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Innovative propellants in hybrid propulsion technology and its applications in space transportation

Fact Sheet

Project Information

ORPHEE

Grant agreement ID: 218830

[Project website](#) 

Project closed

Start date

1 January 2009

End date

31 December 2011

Funded under

Specific Programme "Cooperation": Space

Total cost

€ 3 056 571,00

EU contribution

€ 1 984 154,00

Coordinated by

SAFRAN CERAMICS

 France


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Objective

Nowadays, chemical propulsion is based on solid (launch applications like first stage booster) or liquid technologies (upper stage engines). Complementary, hybrid propulsion technology, as defined in ORPHEE (Operational Research Project on Hybrid Engine in Europe), appears as a new generation of advanced space transportation system. Engines based on this innovative propulsion concept provide advantages like thrust performance, throttling (thrust modulation), versatility (easy adaptation to various configurations), simplicity, safety. which significantly reduce the global engine cost. It will help to consolidate the long term sustainability and ensure a technology needed by the European propulsion space community to remain independent. Hybrid propulsion principle is based on the injection of a liquid oxidizer into the engine combustion chamber where it reacts with a solid fuel to generate hot gases providing the thrust. Enlarge the burning surface is the current proposed solution to reach the needed performance level. It dramatically increases the solid grain volume and the engine weight, limiting the applications. The regression rate is a key parameter controlling the solid fuel grain design. Its increase is a very attractive solution to reduce the grain volume. The main objectives of ORPHEE are to increase versatility of space propulsion system, ensure significant increase performance of hybrid engine, improve solid fuel technological maturity from TRL 1 to 3 and gather European skills on hybrid propulsion and ensure European access to space In near future, the availability of new hybrid engines will allow the access to new space

transportation missions and to obtain significant costs reduction. It will consolidate the knowledge on this innovative technology, allowing the European space community to become non dependant. It may be considered as a competitive propulsion solution to be implemented in future space agencies roadmaps.

Fields of science (EuroSciVoc)

[natural sciences](#) > [physical sciences](#) > [astronomy](#) > [space exploration](#)

[agricultural sciences](#) > [agriculture, forestry, and fisheries](#) > [agriculture](#) > [grains and oilseeds](#)

[engineering and technology](#) > [environmental engineering](#) > [energy and fuels](#)



Keywords

[booster engine](#)

[demonstrator](#)

[hybrid motor](#)

[hybrid propulsion](#)

[mission specification](#)

[road map](#)

[upper stage engine](#)

Programme(s)

[FP7-SPACE - Specific Programme "Cooperation": Space](#)

Topic(s)

[SPA-2007-2.2-02 - Space transportation](#)

Call for proposal

FP7-SPACE-2007-1

[See other projects for this call](#)

Funding Scheme

[CP - Collaborative project \(generic\)](#)

Coordinator



SAFRAN CERAMICS

EU contribution

€ 407 838,00

Total cost

No data

Address

RUE DE TOUBAN LES CINQ CHEMINS

33185 Le Haillan

 **France** 

Region

Nouvelle-Aquitaine > Aquitaine > Gironde

Activity type

Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links

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[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Participants (9)



AIRBUS DEFENCE AND SPACE SAS

 **France**

EU contribution

€ 159 630,00

Address

31 RUE DES COSMONAUTES ZI DU PALAYS

31402 Toulouse Cedex 

Region

Ile-de-France > Ile-de-France > Yvelines

Activity type

Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links

[Contact the organisation](#)  [Website](#) 

[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Total cost

No data



AIRBUS DS GMBH

 Germany

EU contribution

€ 225 000,00

Address

**ROBERT KOCH STRASSE 1
82024 TAUFKIRCHEN** 

Activity type

Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links

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[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Total cost

No data



AVIO SPA

 Italy

EU contribution

€ 175 536,00

Address

**VIA ANTONIO SALANDRA N18
00187 ROMA** 

Activity type

Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links

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[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Total cost

No data



OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES

 France

EU contribution

€ 225 000,00

Address

CHEMIN DE LA HUNIERE

91120 Palaiseau 

Region

Ile-de-France > Ile-de-France > Essonne

Activity type

Research Organisations

Links

[Contact the organisation](#)  [Website](#) 

[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Total cost

No data



DEUTSCHES ZENTRUM FUR LUFT - UND RAUMFAHRT EV

 Germany

EU contribution

€ 202 500,00

Address

LINDER HOHE

51147 Koln 

Region

Nordrhein-Westfalen > Köln > Köln, Kreisfreie Stadt

Activity type

Research Organisations

Links

[Contact the organisation](#)  [Website](#) 

[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Total cost

No data



POLITECNICO DI MILANO

 Italy

EU contribution

€ 194 250,00

Address

PIAZZA LEONARDO DA VINCI 32

20133 Milano 

Region

Nord-Ovest > Lombardia > Milano

Activity type

Higher or Secondary Education Establishments

Links

[Contact the organisation](#)  [Website](#) 

[Participation in EU R&I programmes](#) 

[HORIZON collaboration network](#) 

Total cost

No data



UNIVERSITA DEGLI STUDI DI NAPOLI FEDERICO II

 Italy

EU contribution

€ 194 250,00

Address

CORSO UMBERTO I, 40

80138 Napoli 

Region

Sud > Campania > Napoli

Activity type

Higher or Secondary Education Establishments

Links

[Contact the organisation](#)  [Website](#) 

[Participation in EU R&I programmes](#) 

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Total cost

No data



UNIVERSITATEA POLITEHNICA DIN BUCURESTI

 Romania

EU contribution

€ 129 750,00

Address

SPLAIUL INDEPENDENTEI 313 SECT 6

060042 Bucharest 

Region

Macroregiunea Trei > București-Ilfov > București

Activity type

Higher or Secondary Education Establishments

Links

[Contact the organisation](#)  [Website](#) 

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Total cost

No data



Thyia Tehnologije d.o.o

 Slovenia

EU contribution

€ 70 400,00

Address

DIMICEVA 9

1000 LJUBLJANA 

Activity type

Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links

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Total cost

No data

Last update: 16 July 2019

Permalink: <https://cordis.europa.eu/project/id/218830>

European Union, 2025