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**Extractive Industries and Sustainable Job Creation**

**Biofuel Potential for Transport Sector in Sudan**

By

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The views expressed are those of the author and do not necessarily reflect  
the views of UNCTAD.



**Republic of Sudan**  
**Ministry of Petroleum**  
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**Cubic Globe**



# Outline

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- **Introduction**
- **Transport Sector**
- **Natural resources**
- **Ethanol & Biodiesel**
- **Opportunity**
- **Way Forward**

# Introduction



## Background:

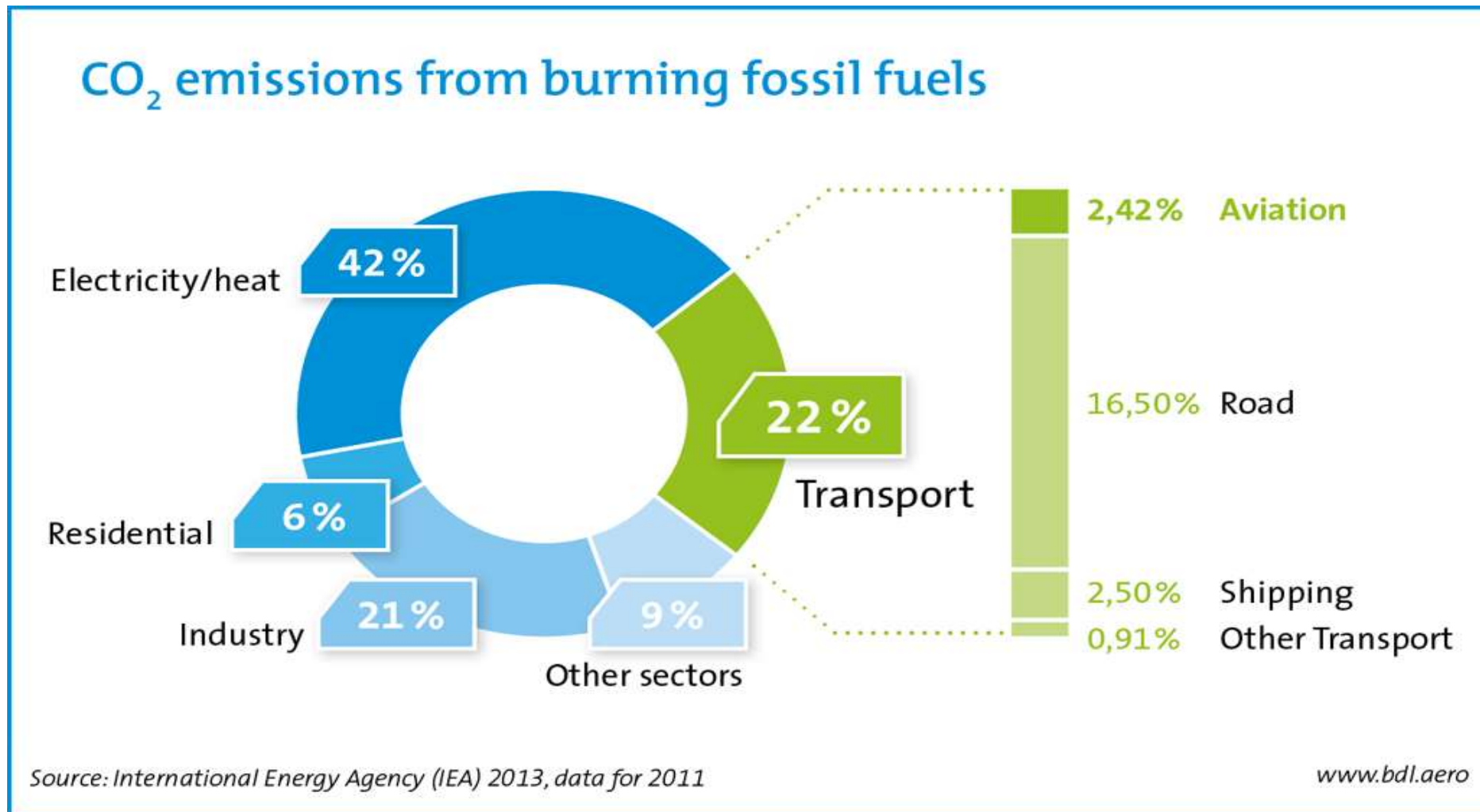
- Sudan has a total area of 1.88 M km<sup>2</sup>, and in 2014, total population was estimated at 35.5 million
- Urban population represents about 41% of the total population.
- Annual population growth rate are projected at 2.14% annually.

# Introduction (continued)

## Biofuel

- Increasing global interest in liquid biofuel

(Reducing GHGE, rural development & energy security)

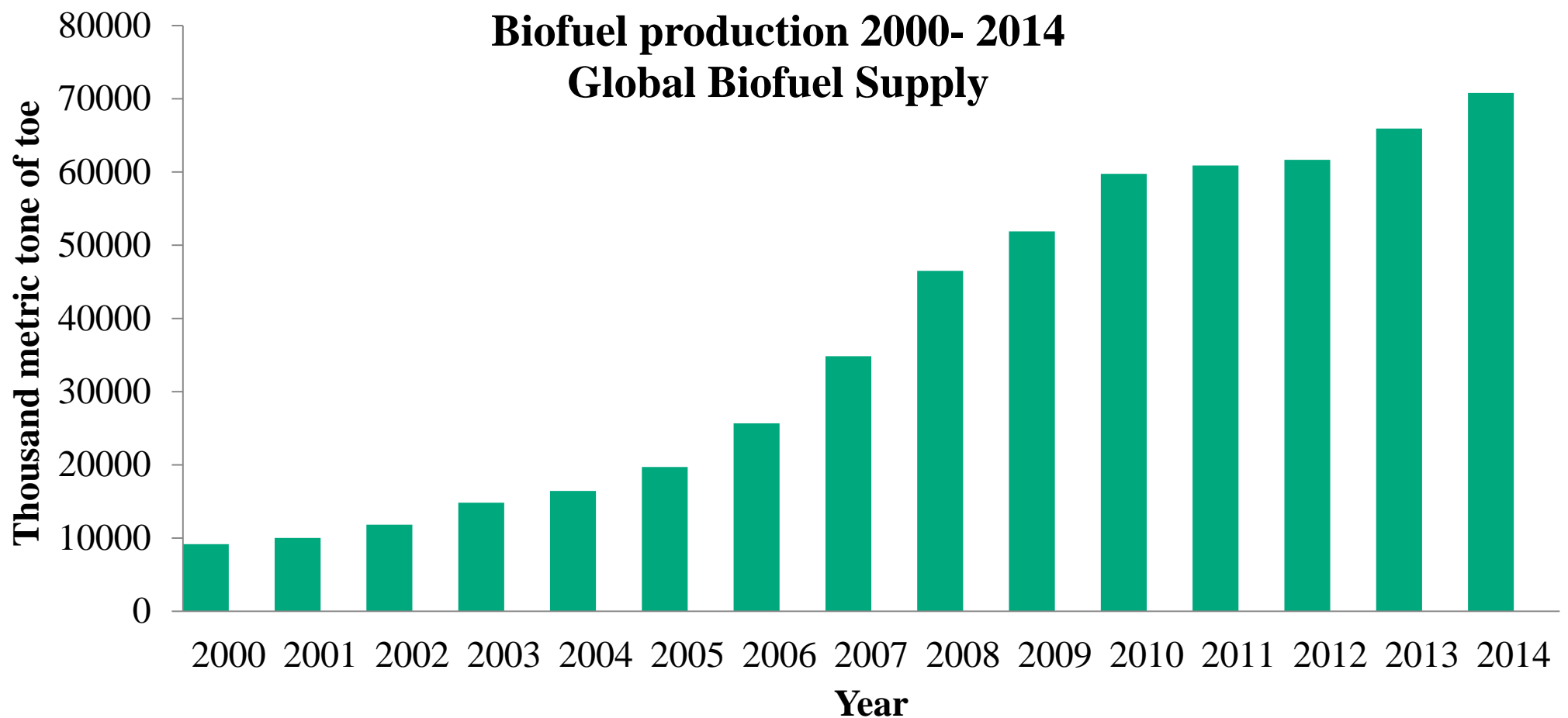


- Biofuels target the transport sector

(CO<sub>2</sub> emissions from transport >22% of world energy-related CO<sub>2</sub> emissions and 75% from Road transport)



# Introduction (continued)



## Global biofuel production grew rapidly in the last decade

- Reached 70.8 million toe in 2014
- 22% average annual growth 2000-10, but only 1.2% 2010-14

## Biofuels provide around 3% of total road transport fuel today

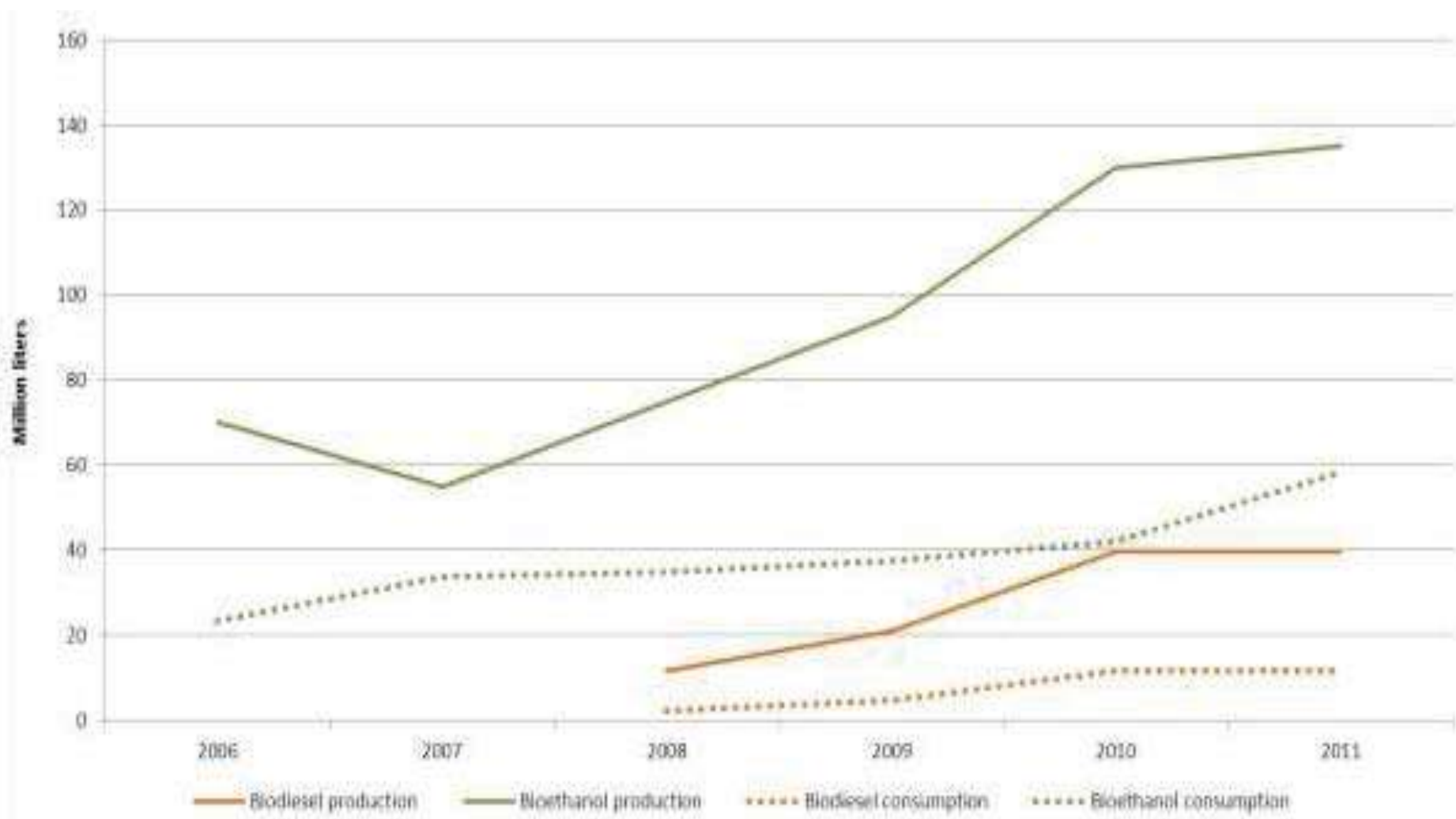
### Support policies main driver behind biofuel development

- more than 50 countries (including many developing countries) have now adopted blending mandates and targets

# Introduction (continued)

## Africa – Biofuels Market

African biofuel production and consumption in million liters



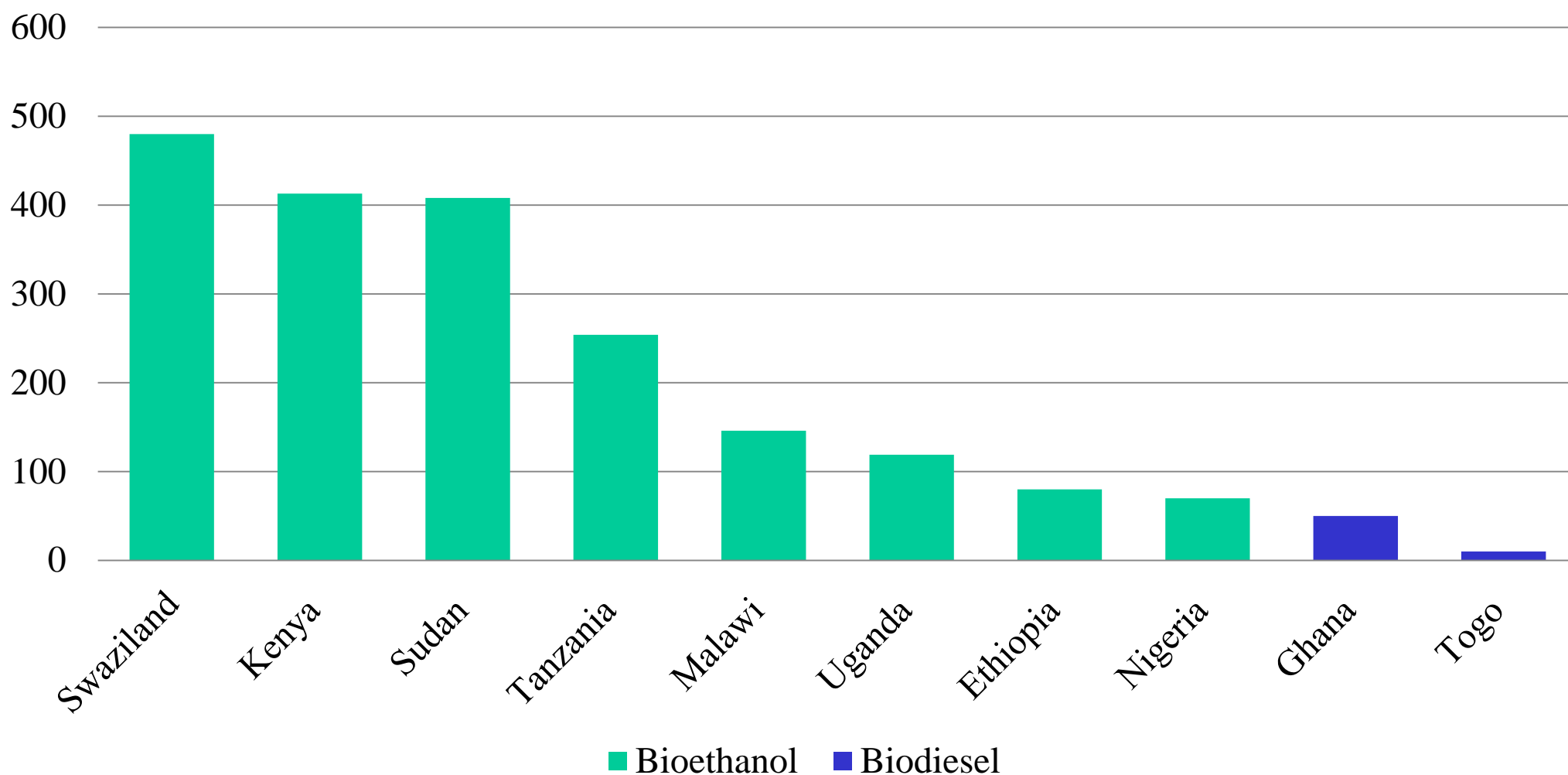
**Africa Produces 70 to 135 million liters, and 2.3 to 11.7 ML annually**

# Introduction (continued)

## Africa –State of Biofuel Development:

- Biofuels development in African has recently attracted considerable interest.
- The biofuels used today in Africa are ethanol and biodiesel, used to fuel car engines

### Biofuel Potential in selected African countries (ML)

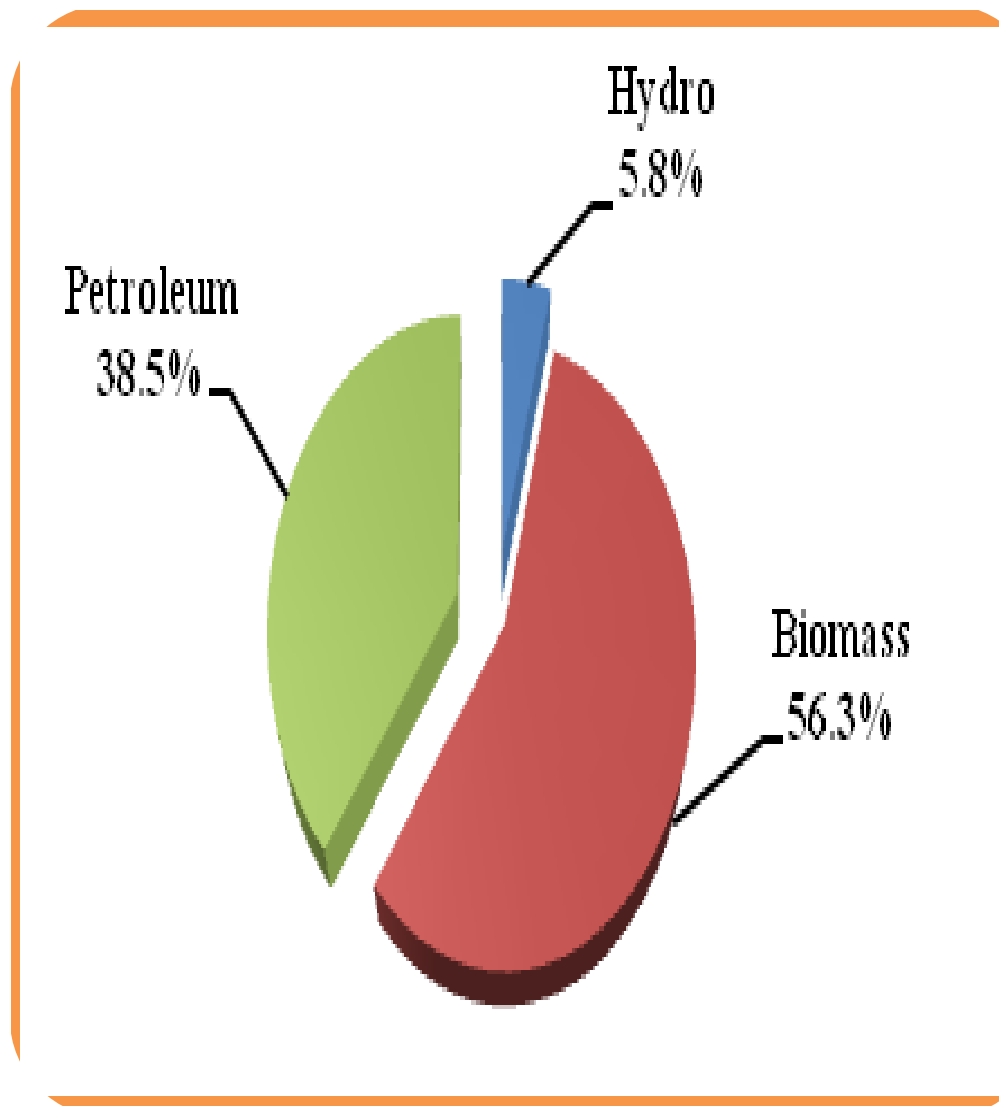




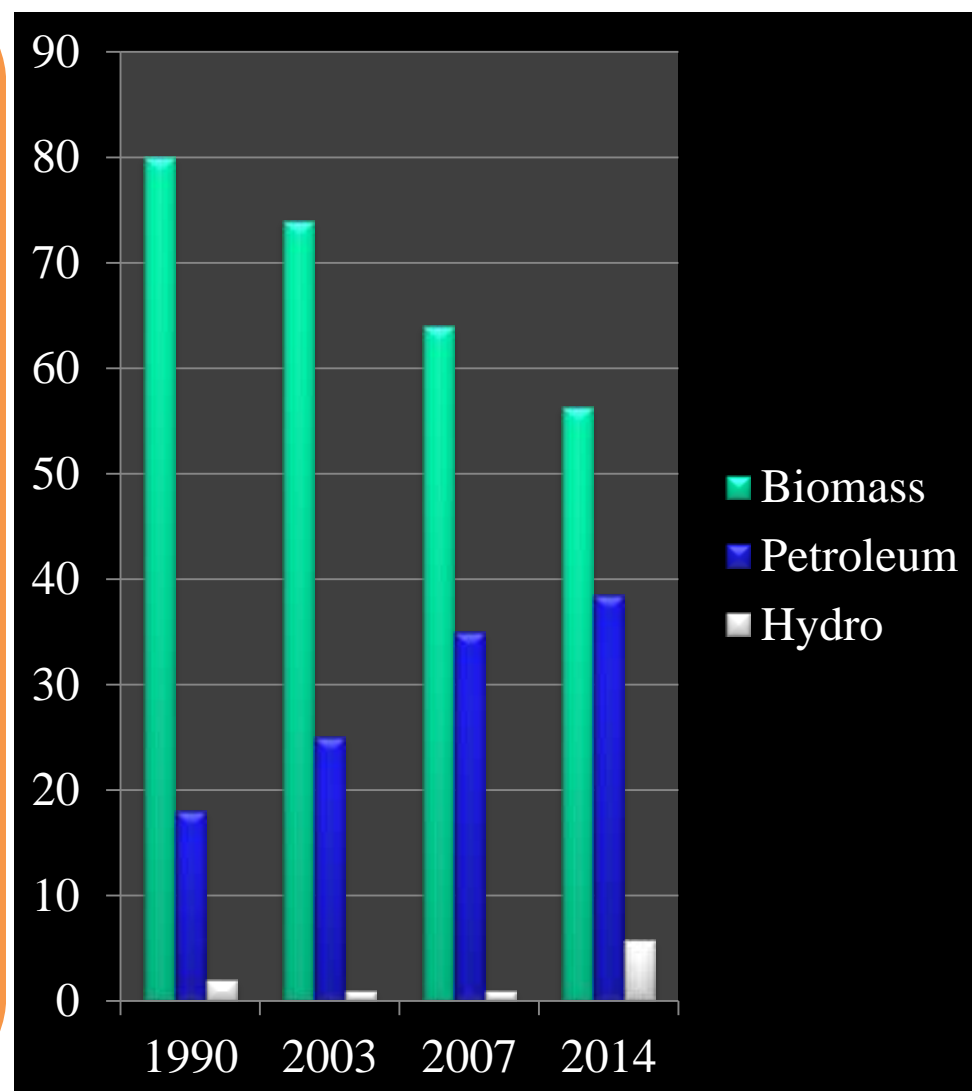
# Transport Sector

## Sudan Energy Balance:

- The primary energy is about 12.193 million toe, in 2014.
- Petroleum energy supply represented **18%** in 1990, and **38.5 %** of the total energy supply in 2014.



Energy Balance 2014

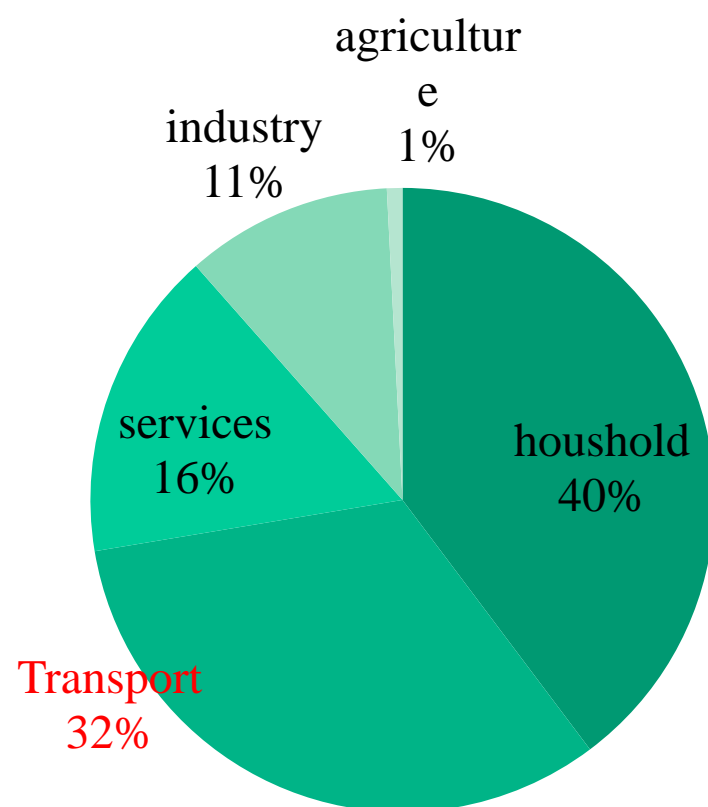


Energy Mix 1990-2014

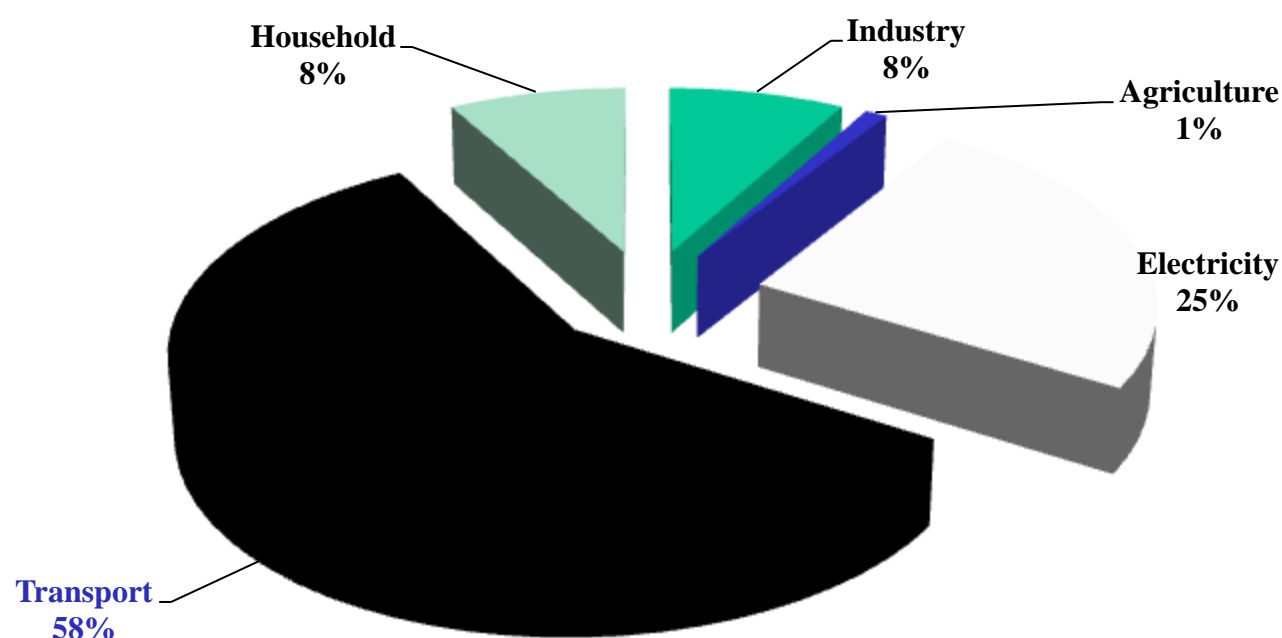
# Transport Sector (continued)

## Facts:

- In 2014, the share of this sector in the total final energy consumption in the country was **32%**.
- Transport sector uses petroleum products only.
- This sector is the biggest petroleum product consumer; it consumed about **58%** of the Petroleum supply



The main end use sectors

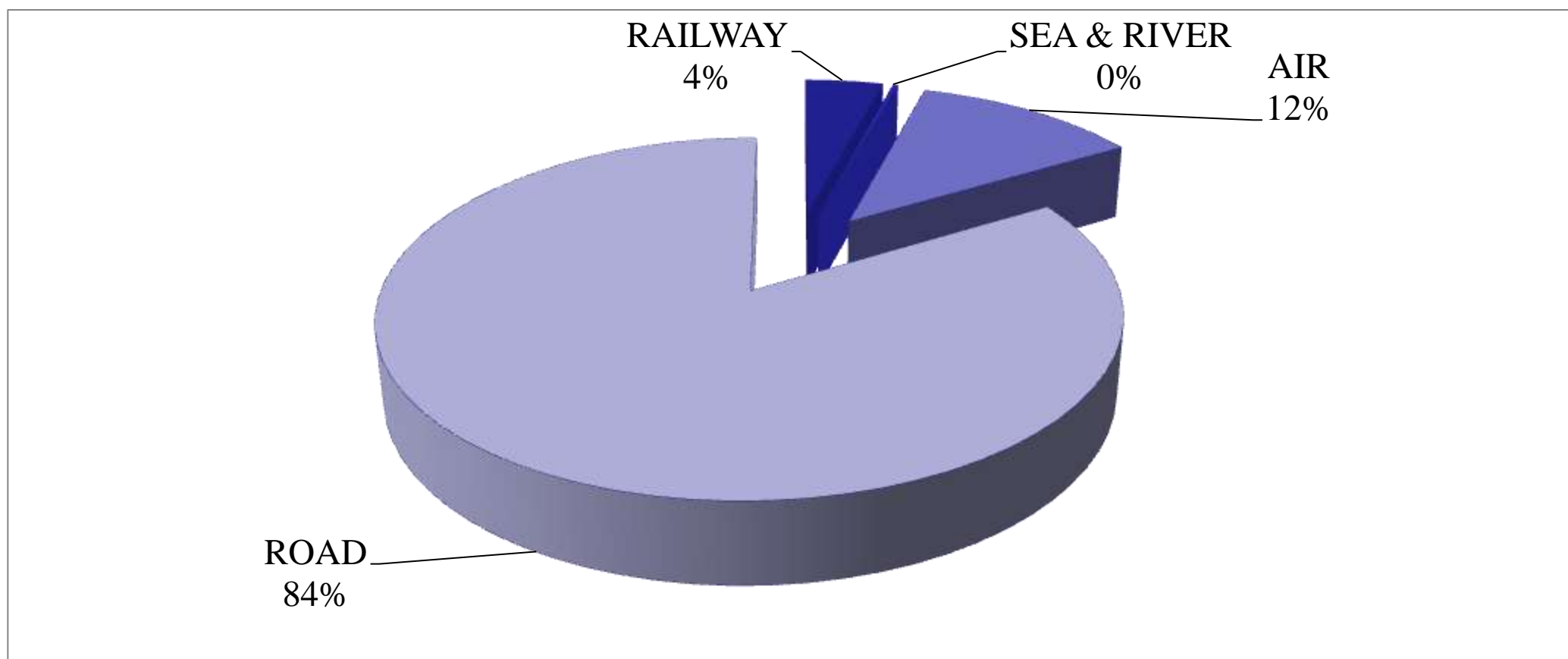


Petroleum consumption by Sectors.

# Transport Sector (continued)

## Road transport:

- The transport sector plays a vital role in various aspects of life (22% share on GDP within Service Sector)
- Road transport uses gasoline & diesel only.
- Road transport is the largest consumer in transport sector ( 84%)



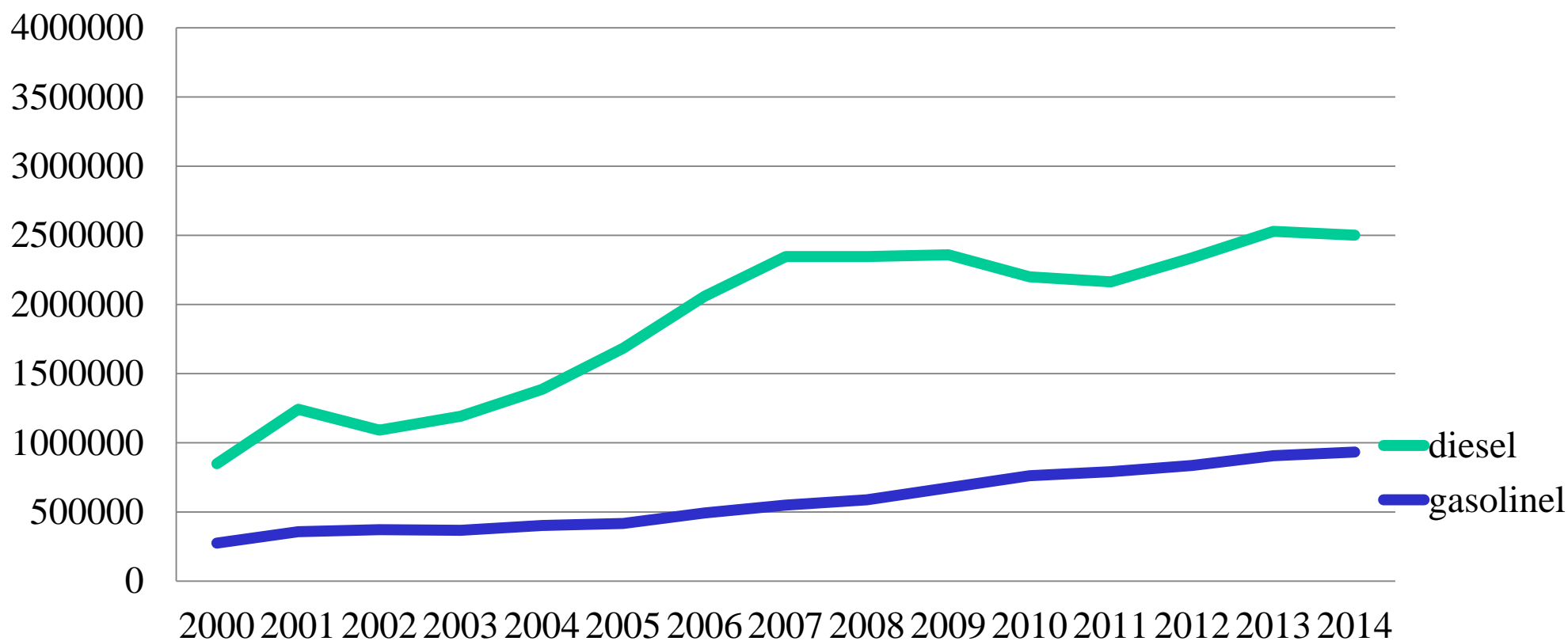


# Transport Sector – Future Prospect

We expect continued growth in the next few years:

## Factors include:

- 1: Increased interest and development in the agricultural sector.
- 2: The Transportation of human and agricultural products.
- 3: The continuous growth in the vehicles fleet that is powered by gasoline.



**Annual consumption of diesel and gasoline products(ton)  
during 2000 -2014**



# SUDAN: Why Biofuel Production?

The **Natural Resources** of Sudan that give it advantages on biofuel production:

- Soil and agricultural land.
- Water Resources.
- Climate.





# Natural resources (continued)

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## Soil and agricultural land:

- **Sandy soil:** North and West of Sudan, (cultivation of millet, peanuts, and sesame ).
- **Clay soil:** Mid and Eastern Sudan  
(cotton , rain-fed mechanized agriculture, and forest cover)
- **The mountainous area** (Jebel Marra)  
(cultivates crops such as strawberries and apples)
- **The Nuba Mountains**, which consists of several intermittent hills (Rain-fed mechanized agriculture).





# Natural resources (continued)

## Water Resources:

Rain	Surface water	Ground water	Treated water
<b>25 to 200 mm</b> (North to mid) <b>600 to 800 mm</b> (Green Belt area)	<b>Nile River system</b> (18.5 bnm <sup>3</sup> /y)	<b>&gt;than 50% of the area of Sudan</b> (15.2bnm <sup>3</sup> )	<b>Sewage &amp; Petroleum processes</b> (0.07bnm <sup>3</sup> )





# Natural resources (continued)

## Types of Climates:

- Desert climate and semi-desert dry
- The savanna climate poor average rainfall
- The savanna rich prolific climate rainfall
- The Mediterranean Sea
- Temperatures range between 45 degrees to 6 degrees



# ETHANOL: Current Development

## Current Activities:

- Sudan started blending ethanol with gasoline (E10)
- A draft law for biofuel prepared by national committee.
- Biofuel Studies & other related activities are part of the 2015-2016 Petroleum and Gas Ministry plan.



# ETHANOL: Production

## Ethanol production and forecast

Ethanol production in Sudan is based mainly on Sugar cane by-products.

➤ Sugar industry in Sudan is considered as a potential industry (655 thousand tonne)

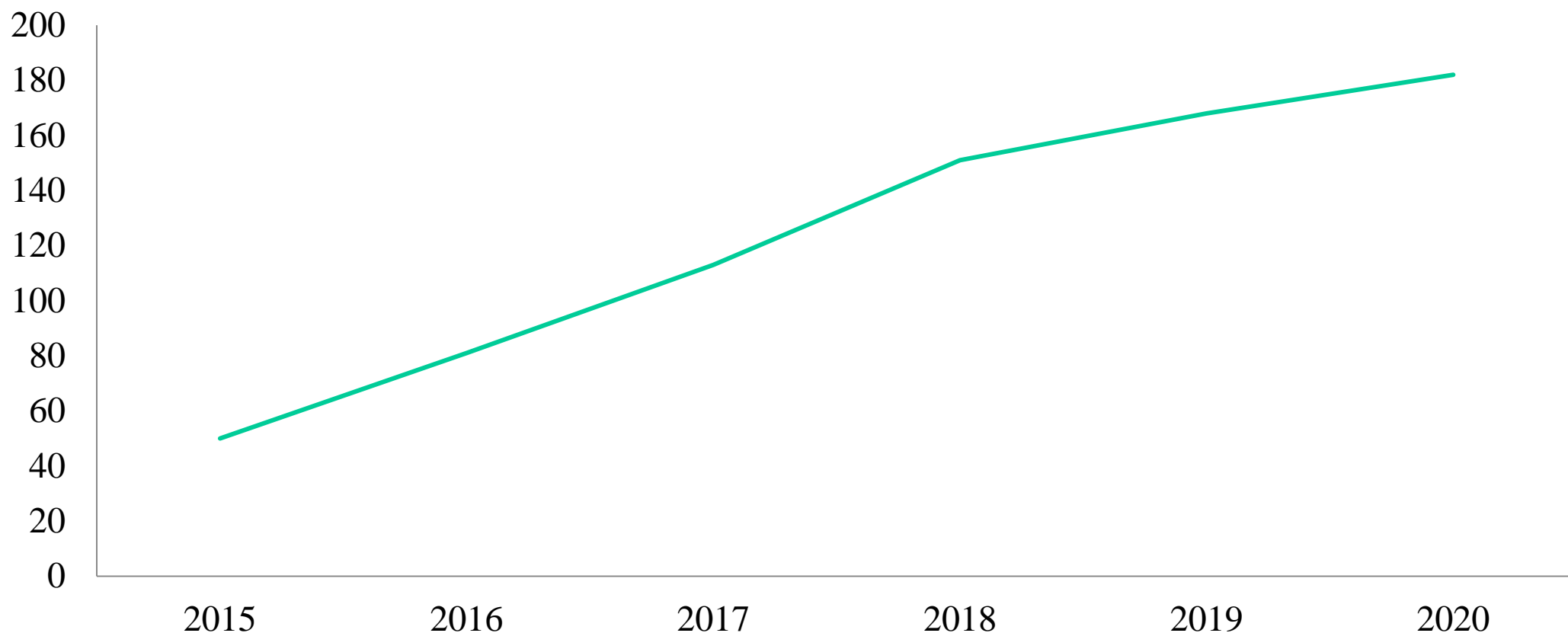
➤ Kennana sugar factory represents about 50% of the whole production, establish ethanol factory (65 ML).





# ETHANOL: Future development

## Ethanol production forecast:



➤ According to the Sugar Sector Strategic Plan 2020, Ethanol production will increase from existing factories, Kennana, Sudanese sugar corporation, white Nile and the new factories, **from 50 ML to 200 ML in 2020 strategy.**

# BIODIESEL

## Biodiesel raw material:

- The animal fat or vegetable oils are the main sources for the production of bio-diesel
- Sudan lies in the tropical zone where a lot of raw materials can be grown, (crops include soybeans, Jatropha).
- Confined to the Sudanese experience in biodiesel production the Jatropha have been cultivated on a small-scale farms.



(Jatropha tree grow in South Kordofan regions)



# Opportunities for Biofuel investments:

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1. Sudan has more than **60 million hectares of idle land**, cultivable through modern or traditional irrigation. Potential investment in innovative solutions can help advance biofuel production (Use of underground water and application of efficient water use technologies)
2. Jatropha, produced in deforested areas of the tropical forests, has great potential for the profitable production of biodiesel.
3. In turn, the Sudanese State has been promoting strategic partnerships for investment in the agribusinesses.
4. . Sudan has highly skilled human resources at low cost, which gives it a competitive advantage on an international level.



# Opportunities for Biofuel investments

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5. Rapid increase in fuel consumption (1.4 M ton of diesel & 1M ton of gasoline, opportunity for biofuel blending).

6. Sudan has the potential to become a major conduit for regional trade to landlocked countries such as Chad and South Sudan.

7. Vehicle sales expect steady growth at an annual average rate of 9.1%, (which will see sales reach 4,920 units by 2019)

8. The Sudanese investment Act of 2013

(The project of investment enjoys all privileges and would have all guarantees)

9. Agriculture Sector in Sudan

(It created 39% of the GDP, employed > 60% of the population).



# Way Forward

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- Strategic commitment to biofuels for transportation (Clear government policy regulations and incentives), are a pre-requisite for the development of the biofuels industry.
- The efforts could lead to sustainable biofuel for transportation.(Opening dialogues with environmental experts and NGOs. As well as getting closer to the on-going certification processes on biofuel industry).
- We need to study our potential in more details (and to seek or find a biodiesel plant that can grow on marginal area).



