



## D6.1 – Concept Selection and Fuel Economy Roadmap

Research Innovation Action

**EUROPEAN COMMISSION**

Grant Agreement No. 874972

HORIZON 2020 PROGRAMME

Topic LC-GV-04-2019

Low-emissions propulsion for long-distance trucks and coaches

<b>Deliverable No.</b>	<b>LONGRUN D6.1</b>	
<b>Related WP</b>	Work Package 6	
<b>Deliverable Title</b>	Concept Selection and Fuel Economy Roadmap	
<b>Deliverable Date</b>	2020-04-30	
<b>Deliverable Type</b>	REPORT	
<b>Dissemination level</b>	Confidential – member only (CO)	
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<b>Status</b>	Final	2020-04-30

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## Publishable summary

Heavy-duty vehicles are widely used in the transport sector in Europe. Heavy-duty vehicles transport 75% of freight over land in Europe (1). Because of their load capacity and annual mileage, heavy-duty vehicles are also a significant source of greenhouse gas (GHG) emissions in Europe. Therefore, any reduction in the emissions of these vehicles will aid in overall reduction of GHG.

Ford Otosan proposed the hybridization of the long haul tractors as a solution to support the efforts to reduce GHG emissions of heavy-duty vehicles.

The hybrid truck proposed by Ford Otosan will include an e-axle as the key component of electrified powertrain. The e-axle is a powerpack that consists of electric motor(s), a multi-speed gearbox and a differential. Project partners Ford Otosan and FEV will design and implement an e-axle to the baseline truck within this work package, in order to reach the project targets of at least 10% energy saving and zero emission drive.

The activities planned in this phase of the project have been successfully executed. Several concept design options are reduced to two distinct topologies. For both topologies, the optimum gear numbers and gear ratios are identified in order to meet the vehicle performance targets. Their performance and efficiency are evaluated in different duty cycles. Furthermore, the most promising topology is implemented in a hybrid F-max tractor analytical model. The energy saving through hybridization with an e-axle is calculated in the reference cycles.

According to the results of the concept phase, the hybrid F-max tractor with the proposed e-axle concept can satisfy the project targets.

## Acknowledgement

The author(s) would like to thank the partners in the project for their valuable comments on previous drafts and for performing the review.

### Project partners:

#	Partner	Partner Full Name
1	FEV	FEV EUROPE GMBH
2	DAF	DAF TRUCKS NV
3	FPT	FPT INDUSTRIAL SPA
4	FORD	FORD OTOMOTIV SANAYI ANONIM SIRKETI
5	IRIZAR	IRIZAR S COOP
6	IVECO	IVECO S.p.A.
7	VOLVO	VOLVO TECHNOLOGY AB
8	VDL	VDL ENABLING TRANSPORT SOLUTIONS BV
9	ABEE	AVESTA BATTERY & ENERGY ENGINEERING
10	AVL	AVL LIST GMBH
11	EATON	EATON ELEKTROTECHNIKA SRO
12	GARR	GARRETT MOTION CZECH REPUBLIC SRO
13	IDIADA	IDIADA AUTOMOTIVE TECHNOLOGY SA
14	IFP	IFP Enegeies Nouvelles
15	AVL	AVL MTC MOTORTTESTCENTER AB
16	NESTE	NESTE OYJ
17	PRIMA	PRIMAFRIO SL
18	SHELL	SHELL GLOBAL SOLUTIONS (DEUTSCHLAND) GMBH
19	SIE	SIEMENS INDUSTRY SOFTWARE SAS
20	TECHNA	FUNDACION TECHNIALIA RESEARCH & INNOVATION
21	TOTAL	TOTAL MARKETING SERVICES
22	UMIC	UMICORE AG & CO KG
23	UNR	UNIRESEARCH BH
24	JRC	JRC -JOINT RESEARCH CENTRE – EUROPEAN COMMISSION
25	CHALM	CHALMERS TEKNISKA HOEGSKOLA AB
26	RWTH	RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN
27	TU/e	TECHNISCHE UNIVERSITEI EINDHOVEN
28	TUG	TECHNISCHE UNIVERSITAET GRAZ
29	UNIAQ	UNIVERSITA DEGLI STUDI DELL'AQUILA
30	VUB	VRIJE UNIVERSITEIT BRUSSEL

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 875189. The information and views set out in this publication does not necessarily reflect the official opinion of the European Commission. Neither the European Union institutions and bodies nor any person acting on their behalf, may be held responsible for the use which may be made of the information contained therein.