

Orbital Machines 
Democratizing Space
by Making Safe & Reliable
Technology Accessible.

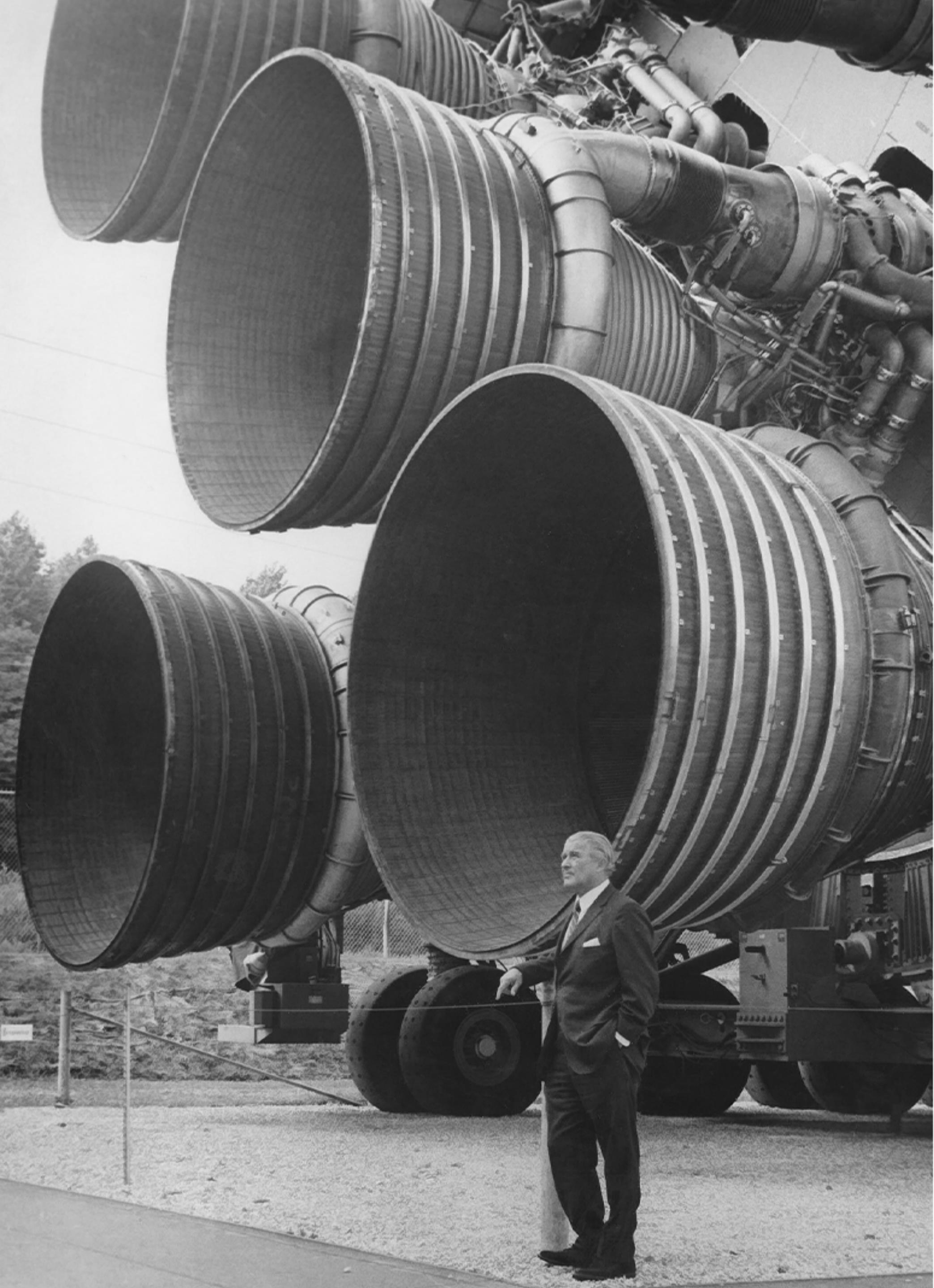


Orbital Machines is the leading European supplier of electric propellant pump technology

A key technology for the space industry

- Commercializing critical space technology and is ready to scale up
- Proof of concept of innovation and established customer revenue
- Profitable and sustainable business model
- Qualified and highly dedicated team
- Pivoting off the trends in the space industry





Seed round: €5 million

Will enable us to

- Respond to significant customer traction
- Establish position as leading supplier of electric pumps to small launch vehicles
- Secure positions in further markets and product portfolio expansion

Will be used on

- €2 million product development and ramp-up to respond to existing traction.
- €1,5 million sales, business & standardization project
- €1,5 million facilities/equipment

The space industry is at Take-off

Space is no longer limited to large governmental entities

Commercial entities and private investments has flourished and the current fastest growing industry is the small launch vehicle industry

Humanity is on its way to conquer outer space, the Moon and Mars, which will unlock a massive need for affordable and reliable in-space infrastructure.

The NewSpace industry is estimated to be a \$1 Trillion economy by 2040¹.



Rocketry is Too Expensive.

Space X's Falcon 1

\$90 million to develop
\$11 million to launch



Rocket Lab's Electron

\$100 million to develop
\$7.5 million to launch



The propellant pump

Up to 50% of the cost¹



1 Wu, Yulin, et al. Vibration of hydraulic machinery Berlin: Springer, 2013.

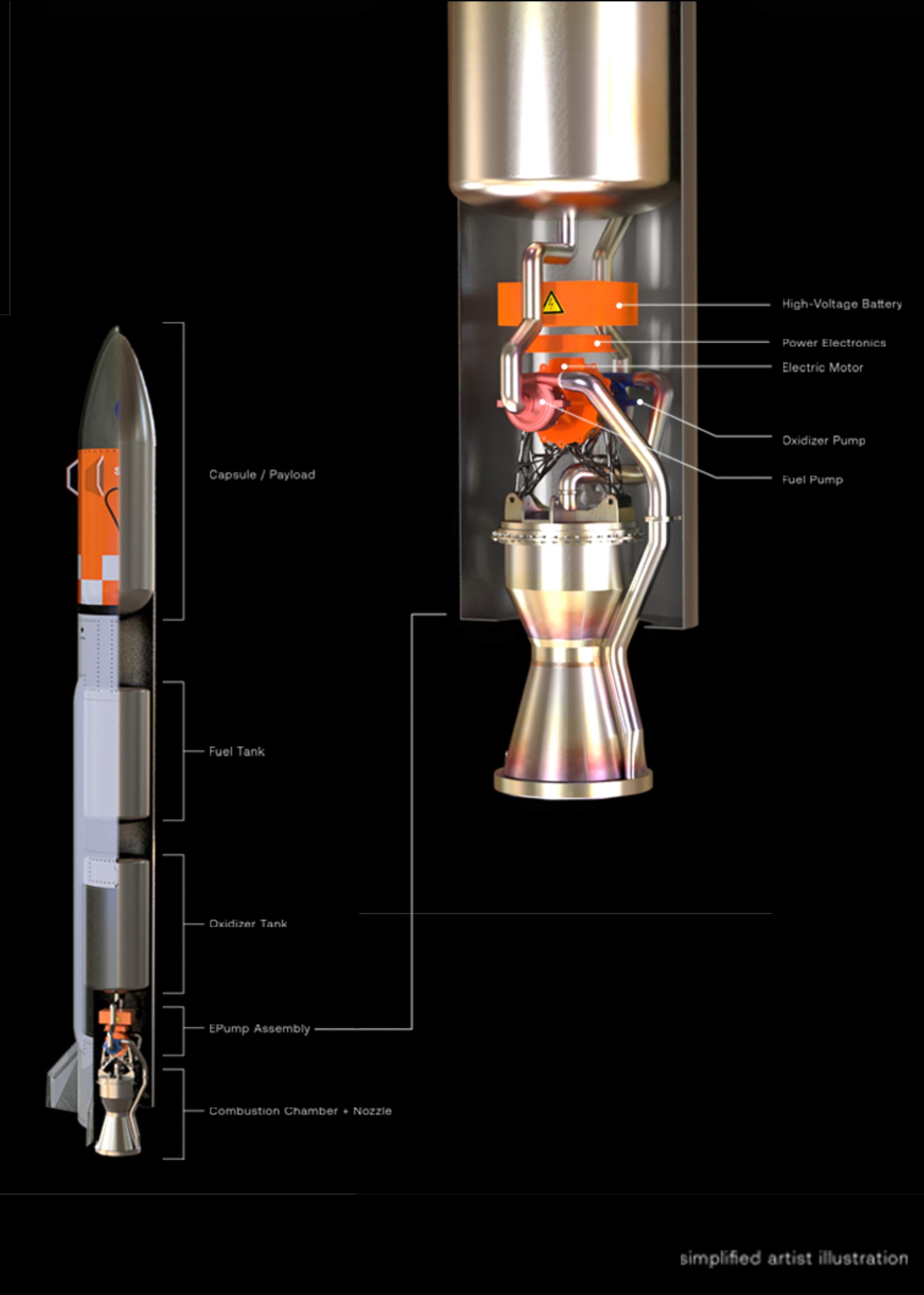
The space industry is dependent on cost and risk reduction through new technologies, effective value chains and new business models.

Electric propellant pumps

The biggest leap of cost and risk reduction

- Replacing the traditional turbopump for launch vehicles, and pressure-fed for in-space applications
- Safer, less complex and easier to handle.
- Industry pioneers: Rocket Lab (Electron) & Astra Space (Rocket 3)
- Standardization opens for significant cost and risk reduction

Needed: A supplier leveraging e-pump standardization



E-pump for Spica

E-pump for Copenhagen Suborbitals BPM100 (100kN) rocket-engine designed to power the SPICA rocket.

X3 as powerful as any operational rocket engine driven by an e-pump

SPICA is designed to perform Copenhagen Suborbitals' ultimate goal of performing a crewed space mission.

Thrust :

100kN

Flow fuel/oxidiser
(l/s) :

25/25

Propellants :

LoX/Ethanol

Weight:

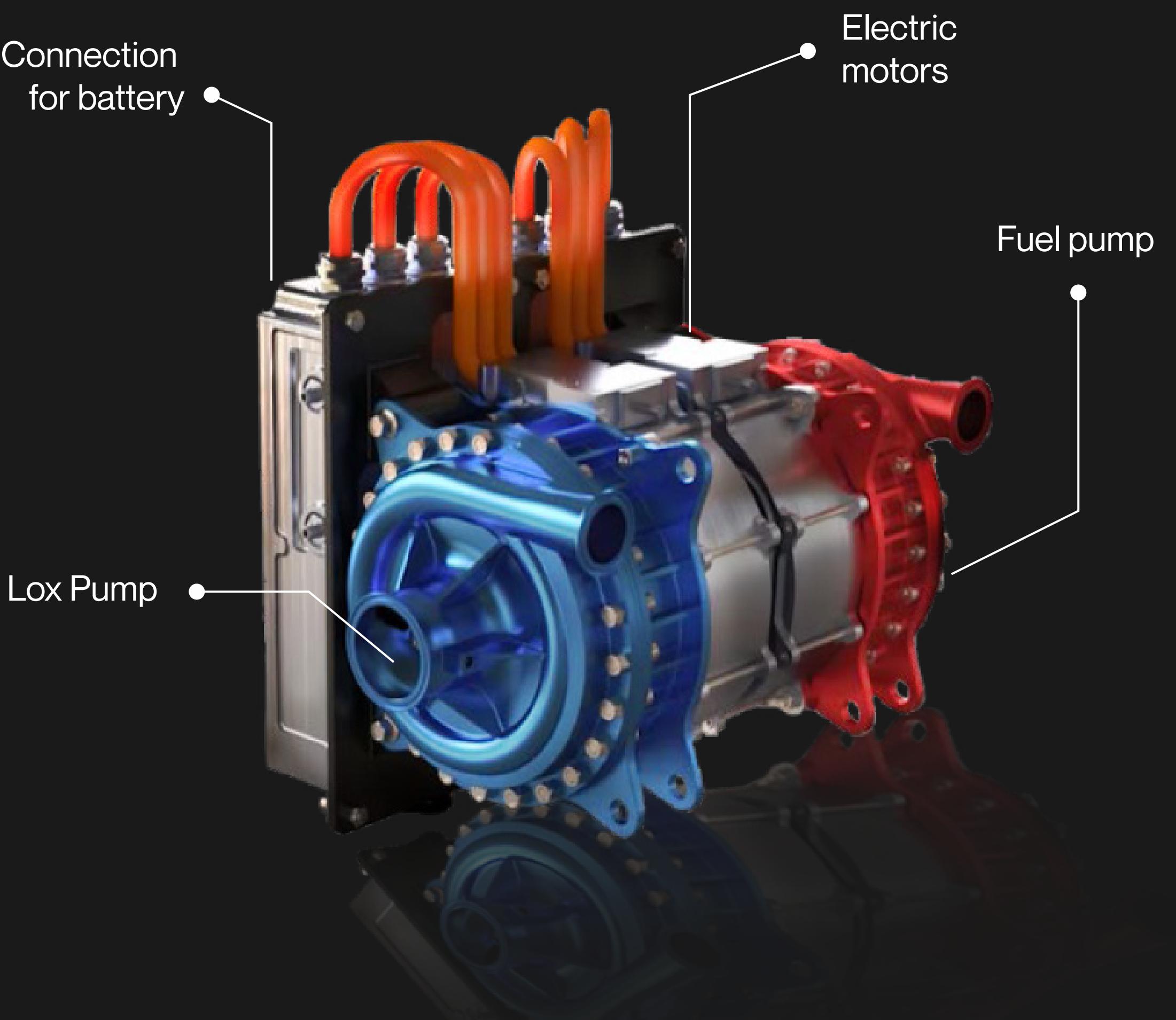
<100 kG

Pressure
inlet/outlet :

3bar/25bar

Shaft power:

300kW



E-pump for Zephyr

E-pump for Venture Orbital Systems rocket engine for “Zephyr”
with 70kG payload capacity to orbit.

The company's first commercial project signed in 2021

This rocket engine and the Copenhagen Suborbital engine have
ideal characteristics for e-pump standardization.

Thrust :

Confidential

Flow fuel/oxidiser
(l/s) :

Confidential

Propellants :

LoX/Rp-1

Weight:

Confidential

Pressure
inlet/outlet :

Confidential

Shaft power:

Confidential





Pivoting off the trends

Orbital Machines is positioned to become a key player of the NewSpace industry, leveraging three major trends:

Battery Technology



New leaps in battery technology will cut the pump weight by up to 2/3. This accelerates the e-pump replacing the turbopump

Commercial off-the-shelf



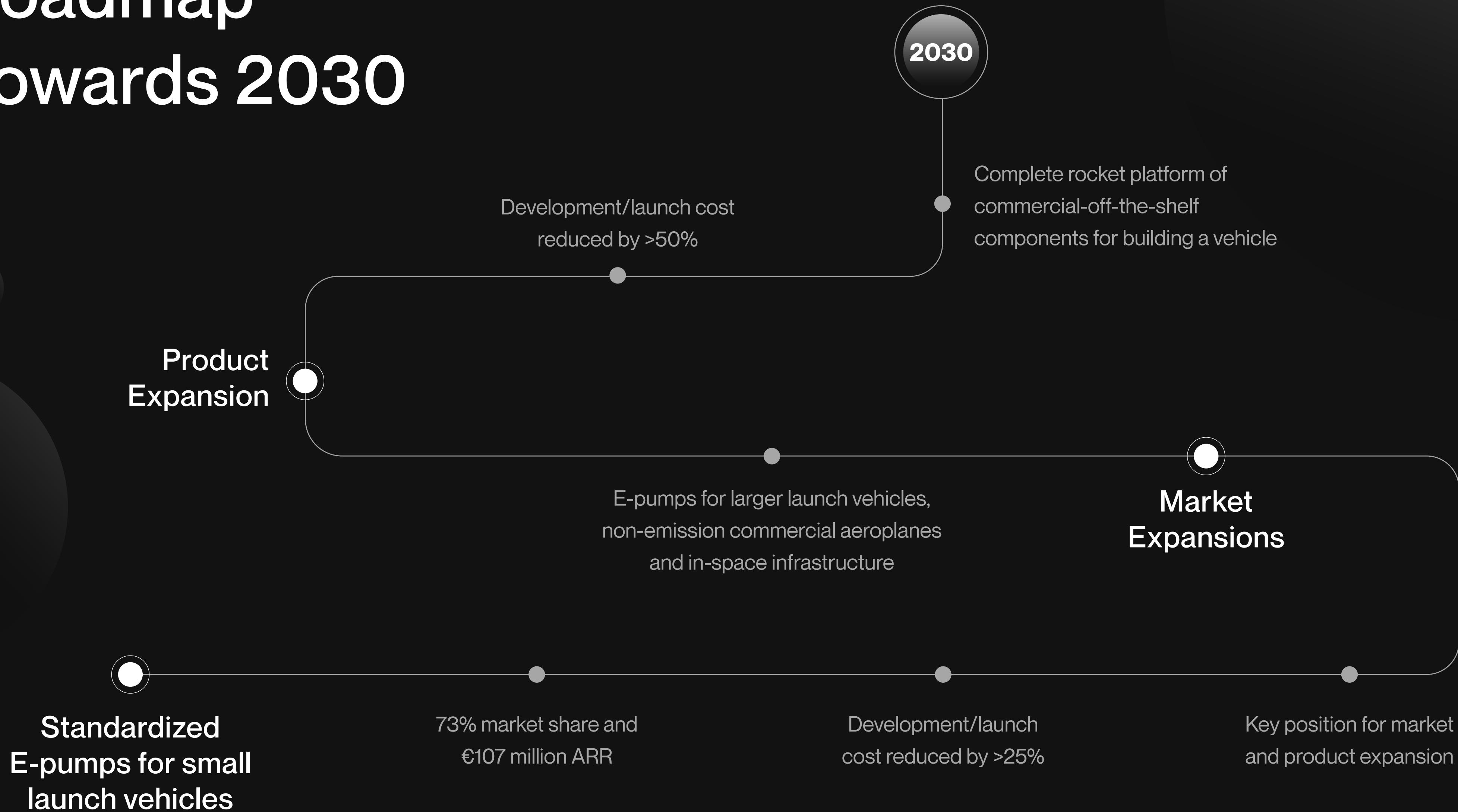
As a maturing industry, standardization and commercial off-the-shelf components will be key for reducing cost and risk

New Industries



E-pumps are key for upcoming industries such as Moon and Mars infrastructure and non-emission aviation

Roadmap Towards 2030



First market focus:
Small launch vehicles

- Satellite launch capacity: <1000 kg
- Commercial industry launching satellites into orbit
- Key drivers: Reducing launch cost and increasing launch frequency
- Currently 18 operational and +100 launchers in development.
- Industry expected to reach \$7,68 Billion by 2030
(CAGR 24,36%)

Copenhagen Suborbitals



COPENHAGEN
SUBORBITALS



Current onboarding projects:

Venture Orbital Systems



VENTURE
ORBITAL SYSTEMS



Further markets - Vertical expansion

Zero Emission Commercial Aviation

Traction: Delivered paid research project to **Leading Global Aerospace Manufacturer**. In negotiations for follow-up project

The global hydrogen aircraft market is value at **\$23.71 billion** in 2030, and is projected to reach **\$144.53 billion by 2040**, registering a CAGR of 20.5% from 2030 to 2040¹



Further markets - Vertical expansion In-Space Transportation

Traction: Currently applying ESA funding for **Green Propellant Lunar Lander Engine** project with consortium

Regular traffic to the Moon, Mars and asteroids will require e-pumps at large scale including planet landers and in-space propellant depots

Lunar lander transportation is estimated to be a **\$109 billion economy in 2040¹**

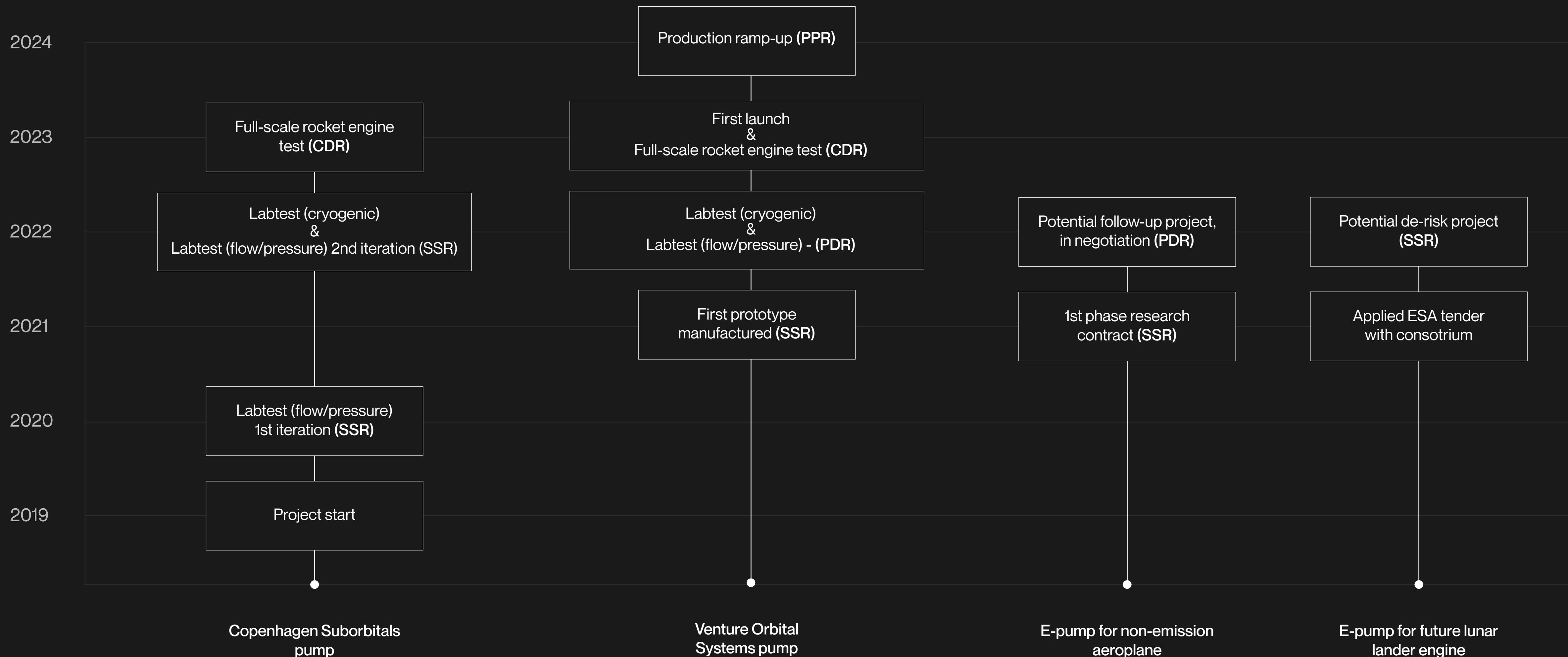
New products - Horizontal expansion

COTS Components

- Most components in a launch vehicle can be standardized
- E-pumps supply key position for horizontal expansion
- Orbital Machines will provide COTS components that fit together like LEGO
- Valves, sensors, guidance system, satellite deployers etc

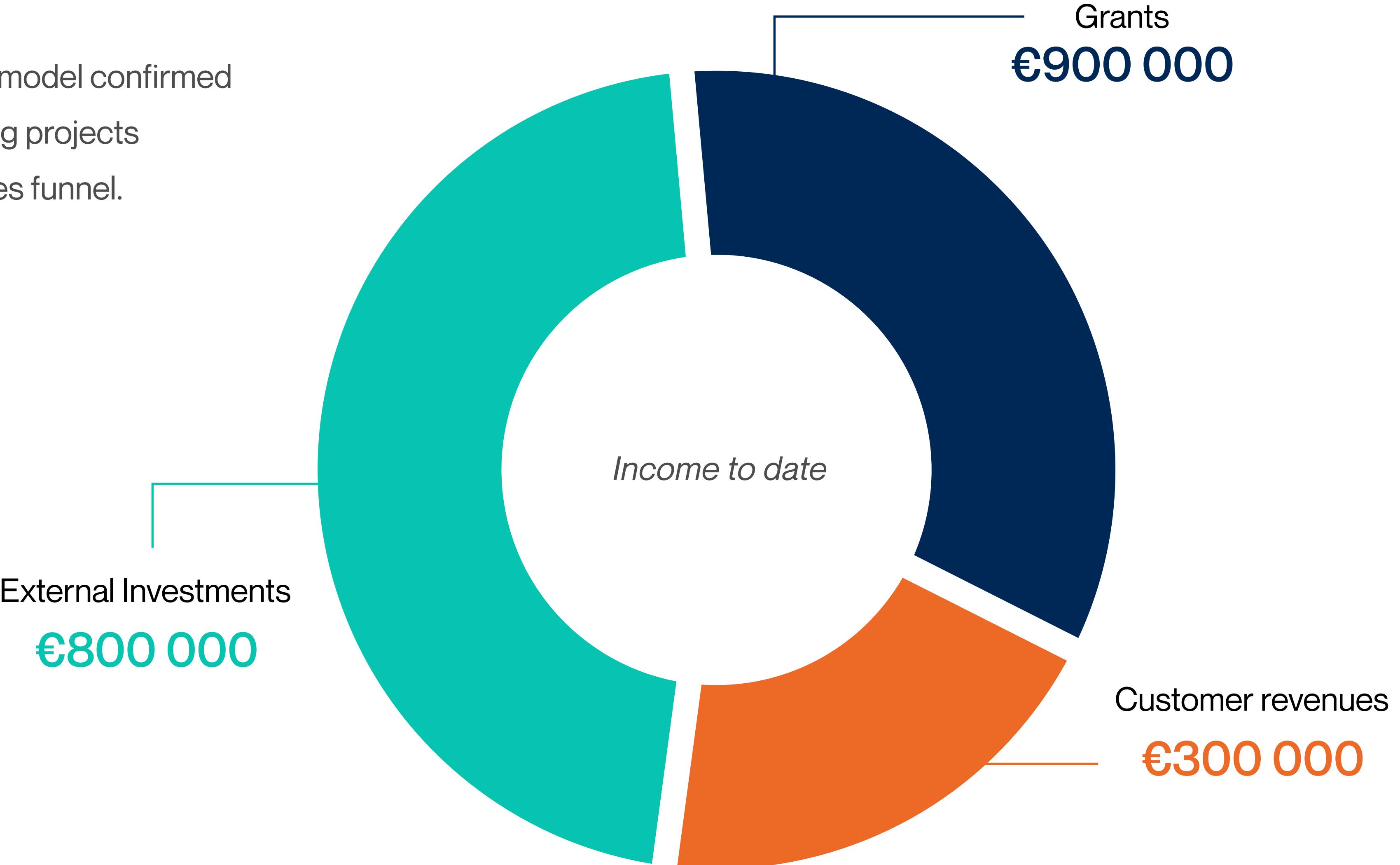


Roadmap : Product development



Business Traction

- Business case & business model confirmed
- 6 LOI's signed for upcoming projects
- 12 customers on top of sales funnel.



Business development

	Customer Revenue	Grants	Established Locations	Team Size end of Year	Customer Traction	Investor Rounds
Year						
2023				30	Total 6 customer projects	A-series €10 million
2022				24	Transform traction to 3 new customer projects	Seed €5 million
2021	First revenue, Total € 300 000 including contracted revenue	€605 000	Test facilities, Copenhagen	14	6 LOI's signed 15 customers in sales pipeline	Pre-seed €535 000
2020		€150 000	Engineering Facilities, Berlin	6	First LOI signed	Pre-seed €200 000
2019		€65 000	Headquarters. Trondheim	2		Pre-seed €180 000

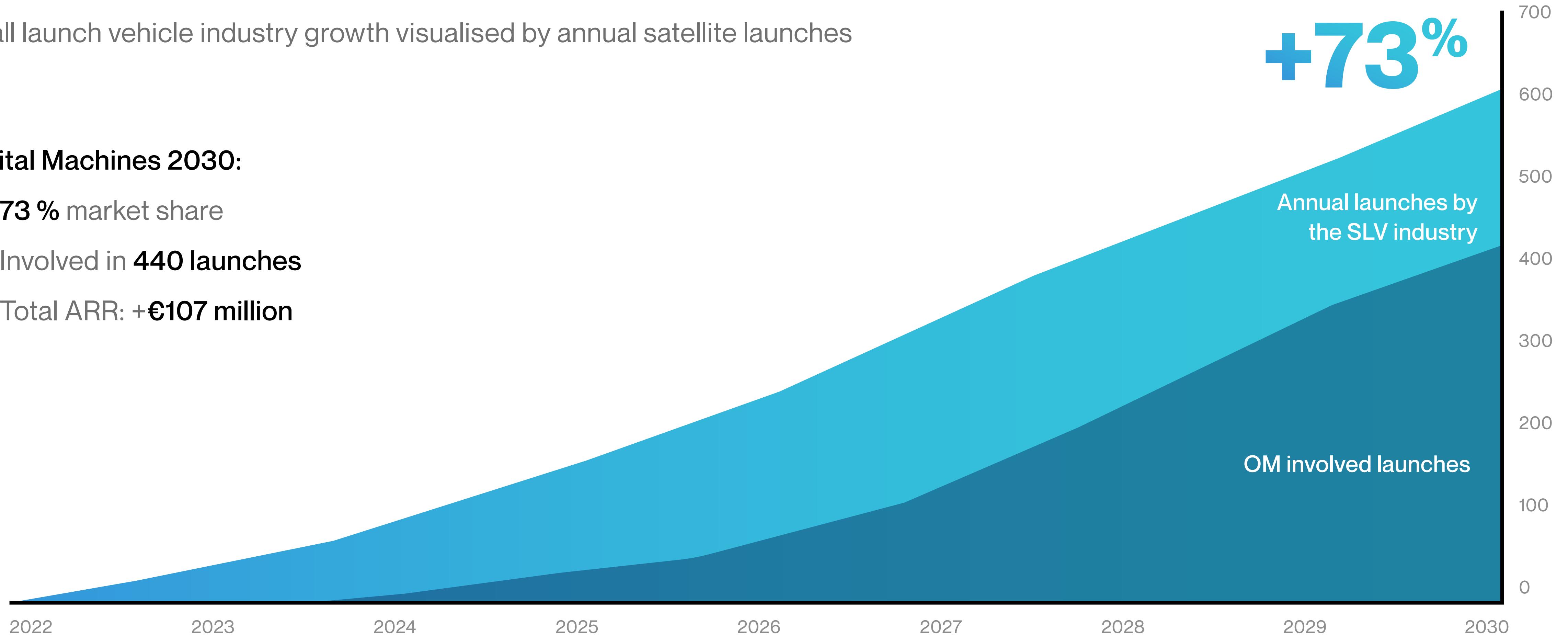
Electric Propellant pumps for small launch vehicles

Market growth & Market share

Small launch vehicle industry growth visualised by annual satellite launches

Orbital Machines 2030:

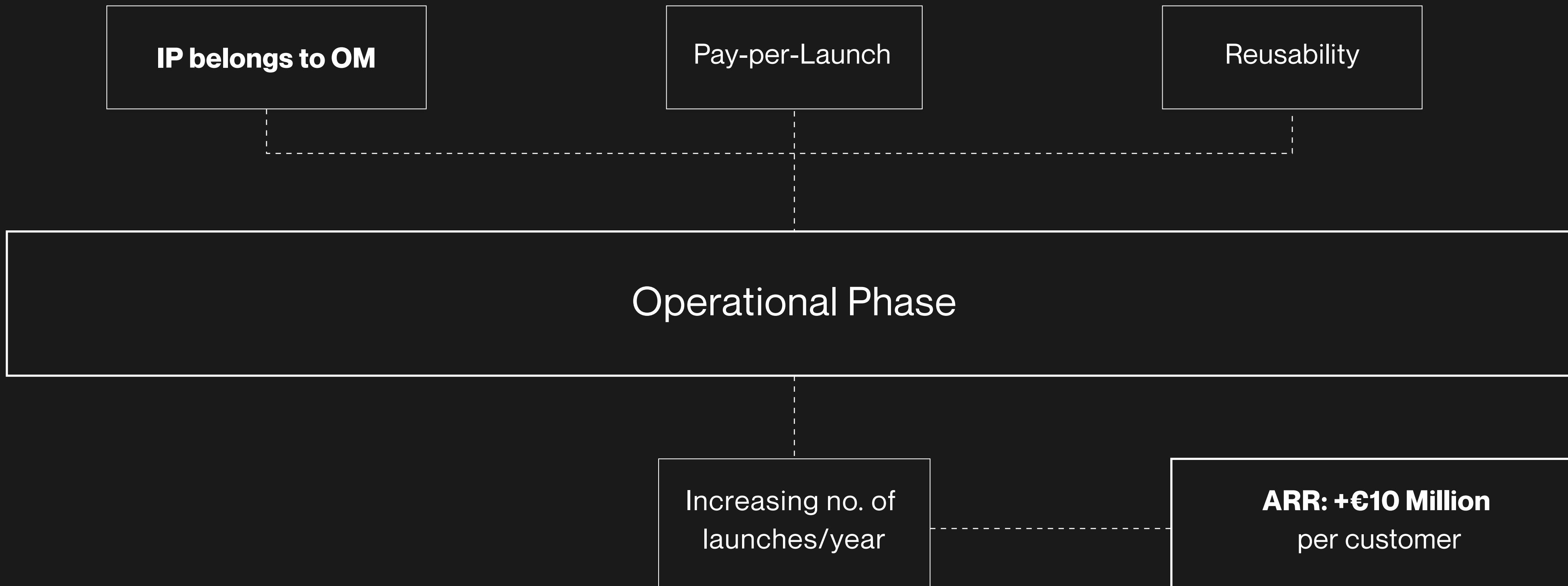
- 73 % market share
- Involved in **440** launches
- Total ARR: +**€107 million**



Electric Propellant pumps for small launch vehicles

Revenue Model

Revenue model based on customer launches



Electric Propellant pumps for small launch vehicles

Economics in detail

	Involved launches	Revenues	Expenses	EBITDA	Cashflow investors
2030	440	€ 107 800 000	€ 31 275 828	€ 76 524 172	
2029	395	€ 96 775 000	€ 28 157 027	€ 68 617 973	
2028	310	€ 75 950 000	€ 22 295 153	€ 53 654 847	
2027	190	€ 46 550 000	€ 14 033 178	€ 32 516 822	
2026	90	€ 25 200 000	€ 10 966 075	€ 14 233 925	
2025	26	€ 11 500 000	€ 8 517 821	€ 2 982 179	
2024	4	€ 4 050 000	€ 4 034 135	€ 16 865	
2023	1	€ 2 350 000	€ 5 104 112	- € 2 754 112	€ 10 000 000
2022	0	€ 1 075 000	€ 3 425 642	- € 2 350 642	€ 5 000 000



Partners

Key partners



**COPENHAGEN
SUBORBITALS**

Copenhagen Suborbitals

Use-case for first technology demonstrator with the Spica rocket.
Access to expertise & test facilities.



theion

Theion Batteries

Developing tomorrow's battery technology of solid-state lithium-sulfur battery, This improves the power density of our pumps significantly and together will change the economics of small launch vehicles.



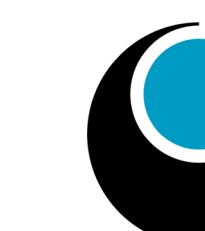
SINTEF

zolve

saft



esa
business
incubation
centre

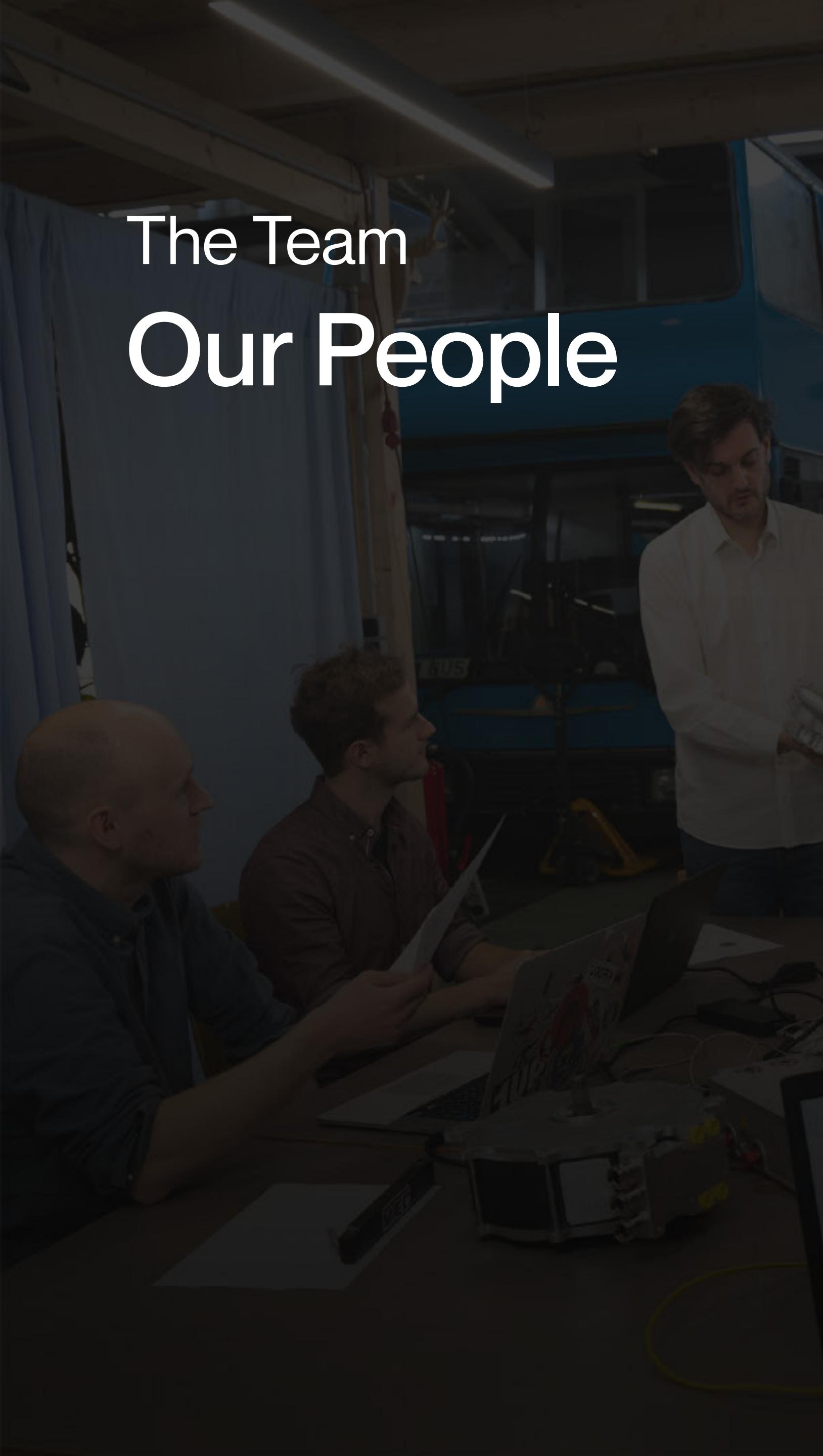


Norsk Romsenter
Norwegian Space Agency

Innovation Norway

Industrial/Research

Financial/Network



The Team Our People

Founding Team & Board



Eivind Lyngsnes Liland

Founder & CEO/CTO

Early employee in Falanx Microsystems (now part of ARM) and founded Swarm64 (now part of ServiceNow) as Founder and CEO/CTO.

Pump design at Copenhagen Suborbitals before founding Orbital Machines in 2018



Ola Eid

Co-founder & Business Developer

B.Sc. in Marketing/business development for SME. Co-founder & CEO at Tech Hugs AS.



Ingrid Husby Liland

Chair of Board & COO

Leading roles in multiple technology companies. Experience in leadership and organisational growth



Mads Wilson

Board Member & strategy development

Space business & industry experience from Copenhagen Suborbitals. Representative Copenhagen Suborbitals

Key Engineers

Team size of 14 with total 40 years experience with pumps and rocketry.
High experience with startup and technology.
Engineers with history from leading aerospace manufacturers.



Dr. Lilian Chabannes

Head of hydraulics

Engineer with Ph.d. and publications of hydraulic pump design. Previous pump engineer at Sobriety.sro (e-pumps)



Cassandra Posada

Head of pump design

Space engineer with M.Sc. thesis at Airbus Defence & Space. Satellite and component design for Ariane 6 at Azimuth Space GmbH



Pooja Channaveerappa

Head of analysis and validation

Design engineer with Ms.c thesis at Airbus Innovation Group. Internships at National Aerospace Laboratories & Hindustan Aeronetics Ltd.



Jop Nijenhuis

Head of Integration and testing

Mechatronic engineer with BSc thesis of Active Guidance System for the Nexø rocket at Copenhagen Suborbitals

Berlin
Engineering & Manufacturing



Trondheim
Headquarters



Copenhagen
Test Facilities



Contact Us

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Engineers



Dr. Lilian Chabannes
Head of hydraulics

Engineer with Ph.d. and publications of hydraulic pump design. Previous pump engineer at Sobriety.sro (e-pumps)



Cassandra Posada
Head of product development

Space engineer with M.Sc. thesis at Airbus Defence & Space. Satellite and component design for Ariane 6 at Azimuth Space GmbH



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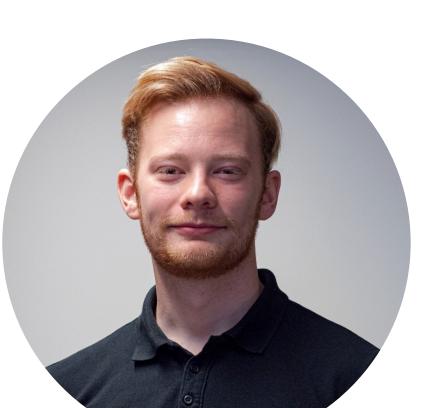
John Bjerregaards
Control and acquisition

Mechanical/test engineer
Production, launch and BPM 100 Engine Design at Copenhagen Suborbitals



Jop Nijenhuis
Head of Integration and testing

Mechatronic engineer with BSc thesis of Active Guidance System for the Nexø rocket at Copenhagen Suborbitals



Øyvind Ingebrigtsen
Mechanical engineer/Seals & Bearings

Previous member of Revolve NTNU - Developing electric race cars. M.Sc candidate in control systems and robotics



Kjersti Bragstad
Mechanical Engineer

Project leader in VOS project
Founder & CEO of Propulse NTNU & Space NTNU



Yannick Bäumer
Software & electronics

M.sc in IT-systems engineering



Anjo Opperman
Head of Accounting (GmbH)

Experience:
Expert on accounting, financial and legals.



Anjo Oppermann
Head of electromechanics

Ms.c candidate in electromechanics. Designed the first electric motor design for Venture Orbital Systems e-pump.

Berlin

Engineering & Manufacturing



Trondheim

Headquarters



Copenhagen

Test Facilities

