Zmeia Drone

Infinity Turbine LLC

[TEL] 1-608-238-6001

[Email] greg@infinityturbine.com

https://infinityturbine.com/infinity-turbine-zmeia-tubular-drone.html

Zmeia Drone

This webpage QR code

PDF Version of the webpage (maximum 10 pages)

Zmeia — the Snake Drone for Persistent Reach

A new class of unmanned platform, Zmeia reimagines aerial presence with a long, flexible airframe that unfurls like a living vine across the sky. Designed for extended missions that demand reach, endurance, and discrete observation, Zmeia combines graceful motion with sophisticated sensors to silently extend situational awareness where traditional platforms cannot.

Lightweight and serpentine, Zmeia excels at filling gaps — threading through urban corridors, tracing river valleys, or stationing along borders and coastlines to provide continuous, low-profile coverage. Its unique form factor enables prolonged airborne persistence and smooth, adaptive flight paths that keep sensors trained on key areas without drawing attention.

Zmeia is built for responsible deployment: configurable mission profiles, layered safety controls, and data governance that prioritize lawful, ethical surveillance and respect for privacy. Whether supporting humanitarian search operations, environmental monitoring, or secure perimeter awareness, Zmeia is about seeing more with less footprint — thoughtfully and safely.

Zmeia Drone

Use Modes:

- Kite (tethered)
- Drone
- Airship

Features:
- Hydrogen gas lift, indefinite loiter time.
- Can charge off a power line in-situ.
- Can isolate the grid using foil streamer or carbon fiber TOW.
- Can foul other drones using light weight spider web net.
- Terminate mode (igniting H_2 gas).
- Self consumption mode (fuel cell uses H_2 to drive electric or miniature gas turbine).

Profile:
- Shape shifting radar signature
- Ability to provide thin front profile.
- Ability to shape into large radar signature profile.
- Stealth mode (uses directional finder from radar emissions as inference to weathervane to reduce radar signature).

Operational:
- Reflective skin or color changing skin.
- Autonomous, directed, controlled, fiber optic, or hybrid mode.

Fuel, Lift, and Shape:
- Use any water through electrolyzer to make hydrogen fuel on-demand at launch location.
- Collapsible Mylar tube easily transportable. Carbon fiber tow frame inflated with air on-site, resin infused for solid shape, or multisegmented shape with rigid or flexible partitions of long tube.
- Hydrogen electrolyzer, tether, and controller can fit into a backpack or in a compact electric trailer. Control via secure smartphone.

Defensive Operations:
- Hard to terminate in compromised area, due to low profile.
- Hard to detect.
- Easy to deploy in lone wolf or wolf pack cluster mesh scenarios.
-

Observational Characteristics:
- Infinite loiter time.
- Better than static blimps which make easy targets.
- Weather vane (horizontal with nose tether.
- Vertical vane with bottom tether.
- Ground tethered target market.

Propulsion:

Zmeia Drone

Use Modes:

• Kite (tethered)
• Drone
• Airship

Features:
• Hydrogen gas lift, indefinite loiter time.
• Can charge off a power line in-situ.
• Can isolate the grid using foil streamer or carbon fiber TOW.
• Can foul other drones using light weight spider web net.
• Terminate mode (igniting H_2 gas).
• Self consumption mode (fuel cell uses H_2 to drive electric or miniature gas turbine).

Profile:
• Shape shifting radar signature
• Ability to provide thin front profile.
• Ability to shape into large radar signature profile.
• Stealth mode (uses directional finder from radar emissions as inference to weathervane to reduce radar signature).

Operational:
• Reflective skin or color changing skin.
• Autonomous, directed, controlled, fiber optic, or hybrid mode.

Fuel, Lift, and Shape:
• Use any water through electrolyzer to make hydrogen fuel on-demand at launch location.
• Collapsible Mylar tube easily transportable. Carbon fiber tow frame inflated with air on-site, resin infused for solid shape, or multisegmented shape with rigid or flexible partitions of long tube.
• Hydrogen electrolyzer, tether, and controller can fit into a backpack or in a compact electric trailer. Control via secure smartphone.

Defensive Operations:
• Hard to terminate in compromised area, due to low profile.
• Hard to detect.
• Easy to deploy in lone wolf or wolf pack cluster mesh scenarios.
•

Observational Characteristics:
• Infinite loiter time.
• Better than static blimps which make easy targets.
• Weathervane (horizontal with nose tether

Hydrogen Tube Drone Concept for Payload Lift

Exploring the design of hydrogen-filled tube structures to carry a 100 pound payload using lightweight composite walls, honeycomb architecture, and large cell panels for maximum lift.

Introduction

Hydrogen is the lightest gas available for buoyancy, making it an attractive option for lifting payloads in airship-style structures. The challenge is creating a form of structural hydrogen containment that is both light enough to float and strong enough to carry meaningful loads. One promising approach is to build long tubular structures with internal hydrogen cells and a lightweight composite frame.

Design Approach

Instead of a traditional foam, the proposed design uses a honeycomb or cellular arrangement where thin walls separate large sealed hydrogen volumes. By keeping cell size large, the surface-to-volume ratio is favorable and the wall mass is minimized. The outer structure is built from carbon fiber reinforced panels and isogrid trusses, allowing the tube to resist bending and handling loads.

The key principle is straightforward. Air at sea level has a density of about 1.225 kilograms per cubic meter. Hydrogen has a density of about 0.090 kilograms per cubic meter. The maximum theoretical lift is therefore about 1.135 kilograms per cubic meter before accounting for structure. The goal is to minimize the mass of walls and framing so that the majority of that lift is available for payload.

Sizing for a 100 Pound Payload

To carry a 100 pound payload, equal to about 45 kilograms, the system must generate at least that much net lift.

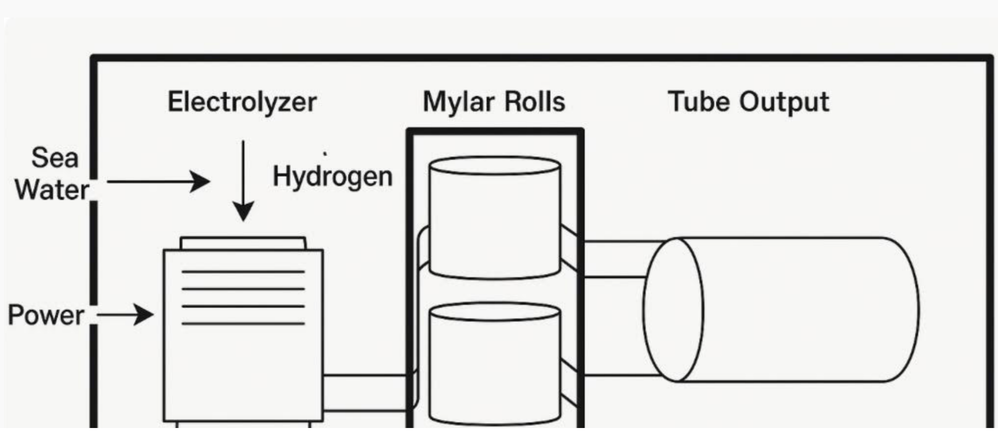
Each cubic meter of hydrogen provides about 1.135 kilograms of lift.
Accounting for structural walls and truss mass, a practical net lift of about 0.6 kilograms per cubic meter can be achieved with large one meter cells and thin composite walls.
Dividing 45 kilograms by 0.6 kilograms per cubic meter gives a requirement of about 75 cubic meters of internal hydrogen volume.

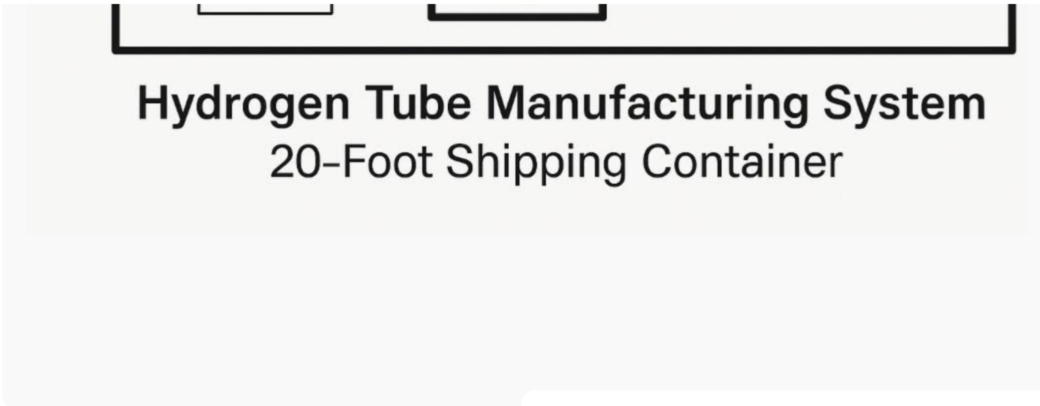
With the constraint of a maximum one meter diameter, this translates to a tubular structure. The volume of a cylinder is area times length. With a cross sectional area of about 0.785 square meters for a one meter diameter, the tube would need to be about 95 meters long to enclose 75 cubic meters of hydrogen.

Structural and Safety Considerations

The tube would be built as a modular composite shell with internal cell panels. Each panel would be sealed with thin film laminates such as aluminized polymer with additional ceramic or graphene coatings to resist hydrogen permeation. Carbon fiber frames would tie the cells together and carry the bending loads of the long tube.

Because hydrogen is flammable, the design would include compartmentalization, pressure relief vents, and protective coatings to reduce leakage. Payload attachments would be connected through


Electrolyzer
Mylar Rolls
Tube Output
Sea Water
Hydrogen
Power



Hydrogen Tube Manufacturing and Power Requirements for a 100 Pound Payload

Analysis of hydrogen generation using a 100 kilowatt trailer electrolyzer and a continuous Mylar welding process to construct tubular structures capable of lifting 100 pounds, including energy, water, material requirements, and container integration.

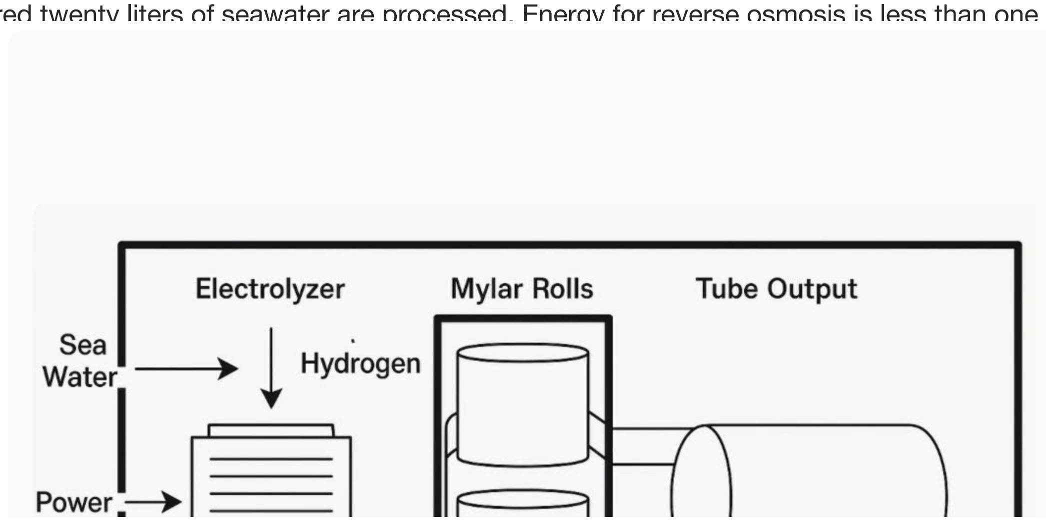
Introduction

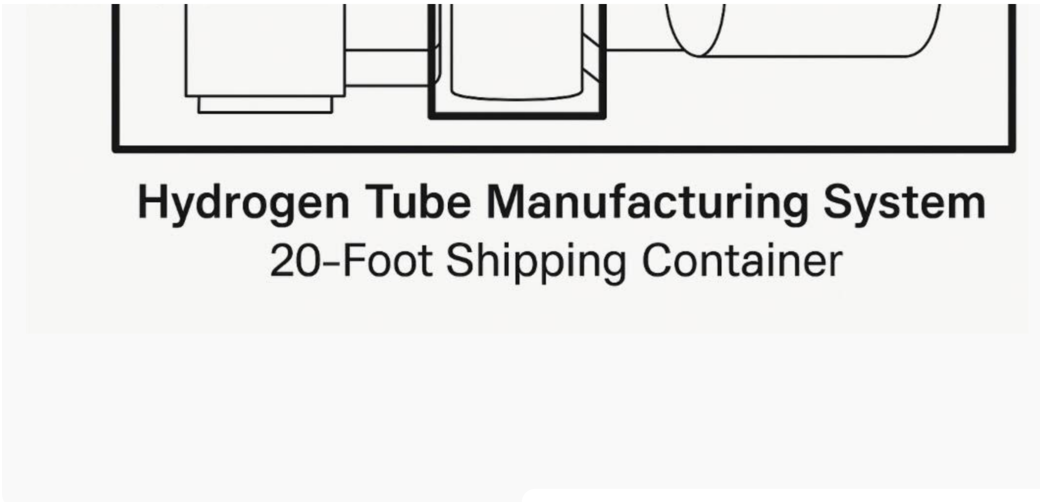
Hydrogen buoyancy systems can be designed as tubular structures filled with hydrogen gas and built from lightweight materials such as Mylar. For a payload target of 100 pounds, a one meter diameter tube about ninety five meters long is required. This article outlines the power and water needed to generate the hydrogen volume with a trailer mounted electrolyzer, and the Mylar material needed for a continuous welding process that constructs and fills the tube on site.

Hydrogen Generation with a 100 Kilowatt Electrolyzer

The required hydrogen volume is seventy five cubic meters, equal to about six point seven kilograms of hydrogen.

Electricity consumption: At fifty kilowatt hours per kilogram, the electrolyzer requires about three hundred thirty seven kilowatt hours. A one hundred kilowatt electrolyzer produces about two kilograms of hydrogen per hour, so the total run time is about three and a half hours.
Water consumption: Each kilogram of hydrogen requires nine liters of deionized water. For six point seven kilograms, about sixty one liters are needed. With seawater as feedstock and a reverse osmosis unit at fifty percent recovery, about one hundred twenty liters of seawater are processed. Energy for reverse osmosis is less than one kilowatt hour.




Hydrogen Tube Manufacturing System
20-Foot Shipping Container