BUS RAPID TRANSIT SYSTEM (BRT) FOR YEMEN

TECHNOLOGY DESCRIPTION

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A BRT[1] system is a high-capacity transport system with dedicated lanes for bus transit. It consists of a systematic combination of infrastructure (bus ways, stations, terminals) with organized operations and intelligent technologies (buses with high capacity) to provide a higher quality experience than traditional bus operations.

BRT systems can make an important contribution to a sustainable urban transport system, particularly if combined with clean bus technologies. It is more energy efficient than conventional buses (per person/kilometre), due to the higher speeds and higher capacity buses.

CURRENT TECHNOLOGY READINESS LEVEL OR COMMERCIAL READINESS INDEX

Yemen has no public transit; it has only a semi-formal transportation system. This system consists of semi-formal mini-buses (paratransit). The operational form of semi-formal transportation is privately owned buses which are a source of income for thousands of families. The role of the local branches of the Ministry of Transportation is confined to limited organizational, taxing, and regulatory aspects.

The Technology Readiness Level (TRL) of BRT in Yemen is between 3-4 due to the fact that the system does not exist in Yemen, it is still in the conceptual and planning stages to be implemented due to several barriers such as financial, technical, and institutional challenges. The Commercial Readiness Index (CRI) of BRT in Yemen is between 1-2. The market conditions for BRT are not fully developed in Yemen. There are no commercial BRT operations currently active, and the emphasis is on creating the enabling frameworks to make such a system feasible in the future.

CLIMATE RATIONALE OF THE TECHNOLOGY

Transport, alongside energy, is the major sector contributing to GHG emissions due to high fuel consumption. The transport sector is also the second largest sector that consumes fossil fuels to meet the energy demand, through the combustion process.

The demand for road transportation will likely increase in Yemen over the coming years. The number of all types of vehicles was estimated to be around 891 736 in 2010, and reached 1 091 899 vehicles in 2013, a growth of around 22%, and the number of motorbikes was 99 410 in 2010 and reached 131 412 in 2013 a growth of 32%. However, passenger road transportation accounts for 65.31% of the number of vehicles while Road Freight Transportation accounts for the remaining 34.69%.

Passenger public transportation is classified into two types: taxis and buses. The number of vehicles used for public Road Transportation for the Base Year 2010 is 123,330, and 37,958 vehicles respectively. Therefore, Passenger Road Transportation accounts for 65.31% of the number of vehicles.

[1] BRT is a 12-metre bus, that uses diesel, gasoline, alternative fuels, and electricity.

Figure 1: Energy Consumed by passenger and freight transportation for the base year 2010

Transportation Type	Transport Via	Type of Fuel Used	Share of Energy	Consumption as (%) of Total
Buses	Road	Diesel	18.7516	10.02
Taxies	Road	Benzene	15.7943	8.44

Considering the data above, Yemen must prioritize the adoption of a BRT system that minimizes GHG emissions, reduces fuel consumption, mitigates air pollution, enhances adaptability to climate impacts, and progresses toward greater environmental sustainability. By investing in such technologies, Yemen can make substantial strides in achieving a resilient and low-carbon transport sector that aligns with national and international climate goals.

AMBITION OF THE TECHNOLOGY

SCALE FOR IMPLEMENTATION AND TIMELINE

This technology – BRT can be implemented in all major cities throughout the country, it is expected to cover most of the major cities in the country by 2040. The target is to start the implementation of at least two systems in two cities by 2035.

AMBITION FOR TECHNOLOGY READINESS LEVEL OR COMMERCIAL READINESS INDEX

The ambition for the Technology Readiness Level (TRL) is to advance the BRT system to TRL 8-9, where the technology becomes fully operational and integrated into urban transport systems. This will involve Ambition for the Commercial Readiness Index (CRI) to CRI 5-6, where the system becomes commercially viable and self-sustaining.

EXPECTED IMPACTS OF THE TECHNOLOGY

The implementation of a BRT system has several anticipated impacts, both environmentally, socially and economically. They are:

- Decreases reliance on private vehicle use thus reducing the consumption of fossil fuels, so the CO_2 will be reduced.
- Lowers health risks for urban populations through better air quality.
- Decreases traffic congestion, enhancing road efficiency.
- Creates jobs in construction, maintenance, and BRT operations
- Provides cost-effective transport, reducing commuting expenses for residents.
- Promotes social equity by offering affordable, accessible transport for low-income communities.
- Enhances connectivity, reducing travel times and increasing access to jobs, schools, and healthcare.

POLICY ACTIONS FOR TECHNOLOGY IMPLEMENTATION

EXISTING POLICIES IN RELATION TO THE TECHNOLOGY

Legislation and by-laws regulating the transport system in Yemen are either virtually non-existent or remain unenforced due to the ongoing political conflict. Only a limited number of laws and regulations address road transport, focusing primarily on the movement of people and goods between Yemeni cities and outlining the roles of institutions within the transport sector. However, access to some of these laws has been restricted since the onset of the conflict in 2015, as official government websites remain blocked. This review provides a summary of the relevant legislation, highlighting key points related to transport technologies.1-Minister of Transport Decision No. (137) of 2009 regarding the regulations, procedures, and requirements for licensing the practice of technical inspection activities for road transport vehicles: The law discusses some issues related to the requirements for light and medium-duty transportation

inspection and operation. It mandates the use of technical inspection devices to measure and monitor vehicle emissions, including gases from petrol, diesel, and gas-powered vehicles to adhere to environmental protection laws to minimize pollution from transportation is required. Vehicles joining the system must not exceed a lifespan of three years, with an optional one-year extension, and can operate within a facility for up to five years, extendable by one year. Strict adherence to environmental protection laws to minimize pollution from transportation is required.

2-Ministerial Resolution No. (68) of 2009 regarding the regulation of land transport activities for passengers by buses: The law discusses some issues related to requirements for practicing land transport activities. It emphasizes obtaining the necessary permits, providing suitable parking for buses, and maintaining comprehensive operating schedules detailing routes, stops, and times while complying with traffic laws. It mandates ongoing inspections and periodic maintenance of buses to ensure technical readiness and adherence to safety and security protocols before each trip.

3-Republican Decree No. (291) of 2008 establishing the General Authority for Regulating Land Transport Affairs: The law discusses some issues related to the need to define the main road transport networks according to set standards. It also mandates the examination of imported transport means to ensure compliance with specifications, preventing entry of non-compliant vehicles to reduce environmental pollution in line with protection laws.

4-Law No. (33) of 2003 regarding land transport: The law discusses some issues related to developing and organizing land transportation services to support economic development. It includes preparing plans based on population needs, conducting studies for city and intercity transport conditions, and creating solutions. It emphasizes determining transportation departure and parking locations, complying with traffic laws regarding vehicle weights and dimensions, and organizing waiting and parking areas. It promotes investment expansion in transportation and stresses the necessity of providing buses specifically designed for urban transit.

5-Republican Decree No. (265) of 1997 regarding the organizational regulations of the Ministry of Transport: The law discusses some issues related to the preparation of studies for project establishment, development, and follow-up, alongside promoting investment in land transportation activities. It emphasizes organizing and enhancing transportation services to identify suitable transport means and proposes strategic growth plans. Developing data-driven programs and technical studies on transportation use and its impact on roads and the environment is also essential.

All the articles in these laws discuss the general issues related to road transport and the role of all the entities related to the transport sector. Unfortunately, there is no sufficient legal and regulatory framework for the transport sector, especially public transport. Therefore, there is a need for specific laws.

PROPOSED POLICIES TO ENHANCE TECHNOLOGY IMPLEMENTATION

1. Updating the regulations and policies of the transport sector, and developing specific policies for BRT deployment, and operation management such as to:
   - ✓ Establish a comprehensive policy that prioritizes sustainable public transport, including BRT.
   - ✓ Integrate BRT systems into Nationally Determined Contributions (NDCs) to support climate resilience goals.
   - ✓ Create or amend traffic laws to prioritize BRT lanes with clear rules for exclusive use, enhancing efficiency and travel time.
   - ✓ Implement laws linking public transit projects to environmental benefits, reducing greenhouse gas emissions, and improving air quality to ensure BRT systems implementation.
   - ✓ Create regulations for efficient space allocation in urban areas for exclusive BRT lanes and mandate the inclusion of BRT facilities, such as dedicated lanes, stations, and signal prioritization, in road construction and urban development projects.
2. Development of financial mechanisms to facilitate investment in BRT projects through PPPs, enabling private sector participation in funding and operations such as to:

- ✓ Introduce policies that provide subsidies or financial incentives for BRT infrastructure, such as grants or low-interest loans.
- ✓ Introduce policies that Offer tax breaks or incentives for companies involved in constructing and maintaining BRT infrastructure.

USEFUL INFORMATION

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LINKS TO TNA REPORTS

https://tech-action.unepccc.org/country/yemen/