

# Hydrogenase - bio-hydrogen airship / building concept

Peter Lobner, updated 18 March 2022

Designed by Vincent Callebaut Architectures, Paris (<http://vincent.callebaut.org>) in 2010, Hydrogenase is radical concept for a variable buoyancy, inhabited vertical airship / building that can dock with a base or fly independently using bio-generated hydrogen as the lift gas. This concept was designed for use in the South China Sea near Shanghai, China.

The designer refers to Hydrogenase as, “the 100% self-sufficient organic airship of the future.” The bio-hydrogen is generated from algae farming in the floating base structure, which also recycles carbon dioxide.



*Hydrogenase airships and floating base structures.  
Source: Vincent Callebaut Architectures*

Basic design features of a Hydrogenase inhabited airship / building are as follows:

- Semi-rigid airship structure
- Dimensions: 480 meters (1,574 ft) tall, 180 meters (591 ft) maximum diameter.
- Four great arch structures support the interior circular platforms and distribute vertically all the levels of the inhabited central rings.
  - Inhabited spaces are included between four great volumes inflated with bio-hydrogen lifting gas.
  - 67 inhabited floors
- Power generation with zero carbon emissions:
  - Hydrogen self-generation and hydrogen fuel cells
  - Wind turbines on the airship
  - Hydro turbines on the floating base
- Flight altitude: 2,000 meters (6,562 ft)
- Maximum cargo load: 200 metric tons (220 tons)
- Maximum speed: 175 kph (109 mph)
- Range: 5,000 to 10,000 km (3,107 to 6,214 miles)

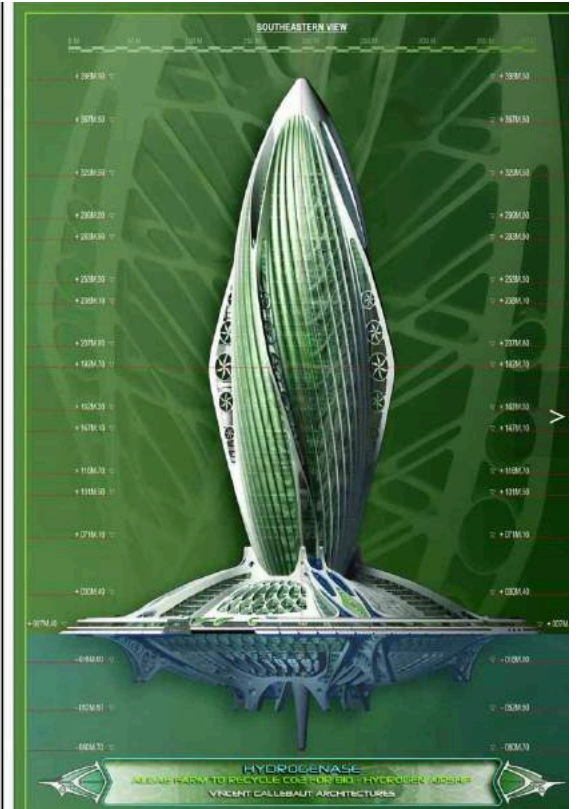
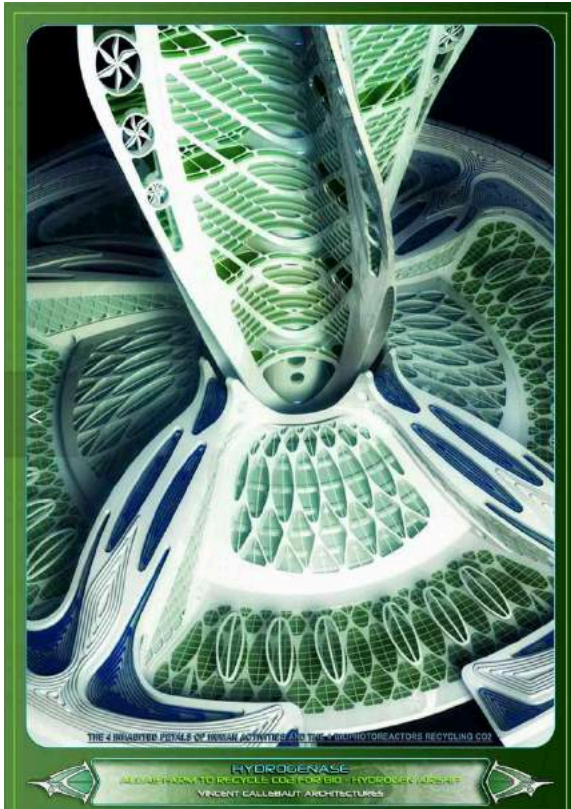
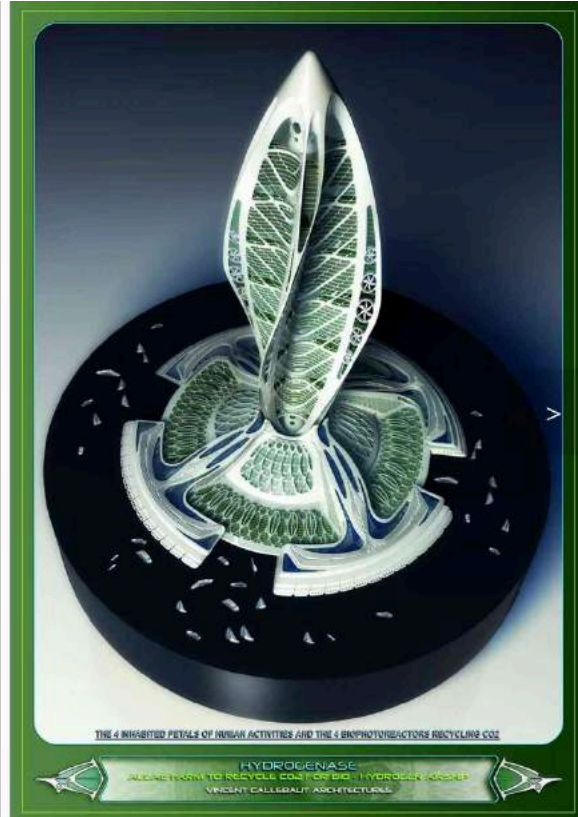
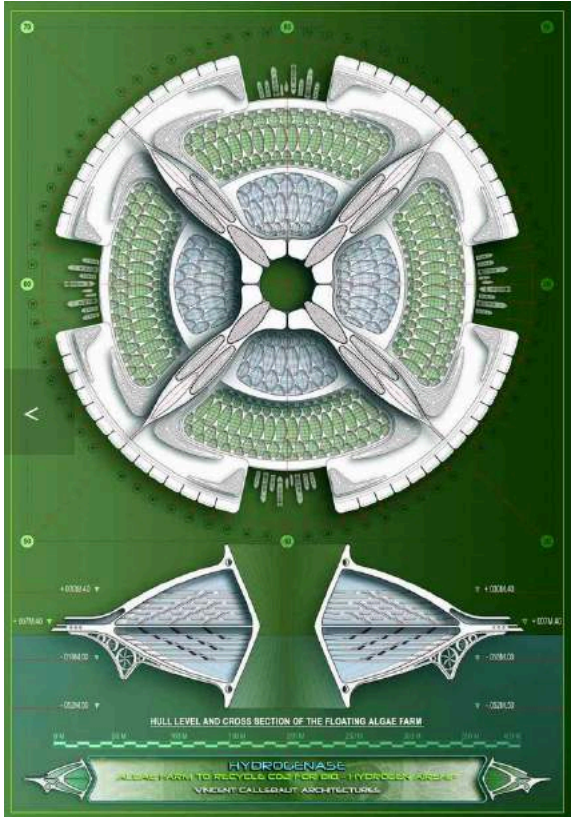
Hydrogenase airships could find applications as movable dwellings and research centers. The airships also could serve as a deployable vehicles that could provide disaster relief in remote areas where they could serve as large flying hospitals and aid centers.

You'll find a through dissertation on the Hydrogenase concept and associated algae farming and bio-hydrogen production on the Vincent Callebaut Architectures, Paris website here:

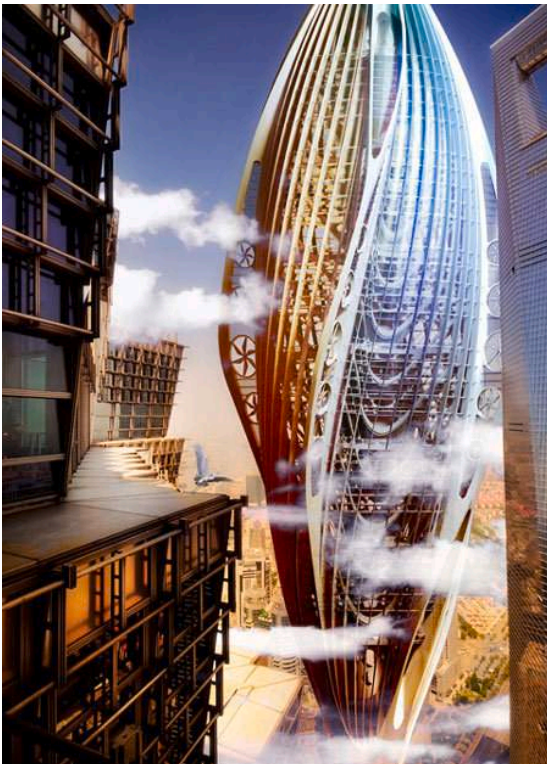
[http://vincent.callebaut.org/object/100505\\_hydrogenase/hydrogenase/projects](http://vincent.callebaut.org/object/100505_hydrogenase/hydrogenase/projects)



*Hydrogenase rigid structural framework design.  
Source: Vincent Callebaut Architectures*



Source: Vincent Callebaut Architectures



*Hydrogenase integrated in the Shanghai, China cityscape.  
Source: ArchDaily*



*Hydrogenase airships shown in their base, launching and in flight.  
Source, all graphics: Vincent Callebaut Architectures*

## For additional information

- Karen Cilento, “Hydrogenase / Vincent Callebaut,” ArchDaily, 9 May 2010: <https://www.archdaily.com/59346/hydrogenase-vincent-callebaut>
- Mike Chino, “High-Flying Algae Airships are Self-Sufficient Airborne Cities,” Inhabit, 10 May 2010: <https://inhabitat.com/high-flying-algae-airships-are-self-sufficient-airborne-cities/>

## **Other *Modern Airships* articles**

- *Modern Airships - Part 1*: <https://lynceans.org/all-posts/modern-airships-part-1/>
- *Modern Airships - Part 2*: <https://lynceans.org/all-posts/modern-airships-part-2/>
- *Modern Airships - Part 3*: <https://lynceans.org/all-posts/modern-airships-part-3/>