

# **SUSTAINABLE TRANSPORTATION IN SOUTH AFRICA: ADDRESSING SOCIETAL NEEDS, ENERGY AND CLIMATE CHANGES**

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## **ABSTRACT**

The transportation sector plays a significant role in climate change as it is often associated with CO<sub>2</sub> emissions from vehicles and during energy production of fuels. The effects of climate change are negatively impacting diverse groups of people around the world and in South Africa which affects the societal needs of communities. Through desktop analysis, this essay aims to explore how sustainable transportation planning in South Africa can contribute to addressing societal needs considering current and future energy and climate change. This essay looks into the transportation sector in South Africa and how current energy changes are implicating societal needs of diverse groups and how future energy changes will contribute towards building sustainable transportation planning in South Africa. The key lessons from other countries identified in this essay includes congestion tax, shift to natural gas and the introduction of electric vehicles. This essay concludes that the success of sustainable transportation planning in South Africa is possible, however it needs to be backed up with strict policies and public education on the importance of sustainable transportation planning.

## **1. INTRODUCTION**

Sustainable energy plays a crucial role in transportation planning hence discussions surrounding transportation planning cannot be fully explored without the integration of energy. The world is currently undergoing diverse changes because of climate change, as such it is crucial to examine how current and future energy changes will impact transportation planning and how in return this will influence the livelihoods of diverse groups and its impacts on climate change. The transportation industry plays a critical role in the economic and social development of a country and the world at large. However, research indicates that the industry contributes a lot in energy consumption, pollution, and emissions (Lu, 2024). On the other hand, energy production falls under the most top contributors of carbon emissions and pollution, more especially the burning of fossil fuels, which contributes negatively to the environment, the people and overall impacting climate change. Addressing the challenges in the transport sector in South Africa will respond to SDG number 7, 11, and 13.

According to recent statistics by Statista (2023), the transportation and power industry (energy) are the top two sectors which generates the most carbon dioxide emissions around the world and numbers keep on increasing yearly. In South Africa, the transport sector is the 3<sup>rd</sup> largest emitting sector with approximately 55 Mt CO<sub>2</sub> emissions and contributing more than 10% to the country's gross emissions (BUSA, 2023). The transport system is currently dominated by liquid fuels and the demand for energy in the sector is expected to have increased by 2050. Such demands raise questions on how energy needs

will be met in the future, considering the strong need to shift to sustainable transport planning in South Africa while considering the societal needs of diverse groups of people. Previous studies (Smith, 2021, Kalaone *et al.*, 2022; Ntuli *et al.*, 2024) have explored sustainable transportation in South Africa focusing on aspects such as enabling partnerships, analyzing modal choices and energy, sustainability, and carbon dioxide emissions mitigation options for South Africa's Road transport sector. However, these studies neglected to examine the diverse societal needs in the context of energy and climate change in South Africa. Therefore, this oversight will be addressed through the objectives and scope of this essay. The objectives of this essay are to examine how current and future energy changes in transportation is affecting or will affect societal needs of diverse groups and explore successful sustainable transportation systems in other countries to see what South Africa can learn in the context of energy and sustainable transportation.

This essay is organized in to 5 sections as follows: section 1 introduction. Section 2 gives an overview of the transportation sector in South Africa and the current and future energy changes in the context of sustainable energy and transportation planning. Section 3 identifies the implications of current and future energy changes in the context of transportation planning for diverse groups of people. Section 4 provides successful sustainable transportation system lessons from other countries that South Africa can learn from to address societal needs through sustainable transport planning and energy and section 5 concludes the essay.

## **2. THE TRANSPORTATION SECTOR IN SA AND THE CURRENT AND FUTURE ENERGY CHANGES IN THE CONTEXT OF SUSTAINABLE ENERGY AND TRANSPORTATION PLANNING**

The transportation sector in South Africa comprises of both private car ownership and public transportation like buses, minibuses, aero planes, and mass transit which is the rail system and high-speed rail system like the Gautrain. Based on the data that was released by the National Household Travel Survey in South Africa, 43,5% commuters used private transport to go to work, 35% used public transport and about 20,3% reported walking. Additionally, the NHTS reported a huge decrease of workers who used public transport in 2013 and 2020 from 5,4 million to 4,7 million (NHTS, 2020). From the data provided above, one can conclude that there was an increase in the use of private vehicles in the country. This shows growth of the transportation sector. However, growth comes with challenges such as environmental and greenhouses gases that affects the lives of people. The challenges caused by the transportation sector have become a topic of concern amongst stakeholders (Oladunni, 2022).

The world at large is feeling the effects of climate change, for which the energy and transportation sectors are major contributors. At this day in time, it is crucial to reskill the transportation industry and introduce sustainable ways of moving people and goods, hence the strong need to move to sustainable energy and provide sustainable transportation systems. Climate change is real, as witnessed even particularly in a location like Thohoyandou in Limpopo, South Africa where hot weather conditions are constantly worsening yearly affecting the livelihoods of people. SDG number 7 of the United Nations Sustainable Development Goals of 2030 emphasizes "affordable and clean energy" and goal number 13 put emphasis on "climate action" this shows the urgent shift to introducing sustainable energy for a better South Africa. The introduction of sustainable energy will respond positively to SDG number 11 and 13 which will improve the lives of diverse groups of people. The importance of energy in the functioning of a country's economy and society

cannot be underestimated, However South Africa is still relying more on non-renewable and harmful fossil fuels for energy production. There is a crucial need to shift towards sustainable energy which is renewable and cleaner to lessen the environmental impacts and mitigate climate change.

### **3. THE IMPLICATIONS OF CURRENT AND FUTURE ENERGY CHANGES IN THE CONTEXT OF TRANSPORTATION PLANNING FOR DIVERSE GROUPS OF PEOPLE**

The dependence on motorized transportation is increasing with time and this affects the energy generation for vehicles. The world at large including South Africa has not found sustainable ways of generating energy is still relying on non-renewable energy like coal. As energy production changes, the transportation sector is one of the most affected sectors as motorized transportation depends on energy. When future energy changes take place, the transportation sector will be the most affected. Current energy changes are negatively affecting people in so many ways, directly or indirectly. For example, the burning of fossil fuels is among one of the causes of climate change which is resulting in high temperatures affecting people's health and causing various health problems and even death for some people who are unable to withstand certain weather conditions. Furthermore, climate change will affect transportation by changing demands for different modes of transportation. For example, when it gets too hot people would rather use transport than walk. Another impact of climate change on transportation infrastructure may be infrastructure deterioration (Bala, 2023).

In current times, climate change is also affecting food production. Supported by social media circulating information this essay made observations on how African farmers complained about extreme hot weather conditions which led to the death of crops and livestock in 2023. From observations most farmers did not harvest crops like the previous due to extreme hot conditions. Although there may be other explanations of these outcomes, it is undoubtable that climate change is one of the causes. With decreasing food production, the cost of food in retail stores increases and now creates a huge and a big gap between the rich and the poor. When food prices increase the economy of the country at large is most likely to be affected thus affecting fuel prices, higher public transportation fare. All these changes negatively affect the lower and middle class the most.

The transition to sustainable energy will mean a transition to sustainable transportation planning thus overall promoting sustainable development. Some of the great benefits of sustainable energy in the context of transportation planning are reduced or zero carbon emissions, saves money, sustainable economy, improved health, better quality of life, reduced traffic congestion, reduced dependence on non-renewable energy social inclusion, affordability, accessibility, and inclusion amongst different groups.

### **4. MOVING TO SUSTAINABLE TRANSPORTATION PLANNING, WHAT CAN SOUTH AFRICA LEARN FROM OTHER COUNTRIES?**

#### **4.1 Congestion Tax**

Several countries have introduced congestion tax as a solution to traffic congestion, for example, according to ARUP (n.d.), London introduced the congestion tax in February 2003 operating from 7am-6:30pm Monday to Friday with a charge of 5 pounds. This led to 15% reduction in traffic in 2003 regardless of the population growth. To date London

charges 15 pounds per day and the introduction of the congestion tax has helped in reducing congestion, improving air quality, reducing carbon emissions, and increased public transport usage. In Sweden, Stockholm officials introduced the congestion tax as a pilot program in January 2006. The introduction of congestion tax was motivated by the need to address the issue of traffic congestion in Sweden's capital which is the national's political, economic, and cultural center. The concept yielded results as traffic levels were at 25% which exceeded the original targets of 10% and 15% of the program (Jablonska, 2019). South Africa can also implement the same program particularly in urban areas as the congestion tax can reduce the number of vehicles on roads while encouraging sustainable transportation planning which will have positive impacts on the people's lives, the environment and energy. This initiative can also accumulate funds that can contribute to road infrastructure development in the country.

#### 4.2 The Transportation Sector Can Shift to Natural Gas

Natural gas is considered the cleanest burning alternative for transportation fueling in recent times, it is safe to use as it dissipates in air in times of accidents and prevents pollution on the ground unlike liquid fuels. Natural gas also has other great economic benefits like being cheaper to re-fuel when compared to its alternatives and environmental benefits as vehicles using it emits few pollutants thus reducing the negative impacts of the transportation systems on the environment (Jhawar, 2022). For a country like South Africa that is still on using fossil fuels and petroleum products to produce energy that is frequently used in the transportation sector, South Africa can take lessons from a country like China that is already at the of using alternatives form of energy like natural gas. The country of China is setting a good example on the use of natural gas for vehicle fueling which is moving towards sustainable transport systems. Shifting to natural gas will have great economic benefits in South Africa and reduce the negative impacts associated with liquid fuels.

#### 4.3 The Introduction of Electric Vehicles

Electric vehicles are vehicles that are powered by electricity. Countries like the USA, China and Norway have already introduced electric vehicles. According to CNBC (2024), Norway has the highest electric vehicles adaption in the world. 82% of the car sales in 2023 were electric vehicles, this was according to the Norway Road Federation. In the USA the percentage of electric vehicles was 7,6% while that of China was 23%. The higher percentage of electric vehicles in Norway is of interest in transportation planning. The incentives of electric vehicles in Norway started in the 1990s and zero carbon-emissions vehicles were exempted from taxes, tolls, and were offered free parking and allowed to used bus lanes. The capital of Norway is also electrifying buses, semi-trucks, and construction equipment. On the other hand, the country has an advantage of hydropower which is available and cheaper which makes electric vehicles more efficient in the country (Pettitt, 2024). The country is working effortlessly to make electric vehicles efficient through installing charging stations across the country. By 2025, it aims that every new car should be zero-emission. To date the country has over 25 000 charging points. Through the initiative, the Norway government has benefited in reduced local emission and improvement in air quality.

While recommending electric vehicles in South Africa, the current energy challenges cannot be overlooked. However, if the country manages to move to sustainable ways of generating electricity and strengthening its energy sector, it is undoubtable that the

introduction of electric vehicles will play a vital role in sustainable transportation planning that will improve the quality of life for diverse groups of people.

## 5. CONCLUSION

Transportation planning is interrelated to energy and achieving sustainable transportation planning around the world and in South Africa highly depends on energy. Taking into consideration the current energy changes that is currently affecting diverse groups of people in a negative way in South Africa and across the world, it is important to focus towards introducing sustainable transportation. The introduction of the above lessons in South Africa will not be one without challenges, some of these challenges may include limited finances, lack of support from the public and more other reasons. Despite that, South Africa, following the footsteps of other countries it can implement strict policies that aim to promote sustainable transportation planning. In addition, the public needs to be educated on the importance of sustainable transportation and how moving towards this system can improve the livelihoods of people. If carefully approached there is still hope to save the country from the current energy changes that are currently having negative impacts on the environment and contributing to climate change thereby preparing the country to withstand future challenges through the introduction of sustainable transportation planning.

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