



CONCEPT NOTE

H2LIFE BIOMASS E-GENERATOR FOR GREEN ELECTRICITY PRODUCTION FROM ALMOND SHELLS

1. BACKGROUND AND CONTEXT

H2Life E-Generation is a non-incinerating thermos-chemical technology designed to convert any organic waste, including plastics, biomass, food waste, manure and more, into energy products such as electricity, synthetic natural gas (SNG), hydrogen, or steam, all with minimal environmental footprint.

The H2Life process consists of four main stages:

1. **Pre-treatment:** Homogenizes and standardizes any type of carbon-based material to create a consistent feedstock.
2. **Gasification:** Conducted at moderate temperatures ranging from 200°C to 700°C, producing synthetic gas (syngas) with minimal harmful emissions.
3. **Syngas purification and enrichment:** Involves a series of chemical manipulations including hydrogen enrichment, conversion of carbon dioxide to methane, and removal of particles, residual carbon dioxide, and sulfur gases.
4. **Energy production:** The purified syngas is then converted into green electricity, synthetic natural gas, or steam for consumption.

H2Life offers 20 different models, with daily electricity production capacities ranging from 10 kWh to 1,000 kWh. The system is compact, fully automatic, and controlled by a sophisticated AI-based PLC. The H2Life E-Generator is an ideal solution for decarbonizing biomass of any type, producing clean energy for hotels, shopping centers, natural parks, industries, agriculture, waste treatment plants, and for domestic electricity supply or backup.

The preferred feedstock for gasification is woody material, including nuts or almond shells. From one ton of dry wooden material, the potential syngas production is approximately 2,000Nm³, which can be converted to 600kWh of clean electricity generated by syngas E-Gen set developed by the EWA Group and comply with the H2life gasification system.

2. ADVANTAGES OF H2LIFE GASIFICATION TECHNOLOGY

1. Versatility and Environmental Impact:

The H2life system valorizes any organic material into clean energy products such as electricity, industrial steam, green hydrogen, or SNG, with minimal environmental impact. Gasification is considered a renewable energy source, which qualifies for carbon credits. In contrast, pyrolysis produces mainly synthetic fuel, which has a similar environmental footprint to fossil fuels, resulting in minimal decarbonization credits, mostly from biochar production.

2. Automation and Efficiency:

The H2life system generates clean electricity with full automation and AI-controlled PLCs, maximizing efficiency without the need for constant human intervention. It provides stable, 24/7 electricity supply with low operating and maintenance costs. Pyrolysis, on the other hand, consumes electricity and requires external heating, demands at least two operators during operation, lacks sophisticated control systems, requires continuous maintenance, and often operates in batch mode. Pyrolysis efficiency is strongly dependent on feedstock nature and is sensitive to moisture content.

3. Space and Model Availability:

H2life optimally balances space and energy output, occupying approximately 150 m², whereas pyrolysis requires a minimum of 375 m². H2life offers 21 different models based on feedstock capacity and energy production, while pyrolysis technology is available in only three models, with no small-scale or low-cost options.

4. Reliability and Maintenance:

H2life features no moving parts, making operational failure extremely rare. Pyrolysis reactors include heavy rotating components (weighing 25-30 tons), which pose a significant failure risk. Moreover, batch or semi-continuous pyrolysis units require frequent start-stop cycles every 9–24 hours, leading to high wear and shorter lifespans of key components such as the reactor. On the same time, gasification is working 24h/365 days per year, non-stop, self-consuming 5kWh electricity only with no moving parts.

3. H2LIFE: TECHNOLOGICAL ADVANTAGES AND IMPACT

The H2Life system delivers transformative benefits, combining sustainability, efficiency, and adaptability for diverse agricultural and industrial applications:

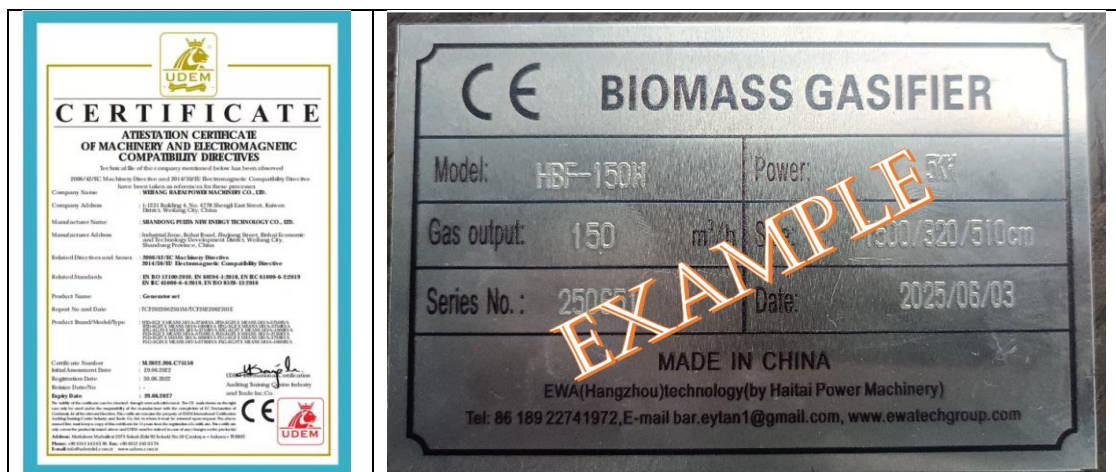
- **Sustainability:** A low-carbon, non-incineration process that emits no smoke, wastewater, or hazardous pollutants, while actively capturing CO₂ for enhanced environmental impact.
- **High Efficiency:** Achieves exceptional energy conversion, generating up to 1,000 kWh per ton of dry biomass, maximizing electricity output from waste.
- **Cost-Effectiveness:** Offers a rapid ROI (8–18 months), with profitability influenced by local electricity costs and feedstock composition—ideal for small farms to large-scale operations.
- **Feedstock Flexibility:** Processes diverse agricultural residues (cotton, sugarcane, rice, wheat, etc.), ensuring broad applicability across farming sectors.
- **Modular & Scalable Design:** Compact and easily integrated into existing infrastructure, with incremental expansion capabilities—farmers can start small and scale up as needed.
- **Low Maintenance:** Fully automated operation with minimal upkeep, reducing long-term operational costs and labor demands.
- **Regional Adaptability:** Designed for remote, off-grid, and decentralized energy production, making clean power accessible in diverse environments.



- **Industry Versatility:** Adaptable across agricultural and industrial sectors, driving widespread adoption and sustainable energy solutions.
By combining cutting-edge technology with practical scalability, H2Life empowers farmers and industries to transition toward cleaner, more efficient energy production.

4. REGULATORY AND POLICY ALIGNMENT

- **H2Life Biomass E-Generator: Advancing Global Sustainability Goals**
- The H2Life Biomass E-Generator is a cutting-edge solution that supports global renewable energy adoption and climate action initiatives, offering both environmental and economic benefits:
- **Emissions Reduction:** Converts waste biomass into clean energy, helping industries and farms meet carbon reduction targets and comply with climate regulations.
- **Financial Incentives:** Qualifies for government subsidies, tax credits, and renewable energy incentives, improving project viability and ROI.
- **UN Sustainable Development Goals (SDGs) Alignment:** Directly contributes to:
 - **SDG 7 (Affordable & Clean Energy)** – Expanding access to sustainable power.
 - **SDG 12 (Responsible Consumption & Production)** – Turning agricultural waste into a valuable resource.
 - **SDG 13 (Climate Action)** – Reducing greenhouse gas emissions through carbon-neutral energy generation.
- **Certified & Compliant:** Manufactured under ISO standards, fully compliant with EU environmental regulations, and CE-certified, with each unit individually tested and verified for performance and safety.





5. ALMOND SHELLS CASE

Recent studies have highlighted the potential of gasification as a viable solution for converting Almond shells into clean energy. Research indicates that gasification technologies can efficiently process almond shells to generate green electricity.

Comparison to Other Biomass

Parameter	Almond Shells	Wood Chips	Rice Husks
Calorific Value	18–20 MJ/kg	16–18 MJ/kg	12–14 MJ/kg
Ash Content	1–3%	0.5–2%	15–20%
Gasification Suitability	★★★★★	★★★★☆	★★★☆☆

Key Insight: Almond shells are ideal for H2Life systems due to high energy density, low ash, and efficiency of syngas production.

Physical and chemical characteristics of Almond Shells

- Size: Typically, 2–4 cm in diameter (pretreatment is not necessary)
- Density: ~0.7–1.1 g/cm³ (bulk density: 300–500 kg/m³)
- Moisture: 8–12%

Component	data
Cellulose	25–30%
Hemicellulose	20–25%
Lignin	30–40%
Sulfur	0.1%
Fixed carbon	~20% (optimal for gasification)
Ash	1–3%
Energy	18–20 MJ/kg (optimal for gasification)





6. SPECIFIC SYSTEMS INFORMATION AND ROI ANALYSIS

6.1. Example - Small-Scale unit (Model HT-150W, Daily Production: 1 MWh)



- The H2Life Biomass E-Generator HT-150W is an ideal solution for:
 - Proof of Concept (POC) validation
 - Small-to-medium electricity consumers
 - Off-grid applications
 - Backup power systems
 - Key Features & Benefits
 - Feedstock Consumption:
- Processes 75 kg/hr of crushed Acacia material → generates 50 kWh of electricity.
- Cost-Effective: Competitive pricing for rapid adoption.
- Real-Time Optimization:
- Live monitoring of operational data for diverse feedstock blends and conditions.
- Certified Compliance: Meets CE & ISO standards for safety and performance.
- Compact Footprint: Requires only 37 m², easily integrable into existing facilities.

ROI Example:

Total CapEx*	\$95,000
Annual O&M Cost	\$5,000
Annual Production (360 days)	396 MWh
Electricity Value (\$0.17/kWh)	\$67,320/yr
Annual Profit	\$62,320



Monthly Profit **\$5,193**

ROI Period **~17 months**

* Includes system, logistics, installation, and infrastructure

6.2. Industrial-Scale Unit (Model HT-1000W, Daily Production: 7.2 MWh)

- Consumption of **500Kg** crushed dry wooden material, sufficient to produce **300kWh** electricity.
- Minimal space requirement (120m²)
- Electricity supply for onsite use or connecting to the grid.
- Brief economy analysis:
Total CapEx (including H2life system, Logistic, installation, infrastructure, etc.: \$380,000
Annual operation and service cost: \$17,250
Annual electricity production (360 days): 2,592MWh
Annual market value of the produces electricity (based on \$0.17/KWh): \$440,640
Annual profit and time for ROI: Profit - \$423,390/annum; \$1,283/day; **ROI - 11 months**

6.3. Industrial-Scale Unit (Model HT-3000W, Daily Production: 24 MWh)

The H2Life HT-3000W delivers large-scale, sustainable energy conversion for industrial operations.

Key Specifications

- Feedstock Consumption: 1,500 kg/hour of almond shells → 1,000 kWh electricity.
- Compact Footprint: Requires only 150 m² of space.
- Flexible Output: Powers on-site operations or feeds into the grid.

Economic Advantages

Metric	Value
Total CapEx	\$1,300,000 (includes system, logistics, installation)
Annual O&M Cost	\$65,000
Annual Production	8,640 MWh (360 days)
Revenue (\$0.17/kWh)	\$1,469,000/year
Annual Profit	\$1,404,000
Daily Profit	\$3,900

Metric	Value
ROI Period	11 months

Why Choose the HT-3000W?

- High-Volume Processing: Converts agricultural waste to clean energy at scale.
- Rapid ROI: Profitability in under 1 year.
- Sustainable Compliance: Meets stringent environmental regulations.

7. CARBON FINANCE & INCENTIVES GUIDE FOR H2LIFE PROJECTS

1. Carbon Pricing & Trading Mechanisms

EU Emissions Trading System (EU ETS)

- Scope: Industrial facilities, power plants, aviation
- Benefit: Sell surplus carbon allowances if emissions are below cap
- Contact:
 - [European Commission EU ETS Helpdesk](#)
 - Email: clima-ets-helpdesk@ec.europa.eu
 - Phone: +32 2 299 11 11 (Europe Direct)

National Carbon Taxes

- Examples:
 - France: €44.60/tonne CO₂ (2023 rate)
 - Sweden: €137/tonne (world's highest)
- Contact: National agencies (e.g., [ADEME France](#))

2. Grants & Subsidies

Innovation Fund (EU)

- Focus: Clean tech (biomass energy, hydrogen)
- Funding: Up to 60% of project costs
- Apply: [Innovation Fund Portal](#)
 - Email: innovationfund@ec.europa.eu

LIFE Programme

- Focus: Circular economy, renewable energy
- Funding: €5.4B budget (2021–2027)
- Contact: [LIFE National Contact Points](#)

3. Carbon Farming & Bioenergy Incentives

Common Agricultural Policy (CAP)

- Eco-Schemes: Payments for agroforestry/biomass production
- Apply: National CAP agencies (e.g., [Germany's BLE](#))

Renewable Energy Directive (RED II)

- Benefit: Tax exemptions for bioenergy projects
- Contact: National energy ministries (e.g., [Netherlands' RVO](#))

4. Voluntary Carbon Markets

Certifier	Website	Contact
Gold Standard	goldstandard.org	info@goldstandard.org
Verra	verra.org	info@verra.org

5. Key Contacts by Country

Country	Agency	Website
Germany	Federal Environment Agency (UBA)	uba.de
Spain	MITECO	miteco.gob.es
Italy	GSE (Energy Manager)	gse.it

Application Process

1. EU Programs: [EU Funding & Tenders Portal](#)
2. National Schemes: Contact local energy/agriculture ministries
3. Corporate Carbon Credits:
 - [South Pole](#)
 - [Ecosystem Marketplace](#)

Pro Tip for H2Life

Highlight BECCS (Bioenergy Carbon Capture) eligibility under the EU Innovation Fund for enhanced funding potential.

Need Support?

We can draft a customized funding application template for your project.

8. CONCLUSION AND CALL TO ACTION

The H2life Biomass E-Generator offers a transformative opportunity to generate almost free-of charge renewable energy from biomass, reduce carbon emissions, and supply green electricity at very competitive costs.

For more information, see www.ewatechgroup.com, or apply to:

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