

JOINT FINAL EVENT 12 & 13<sup>TH</sup> NOVEMBER 2019, SANTA OLIVA, SPAIN



## Future Outlook

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# PaREGEEn results – Independent testing

- ▶ An independent testing of the PaREGEEn demonstrators vehicle has been performed
  - ▶ Mercedes E180 – Emission results

Test type	CO2	PN 23 nm	PN 10 nm
NEDC	-7%	-78%	-89%
WLTC low	-19%	-81%	-82%
WLTC high	-13%	-56%	-69%

**Note:** The table shows the relative results of the demonstrator vehicle comparing to the Baseline.

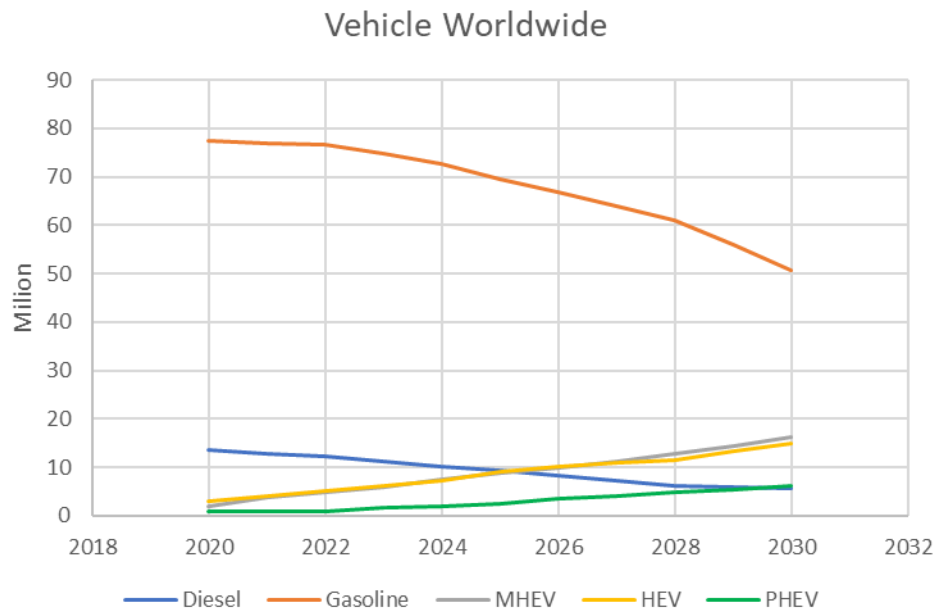
- ▶ The impact of the PaREGEEn new technologies has been assessed and different scenarios have been defined

# PaREGEEn – Technical solution

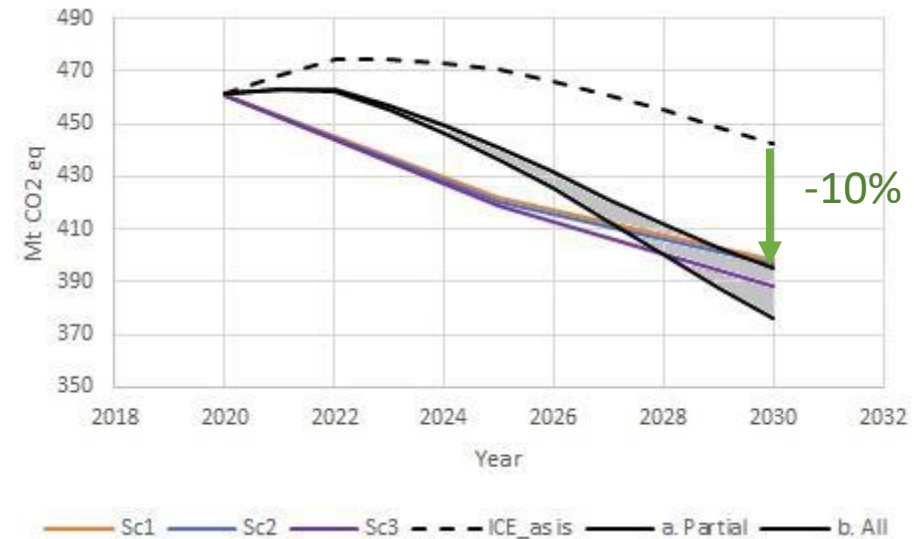
- ▶▶ To achieving the targets, the Daimler vehicle has the following new technology & improvements implemented
  - ▶ Increase of the CR from 10.3 to 12
  - ▶ Stoichiometric homogeneous combustion
  - ▶ Implementation of the Gasoline Particle Filter (GPF)
  - ▶ Installation of the Port Water Injection (PWI)
  
- ▶▶ Further CO<sub>2</sub> improvement obtained by simulation (CFD) – around 6%
  - ▶ Increase of the CR until 14.5
  - ▶ Improved shift strategy
  - ▶ Direct Water Injection (DWI)

# GHG Emission perspectives

Potential overall GHG reduction with WLTC results for European market



BCG Source



Sc1: only E180 & XE, Sc2: all Mercedes & all JLR, Sc3: all gasoline

Remark: future market share between gasoline and diesel has been considered, including hybridisation perspectives:  
 a. Partial share of gasoline and diesel engine for HEV (10% reduction), b. All gasoline engine for HEV (15% reduction)

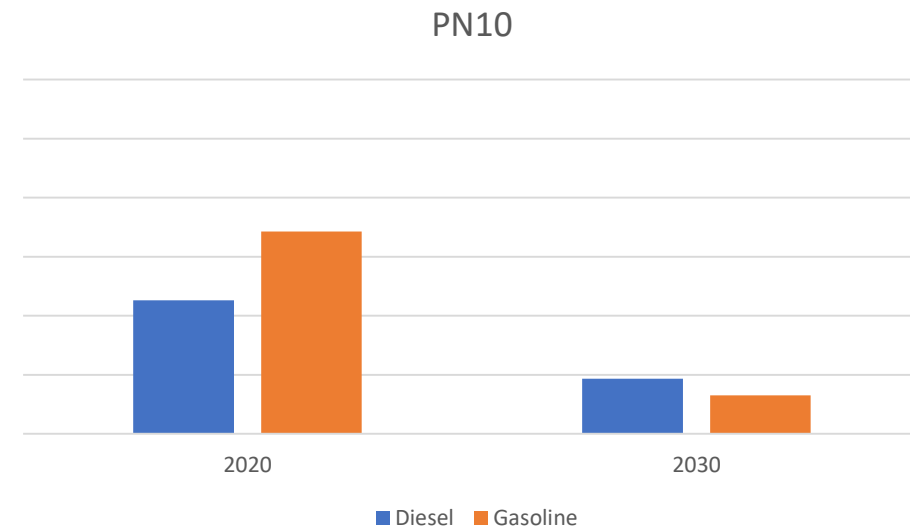
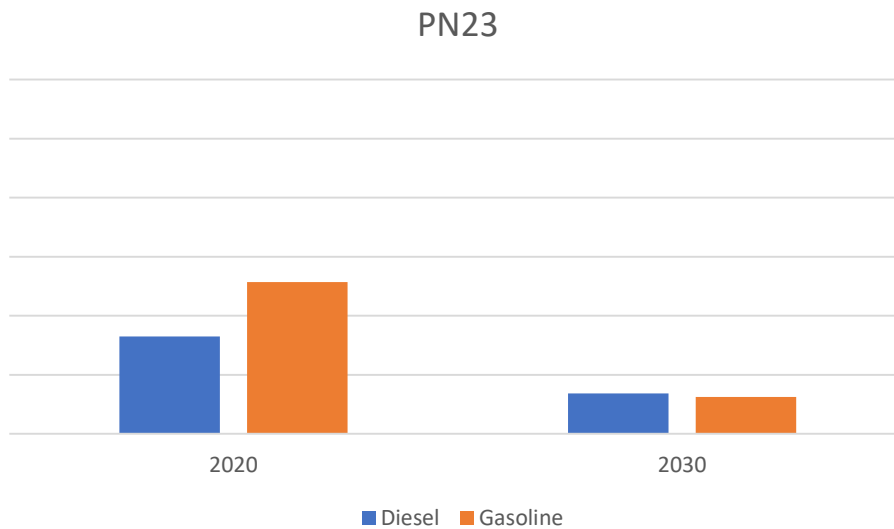
# PN Perspectives

▶▶ **PN23** (referred to baseline WLTC)

▶ Potential reduction of 68% for gasoline

▶▶ **PN10** (referred to baseline WLTC)

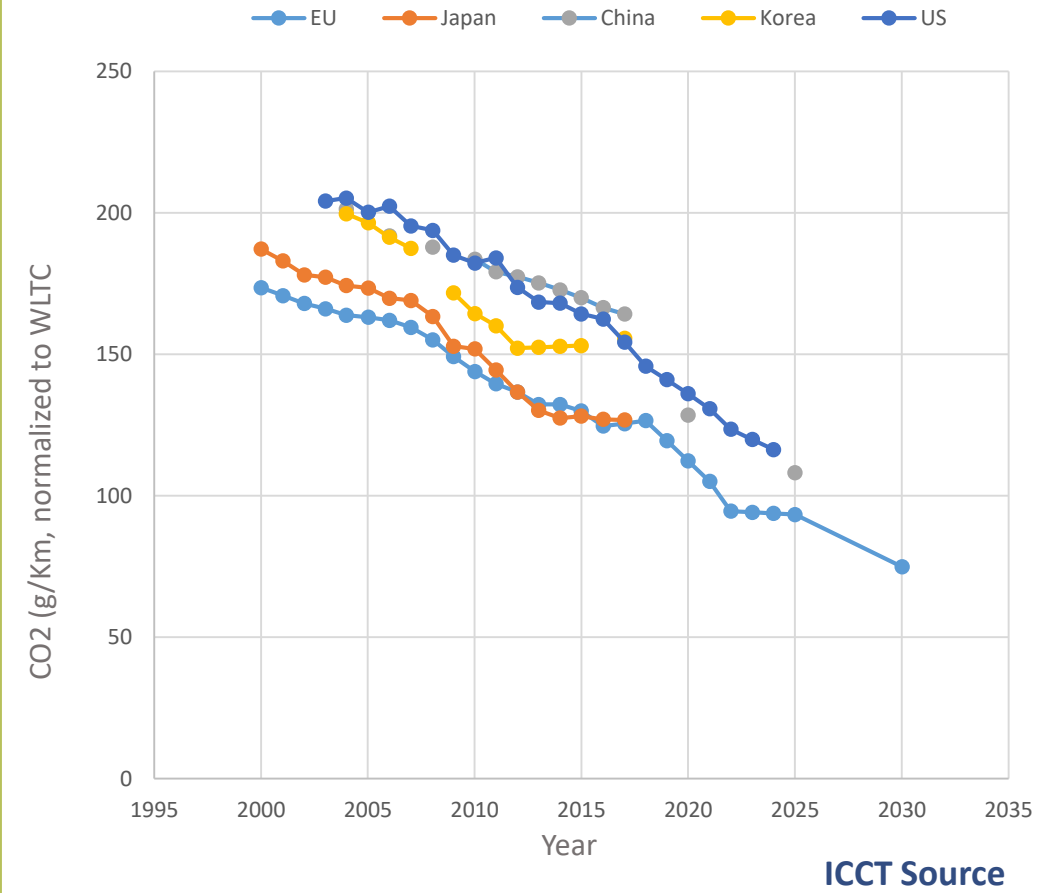
▶ Potential reduction of 75% for gasoline



Remark: for Diesel it has been considered the results in WLTC from Dieper Project for Iveco Daily (-88% PN23 and -64% PN10)

# Regulation perspectives - GHG

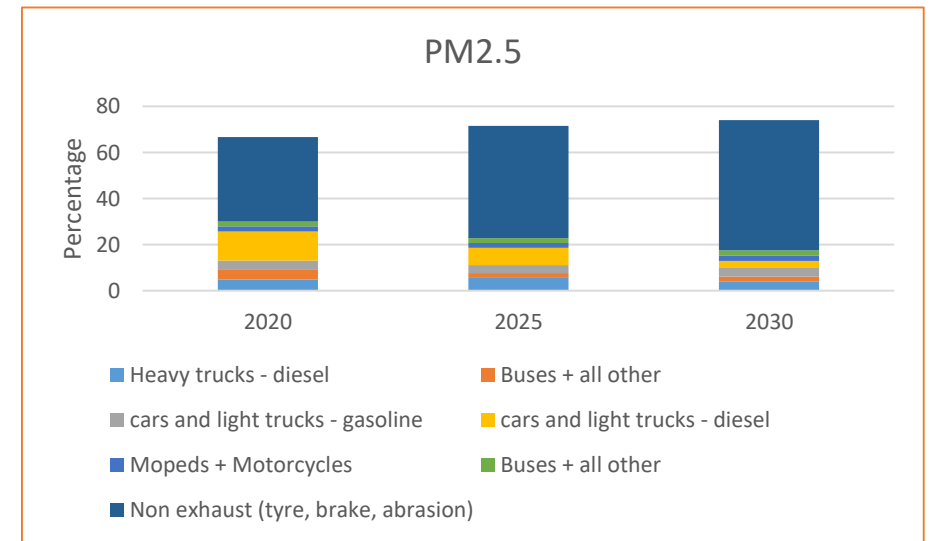
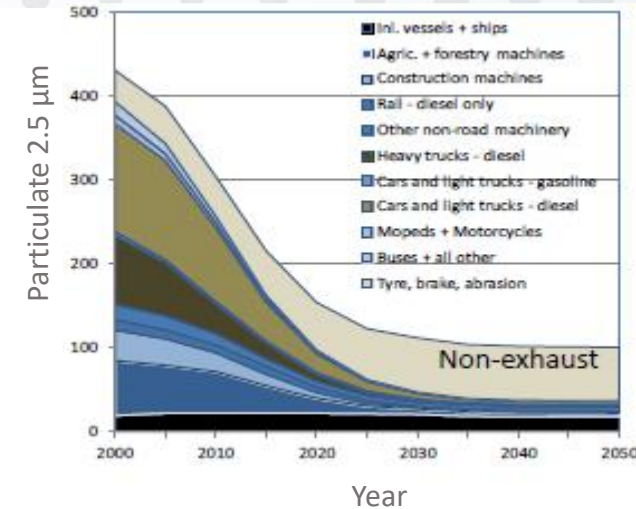
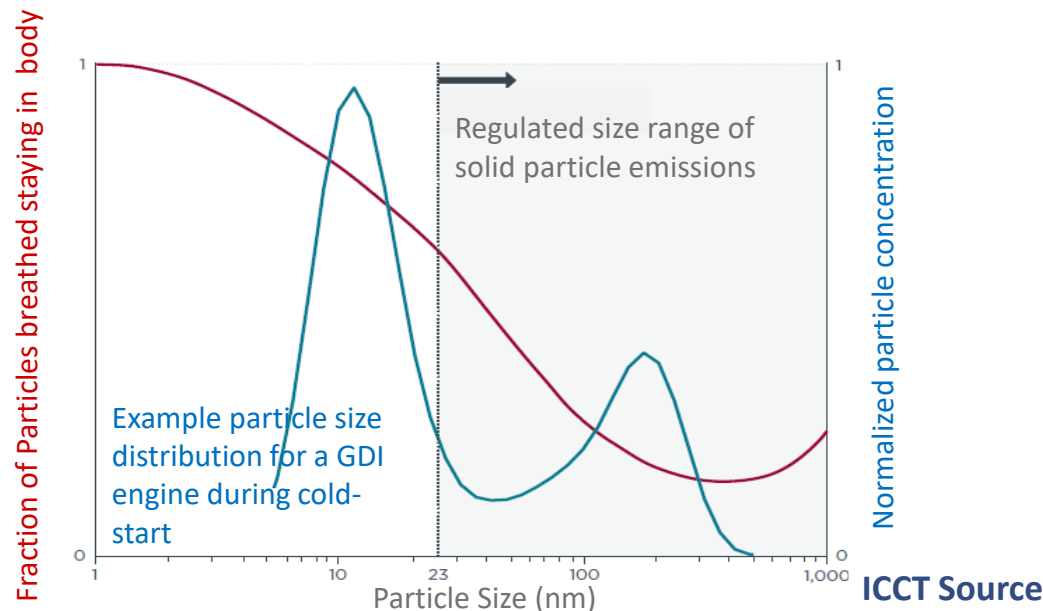
- ▶ GHG CO<sub>2</sub> emission is a global problem in order to cope with climate change below 2 degrees temperature increase
- ▶ All main vehicle markets are willing to fulfill the roadmap in carbon dioxide and other GHG gases emissions
- ▶ Improvement in ICE, alternative fuel usage and electrification in propulsion systems should be the short and medium term viable solutions





# Regulation perspectives - Particulates

► Particulate emissions further reduction need for human health via engine and aftertreatment as well as non-exhaust improvements





# Conclusions

- ▶▶ **The experimental results fulfill the expectations:** both for GHG CO<sub>2</sub> emissions and PN<sub>23</sub> and PN<sub>10</sub> nm in the Mercedes E180 of the present projects, further improvements have been demonstrated via simulation
- ▶▶ **GHG CO<sub>2</sub> and particulate reduction potential perspective in 2030:** improvements on engine and aftertreatment of the Mercedes E180 make reductions possible if implemented on the entry market of the gasoline engines vehicles in 2030 vehicle parc even considering an initial increment of market share for gasoline versus diesel and further electrification
- ▶▶ **Further effort must be made for GHG CO<sub>2</sub> as well as for particulate emissions improvement, whilst keeping costs and other pollutants under acceptable limits**

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# Thank you

Any questions?

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