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Parameter: CO2 Emissions (*Weightage: 40%)*

Industrial Revolution human activity has increased the concentration of greenhouse gases in the atmosphere. The atmospheric concentration of carbon dioxide (CO2) has increased by 31% since 1750 to levels that have not been exceeded during at least the past 420,000 years. The Intergovernmental Panel on Climate Change, established by the World Meteorological Organization and the United Nations Environment Program, has concluded that human activities which increase greenhouse gas concentrations are "enhancing" the natural greenhouse effect and resulting in a changing climate.

Thus it is essential to adopt "carbon-constrained future" in which the global production of greenhouse gas emissions will have to be limited.

The transport sector in 2002 used 21% of the worldwide all-sector total energy consumption and is projected to generate over 60% of the increase in total energy use through 2025 Increasing energy efficiency in the road transportation sector and the GHG emissions that it produces—is crucial to resolving these issues.

In an integrated approach, all road transport players have to be involved in the reduction of CO2 and pollutant emissions and where possible technical neutral approach should be followed.

Increasing the use of environmentally friendly and sustainable alternative energy sources like for example advanced biofuels (biodiesel, bioethanol, biomethane, synthetic biofuels), or renewable hydrogen and electricity are some of the essential fields of action.

The United Nations expect that between 2000 and 2030 the global vehicle population will double from 800 m to 1.6 billion vehicles. Given this growth it is essential to take action now to achieve a greater use of EFV's and advanced technologies.

Worldwide existing legislation and standards for CO2 /Fuel Economy

Regulations / Standards

Fuel economy or CO2 emissions standards are an effective way of overcoming the natural aversion to investing in fuel economy that result from the inherent instability of oil prices.

There is a range of approaches to standard setting across countries, and target rates of fuel economy improvement may differ but all have the same goal of promoting more efficient new cars. The current world wide fuel economy standards are summarized below.

Status of current worldwide CO2/ Fuel Economy Initiatives

Country Name	Remarks	Approach
Japan	**Top Runner Approach.2005 for diesel & 2010 for gasoline.** **The standards required a 19% improvement in fuel economy by 2010 (in L/100km; equal to a 23% increase in KM/L). In 2007, additional standards were introduced which require a similar 19% improvement in L/100km (24% increase in km/l) between 2004 and 2015**	**FE norms, weight based**
EPA, USA	**The United States introduced Corporate Average Fuel Economy (CAFE) standards in 1975. The recently passed EISA law in the United States will require a 40% increase in new car and light truck miles per gallon (about a 25% improvement in litres per 100 km) over 2007 levels by 2020.**	**FE norms**
CARB, USA	**Control for greenhouse gases from new motor vehicles sold in California in the 2009 and subsequent model years (average reduction of about 22% in MY 2012 and about 30 % in MY 2016). The following emissions are covered and expressed as CO2 equivalent ("CO2e" standards in g/mile):** • CO2- , CH4- and N2O emissions resulting from vehicle operation • Additional CO2 emissions resulting from the operation of the air conditioning system (indirect emissions) • Direct refrigerant emissions (e.g. leakage, scrappage) • Emissions of fuel production ("upstream emissions" ; benefits for LPG,E85 and H2 vehicles • CARB defies CO2e as the sum of vehicle greenhouse gases weighted by their global warming potentials (CO2+296 x N2O +23 x CH4) minus credits for optimized mobile A/C systems	**GHG Norms**
EU	**The objective of the regulation is to reach 120 g/km in 2015, as an average for the whole passenger car fleet (new vehicles), starting in 2012 (phase-in). This goal is splitted in 130 g/km based on type approval of M1 vehicles and 10 g/km related to the complementary measures (biofuels).**	**CO2 Norms, weight based**
China	**Fuel consumption std. applied to M1vehicles with more than 3.5 tons. 2 Sets of std. each for MT & AT. 2 phase implementation : Phase I started in 7/ 2005 for new approved models & 7/2006 for in production car models** **Phase II started in 1/2008 for new approved models & 1/2009 for in production car models. The authorities are planning to phase III fuel limits in 2011 & to initiate framing in the year end**	**FE norms for light duty commercial vehicles, weight based**
India	**Discussions are going on**	**Will be CO2 based**

SWOT ANALYSIS

The rating criteria for CO2 is shown below which is independent of mass, class, fuel, technology. This

	Strength	Weakness	Opportunity	Threat
CO2 Regulation	In line with current regulations	No EFV definition in itself	Third party certification possible	Only climate change is addressed and not air quality
Fuel Regulation	In Europe regulation of fuel quality is an accepted approach to define certain fuel parameters that are health and environmentally related	Not all world regions follow that method		
Top Runner approach	Sets energy efficiency targets and Accepted approach in Japan	Not world-wide harmonized	Short-term update of top-runner targets against time consuming standards setting.	Continuous definition update depending on local circumstances will lead to fragmentation.

rating is suggested only for M1 category vehicles. CO2, being the most important parameter, given the Maximum weightage of 40% in the total rating of the vehicle.

CO2 Rating in %	**CO2 Emission g/km**	**CO2 Rating in %**	**CO2 Emission g/km**
40	<=60	14	261 – 280
35	61 – 80	12	281 – 300
30	81 – 100	10	301 - 320
28	101 – 120	8	321 – 340
26	141 – 160	6	341 – 360
24	161 – 180	4	361 – 380
22	181 – 200	3	381 – 400
20	201 – 220	2	401 – 420
18	221 - 240	1	421 – 440
16	241 – 260	0	441 onwards

Type Approval Test Values should be considered for CO2 Rating. The values of the test can be directly compared against the values in the table to determine the CO2 rating.

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