WEC COMMITTEE

FIA WORLD ENDURANCE CHAMPIONSHIP A PARTNERSHIP

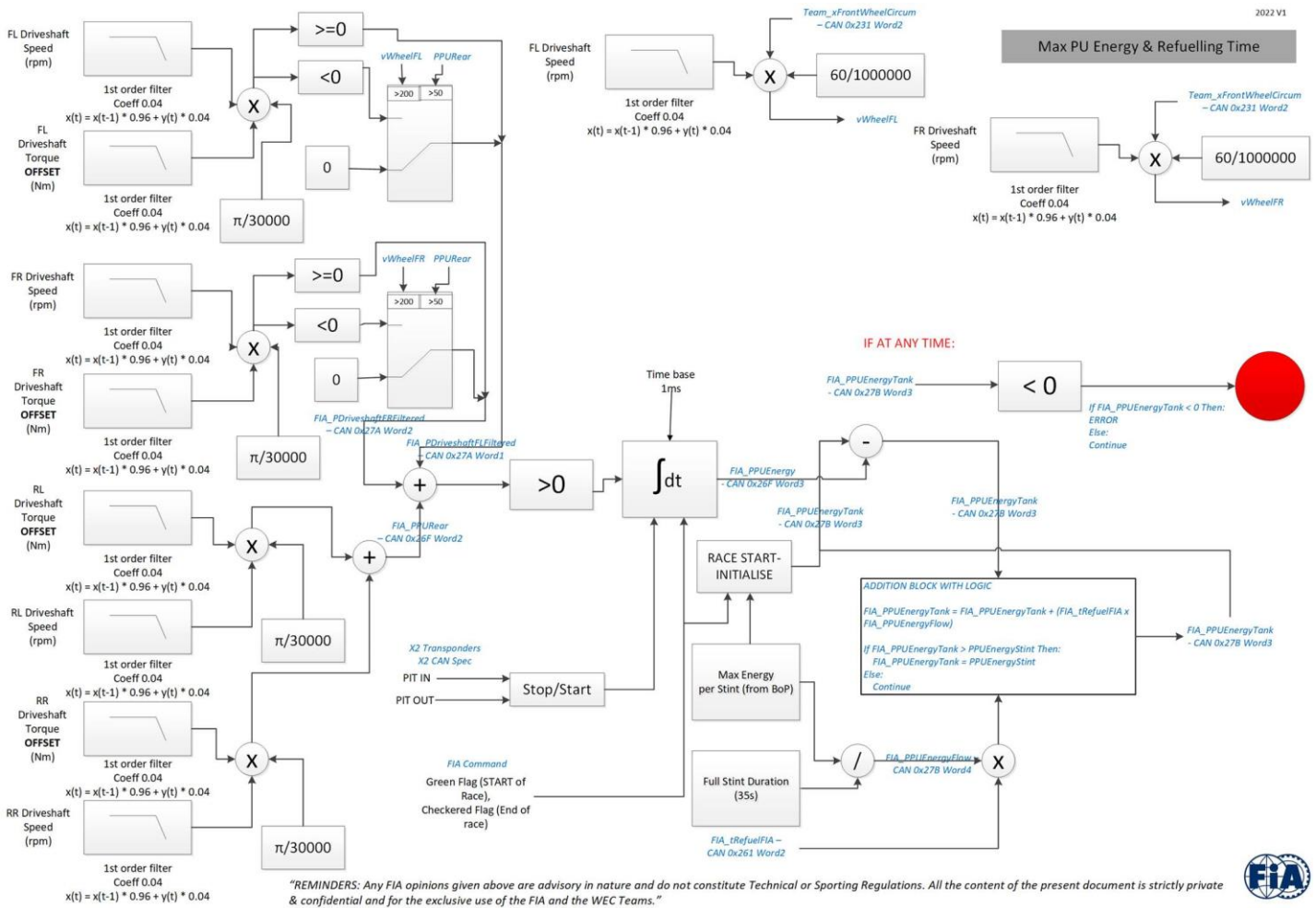|	
TO:	☒ Teams ☒ Manufacturers
CATEGORY:	☒ Hypercar ☐ LMP2 ☐ LMGTE Pro ☐ LMGTE Am
DECISION N°:	**WEC_2022_D0018_Hypercar_Refuelling_Amended**
DATE:	04/05/2022 **FROM:** The WEC Committee
SUBJECT:	Hypercar refuelling

APPLICABLE REGULATION

☒ *2022 Le Mans Hypercar Technical Regulations*

DECISION

1- During the race, the maximum cumulative deployed energy per stint (PPUEnergyStint) must be lower than the value described in the BOP table. The oversight will be based on the principle of a virtual energy tank store represented as PPUEnergyTank in the strategy.

2- The energy consumption will be calculated from the integral of the driveshatft torque sensors.

3- That energy will be considered from pit-out to pit-in.
For the first stint, the energy will count from the start-finish line at the start of the race (PPUEnergyTank = PPUEnergyStint).
For last stint, the energy calculation will stop at on the finish line at the chequered flag.

4- If PPUEnergyTank drops below 0 a penalty will need to be taken following infringement table in Appendix 4 of WEC 2022 Sporting Regulations and the deficit of PPUEnergyTank needs to be compensated at next pitstop at the rate defined by PPUEnergyFlow.

5- When the refueling hose is connected PPUEnergyTank will increase by the rate defined by PPUEnergyFlow in MJ/s which corresponds to PPUEnergyStint/35s.

6- It is the Competitor's responsibility to ensure that the sensor's signal is correct. Any failure to do so will result in an immediate obligation to fix the problem. Any power cycle done during refuelling will result in a not compliant refuelling time.

Extract from Appendix 4 of the FIA WEC 2022 Sporting Regulations: Penalties for failure to respect the technical regulations:

		Free Practices	Qualifying	Race		
	Infringment			Occurence	Race < 12H	Race > 12H
a	PPUEnergyTank < 0	-	-	1st time	Stop&Go 60 sec	Stop&Go 120 sec
				2d time	Stop&Go 120 sec	Stop&Go 180 sec
				3d time and more	Stop&Go 180 sec	Stop&Go 240 sec

2022 V1

Max PU Energy & Refuelling Time

FL Driveshaft Speed (rpm)

1st order filter Coeff 0.04
$x(t) = x(t-1) * 0.96 + y(t) * 0.04$

FL Driveshaft Torque OFFSET (Nm)

1st order filter Coeff 0.04
$x(t) = x(t-1) * 0.96 + y(t) * 0.04$

>=0
<0
0

vWheelFL   PPURear
>200   >50

$\pi/30000$

FR Driveshaft Speed (rpm)

1st order filter Coeff 0.04
$x(t) = x(t-1) * 0.96 + y(t) * 0.04$

FR Driveshaft Torque OFFSET (Nm)

1st order filter Coeff 0.04
$x(t) = x(t-1) * 0.96 + y(t) * 0.04$

>=0
<0
0

vWheelFR   PPURear
>200   >50

$\pi/30000$

FIA_PDriveshaftFRFiltered ~ CAN 0x27A Word2
FIA_PDriveshaftFLFiltered ~ CAN 0x27A Word1

RL Driveshaft Torque OFFSET (Nm)

1st order filter Coeff 0.04
$x(t) = x(t-1) * 0.96 + y(t) * 0.04$

RL Driveshaft Speed (rpm)

1st order filter Coeff 0.04
$x(t) = x(t-1) * 0.96 + y(t) * 0.04$

$\pi/30000$

RR Driveshaft Torque OFFSET (Nm)

1st order filter Coeff 0.04
$x(t) = x(t-1) * 0.96 + y(t) * 0.04$

RR Driveshaft Speed (rpm)

1st order filter Coeff 0.04
$x(t) = x(t-1) * 0.96 + y(t) * 0.04$

$\pi/30000$

FIA_PPURear ~ CAN 0x26F Word2

>0

FL Driveshaft Speed (rpm)

1st order filter Coeff 0.04
$x(t) = x(t-1) * 0.96 + y(t) * 0.04$

Team_xFrontWheelCircum ~ CAN 0x231 Word2

60/1000000

vWheelFL

FR Driveshaft Speed (rpm)

1st order filter Coeff 0.04
$x(t) = x(t-1) * 0.96 + y(t) * 0.04$

Team_xFrontWheelCircum ~ CAN 0x231 Word2

60/1000000

vWheelFR

Time base 1ms

$\int dt$

FIA_PPUEnergy ~ CAN 0x26F Word3

FIA_PPUEnergyTank ~ CAN 0x27B Word3

IF AT ANY TIME:

FIA_PPUEnergyTank ~ CAN 0x27B Word3

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< 0

If FIA_PPUEnergyTank < 0 Then:
ERROR
Else:
Continue

FIA_PPUEnergyTank ~ CAN 0x27B Word3

ADDITION BLOCK WITH LOGIC

FIA_PPUEnergyTank = FIA_PPUEnergyTank + (FIA_tRefuelFIA x FIA_PPUEnergyFlow)

If FIA_PPUEnergyTank > PPUEnergyStint Then:
FIA_PPUEnergyTank = PPUEnergyStint
Else:
Continue

FIA_PPUEnergyTank ~ CAN 0x27B Word3

RACE START- INITIALISE

Max Energy per Stint (from BoP)

X2 Transponders
X2 CAN Spec
PIT IN
PIT OUT

Stop/Start

FIA Command
Green Flag (START of Race),
Checkered Flag (End of race)

Full Stint Duration (35s)

/

FIA_PPUEnergyFlow ~ CAN 0x27B Word4

X

FIA_tRefuelFIA ~ CAN 0x261 Word2

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FIA

PERIOD OF VALIDITY/APPLICATION OF THE DECISION

This decision comes into effect:
☒ **with immediate application**
☐ from:

And is applicable:
☒ **until further notice**
☐ for the mentioned Competition(s) only