing the green transport strategy and climate change policy and strategy to cover the green

transport manufacturing (cars, buses, trains, aeroplanes, and marine transport as examples), green transport supply chain and procurement systems, green energy, and transport performance targets for both public and private sector companies and organisations. The shift and reduction in greenhouse gas emissions requires collective action by government and the non-state sectors. Civil society and community green energy and transport action groups should be supported in efforts to increase awareness and campaign for greenhouse gas reduction. Another way is through organising school and tertiary competitions on innovation and technology showcasing benefits and project implementation covering the energy and transport sector aimed at reducing greenhouse gas emission for example. Through such structured engagements and efforts, movement and shifts towards the new normal aimed at addressing the 'new normal' through climate change mitigation, adaptability, and reduction of greenhouse emissions in the transport sector will be witnessed.



Source: Adapted from Lewis, 2018

**Figure 1: Reducing greenhouse gas emissions (GHGs) from the transport sector**

From a discussion of the various possible ways to innovate on energy and transport to reduce greenhouse gas emissions, the next section discusses a case study on climate change flagging the energy and transport dimensions that have implications for greenhouse emissions in the process.

## 6. CASE STUDY ON CLIMATE CHANGE FOCUSING ON THE WESTERN CAPE PROVINCE, SOUTH AFRICA

The assignment task is to reflect on how the climate change affects the energy and transport sector and climatic impacts occurring in its environment and atmosphere phases. The transport sector in the Western Cape province is experiencing a great depression and stress and the development planning approaches which are causing it to be impacted negatively as in the communities themselves also being developed and strategically established further and further away from economic zones and nodal concentration points (Department of Environmental Affairs and Planning, Western Cape, 2008). The energy and transport sector are a highly suspected major and a significant contributor to the country's greenhouse gas (GHG) emissions with an overarching burden occurring in the Western Cape. The growth in demand for these gas emissions that are already occurring in the Western Cape province will pose a great pain or will create a societal and major

problem. Mitigation opportunities on the province of South Africa from the transport sector will include cleaner fuel programmes, disaster risk management interventions and Initiatives, and commercialising innovation in the province (World Bank, 2009; Chakwizira, 2019).

From this succinct review of a case study in the Western Cape province of South Africa, the next section presents concluding remarks on the paper. This following section thus ties down the arguments as presented throughout this piece of writing.

## **7. CONCLUSION**

In concluding, it is imperative that climate change, energy, transport policy and planning action and measures should proceed based on a critical reflection and understanding of the interconnections and interdependencies of the climate change, energy, and transport sector, if sustainable development and greenhouse gas emissions reductions are to be realised in the short, medium, and long term for South Africa. The energy and transport sector are well positioned to act as lead sectors in the quest to adapt to climatic impacts through adopting policies and creating mitigation measures on reducing the impact that climate change has in South Africa. It should be re-stated that the focus on the South Africa's energy and transport sector is informed by the fact that these two sectors contribute significantly to climate change in the atmosphere because they are great emitters of greenhouse gas emissions (GHG) in the country so far. This paper has managed therefore to reflect on the range of possible energy and transport sector adaptation mechanisms and options in the face of the reality of climate change in South Africa. Indeed, while the energy and transport sector have been used in illustrating the reality and impact of climate change on the South African socio-economic landscape, the reality is far much more complex than presented in this paper. At the same time, all sectors of the economy such as agriculture, water, human settlements, built environments et cetera are affected. It is therefore important to have coordinated, integrated and comprehensive climate change adaptation efforts covering all sectors of the economy as each sector behaves differently and is affected differently by climate change suggesting that different sectors of the economy exhibit different vulnerabilities to climate change. So, this calls for a unified and joined governance approach in adoption a bundle of interventions aimed at climate change adaptation and mitigating to reduce the greenhouse gases footprint impact of climate change in the country.

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