



Challenges posed by 2 wheelers for meeting next stage emission norms

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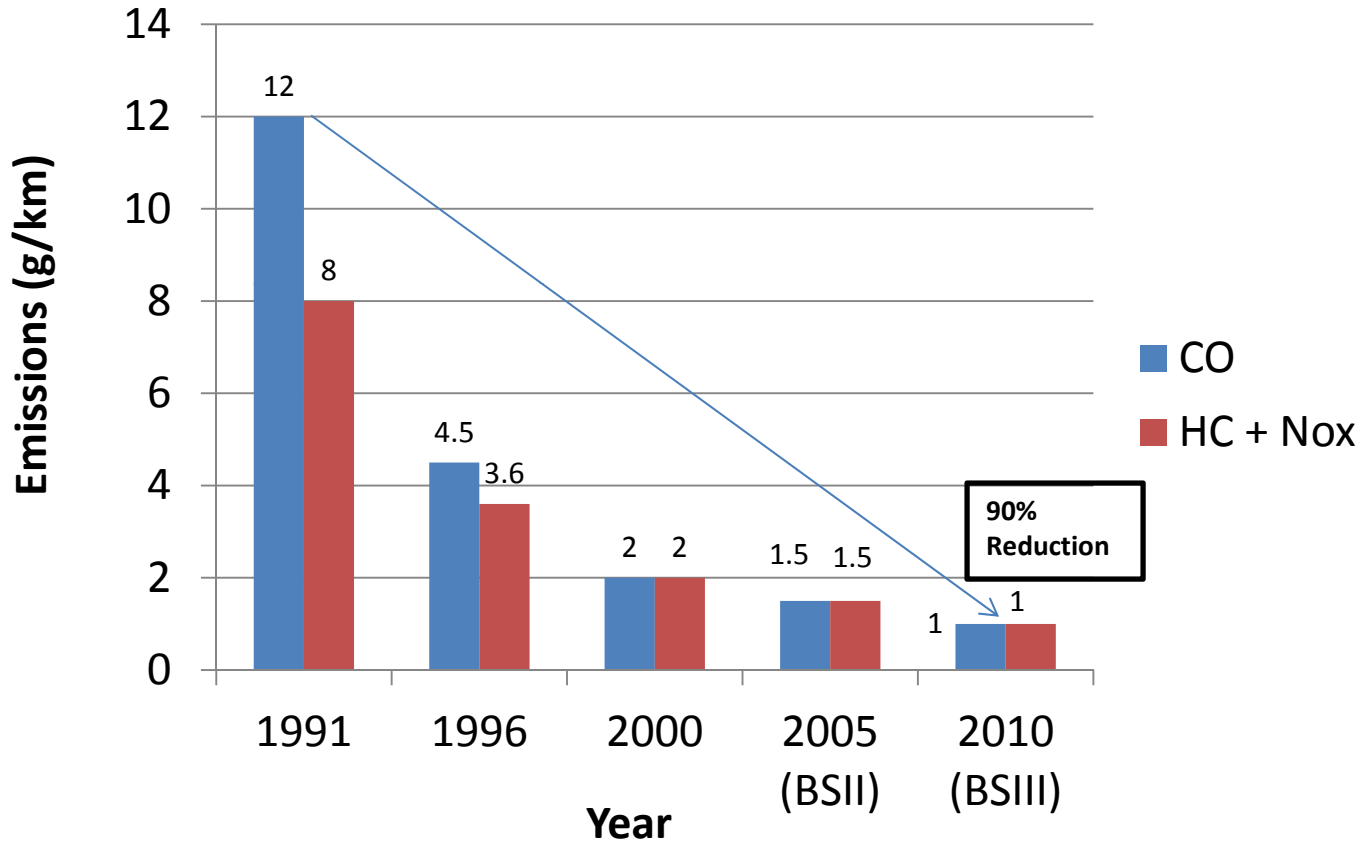


Background

- Emission regulations in India started in 1991
- Regulations based on Indian Drive Cycle (IDC) which was specially developed for 2 and 3 wheelers by ARAI in mid 80's
- Over the past few years, mass emission norms have been progressively made stringent
- Industry found it necessary to review test cycle and test procedures, as well as aligning with Global regulations



Indian Two Wheelers Emission Norms – Progression



Current BS III norm is considered to be one of the most stringent world wide



WORLDWIDE HARMONISED MOTORCYCLE TEST CYCLE

- Project started in 1999 in Europe
- In year 2000, brought under umbrella of UNECE WP.29 with establishment of WMTC informal group
- **Objective is to develop a worldwide harmonized motorcycle emission test procedure**
- Over the past few years India actively participated in this development along with EU, Japan, FAMI, USA and other international stake holders
- UNECE notified WMTC as a Global technical regulation (GTR 2)
- **Govt of India has issued the final notification in June 2012 introducing WMTC as an alternative regulation for BS III in India .**



Major differences between IDC and WMTC Test cycles

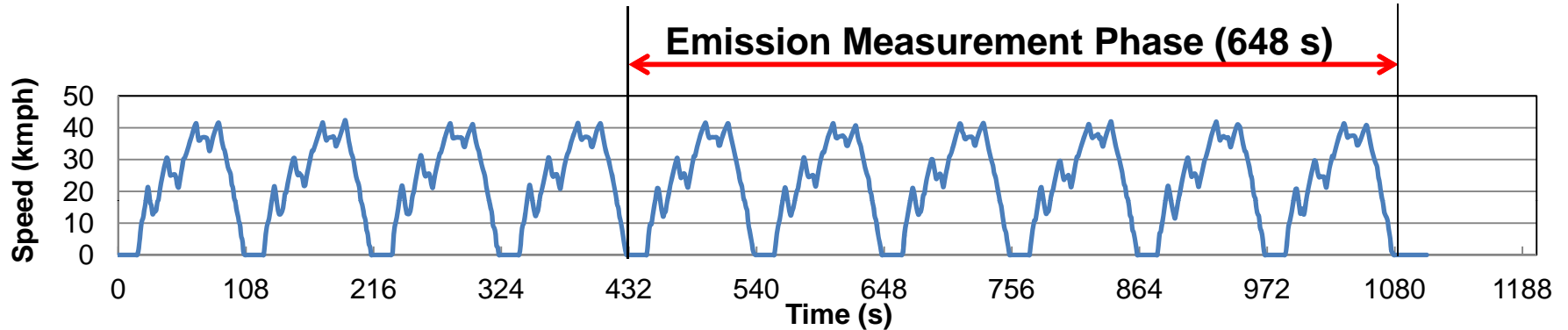
- While IDC is applicable to all motorcycles, WMTC categorises them into different classes (Class 1, 2 and 3) based on CC and max speed)
- specifies three different test cycles (Part 1, 2 and 3) applicable for different categories .
- An alternative set of cycles, which is to be used by low-powered motorcycles
- Totally new test cycles specifying higher max speeds, higher acceleration and deceleration ramps and very different time ratios compared to IDC test cycle
- WMTC specifies cold start condition as against warm start in

IDC

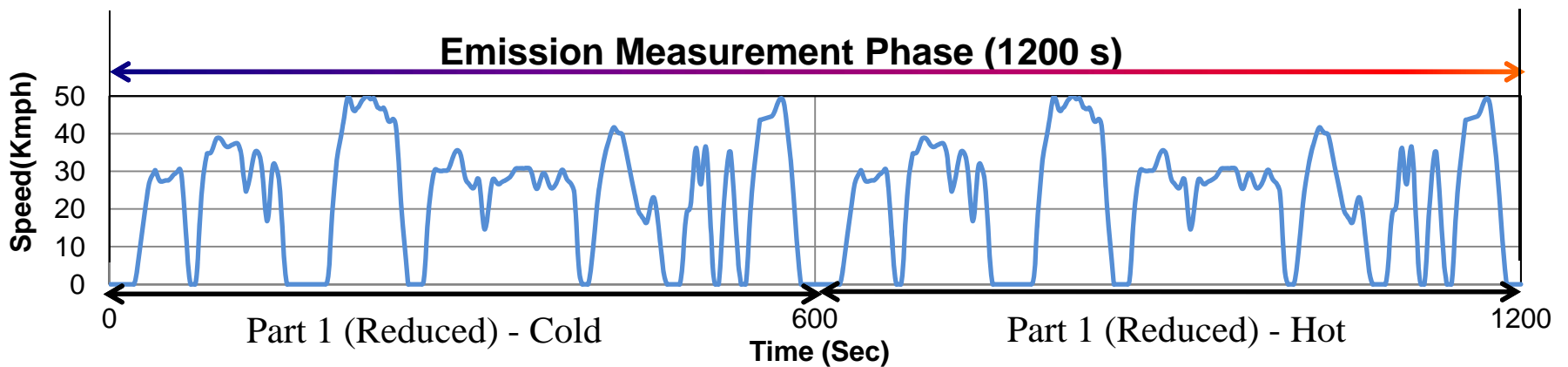


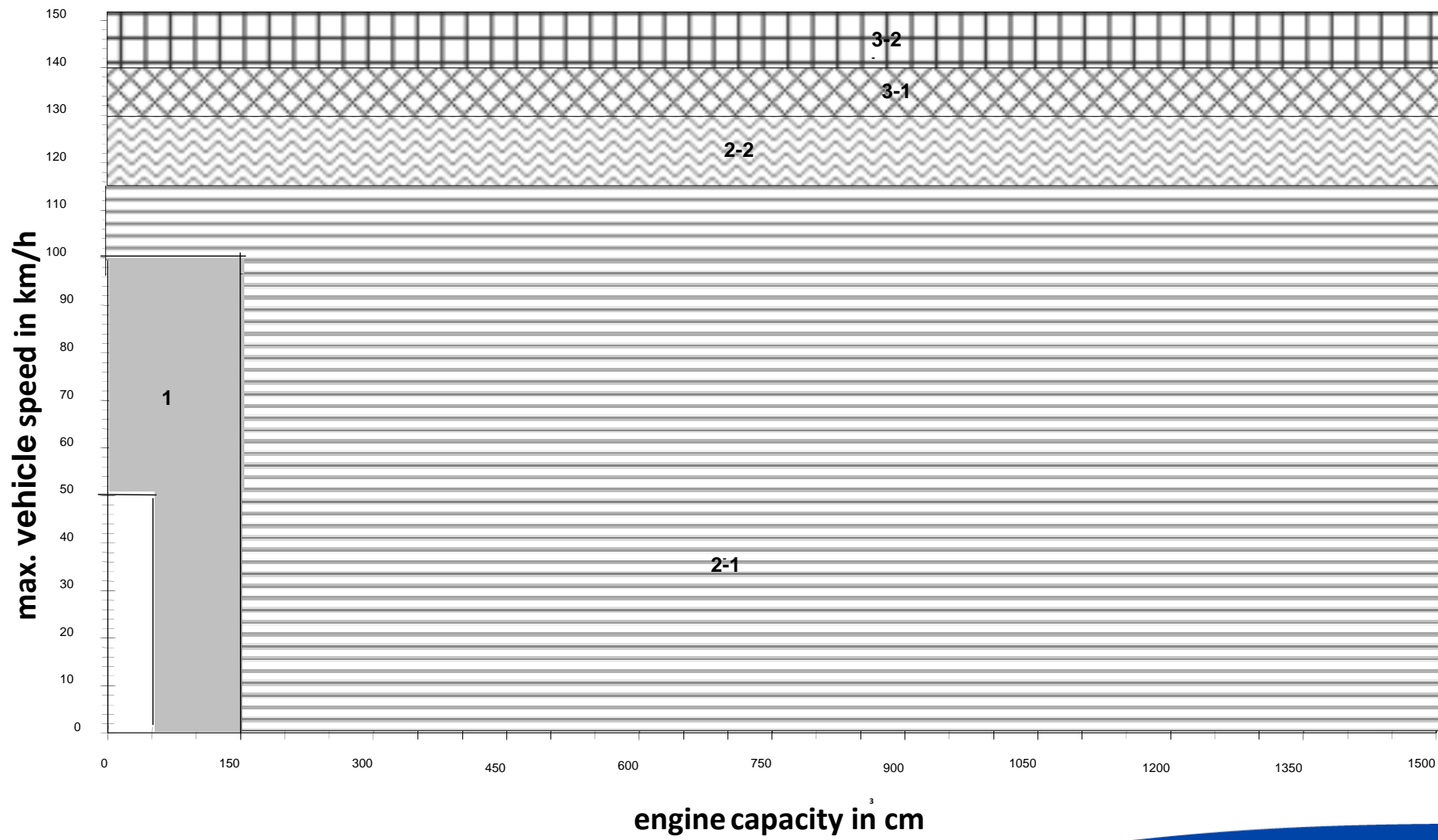
Comparison of Cold & Warm start – BS III Vs BS IV (Class 1)

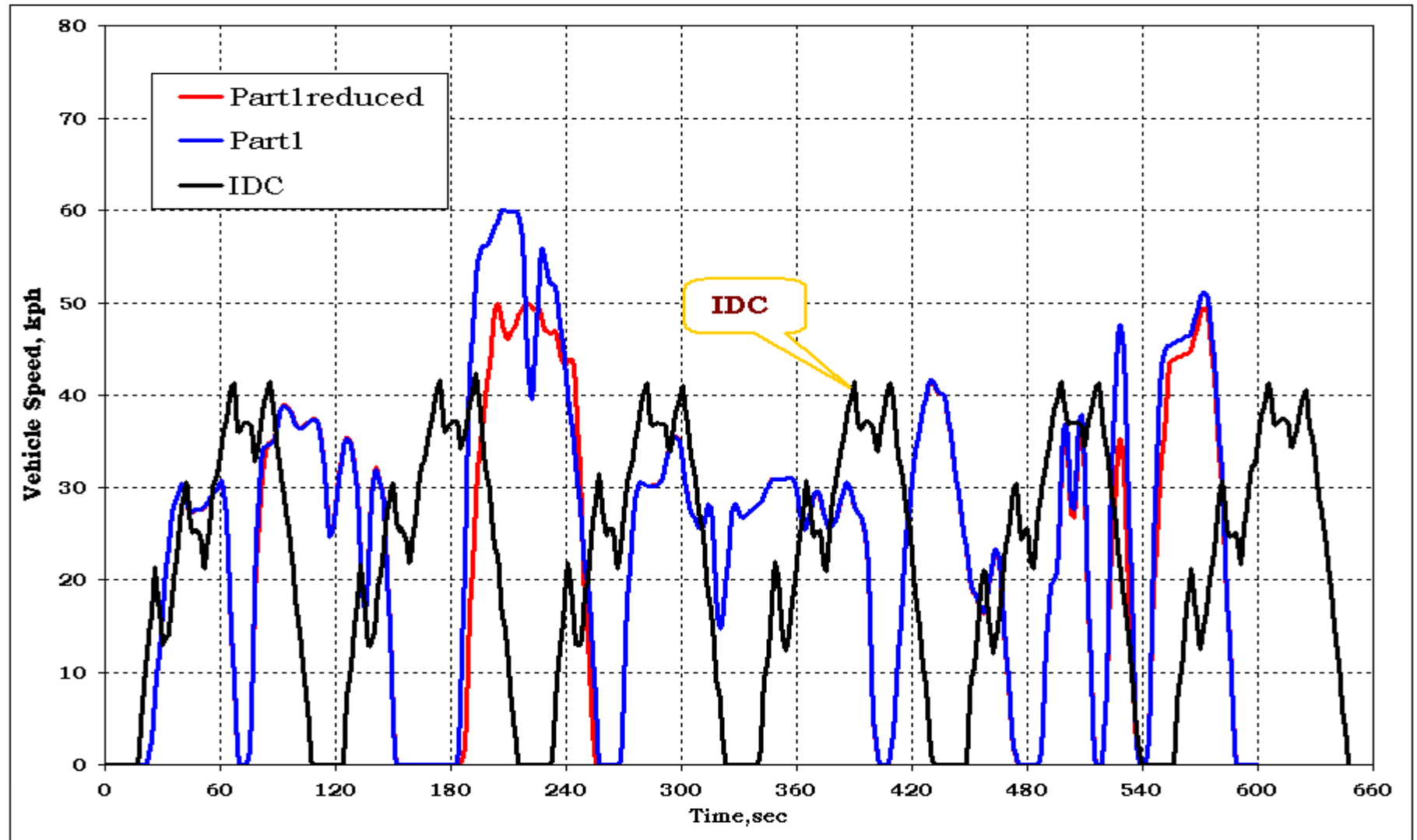
Indian Drive Cycle (IDC) - BS III

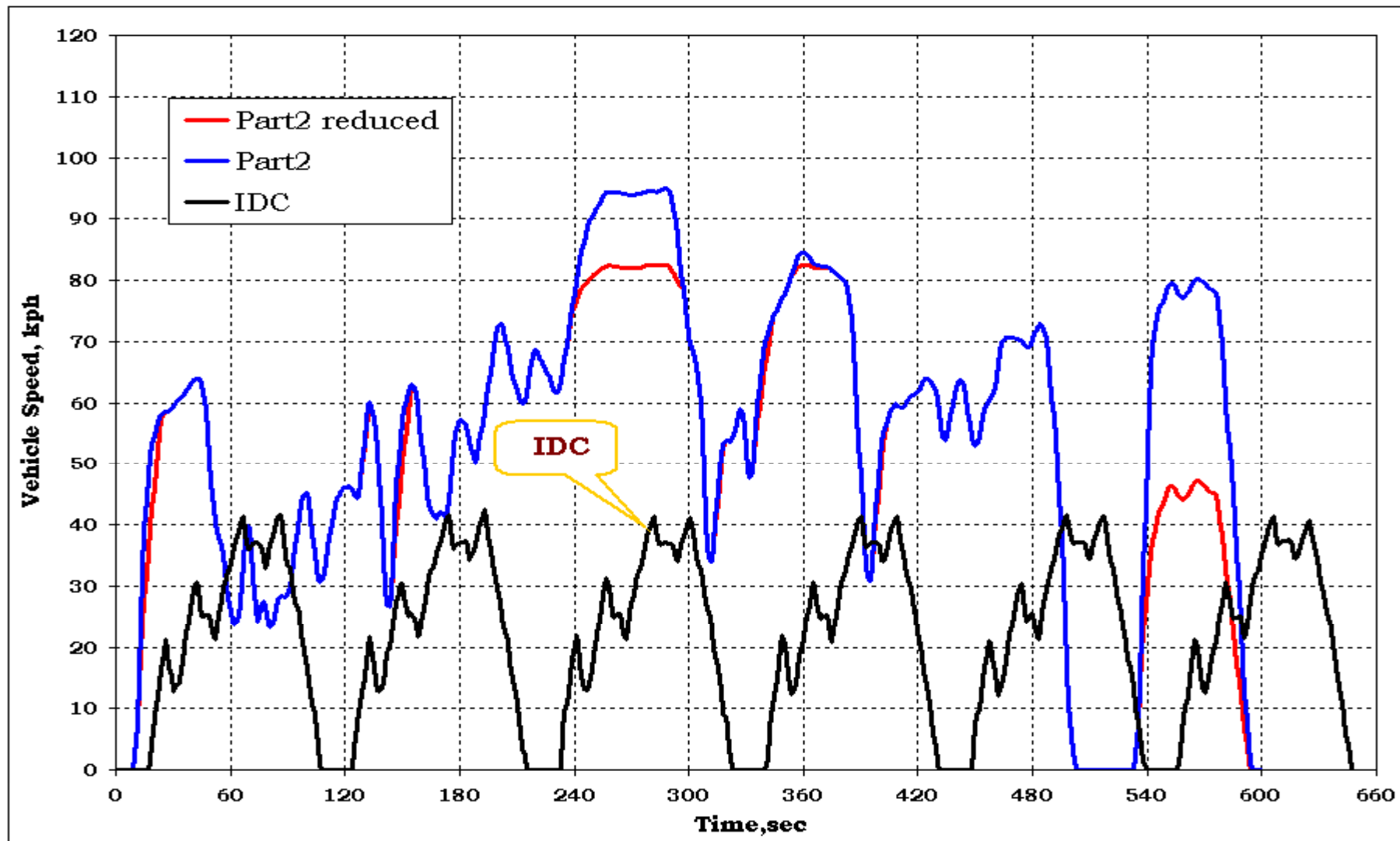


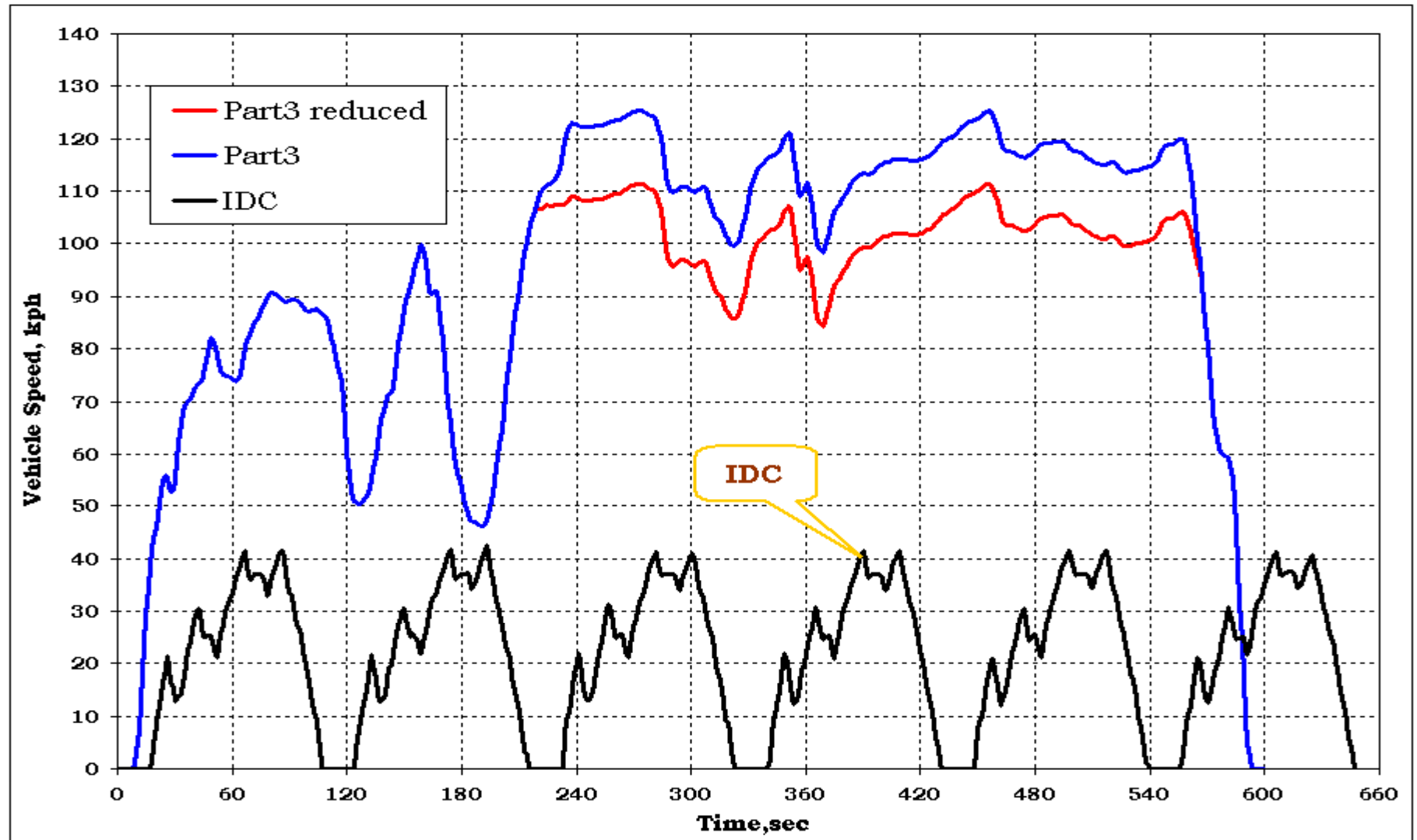
Class 1 WMTC Cycle













Current BS III norms

Class	Limit (g/km)				Remarks
	IDC -BS III		WMTC alternate BSIII		
	CO	HC+NOx	CO	HC+NOx	
1 & 2.1	0.83	0.83	1.87	1.08	Limit values for WMTC arrived at by establishing correlation factor
2-2	0.83	0.83	2.62	0.92	Due to non availability of sufficient Indian data, adopted EU limit values
3-1 & 3.2	0.83	0.83	2.62	0.55	

- Deterioration factor of 1.2 and Durability of 30,000kms Built-in in the Norms



BS IV proposals from SIAM to MoRTH

- **SIAM Proposal for next stage regulation(BS IV) to be based on WMTC Classification (CC & Max Speed) only**
- **IDC will be replaced by WMTC test procedures**
- **Around 25% reduction of emissions (CO, HC+NoX) compared to current BS III levels (This is in line with % reduction between Euro III and the proposed Euro IV norms)**
- **Combined HC +NOx norm to be continued, to help conservation of fuel and to maintain high fuel economy on Indian motorcycles**
- **(Govt contemplating fuel efficiency norms for two wheelers soon)**
- **Evaporative emission norms are proposed for the first time for motorcycles in India (test procedure and norm to be in line with EU)**
- **Crankcase emission regulation for the first time (ensuring fitment of breather pipe on crankcase, connected to intake system)**



Concern - Availability of BS-IV fuel

- In order to meet stringent emission norms as well as durability of after treatment devices, 2 Wheeler industry also requires BS IV fuel.
- Oil companies seem to have difficulty to make BS-IV commercial fuel available all over India in time to meet for BS IV stage .
- BS-IV commercial fuel differ from BSIII commercial fuel on

	BSIII fuel	BSIV fuel
Sulphur	150 ppm	50 ppm
Aromatic content	35% max	42% Max

- There is literature available which indicates that use of fuel with higher sulphur content tends to give higher emissions and lower durability of after treatment devices
- **Dual stage emission norms, would create unmanageable logistics difficulties considering the volume of production and No. of models and variants.**
- **Needs to be sorted out**



Technologies to be adopted

- Further optimization of engines to improve combustion efficiency and fuel efficiency
- Improved carburetor systems.
- Secondary air systems
- Improved after treatment devices to reduce tailpipe emission.
- Fuel injection system for some models.
- 3-way catalyst systems for some models
- Evaporative emission control system (first time in India)
- Optimising Crankcase emission system on engines

Summary- Challenges posed by 2 Wheelers for meeting next stage Emission norms (BS IV)



Changing over to totally new WMTC test cycles and procedures

- higher max.speed
- higher acceleration and deceleration ramps
- very different time ratios
- Different test cycles for different categories of m/cycles
- Cold start condition
- Evaporative emission control
- Crankcase emission control
- Deterioration Factor (not currently in EURO)
- Durability limits (not currently in EURO)
- COP procedure in vogue (not currently in EURO)
- Availability of BS IV fuel across the country (?)
- To meet stringent emission norms as well as durability



Thank you