SubOrbit+ – The Quiet Urban Launch System

Whitepaper – July 2025

Executive Summary

SubOrbit+ is a revolutionary micro-launch system that transforms decommissioned mining shafts into vertical, silent launch platforms for small satellites. By combining vacuum-based magnetic acceleration, a low-noise hybrid booster, and a compact orbital stage, SubOrbit+ enables frequent, safe, and urban-compatible access to Low Earth Orbit (LEO). This innovation addresses Europe's strategic need for sovereign launch capacity—without dependency on foreign spaceports or high-cost infrastructure.

1. Project Overview

SubOrbit+ integrates proven and novel technologies into a three-phase launch platform:

1. Vacuum shaft acceleration to ~300 m/s using magnetic propulsion.
2. Hybrid booster providing ~1.0–1.5 km/s within the lower atmosphere.
3. Orbital injection stage delivering ~6.2 km/s for final LEO placement.

The entire stack (~300 kg total mass) is launched from a refurbished vertical shaft (500–800 m deep), formerly part of industrial mining operations.

2. Technical Architecture

Phase 1 – Magnetic Vacuum Launch (Subsonic)

- Exit velocity: up to 300 m/s
- Shaft length: 500–800 m
- Max g-load: 15 g
- Energy demand: ~100 kWh
- No emissions, no sound

Phase 2 – Hybrid Booster (Atmospheric Ascent)

- Adds 1.0–1.5 km/s delta-v
- Propellant: HTP + Methane (or Cold Gas Hybrid)
- Silent combustion technologies for urban safety
- Max altitude: 8–12 km

Phase 3 – Orbital Stage (LEO Injection)

- Adds ~6.2 km/s delta-v
- Propulsion: solid or LOX/kerosene
- Payload: 10–15 kg
- Target orbits: 300–600 km LEO

3. Why Three Phases?

The segmentation into ground-based, atmospheric, and orbital stages provides:

- Fuel savings via kinetic pre-boost
- Acoustic isolation in populated areas
- Flexibility to scale or adapt each stage independently
- Enhanced safety through modular redundancy
- Reusability potential for booster & shaft systems

4. Key Advantages

- No sonic boom, no urban noise
- Operates from within Europe, no foreign base needed
- Low infrastructure footprint (retrofits existing mines)
- Launch frequency independence (no range scheduling)
- Supports EU sovereignty in space access

5. Challenges

- Precision coordination between all three phases
- Thermal protection at shaft exit
- Navigating urban licensing & airspace regulation
- Cost optimization at sub-20 kg payloads

6. Strategic Relevance for Europe

SubOrbit+ reinforces Europe’s capability to launch satellites autonomously and responsively.

Applications include:
- Real-time Earth observation
- Civil protection & climate monitoring
- Dual-use & defense
- Academic research platforms

It aligns with EU initiatives in GreenTech, digital sovereignty, and industrial resilience.

7. Commercial & Financial Model

Cost Structure (per launch):

- Energy & materials: ~€300
- Booster + Orbital stage: €2,000–2,500
- Operations & crew: €500–1,000
- Infrastructure/licensing: €300–700
- Total estimated cost: €3,500–4,500

Pricing & Scale:
- Target price: €40,000–60,000 per launch
- Target cost: < €4,000/kg at scale
- Break-even: ~70 launches/year
- Phase 1: 10–15 launches/year, scaling to 100+

Revenue Streams:
- Standard launch contracts (academia, defense, EO)
- Priority slots ("Rapid Launch")
- API access to telemetry & tracking data

Funding Needs:
- Seed: €3–5 million (prototype & feasibility)
- Series A: €25–35 million (retrofit, engine, orbital stage)
- Eligible for ESA/European Innovation Council/public-private partnerships

8. Contact

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