DESTA

Demonstration of 1st European SOFC Truck APU

**Funding:** European (7th RTD Framework Programme)
**Duration:** Jan 2012 - Jun 2015
**Status:** Complete with results
**Total project cost:** €10,441,619
**EU contribution:** €3,874,272

**Call for proposal:** FCH-JU-2010-1
**CORDIS RCN:** 101451

**Objectives:**

Within the DESTA project the first European SOFC (Solid Oxide Fuel Cell) Truck APU (Auxiliary Power Unit) will be demonstrated. SOFC technology offers big advantages compared to other fuel cell technologies due to compatibility to conventional road fuels like diesel. Within the last years significant improvements have been made to bring SOFC stack technology and APU BoP components to prototype and product level.

The project will begin with APU requirement definition for application of an SOFC APU into an US type Volvo heavy-duty truck. In parallel the test conditions for the vehicle test and off-vehicle tests will be elaborated. Due to huge development efforts at Eberspächer and AVL at project begin of DESTA already 2 SOFC APU systems will be available at laboratory prototype level. These 2 APU systems (in each case 3) will be tested based on an accelerated test profile for at least 1 year. Based on the test results and additional investigations a benchmark of the 2 systems will be performed by the independent research institute Forschungszentrum Jülich. Based on this benchmark and derived recommendations the 2 systems will be merged and optimised to one final DESTA SOFC APU. In this process the most promising approaches from both systems will be identified and realized in the final DESTA SOFC APU.

In parallel to the system test and development TOFC will focus on SOFC stack optimisation. In this project the decision has been made to focus on ASC stacks to due high maturity of this technology. This technology is already very close to industrialization. But the stacks still have to be improved in terms of start-up time, lifetime and sulphur tolerance which will be performed in WP3. Finally, the optimised DESTA SOFC APU systems will go into tests. On the one hand the truck demonstration and on the other hand laboratory systems tests (performance, long-time, vibration, salt spray etc.) will be performed.

**Parent Programmes:**
**FP7-JTI - Specific Programme "Cooperation": Joint Technology Initiatives**

**Institute type:** Public institution
**Institute name:** European Commission
**Funding type:** Public (EU)

**Lead Organisation:**

Avl List Gmbh

**Address:**
Hans-List-Platz
8020 Graz
Austria
**Organisation Website:**
[http://www.avl.com](http://www.avl.com)

**EU Contribution:** €782,860

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**Partner Organisations:**

**Eberspaecher Climate Control Systems GmbH & Co Kg**

**Address:**
Eberspacherstrasse 24  
73730 Esslingen Am Neckar  
Germany

**EU Contribution:** €2,058,995

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**Topsoe Fuel Cell A/s**

**Address:**
Nymoellevej 55  
2800 Lyngby  
Denmark

**EU Contribution:** €634,242

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**Volvo Bus Corporation**

**Address:**
Fästningsvägen 1  
40508 Gothenburg  
Sweden

**Organisation Website:**

**EU Contribution:** €333,215

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**Forschungszentrum Juelich GmbH**

**Address:**
Leo-Brandt-Strasse  
52425 JUELICH  
Germany

**Organisation Website:**
[http://www.fz-juelich.de](http://www.fz-juelich.de)

**EU Contribution:** €64,960

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**Technologies:**

- Fuel cells and hydrogen fuel
- Solid Oxide Fuel Cell Truck Auxiliary Power Unit

**Development phase:** Validation

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**Key Results:**

**Novel auxiliary power units to mitigate negative consequences of idling heavy duty trucks**

The idling of heavy duty trucks is cause for concern given the resulting power consumption, pollution, noise and financial issues. An EU initiative introduced cutting-edge anti-idling technology that uses fuel cells.

Typical heavy duty trucks are idled about eight hours daily, with drivers consuming electric energy for
functions such as air conditioning and media devices. This power demand is provided by idling of the main engine or standard engine-based auxiliary power unit (APU) systems. However, they are not very efficient or cost effective, emit large emissions and produce noise.

Legislation in the United States limits or prohibits the idling of engines. It is even contemplating a country-wide ban, an action which will inevitably lead to a significant boost in anti-idling solutions.

With this in mind, the EU-funded [http://www.desta-project.eu/desta-project/](http://www.desta-project.eu/desta-project/) (DESTA) (Demonstration of 1st European SOFC Truck APU) project aimed at accelerating the development of solid oxide fuel cell (SOFC) APU systems.

Work began by defining the APU requirements for a heavy duty truck for the American market. Six APU systems were built and rigorously tested before final selection. SOFC stacks were also tested with respect to thermal cycle ability, sulphur tolerance and long-term operation.

Project partners identified and integrated the most promising approaches from the SOFC systems into the final SOFC APU system. They devised new system architecture, developed a control system and designed a vehicle interface. Key components include a DC/DC converter, electrical junction box, batteries and battery state of charge sensor, control panel and wireless router, isolation monitor, keypad and vehicle ECU. In addition, various optimisation tasks were performed to improve system performance, lifetime and reliability.

Thanks to DESTA, the first European SOFC APU aboard a heavy duty truck was successfully demonstrated. The solution has considerable fuel savings potential, resulting in less costs and carbon dioxide emissions. It will also reduce engine hours, engine maintenance and service costs.

Documents:
- [Final Report Summary - DESTA (Demonstration of 1st European SOFC Truck APU)]

**STRIA Roadmaps:** Low-emission alternative energy for transport

**Transport mode:** Road transport

**Transport sectors:** Passenger transport, Freight transport

**Geo-spatial type:** Other