Beijing SAWES Energy Technology Co., Ltd. – Buoyant Air Turbine (BAT)

Peter Lobner, 31 October 2024

1. Introduction

In October 2024, several Chinese news sources reported that the firm Beijing SAWES Energy Technology Co. Ltd, in collaboration with Chinese institutes including Tsinghua University and the Aerospace Information Research Institute of the Chinese Academy of Sciences, had developed and flown a buoyant a buoyant air turbine (BAT), identified as the S500, and generated electric power.

Tethered S500 buoyant airborne turbine (BAT) and its base station.
Source: China Daily (photo taken 10 Oct 2024)

Prevailing winds are stronger at higher altitudes and offer more energy for harvesting than at ground level. This is the rationale for the trend toward taller, larger diameter stationary wind turbines that can harvest energy from winds at altitudes up to about 300 m (984 ft).

A BAT is a tethered aerostat (a kite balloon) that can lift a lightweight generator into the stronger prevailing winds and deliver electric power via its tether to a ground station and then on to an electrical substation for a local micro-grid, or to the grid itself. This can be accomplished without the massive hardware associated with terrestrial wind turbines sited on land or offshore.

2. SAWES BAT demonstrated in China

The Chinese domestically-produced, helium-filled BAT, known as the S500, has a rated power of 50 kW. The October 2024 flight test was conducted at an operating altitude of 500 meters (1,640 ft) above ground in Wuhan, in central China's Hubei Province.

SAWES chief technology officer, Weng Hanke, identified the following potential applications for the BAT:

> “S500 is developed for scenarios such as emergency rescue, surveying and mapping, and urban security. When an earthquake or flood occurs, it can be quickly launched to ensure on-site power supply and communication."

Tethered S500 BAT at its operating altitude above Wuhan, China.
Source: China Daily (photo taken 10 Oct 2024)

Closeup view of the ring tail configuration on the tethered S500 BAT. Source: China Daily (photo taken 10 Oct 2024)

SAWES announced plans to build and test a 100 kW BAT designed to operate at an altitude of 1,000 meters (3,281 ft).

Functionally, the SAWES S500 is very similar to the BAT developed and test flown by the U.S. firm Altaeros Energies, which is addressed in a separate article.

Altaeros BAT operational testing. Source: Altaeros (circa 2012)

For more information

- "China's self-developed airship harvests wind power at record height," China Daily, 12 October 2024: https://www.chinadaily.com.cn/a/202410/12/WS6709ce66a310f1265a1c7306.html
- Chen Na, "China's Self-developed Airship Harvests Wind Power at Record Height," Chinese Academy of Sciences, 11 October 2024: https://english.cas.cn/newsroom/cas_media/202410/t20241015_691775.shtml

Other *Modern Airships* articles

- *Modern Airships - Part 1*: https://lynceans.org/all-posts/modern-airships-part-1/
    - Altaeros Energies – Buoyant Airborne Turbine (BAT)
- *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/