Prospects for “Decarbonization” of African Transport

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African CO₂ emissions from transport

- Africa responsible for 3% of world’s CO₂ emissions, and 4% of world’s transport-related CO₂ emissions, in 2014
  - Up from 3% in 2005
- Transport responsible for 26% of all CO₂ emissions in Africa in 2014
  - Up from 23% in 2005
  - Higher than World average of 23%
- 95% of emissions in sector in Africa comes from road vehicles
- Total per capita transport-related CO₂ emissions in Africa = 24% total transport related per capita CO₂ emissions worldwide

Source: IEA
Decomposing “Decarbonization”: Technical-based approach

Activity
Brawn
Carbon

Activity
Structure
Intensity
Fuel mix

VKT * emissions per VKT
Policy-based decomposition

**EASI conceptual framework**

**ENABLE**
Establish an effective and responsible governance system with adequate:
- institutions,
- human resources,
- financing.

**AVOID**
Minimize the need for individual motorized travel through adequate land-use and transport planning and management.

**SHIFT**
Increase or maintain shares of more socially & environmentally sustainable modes (public transport, walking, cycling).

**IMPROVE**
Improve the efficiency and safety of transport modes & services while minimizing their environmental footprint.

- **Governance efficiency**
- **Land use efficiency**
- **Multimodal transport system efficiency**
- **Road space use & vehicle efficiency**
Avoid – head off need for motorized transport

- Ideal approach:
  - Compact
  - Dense
  - Mixed primary uses
  - Walkable
  - Cycleable
Avoid

- African reality
  - Infrastructure investment needed to shape cities; but cities grow faster than investment
  - Lack of basic pedestrian / cycling facilities
  - Land markets don’t function well
  - African cities don’t aggregate opportunities effectively; land-use homogenization
  - As cities develop articulated density, motorized travel likely to increase

Ibadan
Shift: motorized transport from low to high capacity vehicles – Urban Transport – Bus reform

- Ideal approach
  - Facilitate business models for PT operators
    - Frequency
    - Comfort
    - Affordability
  - Accumulate capital to invest in large capacity & high quality vehicles
Shift – Urban transport – Bus reform

- African Reality
  - Dominated by small-scale, slim margins
  - Weak public institutions
  - Varying degrees of auto-regulation
  - VKT higher than need be, because many low-capacity vehicles service demand
Shift – Urban Transport – Mass transport development

- Ideal approach
  - Hierarchies of transport services to channel movements toward high capacity corridors
Shift – Urban Transport – mass transport development

- African reality
  - Lack of adequate know-how and capacity to plan for and make decisions regarding mass transport
  - Lack of institutional capacity to manage mass transport development
  - Lack of investment finance capacity
Shift – Urban Transport – last mile connectivity

- Ideal approach -- develop an array of ICT-facilitated seamless mobility services to facilitate last mile connectivity
  - car-sharing
  - bike-sharing
  - van-sharing
  - taxis and shared-taxis
  - ICT enabled paratransit
- African reality – lots of potential, actually
Shift -- Freight transport – truck shipment consolidation

- Ideal approach
  - using ICT to consolidate trucking shipments earlier in logistics chain, and to minimize empty backhauling, to reduce truck VKT
Shift -- Freight transport – truck shipment consolidation

- African reality
  - Low rural densities and sparseness of road networks limits opportunities for consolidation
  - Unbalanced directionality of goods flows in many road corridors in Africa makes empty backhauling almost inevitable
  - ICT access and innovation not as much a constraint as might be expected

![Graph showing transit to Chad through Douala](attachment:image.png)
Shift -- Freight transport – truck shipment consolidation

- Ideal approach
  - Develop rail freight corridors as viable alternatives to road-based corridors
Shift – Freight transport – mode shift to rail

- African reality
  - Most existing rail facilities are colonial-era facilities oriented toward moving bulk goods from sites of extraction to ports
  - Some development of Primate-city-to-Port lines (e.g. Addis Ababa to Djibouti), but economic viability lines is questionable.
  - Unbalanced directionality of goods flows is even more challenging for rail than trucking operations
Policy-based decomposition

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- Governance efficiency
- Land use efficiency
- Multimodal transport system efficiency
- Road space use & vehicle efficiency
Improve – the characteristics of vehicles and the systems they operate on

- Three strategic approaches
  - Improve energy efficiency of vehicles
  - Improve networks and operators so as to reduce number of accelerations per vehicle kilometer
    - Traffic management
    - Eco-driving
    - Internet of things / connected vehicles
  - Reduce carbon content of motor vehicle fuels and drive trains
    - Bio-diesel
    - Electric vehicles
Motorization in Africa

- Recent pilot study in Ethiopia and Kenya
  - Vehicle fleet growth in both countries increasing exponentially, dominated by 2nd hand cars and new two-wheelers
    - Ethiopia: Motorcycle growth rate of 25% per year, 85% of cars imported are 2nd hand
    - Kenya: 85% of cars and trucks imported are 2nd hand

Age profile of Kenya car fleet

Source: World Bank
Motorization management

- The process of shaping, through public policies and programs, the profile, quality and quantity of the motor vehicle fleet as motorization occurs
- Not widely or effectively practiced in Africa at present
Multiple dimensions of motorization management

- Outcomes (policy)
- Inflection points (politics)
- Viability (practicality)
How to head off growth in fossil fuel consumption from a 2nd hand fleet?

- Worldwide, estimate between 25 to 35 million light duty vehicles moving internationally as 2nd hand vehicles
- But very little is known about these vehicles – little data and research
- Fuel economy standards not appropriate
- Best mechanism is fiscal incentives such as feebates
12 key programs identified through the pilot study

- Motor vehicle information management system (MVIMS)
- Public engagement and sensitization
- Process to establish Dynamic Profile of Standards (DPOS) for emissions and fuel quality
- Process to establish DPOS for safety and fuel economy
- Import certification
- In-use inspection and maintenance
- Vigorous programs of on-road enforcement
- Mechanics’ training and certification
- Quality assurance measures for vehicle parts used in maintenance
- Development and enforcement of regulatory standards for vehicle body construction & modification
- Fuel quality testing regime and protocol
- End-of-Life Vehicles management