THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

MINISTRY OF TRANSPORT

EXPERIENCE IN MEASURING TRANSPORT EMISSIONS

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The Ethiopian Climate-Resilient Green Economy Strategy (CRGE)

- **Why CRGE Path?**
  - Ethiopia Is experiencing the effects of climate change
  - Unsustainable use of natural resource
  - Current and expected domestic savings and foreign direct investments, grants, and transfers will not be sufficient to fund projected growth
  - Conventional development path could be financially challenging
  - Climate change presents the necessity and opportunity to switch to a new, sustainable development models

- The Government of the FDRE has therefore initiated the Climate-Resilient and Green Economy (CRGE) initiative to:
  - Protect the country from the adverse effects of climate change and
  - build a green economy that will help realize the ambition of reaching middle-income status by 2025
- The green economy component of the CRGE was completed and launched at the 17th COP in December 2011.
- The CRGE initiative follows a sectoral approach:
  - Agriculture, Forest, Power, Transport, industry and Buildings/green city

HOW TRANSPORT EMISSION IS MEASURED

1. Working arrangements

- The transport Sectoral Technical committee (STC) was composed of experts from relevant organization/sectors
- The WG met-2 days/week to take task & approve the works done
- Close follow up and Involvement by officials from MOT

2. Works done by the STC

- Measuring the base line emission for 2010
- Projecting emissions for 2011-2030 based on a “Business as Usual (BAU)” scenario
- Identifying and quantifying mitigation levers
- Evaluating the Cost and feasibility of levers
- Developing work plan for implementation

3. Sources of data and Vehicle classification

- Main Sources of data
  - Accountable organization to MOT
  - Growth and transformation plan of Ethiopia (2012/2011-2014/2015)
  - National Transport master plan
  - Addis Ababa city transport policy
  - Ethiopian petroleum enterprise
  - Passenger and freight transport associations
  - Revenue and customs authority
  - Vehicle importers
  - Internet (mainly for studies and other countries experiences)

•Vehicle Classification

Passenger transport	Freight transport
1.Intra-city ✓Taxi (3-wheelers, small, mini, midi, maxi) ✓Motorcycles ✓Private autos ✓Field Vehicles	**1. Dry cargo inland** ✓5-19 quintals trucks ✓20-34 quintal trucks ✓35-69 quintals trucks ✓70+ quintals trucks ✓Rail
2. Inter-city ✓Bus-mini ✓Bus-midi ✓Bus-maxi ✓Rail ✓Air	**2. Liquid cargo inland** ✓Road trucks ✓Rail
3. International ✓Air	**3. International** ✓Sea ✓Rail

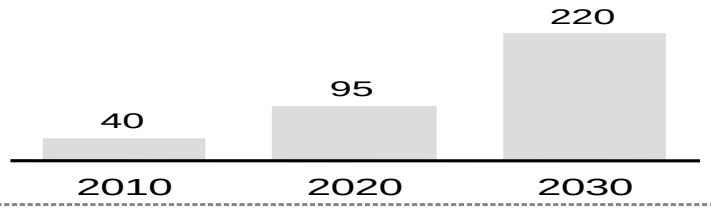
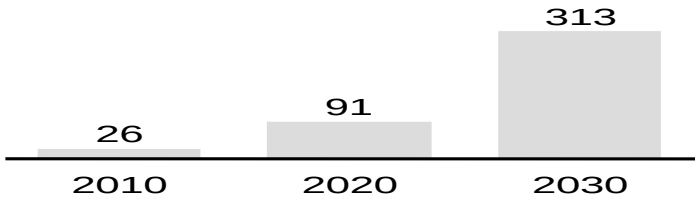
•*Each sub group is further classified by fuel type*

4. Main drivers of GHG emission

- Increase in tonne-kilometres of freight transported
  - » Annual growth rate ranging from 12.4%-13.7%.
- Increase in passenger-kilometres travelled
  - » an annual growth rate of 8.3%-9.1%

Transport – Evolution of the main transport emission drivers

Output overview

Key emissions drivers	Projected evolution	Rationale
Passenger-km travelled/year Billion passenger-km		? Increase in passenger-km travelled projected based on elasticity of passenger-km to real GDP, usingGTP GDP target extrapolated to 2030
Tonne-km of cargo transported/ year[1] Billion tonne-km		? Increase in tonnekm of cargo transported based on elasticity of passenger-km to real GDP, usingGTP GDP target extrapolated to 2030

Ethiopia CRGE, 2011

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5. **Baseline and BAU GHG emissions measurement**

- General assumption:
  - 250 Annual working days for medium and large trucks is assumed.
  - 300 Annual working days for all other vehicles is used.
  - 80% Fleet availability
  - Fuel economy for gasoline and diesel cars are different
- Emission factors:
  - For gasoline 2.4 kg co2e/L
  - For diesel 2.68 kgco2e/L
  - For jet fuel 2.7 kgc02/L

- **Emission Calculation:**

Passenger -kilometer or ton -kilometer per year =

Vehicle fleet *fleet availability* Km/vehicle/year * load factor

Fuel consumed per passenger or ton- km=

Fuel consumed/Km*load factor

Passenger Transport:

=Passenger- km per year*Fuel consumed per passenger or ton- km* emission factor

Freight Transport:

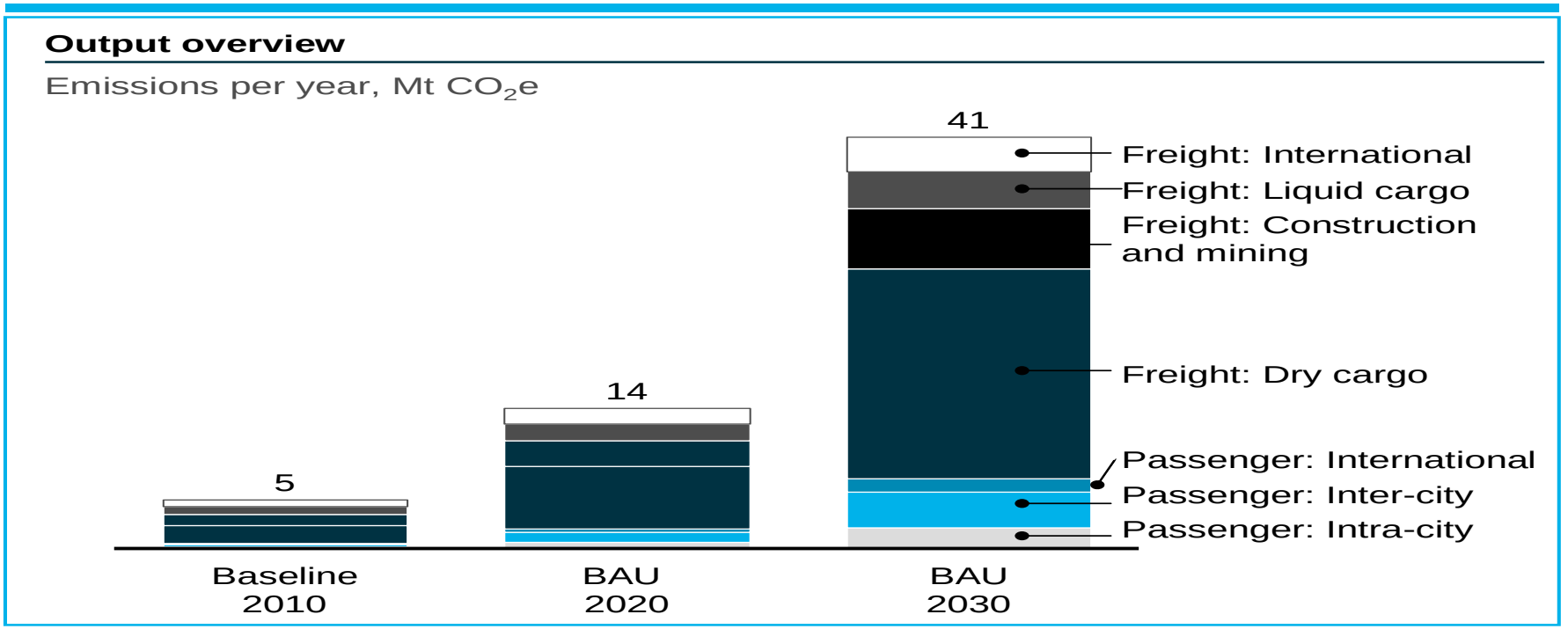
= Ton- km per year*Fuel consumed per passenger or ton- km* emission factor

Group	Sub Group	Mode	Class	Fuel consumed	Fuel economy -	p-km (t-km) - Million	Emission F - kgCO2e/L	EMISSIONS - MtCO2e
Passenger	Intra City	All	All			11309.86274		
0.0896		Road	All			11309.86274		
		Road	Private au	Gasoline		2656.144848		
			ICE standa	Gasoline	6	2656.144848	2.42	
			Hybrid	Gasoline	4.2	0	2.42	
			Plug in Ele	Electricity	0	0	0	
			E85	Gasoine	5.1	0	2.057	
		Road	Taxi - 3-W	Gasoline		281.34	2.42	
			ICE standa	Gasoline	2	281.34	2.42	
			Compress	CNG	1.5	0	1.5	
		Road	Taxi - sma	Gasoline	3	511.090965	2.42	
		Road	Taxi - min	Gasoline	1.630434783	4646.742766	2.42	
		Road	Taxi - mid	Diesel	1	1231.56	2.68	
		Road	Bus - Maxi	Diesel	0.416666667	1319.53536	2.68	
		Road	Bus Rapid	Diesel	0.375	0	2.68	
		Road	Bus Rapid	Electricity	0	0	0	
		Road	Field vehi	Diesel	3	553.068	2.68	
		Road	Motor Cyc	Gasoline	3	110.3808	2.42	
		Rail	Light Rail	Electricity	0	0	0	
0.0896	Inter City	All	All			18853.72511		
		Road	All			18670.75771		
		Road	Bus - mini	Diesel	2.142857143	8099.225707	2.68	
		Road	Bus - midi	Diesel	1	4926.24	2.68	
		Road	Bus - Maxi	Diesel	0.8	5092.224	2.68	
		Road	Field vehi	Diesel	3	553.068	2.68	
		Rail	Electric	Electricity	0	0	0	
		Air	All	Aviation gasoline		182.9674	2.42	
0.0896	Internatio	Air	All	Jet fuel		10132.1168	2.7	
Freight	Dry cargo	All	All			9085.305493		
0.1344		Road	All			9085.305493		
		Road	5-19 quint	Diesel	40	216.0855385	2.68	
		Road	20-34	Diesel	8.333333333	2309.561449	2.68	
		Road	35-69	Diesel	6	1654.922202	2.68	
		Road	70+	Diesel	5.714285714	4904.736302	2.68	
		Rail	Electric	Electricity	0	0	0	
		Air	All	Aviation gasoline		0	2.42	
0.1344	Construction and mining			Diesel	4	2782.08	2.68	
0.1344	Liquid car	All	All			1005.7216		
		Road	All	Diesel	4	1005.7216	2.68	
		Rail	Electric	Electricity	0	0	0	
		Pump	Electric	Electricity	0	0	0	
0.1344	Internatio	Sea	All	Fuel oil		12379	3	
		Rail	All	Electricity		0	0	
0.1344		Air	All	Jet fuel		490	2.7	

Emission calculation model

FINDINGS

Transport – Level of GHG emissions increases eightfold until 2030 under the business-as-usual scenario

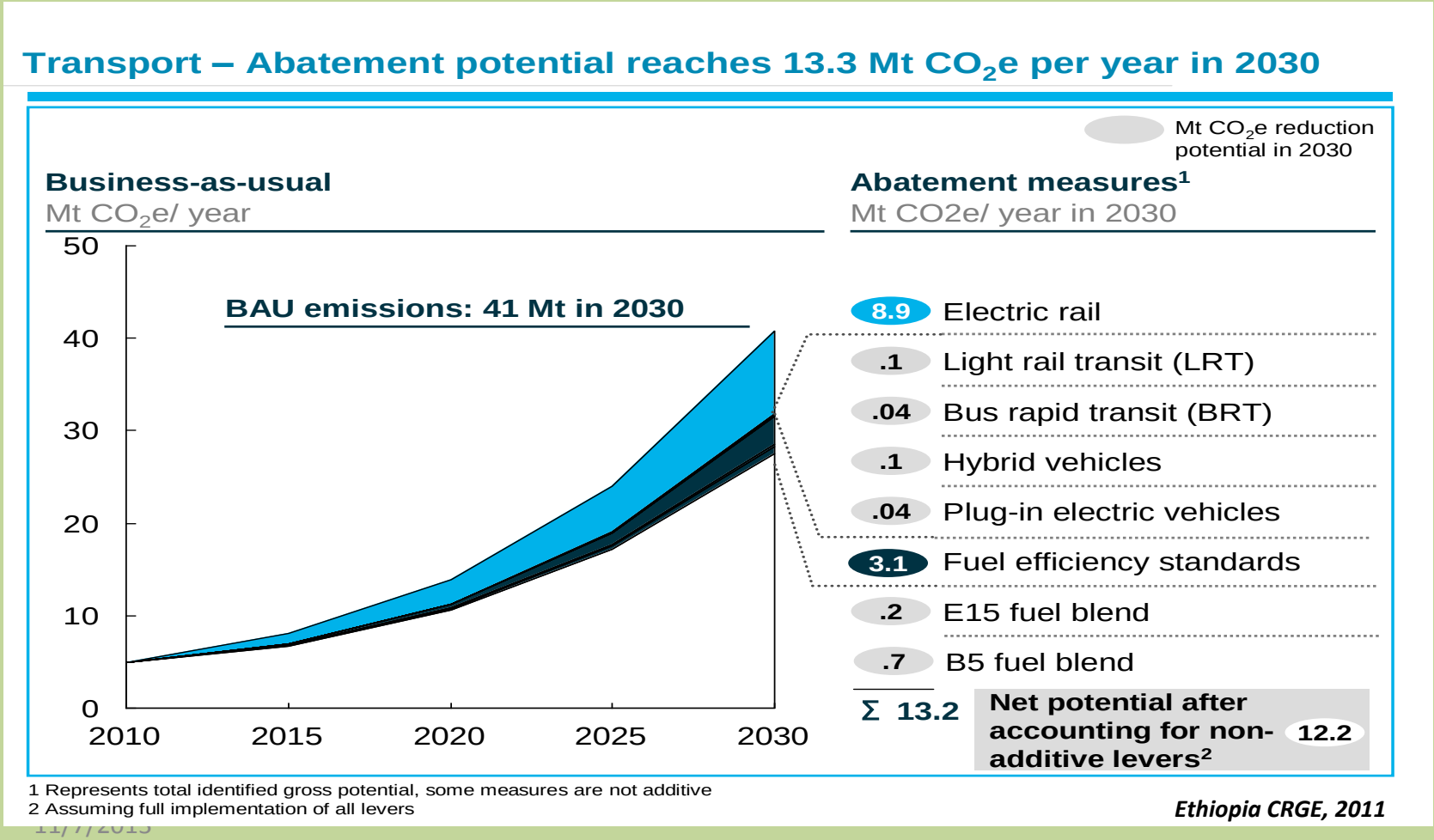


Ethiopia CRGE, 2011

- Road transport account for 70% of BAU emission in 2030

ABETMENT POTENTIAL IN THE TRANSPORT SECTOR

- In total, an abatement potential of up to 13.3 Mt CO_2e in 2030 has been identified



Thank You!!