

# FOCUS

## BIOMASS

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Independent.  
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SGS





# Focus on biomass

## **Biomass is a fast-growing sector at the heart of the clean energy transition — but what exactly is it?**

At its core, biomass refers to organic material, used to generate heat, power, and renewable fuels such as ethanol and biodiesel.

In this edition of our **Focus On** campaign, we explore the role of biomass in advancing global energy goals. From sustainable sourcing and advanced testing to certification, inspection, and regulatory support, discover how SGS can help you navigate the biomass value chain with precision and confidence.

Whether you are a fuel producer, utility provider, or project developer, our global expertise ensures your operations meet the highest standards for quality, compliance, and sustainability — wherever you operate.

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**Take your biomass operations to the next level.  
Get in touch today.**

✉ [agriculture@sgs.com](mailto:agriculture@sgs.com)





# Driving the global transition

As the world advances toward a low-carbon future, biomass is emerging as a dependable, versatile energy source that complements and strengthens the renewable energy mix.

Unlike intermittent renewables like solar and wind, biomass provides reliable, dispatchable energy — making it a valuable component in hybrid energy systems and baseload generation. Its versatility extends across solid, liquid, and gaseous forms, enabling wide application.

In 2022, biomass accounted for 96% of all renewable heat generated globally<sup>[1]</sup>, and demand continues to grow. The global biomass market reached over 54 exajoules (EJ) in 2021, with solid biomass leading the way. Looking ahead, it's projected to grow at a compound annual growth rate (CAGR) of 4.84% through 2032<sup>[2]</sup>, driven by evolving policies, technological innovation, and increased investment in sustainable energy systems.

With the right safeguards in place, it can deliver both environmental and economic value across a wide range of supply chains.

## SGS: Your trusted partner

At SGS, we ensure that every link in your biomass supply chain meets the highest standards of sustainability and reliability.

[1] Global Bioenergy Statistics Report 2024 Summary. (2024.d.). Available at: [worldbioenergy.org](https://worldbioenergy.org)

[2] Takki, K. (2024). Biomass to Account for 18% of the Energy Market. [online] Statzon.com.

## Types of Biomass

Our biomass services cover a diverse range of feedstocks. These include:

### Agricultural biomass

- Energy crops (e.g. switchgrass, miscanthus, willow)
- Food crops (e.g. corn, sugarcane)
- Crop residues (e.g. corn stalks, wheat straw, rice husks)

### Forestry biomass

- Wood products (e.g. logs, saw dust, wood pellets or wood chips)

### Organic waste biomass

- Animal manure
- Food waste (from households or food industries)
- Green waste (e.g. grass clippings, leaves)

### Industrial waste biomass

- Residues from sawdust and wood
- Black liquor (from paper manufacturing)
- Bagasse (sugarcane residue from sugar production)

### Other

- Algae
- Animal fats
- Used cooking oils (UCO)





# Biomass sources and applications

Biomass can be sourced from virtually any environment where organic material is found—forests, farms, cities, factories, and even aquatic systems. This broad availability makes it a uniquely versatile renewable energy source, adaptable to diverse regional and industrial contexts.

The way biomass is used varies significantly depending on its form. Solid biofuels are well-suited for heat and power generation, particularly in rural or industrial settings. Liquid biofuels, on the other hand, are ideal for transportation, as they integrate easily into existing fuel infrastructure. Agricultural biomass stands out for its flexibility and impact — capable of powering homes and vehicles, enriching soils, and even replacing plastics and construction materials — delivering both environmental and economic benefits.

Beyond its immediate applications, biomass supports circular economy models by transforming waste into valuable resources.

When responsibly sourced and managed, biomass contributes significantly to carbon reduction strategies and net-zero commitments. However, its sustainability depends on careful planning, traceability, and a balanced approach to land use and resource efficiency. **That’s where SGS can help.**

**Table 1.1. Industry vs. biomass application**

Industry	Application(s)	Industry	Application(s)
<b>Agriculture</b>	Biogas from manure, food waste, and crop residues power on-farm energy systems.	<b>Forestry</b>	Forestry operation by-products are used to reduce reliance on external energy sources.
<b>Aviation</b>	Sustainable Aviation Fuels (SAF), made from biomass, help cut emissions in air travel.	<b>Pulp &amp; paper</b>	Black liquor from pulping is used to generate steam and electricity within mills.
<b>Biochemicals &amp; bioplastics</b>	Biomass forms the basis for sustainable alternatives to petroleum-based products.	<b>Transport</b>	Bioethanol, biodiesel, and hydrotreated vegetable oil (HVO) fuel vehicles.
<b>Construction</b>	Wood residues are used to produce bio-based insulation panels, boards, composites.	<b>Waste management</b>	Organic waste, once treated, generates reusable biogas, compost, and fertilizers.
<b>Energy &amp; power</b>	Wood chips, pellets, sawdust, and logs can deliver renewable heat and electricity.		





# Trends, challenges & regulations

Whilst presenting significant opportunities for sustainable energy and materials, realizing the full potential of biomass and its raw materials requires careful management of challenges, a forward-looking approach to innovation, and awareness of varying regulatory landscapes.

## Driving innovation

Evolving beyond the traditional, biomass is the cornerstone of clean energy, circular economy models, and carbon reduction strategies. Technologies like Bioenergy with Carbon Capture and Storage (BECCS) are enabling negative emissions, while Sustainable Aviation Fuels (SAF) and advanced biofuels are becoming increasingly viable at scale.

Decentralized and modular systems are gaining traction, particularly in off-grid or rural regions, and digital tools—like AI, blockchain, and remote sensing—are streamlining feedstock sourcing, conversion processes, and operational efficiency.

Meanwhile, biomass is being integrated into hybrid renewable systems with solar and wind to provide continuous, clean power.

## Key challenges

Despite its benefits, biomass is not without limitations. Issues such as land-use competition with food crops, high infrastructure costs, and sustainability risks can impact viability. Biomass is also bulky and low in energy density, which can make storage and transport inefficient. Additionally, inconsistent regulatory support and public understanding can pose barriers to broader implementation. Addressing these challenges is essential to ensure biomass remains a sustainable and efficient part of the global energy mix.

With the right strategies in place — and the support of SGS — biomass can play a powerful role in advancing climate targets, strengthening energy security, and enabling a more circular economy.





## Global regulatory landscape

The regulatory landscape surrounding the production, certification, and trade of biomass continues to rapidly evolve. Varying by region, policies are shaped by distinct priorities — from climate targets and energy security to land use and industrial development.

In **Europe**, regulation is driven by strong sustainability objectives. The Renewable Energy Directive (RED II) sets rigorous criteria for greenhouse gas (GHG) savings, land use, and traceability. To qualify under RED II, biofuels must demonstrate verified greenhouse gas (GHG) reductions and avoid deforestation or degradation of carbon-rich ecosystems. Only biofuels certified under approved sustainability schemes are eligible for compliance.

In the **United States**, regulation centres around energy diversification and domestic production. The Renewable Fuel Standard (RFS), managed by the Environmental Protection Agency (EPA), mandates the blending of renewable fuels into the national transportation fuel supply. Compliance is tracked using Renewable Identification Numbers (RINs) — tradable credits that link specific volumes of renewable fuel to obligated parties. The system differentiates between conventional and advanced biofuels, including cellulosic ethanol and biomass-based diesel, incentivising innovation and feedstock diversification.

Across **Asia**, the regulatory landscape is diverse and in transition.

- China supports ethanol and biodiesel development through regional E10 blending pilots and domestic production incentives, although national mandates vary.
- India is accelerating its bioenergy ambitions through the National Bio-Energy Policy, focusing on ethanol blending, biomass power generation, and the use of agricultural residues.
- Other countries in the region — including Indonesia, Thailand, and Vietnam — are adopting elements of international certification systems (e.g., ISCC, RSB, FSC) to align with export market expectations and improve sustainability standards.

As these frameworks continue to evolve, navigating regional requirements can be complex. That's why we support clients with local expertise and global insight — helping you meet compliance obligations wherever your biomass operations are located.

**Confused about your local regulations?**

**Contact our teams for guidance: [agriculture@sgs.com](mailto:agriculture@sgs.com)**





## Testing solutions

As the global demand for renewable energy continues to grow, it is critical to ensure the quality, consistency, and sustainability of biomass and its raw materials. At SGS, we offer a comprehensive suite of testing and analytical services to support the solid biomass industry. Using state-of-the-art instrumentation and robust quality control protocols, our solutions help verify fuel quality, enhance performance, and meet regulatory and sustainability requirements.

Our wide array of solutions includes proximate analysis which evaluates key physical properties such as moisture and ash content, helping to identify opportunities to improve combustion efficiency and maximize energy output. We also conduct ultimate analysis, determining the elemental composition to better understand energy potential and combustion characteristics.

To accurately assess fuel quality, we measure gross (higher heating value) and net (lower heating value) calorific values, which reflect the total energy released during combustion and support fuel classification. We also evaluate the ability of densified biofuels like pellets to remain intact during transport and handling, and bulk density to determine how much mass a material occupies per unit volume, which is essential for optimizing logistics and storage with mechanical durability testing.

### Our solutions:

- Proximate analysis
- Ultimate analysis
- Calorific values
- Halogens (chlorine)
- Mechanical durability
- Particle size distribution
- Ash melting behavior / Ash fusibility
- Major Elements (MAA)
- Minor Elements (Trace)
- and more

### Verifying accuracy with proficiency testing

In addition, we also offer proficiency testing (PT) and certified reference materials (CRMs) through our Laboratory Quality Services International (LSQi), helping laboratories verify performance and maintain accuracy.

Used across a wide range of sectors, LQSi programs assess lab results using unknown test samples — allowing participants to benchmark against peers, manage risk, and meet quality standards. With over 40 years of experience, SGS supports labs in delivering consistent, high-quality data that drives confident decisions.

Whether you're a fuel producer, utility provider, or project developer, SGS is your trusted partner for reliable, accredited biomass testing. Contact us to learn how we can help you meet today's quality, environmental, and performance standards with confidence.





# Independent inspections

Across every point in the supply chain — transit, storage, or transfer — independent **inspections** are essential.

Our global network offers a comprehensive range of services. Tailored to the specific needs of the biomass industry, these services ensure that your product meets the stringent regulatory specifications for energy content, moisture levels, and sustainability criteria.

## Protecting quality from start to end

The process begins with a carrier cleanliness inspection to ensure ship holds, containers, or railcars are clean, dry, and free from contaminants that could affect biomass quality or safety. Once cleared, we conduct draft surveys to determine the weight of bulk biomass—crucial for loose materials like wood chips or sawdust. This step is enhanced by our proprietary **SGS Draft Survey Tool**, which improves accuracy, consistency, and traceability through streamlined data capture and reduced human error, aligned with international trade standards.

Our on-site inspectors also conduct representative sampling per ISO 18135, which defines the correct procedures, specifically for solid biofuels. Whether loose or packaged, accurate sampling is essential for laboratory analysis to determine quality.

In more complex operations, such as ports, biomass power plants, or processing hubs, we support clients with the design and installation of Mechanical Sampling Systems (MSS) that enable safe, consistent, and automated sampling of high-throughput materials like pellets or shredded agricultural residues.

### Our solutions:

- Carrier cleanliness
- Draft survey
- Cargo superintendence
- Weighing supervision
- Sampling
- Stockpile Survey
- Volumetric Assessment
- MSS design and installation
- Bias testing

The benefits of utilizing SGS inspectors are far-reaching. Thanks to our extensive global network, we deliver these solutions consistently across borders, ensuring your biomass commodities are supported by trusted verification, wherever your operations take place.





# Certifying sustainability & accessibility

Since the 1990s, our experts have supported every stage of the biomass and biofuel journey, offering trusted certification and verification solutions to support your operations from forest and farm to finished fuel.

Our auditors, inspectors, and sustainability professionals help clients meet the latest regulatory requirements, achieve recognized certifications, and demonstrate responsible sourcing and production practices. Whether you're working toward voluntary sustainability goals or preparing for complex compliance obligations, we deliver practical solutions with global consistency and local insight.

## Trusted third-party assessment services

We offer a comprehensive portfolio of globally-recognized, third-party certification and verification services. These programs validate your operations against rigorous environmental, legal, and sustainability standards — helping you demonstrate compliance, build credibility, and access regulated markets.

- **Chain of Custody Certification (FSC™ & PEFC)** - Verifies traceability of timber and biomass from origin to end use
- **ENplus®** - Certifies wood pellets meet ENplus® quality and sustainability standards
- **EU Timber Regulation (EUTR)** - Confirms legal sourcing through due diligence and supply chain checks
- **Forest Management Certification (FSC™)** - Demonstrates responsible forestry practices to FSC™ standards
- **ISCC PLUS** - Supports deforestation-free, climate-friendly, and traceable supply chains
- **Roundtable on Sustainable Biomaterials (RSB)** - Verifies sustainable biomass and biofuel production under the RSB framework
- **Sustainable Resources Verification Scheme GmbH' (SURE)** - Confirms RED II compliance for biomass used in power, heat, and cooling

### Additional Verification Services:

- Customized audit solutions
- Sustainability report assurance
- Greenhouse Gas (GHG) assessments
- Carbon credit certification
- and more

Wherever you operate, we bring together local knowledge and global reach to help you build trust, reduce risk, and ensure your biomass operations are compliant, sustainable, and future-ready.





# Enhancement through industrial assurance and supply chain expertise

As biomass projects grow in scale and complexity, ensuring quality, safety, sustainability, and performance across the full project and supply lifecycle becomes critical. That's where our **Industries & Environment** business line plays a vital supporting role.

Through our Industrial Assurance and Supply Chain services, we offer end-to-end expertise to help you plan, execute, and operate biomass infrastructure and supply chains with confidence, from capacity development and permitting, to asset performance and supplier compliance.

## Industrial Assurance: Supporting Every Stage

Built around four key pillars, we support long-term sustainable production through:



### Capex Assurance

End-to-end support for biomass facility development, including permitting, QHSE oversight, commissioning, and smooth transition to operations.



### Opex Assurance

Enhance operational safety, asset performance, and resource efficiency while ensuring environmental and regulatory compliance.



### Supply Chain Assurance

Manage supplier quality, sustainability, and delivery performance through audits, capacity-building, and risk reduction.



### Equipment Assurance

Ensure equipment meets regulatory, safety, and sustainability standards for market access through certification and verification services.

## End-to-End Supply Chain Support

Biomass supply chains are increasingly influenced by the energy transition, sustainability targets, and global market uncertainty. To remain competitive and resilient, businesses must gain greater visibility, flexibility, and control across their operations.

At SGS, we provide comprehensive supply chain solutions, from supplier qualification and risk assessment to digital traceability and sourcing optimization. Whether you are managing feedstock procurement, processing logistics, or equipment delivery, we help ensure continuity, compliance, and performance.

As your end-to-end partner, we help you build a resilient, responsible operation that meets today's expectations and tomorrow's challenges.

**Contact us to enhance quality and reduce risk:**  
**[industries.environment@sgs.com](mailto:industries.environment@sgs.com)**



# Our unrivaled network



*"At SGS, we're proud to support our clients on their journey through the energy transition. Our global biomass services help you source responsibly, meet sustainability goals, and stay ahead of regulations. Whether it's testing, certification or supply chain support, we're here to make things simpler, more reliable, and ready for what's next."*

**- Jamie Fisher, Global Business Manager - Biomass at SGS.**

Our active Global Operations offer unmatched coverage in biomass services. Our extensive network of laboratories, inspection teams, and field specialists enables us to deliver reliable, high-quality support at every stage of the biomass value chain. From assessing feedstock at origin to verifying sustainability credentials and ensuring regulatory compliance, SGS is your partner in building transparent, efficient, and future-ready biomass operations.

We understand the regional differences in standards, infrastructure, and market requirements — and we tailor our services accordingly. Whether you're trading wood pellets, producing biofuels, or managing biomass-based energy systems, we bring the same level of precision and assurance across borders.

Whatever the commodity. Wherever the location. Our trusted professionals will be with you every step of the way.

**Advance your biomass operations with our expertise.**

**Get in touch today.**

✉ [agriculture@sgs.com](mailto:agriculture@sgs.com)



# Trusted. Independent. Committed.

## Contact us

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# SGS

When you need to be sure