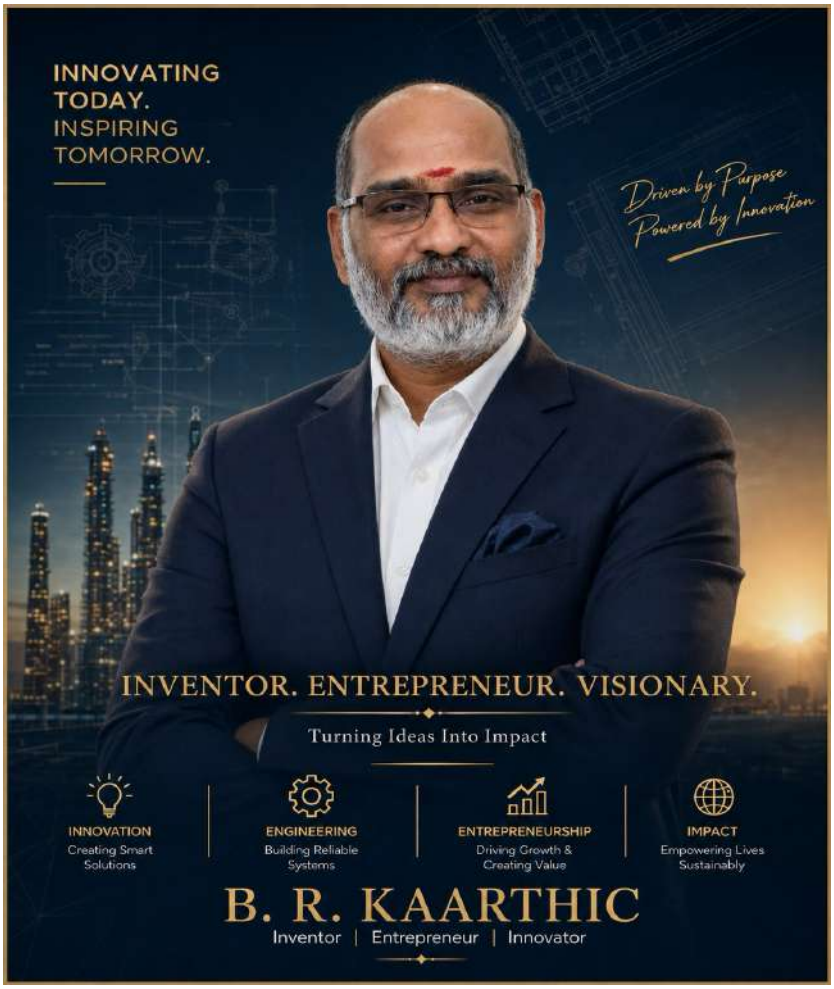
Beyond Conventional Electrolysis

Tube-X & PLY FLY High-Volume HHO Engines for Industrial Boilers, Furnaces, Kilns and Thermal Applications



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1. Website Introduction

BIRD Renewables introduces two proprietary high-volume HHO generation technologies: **Tube-X Hydrolyser Engine** and **PLY FLY Hydrolyser Engine**.

These engines are developed for industrial heat applications such as boilers, furnaces, heating booths, industrial burners, kilns, iron ore thermal processing and high-temperature industrial systems.

Unlike ordinary electrolysers, Tube-X and PLY FLY are designed with special stack architecture, controlled electrical operation, polarity management, proprietary treated-water operation and modular industrial scaling.

Tube-X and PLY FLY are not presented as standard plate electrolysers. They are proprietary HHO generation engines developed to re-engineer the reaction environment and support industrial thermal applications.

2. Understanding Conventional Electrolysis

In ordinary water electrolysis, gas production is governed by **Faraday's Law of Electrolysis**. Faraday's Law explains that the amount of hydrogen and oxygen produced is related to the electric charge passed through the electrolyte.

In simple words: **more current + more operating time = more gas production.**

A conventional electrolyser is normally limited by electrode surface area, current density, electrolyte conductivity, voltage loss, bubble sticking, stack temperature, internal resistance and gas release path.

Conventional limitation	Effect on gas production
Electrode surface area	Limits active reaction area
Current density	Controls gas generation rate
Electrolyte conductivity	Affects resistance, heating and stability
Voltage loss	Reduces useful system efficiency
Bubble sticking	Blocks active surface and slows release
Gas release path	Affects stable output and measurement

3. Scientific Positioning

BIRD Renewables does not present Tube-X and PLY FLY as ordinary electrolysers. They are presented as proprietary high-volume HHO generation engines.

Tube-X and PLY FLY engines do not claim to violate Faraday's Law. Instead, they are proprietary high-volume HHO generation systems designed to operate beyond the limitations of ordinary electrolysers by changing stack geometry, reaction surface behaviour, polarity control, treated-water operation, bubble release dynamics and module-level power control.

The systems are therefore best evaluated as complete black-box systems by measuring input power, water input, gas output, gas composition, pressure, temperature, continuous running stability and application performance.

4. Tube-X Hydrolyser Engine

Advanced Wet-Cell Stack HHO Generation Technology

The Tube-X Hydrolyser Engine is a proprietary HHO generation engine developed by Bealur Ramalingam Kaarthic for industrial heat support and large-scale gas generation applications.

Tube-X is designed with a special wet-cell stack arrangement, controlled DC voltage signal operation, alternating anode-cathode working zones and proprietary treated-water operating method.

Feature	Tube-X Description
Engine name	Tube-X Hydrolyser Engine
Technology class	Proprietary HHO / oxyhydrogen generation system
Stack type	Special wet-cell stack arrangement
Electrical method	Controlled DC voltage signal operation
Electrode behaviour	Alternating anode-cathode working method
Operating medium	Proprietary IP-treated water
Application	Boilers, furnaces, heating booths, kilns and industrial burners
IP status	Internal design and operating method confidential

Tube-X Designed For

- Industrial boiler combustion support
- Furnace heat enhancement
- Heating booth thermal applications
- Kiln and iron ore thermal process support
- Dual-fuel burner integration
- Modular HHO gas plant development
- Continuous-duty industrial operation

Tube-X performance depends on proprietary engine geometry, wet-cell stack design, power control, operating pressure, temperature behaviour, IP-treated water and validated site conditions. Final commercial rating shall be confirmed through calibrated black-box testing.

5. PLY FLY Hydrolyser Engine

Polarity-Controlled High-Volume HHO Generation System

The PLY FLY Hydrolyser Engine is an advanced proprietary HHO generation system developed for high-volume industrial applications.

PLY FLY uses a special stack system where water movement, polarity behaviour and internal reaction zones are managed using proprietary techniques.

Feature	PLY FLY Description
Engine name	PLY FLY Hydrolyser Engine
Technology class	High-volume HHO generation platform
Core method	Polarity-changing water-stack technique

Feature	PLY FLY Description
Stack behaviour	Dynamic reaction and gas-release management
Operating medium	Proprietary IP-treated water
Application scale	Large boilers, furnaces, kilns and heating booths
IP status	Internal stack design and process confidential

The PLY FLY Hydromyser Engine is designed for high-volume HHO generation under controlled proprietary operating conditions. Internal R&D; performance references are subject to calibrated validation, industrial trial and safety certification before commercial publication.

6. Internal R&D; Performance Reference

BIRD Renewables' proprietary Tube-X and PLY FLY development has demonstrated internal R&D; performance references up to:

4,880 LPH per kWh

This value is not presented as ordinary electrolysis performance. It is associated with a proprietary operating environment involving special stack geometry, controlled DC signal operation, alternating anode-cathode behaviour, polarity-changing techniques, IP-treated water operating medium, internal flow management, gas release architecture and module-level power control.

The 4,880 LPH per kWh reference is an internal R&D; performance reference under controlled Tube-X / PLY FLY operating conditions using proprietary treated-water methodology. Final commercial rating will be confirmed only after calibrated dry-gas flow measurement, full power analysis, temperature-pressure correction, gas composition testing and continuous black-box validation.

7. Industrial Modular Scaling

For high-capacity applications, Tube-X and PLY FLY technologies can be developed as modular HHO generation platforms.

Application	Proposed use
2 ton boiler	HHO + PNG / diesel / LDO support
5 ton boiler	Modular HHO-assisted combustion
12 ton boiler	Large-volume HHO thermal support
Furnace	Flame enhancement and heat support
Heating booth	Thermal process support
Iron ore kiln	Industrial heat support
Burner system	Dual-fuel integration

15 Lakh LPH Industrial Target

PLY FLY technology is designed for high-volume modular development up to **15,00,000 LPH HHO gas generation system**. This scale is intended for 12 ton boiler class support, large furnace applications, industrial heating booths, iron ore kiln support and thermal process support.

Large-capacity systems such as 15 lakh LPH HHO plants shall be designed only under engineered modular configuration, site-specific thermal calculation, gas safety design, flame control system, boiler/burner interlock and certified industrial validation.

8. How Tube-X & PLY FLY Differ from Ordinary Electrolysers

Ordinary electrolysers generally use fixed electrode plates, standard electrolyte conductivity, continuous DC input and conventional gas-release behaviour. BIRD's Tube-X and PLY FLY engines use a different engineering direction.

Ordinary electrolyser	Tube-X / PLY FLY approach
Fixed plate design	Proprietary stack geometry
Standard DC input	Controlled DC signal operation
Simple anode-cathode arrangement	Alternating / polarity-managed working zones
Ordinary water or electrolyte	Proprietary IP-treated water
Limited bubble release path	Managed gas-release architecture
Small-scale gas production	Modular industrial scaling
General application	Boilers, furnaces, kilns and heating booths

9. What Is HHO Gas?

HHO gas is an oxyhydrogen gas mixture generated from water-based processing. The gas contains hydrogen and oxygen.

Approximate gas ratio: **H2 : O2 = 2 : 1 by volume**.

HHO gas is not the same as stored pure hydrogen cylinder gas. It is generated on demand and used immediately through a controlled safety system.

BIRD HHO gas is an on-demand oxyhydrogen gas generated from water-based operation. It contains hydrogen and oxygen in approximately 2:1 ratio by volume and is designed for controlled combustion-support applications.

10. Why HHO Can Burn Without Carbon

Fire does not always need carbon. Fire needs fuel, oxygen and ignition. In HHO gas, hydrogen is the fuel, oxygen supports combustion, and ignition starts the reaction.

Burning reaction: **2H2 + O2 -> 2H2O + Heat**.

Because HHO contains no carbon, its own combustion produces mainly heat and water vapour. HHO can therefore be used for torch, brazing, welding-support, cutting-support, burner-support and thermal applications without producing carbon soot from the HHO gas itself.

11. Green HHO / Green Oxyhydrogen Positioning

Hydrogen colour names are based on production method. When hydrogen or HHO is generated from water using renewable electricity, it can be aligned with green hydrogen / green oxyhydrogen positioning.

BIRD HHO technology is an on-demand green oxyhydrogen gas generation concept, especially when powered by renewable electricity such as solar, wind or other clean power sources.

12. Industrial Applications

Application area	Description
Boiler applications	HHO-assisted combustion for package boilers and industrial steam boilers.
Furnace applications	High-temperature thermal support for metal and industrial process heating.
Heating booths	Controlled thermal booths for billets, components and process heating.
Iron ore kilns	Industrial heat support for kiln-based thermal processing.
Burner systems	HHO + PNG, HHO + CNG, HHO + diesel, HHO + LDO and other dual-fuel burner concepts.

Torch / brazing / welding support	HHO flame applications for controlled high-temperature work.

13. Safety and Validation

HHO gas must be handled only with proper engineering controls. All industrial HHO systems must be designed with certified gas safety controls, flashback protection, pressure control, flame monitoring, boiler interlock and trained operator supervision.

- On-demand generation only
- No HHO storage cylinder
- No compression of HHO gas
- Flashback arrestor
- Non-return valve
- Water bubbler / safety trap
- Flame arrestor
- Pressure relief valve
- Gas leak detector
- Flame sensor
- Auto shut-off solenoid valve
- Emergency stop switch
- Boiler interlock
- Proper ventilation
- Certified burner tuning
- Trained operator

14. Black-Box Validation Method

BIRD Renewables protects the internal IP of Tube-X and PLY FLY engines. Validation can be performed without revealing internal design.

Test parameter	Purpose
Input power	kW / kWh verification
Gas output	LPH measurement
Gas composition	H2 / O2 ratio check
Water input	Consumption tracking
Pressure	Operating condition
Temperature	Thermal stability
Running time	Continuous-duty validation
Steam output	Boiler performance
Flue gas	Combustion quality
Safety interlock	Operational safety

Confidential items

- Internal stack design
- Polarity-changing method
- IP-treated water formula
- Material treatment
- Manufacturing process
- Operating parameters
- Circuit / software logic
- Special gas-release architecture

Tube-X and PLY FLY systems shall be evaluated through black-box validation. The testing party may verify input power, water consumption, gas output, gas ratio, pressure, temperature, steam output and safety performance, while internal design and proprietary methods remain confidential.

15. IP Protection Statement

The Tube-X Hydrolyser Engine, PLY FLY Hydrolyser Engine, internal stack design, polarity-changing method, IP-treated water process, material treatment, gas-release architecture, control logic and manufacturing method are confidential intellectual properties of Bealur Ramalingam Kaarthic / BIRD Renewables. Technical details will be disclosed only under NDA, licensing agreement, payment terms and legal documentation.

16. Scientific and Commercial Disclaimer

Performance values mentioned for Tube-X and PLY FLY are based on internal R&D; references and proposed industrial development targets. Final commercial rating will be confirmed through calibrated dry-gas flow measurement, full electrical power analysis, water input measurement, pressure and temperature correction, gas composition testing, continuous running trials, flue gas analysis, steam output measurement and certified black-box validation. BIRD Renewables does not disclose internal IP design, treated-water formula or proprietary operating methods in public documents.

17. Short Website Summary

BIRD Renewables' Tube-X Hydrolyser Engine and PLY FLY Hydrolyser Engine are proprietary high-volume HHO generation systems developed by Bealur Ramalingam Kaarthic for boilers, furnaces, kilns, heating booths and industrial thermal applications.

These engines are not ordinary electrolysers. They use special stack architecture, polarity management, controlled electrical operation, IP-treated water and modular industrial scaling.

The internal technology remains confidential and will be shared only under NDA, legal agreement, licensing terms and proper payment conditions. Final industrial performance will be confirmed through calibrated black-box validation and certified safety testing.