



Hybrid GRPE workshop on the global harmonization of Heavy Duty fuel economy, energy consumption and range determination

Session 1 : Latest iterations of HDV Fuel Economy standards
- Global overview of Heavy Duty Fuel Economy standards -

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Background

OICA has requested the GRPE to promote harmonization of fuel efficiency regulations for heavy vehicles and has organized two workshops at the GRPE. Due to the interruption of activities caused by the Covid and other events, the GRPE has yet to initiate the development of harmonized fuel efficiency regulations for heavy vehicles. At last year's GRPE meeting, there was a request to resume this activity, and a workshop with government officials is scheduled to be held at GRPE in May to discuss the promotion of standards harmonization. Therefore, it is necessary to organize the current situation and compile requests as stakeholders for the workshop to be held in May.

Expert Meeting on 26th March

OICA organized the expert meeting to share the information and discuss about how to proceed the harmonization for HD fuel efficiency. Based on the discussion at this expert meeting, Workshop for HD fuel efficiency is prepared.



Expert Meeting on 26th March

Background

- As announced during January GRPE session, OICA organized on 26 March the first meeting of the so called «Ad Hoc Experts Group» to discuss the FE harmonization topic.
- Several delegations attended the meeting, among others the EU Commission, DG Clima, Japanese Government, GRPE Chair and Secretariat, etc.
- OICA made a presentation related to some key aspects:
 1. Purpose, background
 2. Status of fuel economy regulations
 3. Recent update
 - a. in Japan
 - b. in Europe
 - c. in US
 - d. in China
 - e. Schedule of different areas



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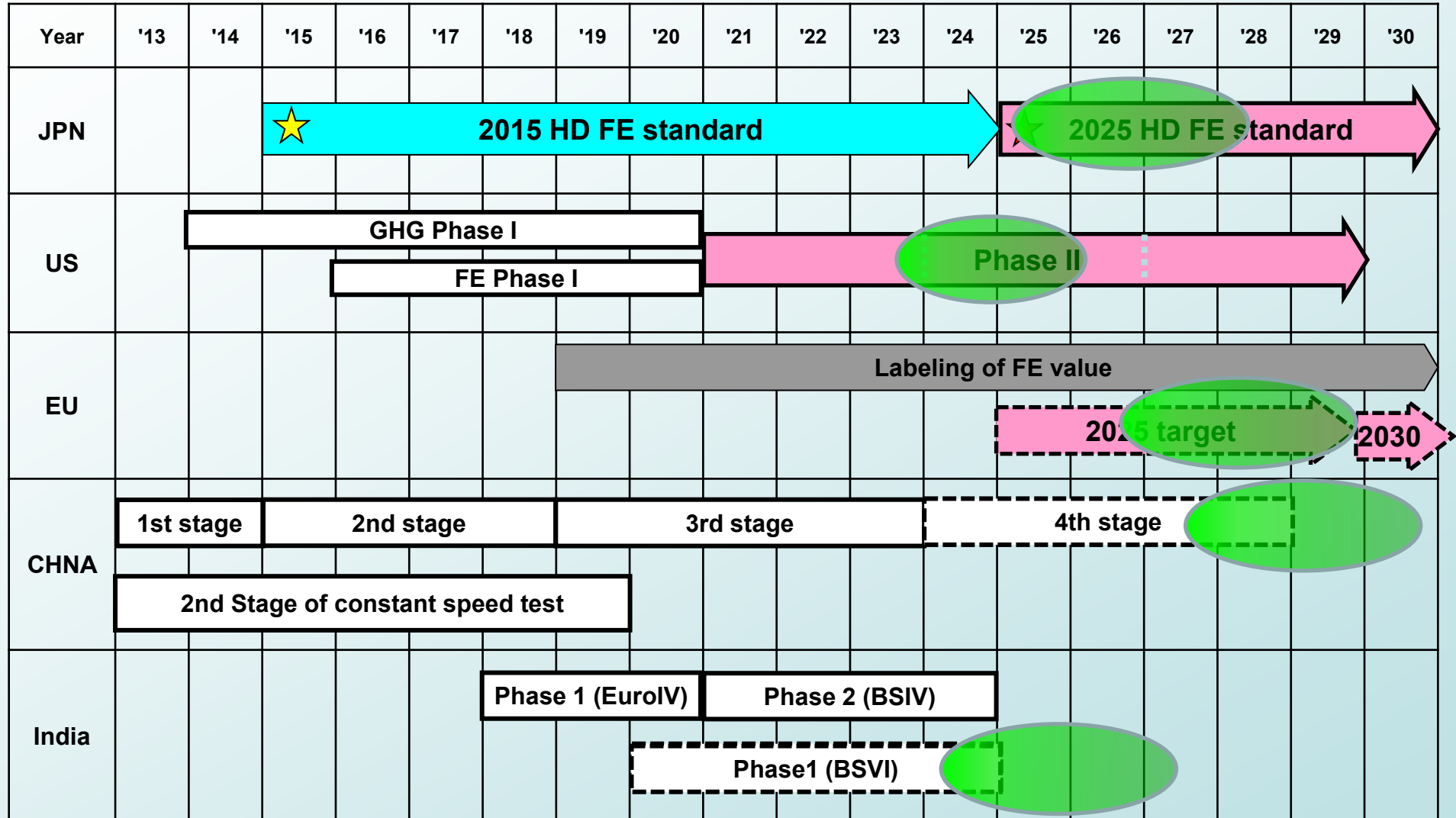
Expert Meeting on 26th March

Discussion at the Ad Hoc Experts Group of 23 March

- DG Clima (EU Commission) expects from OICA concrete proposals on the possibility of harmonization could be and where it will be difficult to harmonize; they asked to Industry to have already some ideas of harmonization during the workshop to avoid starting from the beginning.
- Target should be to select the parts of the legislations that could be harmonized, as there are a lot of differences all over the world, and it is needed to define what is the goal that we can realistically achieve.
- GRPE Secretariat briefly explained what the GRPE top table has in mind for the workshop:
 - An overview on FE harmonization worldwide: update since the last workshop in 2019-2020.
 - Possible inclusion of other GRs (like GRBP with Tyre rolling resistance)
 - Discussion of options to implement the proposals, i.e. 1958A / 1998A / Mutual Resolutions...
- GRPE Chairmen confirmed the need to have a clear picture on what we stand since 2019-2020, and see what's the goal after the workshop, e.g.:
 - start with some harmonization process
 - possible creation of an IWG
 - define the first steps of measurement
 - define the scope, activities, how to implement it (a Resolution? a UN GTR? UN regulation?)
 - to go step by step for harmonization.



HD FE regulatory schedule in each area



Legislation

Under consideration

Possibility of Rule making



Elements FE regulation including measurement method

Elements	Sub-Elements	Issues	Examples
FE Unit	-	Transport efficiency or Easily understandable unit	- km/L - ton.km/L
Others	Criteria	Limit of FE value or average value	- Averaged by number of sales (CAFE)
Vehicle classification	-	Simpler category is desired, but needs to reflect to real world complexity	- Vehicle type (Tractor, bus....etc) - GVW, type of cabin
Items of FE effect	-	Accuracy vs. cost of measurement Contribution for FE	- Engine, T/M - Aero dynamic and rolling resistance
Driving Mode	-	Vehicle speed base or road data base less complexity vs real world reflection	- Combination of two cycles - Unique mode for each vehicle type
Measurement Method	Chassis dynamometer	Chassis dynamometer measurement requires real vehicle	
	Simulation	Driver model is required for simulation	- Common calculation logic - Difference of steady and transient
	Engine measurement	Number of measurement points Transient operation effect	- CO2 measurement by engine - Engine FE map and simulation
	Aero dynamic measurement	Measurement methods Selection of vehicle type, rear body	- Coast down, steady speed drive - CFD - Wind tunnel
	Tyre rolling resistance	Measurement method, labeling	- Common tyre measurement method - How to handle a number of axes
	Others	Measurement method	- Driveline drag, Auxiliary drag, etc.



FE Elements in each Area

Item		Sub-item	Status of each region			
			EU	US (PHASE II)	China	Japan (Next FES)
Categorize			Vehicle type, Axles, Configurations, Weight	Weight Cab type	Vehicle type Weight	Vehicle type Weight
FE Unit			CO ₂ g/ton-km g/passenger-km	gal/1000ton-mile CO ₂ g/ton-mile	L/100km	km/L
FE Criteria			Targets in force since 2019 (revised in 2024) for 2030, 2035, 2040	Becomes strict every 3 years	Becoming strict in 2019	FES value around 2025 is decided this year
Mode			10type	ARB tangents 55,65 mph	C-WHVC	JE05, Inter city
Measurement method	Engine	Steady state Engine Map	100 points	70points for 55,65 mph	81 points	51 points
		Transient Engine Map	NA	Cycle average map	NA (Include chassis dyno)	NA
		Transient coefficient	WHTC correction factor tool	Include Cycle average map	NA (Include chassis dyno)	Table value 3%
	Powertrain	FE map with powertrain	For Hybrid, AT, AMT by simulation	For Hybrid, AT, AMT by powertrain test	NA	For Hybrid and AMT by simulation
	Gear	T/M efficiency	Table value or Measurement	Table value or Measurement	NA (Include chassis dyno)	Table value
		AT parts efficiency	Table value or Measurement	Include powertrain test method	NA (Include chassis dyno)	Table value or Measurement
		Axle efficiency	Table value or Measurement	Table value or Measurement	NA (Include chassis dyno)	Table value
	Aero Drag	Aero Drag measurement	Constant speed Simulation	Coast down Wind tunnel CFD	Table value (Opt. Wind tunnel or coast down)	Coast down or Constant speed
		Vehicle select method	Family Concept	?	?	Family Concept
	Tire	Resistance measurement	(EC) 1222/2009 = ISO28580	ISO 28580	Table value	Ranking by ISO 28580
		Resistance select Method	Direct input of tire RRC for each vehicle	Direct input of tire RRC for each vehicle	-	Averaging tire RRC to be used
	auxiliary parts		Generic or OEM-specific	?	NA	Only installed when measuring engine
	Determine FE value	Simulation	Input data & Logic	Input data and driver model is different based on item above		
Chassis dyno			NA	NA	Must family-representative vehicle	NA



Summary

- The elements that make up the fuel economy regulations of each country can be categorized into common items.
- These elements can be divided mainly into those related to market and government policies and those related to technical approaches.
- Due to the characteristics of heavy-duty vehicles, most regions have adopted a method of measuring devices that affect fuel efficiency and calculating fuel efficiency values by simulation or other means, rather than using the vehicle itself.
- In many regions, engine fuel consumption maps, vehicle aerodynamic drag measurements, and tire rolling resistance measurements are used to measure devices that have a large impact on fuel efficiency.



Thank You for the attention!