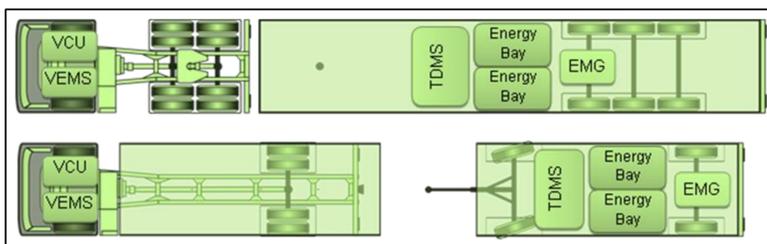


Configurable and Adaptable Trucks and Trailers for Optimal Transport Efficiency

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The overall objective of the TRANSFORMERS project is to develop and demonstrate innovative and energy efficient trucks and load carriers. This is meant for long distance transport assignments with an improved load efficiency leading to an overall 25% lower energy consumption on a tonne.km basis and a lower impact on the road infrastructure.



Structure of the distributed HoD driveline concept for tractor/semi-trailer and truck/trailer

End User Requirements

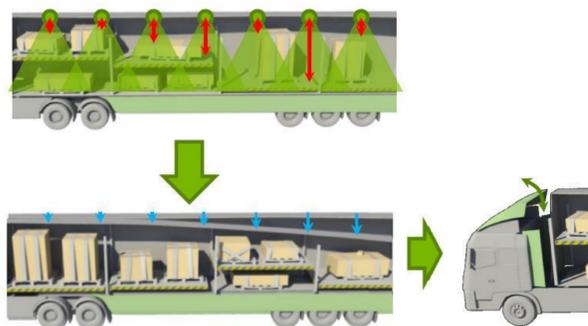
The TRANSFORMERS End User Requirements report assesses the road freight transport industry with respect to the interaction of a truck-trailer configuration and the key stakeholders involved. Its purpose is to provide a tool for identifying relative areas of strength and weakness and to prioritize opportunities for a new configurable and adaptable Hybrid-on-Demand Truck Trailer configuration.

Measures of transport services development are captured across four pillars, namely:

- Transportation Efficiency
- Logistics Efficiency
- Social and Environmental Impact
- Safety and Operating Features

	c_D	A/m^2	$c_D \cdot A/m^2$	$\Delta F_{D, rel.}$
a)	0.651	10	6.51	+25.0%
b)	0.542	10	5.42	+4.0%
c)	0.521	10	5.21	Ref.
d)	0.554	8.93	4.94	-5.2%
e)	0.472	10	4.72	-9.4%
f)	0.457	8.93	4.08	-21.7%

Values and drag force reductions for a few use cases with different settings of trailer height and roof deflector.



Values and drag force reductions for a few use cases with different settings of trailer height and roof deflector.

Benefits vs. Challenges

New opportunities and technologies allow modern vehicles to be more efficient and advanced from a design point of view. However, the purpose of the project is not to create an innovative truck that nobody will be able to use. This may be caused by either legal restrictions, simple reluctance to invest, or to lose load capacity (even if minor).

Possible Benefits	Possible Challenges
Lower emissions	Higher operating costs
Lower fuel consumption	Reduced overall vehicle capacity
Higher load factor	Lower transport rates
Fewer vehicles on the road	Slow market uptake
Sum: Which way is higher? Can they be compensated by incentives. Which incentives could be considered?	

Objectives

- Develop and demonstrate trailer mounted Hybrid-on-Demand Driveline for truck-trailer combinations
- Develop toolbox with aerodynamic measures
- Develop toolbox with loading efficiency measures

Facts & Figures

- Start date 1 September 2013
- End date 28 February 2017
- Total budget 8.0 M€
- EC Funding 5.2 M€



Fuel & Load efficiency target

The project's conceptual components and their impact on fuel efficiency and transport efficiency, are presented below. In total, this package of concepts and components enables transport mission rightsizing of truck-trailer combinations resulting in up to 18% improved fuel efficiency and between 10 to 15% improved load efficiency. Overall, this represents an improvement of the transport efficiency of 25%.

Concept/component	Fuel consumption reduction potential
Mission adaptable Hybrid-on-Demand driveline concept including advanced mission based motor and driveline management	8 % - 12%*
Downsized truck diesel engine	2 %
Mission-based configurable aerodynamic overall truck-trailer design (toolbox)	
- Lift able roof	2 %
- Automatic adjustable front deflector and introduction of (flexible) rear diffuser, side skirts, underbody deflectors and boat tail	4.5 %
- Closing the gap between truck and (semi)trailer, e.g. by using a retractable drawbar in case of the truck-trailer combinations;	1.5 %

* 8% and 18% refers to truck-(semi)trailer combinations used in long haulage transports.

Concept/component	Load efficiency increase potential
Loading efficiency optimised trailer inside design (toolbox)	
- Change front bulk head and backportal of semitrailer to facilitate the loading of 1 extra Euro pallet	3 %
- Trailer with a 500 mm extended inner floor in combination with a retractable drawbar to facilitate loading of extra cargo (+5%) or 2 extra Euro pallets (+10%)	5 - 10 %
- Introduce a flexible extra floor in (semi)trailers to allow a double stacking	Up to 40 % (On average 10%)