

STRATEGIC BUSINESS PLAN – ISO/TC 238

Executive summary

Business Environment

The majority of biomass produced, traded and consumed around the globe is for food purposes. However, a significant portion, primarily forest-based material, is used for industrial production of construction material (lumber and board) and for production of consumables such as pulp, paper and a host of allied products. Although mankind has been using biomass for heating and cooking purposes for a very long time and still today an estimated 2.5 billion people do, biomass has not been traded as a fuel on a large industrial scale until the middle of the last century for power generation, heating and cooling. As this trade has increased also internationally so has the demand for a reliable and agreed upon standards. The demand is predicated on a requirement for a common way of evaluation of the traded commodity for compensation purposes as well as a demand for more precise product characteristics for technical and safety reasons.

The net effect by the CO₂ from burning biomass is considered neutral since the same gas is recirculated within an estimated 10 – 200 years from the release through the photosynthesis process back to biomass. The shift to a variety of renewable forms of energy is under way, including replacement of fossil fuel with biomass-based fuels, so called solid biofuels. There is obviously a great disparity from one region to the next which clearly directs us into extensive trading with energy and fuels, particularly solid biofuel which already is the dominating renewable fuel with an enormous potential for expansion, without encroaching on the uses of biomass for food or construction material. Product classification, specification standards, and safety standards are essential tools for achieving an efficient distribution of energy as the basis for much of our aspiration for a better living standard around the globe.

The steel industry has begun transitioning to biocarbon as an alternative to fossil-based coal, motivated by the need for reduction of emissions. The global market for pyrogenic biocarbon is rapidly increasing, with estimated growth rates ranging from 12.1% to 13.9%, according to various market analyses and in Europe, the industry's annual growth rate can reach as high as 68%. Pyrogenic biocarbon is used in various industrial and material-based applications, including soil amendment, carbon dioxide sequestration, energy storage, filtration, and in the feed and pharmaceutical industries. International standards are essential for establishing reliable specifications of pyrogenic biocarbon properties across various applications, facilitating the large-scale commercial implementation of new and emerging technologies. The goal is to ensure a common understanding among all stakeholders of the different types, origins and classes of pyrogenic biocarbon and their various applications. The objectives are to eliminate confusion and promote widespread market adoption and commercialization of these materials. New safety specifications for storage and transportation of pyrogenic biocarbon and to prevent the risk of self-heating and self-ignition will also need to be developed.

Benefits

The purpose for developing standards is to:

- Simplify communication between fuel suppliers and customers
- Assure that products and processes and solid biofuels and pyrogenic biocarbon are compatible
- Provide the market with tools to determine the economic value of delivered fuel
- Produce a common way to control and regulate safety demands

Priorities

To develop standards in the following areas within solid biofuels and pyrogenic biocarbon:

- Terminology
- Specifications and classes of solid biofuels and pyrogenic biocarbon
- Sampling and sample preparation
- Physical and mechanical test methods
- Safety for handling and storage of biofuels and pyrogenic biocarbon
- Chemical test methods

The majority of active work items in ISO/TC238 is in collaboration with CEN/TC335 under Vienna agreement between ISO and CEN.

1. Introduction

1.1 ISO technical committees and business planning

The extension of formal business planning to ISO Technical Committees (ISO/TCs) is an important measure which forms part of a major review of business. The aim is to align the ISO work programme with expressed business environment needs and trends and to allow ISO/TCs to prioritize among different projects, to identify the benefits expected from the availability of International standards, and to ensure adequate resources for projects throughout their development.

1.2 International standardization and the role of ISO

The foremost aim of international standardization is to facilitate the exchange of goods and services through the elimination of technical barriers to trade.

Three bodies are responsible for the planning, development and adoption of International standards: [ISO](#) (International Organization for Standardization) is responsible for all sectors excluding Electrotechnical, which is the responsibility of [IEC](#) (International Electrotechnical Committee), and most of the Telecommunications Technologies, which are largely the responsibility of [ITU](#) (International Telecommunication Union).

ISO is a legal association, the members of which are the National standards Bodies (NSBs) of some 164 countries (organizations representing social and economic interests at the international level), supported by a Central Secretariat based in Geneva, Switzerland.

The principal deliverable of ISO is the [International Standard](#).

An International Standard embodies the essential principles of global openness and transparency, consensus and technical coherence. These are safeguarded through its development in an ISO Technical Committee (ISO/TC), representative of all interested parties, supported by a public comment phase (the ISO Technical Enquiry). ISO and its [Technical Committees](#) are also able to offer the ISO Technical Specification (ISO/TS), the ISO Public Available Specification (ISO/PAS) and the ISO Technical Report (ISO/TR) as solutions to market needs. These ISO products represent lower levels of consensus and have therefore not the same status as an International Standard.

ISO offers also the International Workshop Agreement (IWA) as a deliverable which aims to bridge the gap between the activities of consortia and the formal process of standardization represented by ISO and its national members. An important distinction is that the IWA is developed by ISO workshops and fora, comprising only participants with direct interest, and so it is not afforded the status of an International Standard.

2. Business Environment of the ISO/TC

2.1 Description of the Business Environment

The following political, economic, technical, regulatory, legal and social dynamics describe the business environment of the industry sector, products, materials, disciplines or practices related to the scope of this ISO/TC, and they may significantly influence how the relevant standards development processes are conducted and the content of the resulting standards:

The following 7 distinctly different markets are established for solid biofuels and Pyrogenic Biocarbon:

- Wood pellets for supply to large scale production of heat and/or electrical power. This trade has developed a critical mass to sustain long range deliveries between loading and discharge ports using deep ocean vessels. This business area is characterized by very large international business transactions with increasing demand for internationally recognized testing, classification and safety standards.
- Packaged or loose pellets in bulk for the residential market with gradually higher quality demand to mitigate the particulate emissions during combustion. This business area is characterized by a large number of domestic business transactions and has fostered a number of national standards in addition to testing, classification and safety standards.
- Briquetted wood for a combination of residential market and smaller industrial heat producing facilities. This business area is characterized by domestic business transactions with demand for testing, classification, and safety standards for certain parameter such as moisture, calorific value and total ash
- Non-woody-pellets. This business area is characterized by mainly domestic business transactions with demand for test, classification and safety standards primarily focused on the ash characteristics, moisture content and calorific value.

- Wood chips or hogfuel for stoker, fluidized bed and gasification energy conversion is used within a relatively short distance from the source of the raw material. This business area is characterized by many domestic business transactions with demand of testing, classification, and safety standards. Industrial use of wood chips is increasing, but no detailed estimation is available. International trade of wood chips is now starting to increase.
- Thermally-treated and densified pellets and briquettes produced by various processes, such as torrefaction, hydrothermal carbonization, and steam explosion. These are new technologies aimed at increasing the energy and bulk density of biofuels.
- Pyrogenic biocarbon. This material is produced at higher pyrolysis intensity than the thermally-treated and densified material mentioned in the previous bullet. Commercially-produced pyrogenic biocarbon is a relatively new but fast growing market. The main market for biochar is in the field of soil applications, e.g. as soil improver, fertilizer, environmental remediation, compost/manure additive and horticulture growing media. Biochar is also used as additive in concrete and other building materials. Other emerging applications are in the metallurgical, filtration and energy storage sectors.

Thus, bioenergy is an important and essential part of global energy security. It allows for more independence from fossil fuels. Bioenergy prices are much more stable than fossil fuel prices; it can be produced from local resources and absorb seasonal fluctuations of other renewables; bioenergy is compatible with current infrastructures, so it can already be used now. Most importantly, biomass can be stored, it is versatile and can deliver heat and power, supply fuels for transportation or deliver renewable gas.

Bioenergy contributes substantially to climate change mitigation when it is produced from biomass that is grown sustainably or based on waste and residues; converted to energy products efficiently and used to replace fossil fuels.

However, bioenergy is in the slipstream of solar and wind energy, which does not do justice to its global importance. Only with an expansion of sustainable bioenergy – in addition to energy savings and strong growth of other types of renewables – we will be able to meet the increasing demand for renewable energy and also achieve more (national) energy independence.

2.2 Quantitative Indicators of the Business Environment

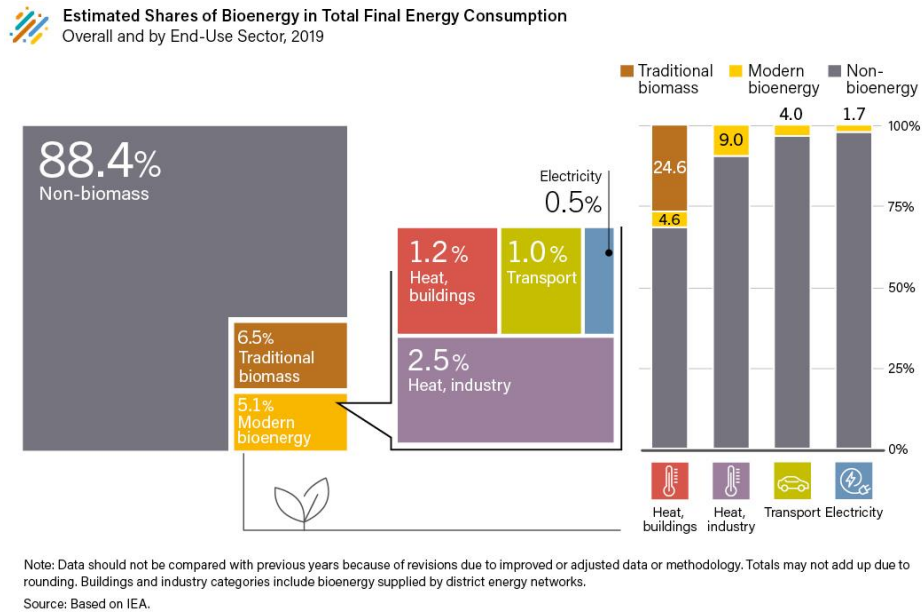
The following list of quantitative indicators describes the business environment in order to provide adequate information to support actions of the ISO/TC:

One of the crudest forms of solid biofuel is hogfuel from the forest industry which in most cases includes bark and, in many cases, a substantial amount of silica as a result of contamination during handling and the relatively high ash content in bark. Hogfuel is seldom traded off-site due to the relatively low market value.

Wood pellets made out of sawdust and planer shavings on the other hand are traded to a large extent at long distance and is today the most traded solid biofuel under contract stipulating quality requirements, often with rigorous requirement for testing certain parameters.

Pelletized biofuels have become a very important commodity as well as an integral part of our emerging new energy supply worldwide. A potential need for strategic solid biofuel reserves is being discussed due to the dependence on a predictable supply of fuel for district heating.

Figure 1 presents the bioenergy share in total final energy consumption in 2019. Other more modern and efficient uses of bioenergy provided around half of all renewable energy in final energy consumption in 2019 – an estimated 19.5 EJ, or 5.1% of total global final energy demand. (See Figure 1.) Modern bioenergy provided around 13.7 EJ for heating (7.3% of the global energy supply used for heating), 4.0 EJ for transport (3.3% of transport energy needs) and 1.7 EJ for global electricity supply (2.1% of the total). Modern bioenergy use has increased most rapidly in the electricity sector – up 27% between 2010 and 2019 – compared to around 15% growth for transport use and less than 5% for bioheat (REN21, 2022, the Renewables 2021 Global Status Report (GSR)). In 2019, 97% of all renewable heat produced was from biomass with minor contribution from geothermal and solar thermal technologies.



REN21 RENEWABLES 2021 GLOBAL STATUS REPORT

Figure 1. Bioenergy share in total final energy consumption 2019

Figure 2 presents the electricity generation in 2019. 27 044 TWh of electricity was generated globally with renewables having a share of 27%, mainly driven by the increasing use of solar and wind as well as significant contribution from hydropower and biomass. In 2019, 7 311 TWh of renewable electricity was produced globally. Hydropower was the largest renewable electricity generating source with a share of 59% followed by wind at 20%. Bioenergy was the third largest renewable electricity generating source with production of 768 TWh in 2019. (Global Bioenergy Statistics 2021, World Bioenergy Association 2022).

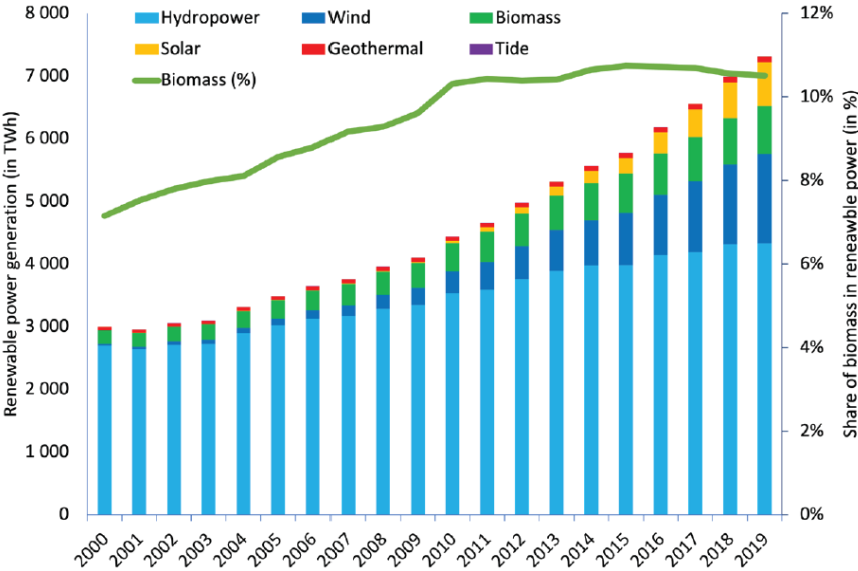


Figure 2. Renewable electricity generation by source. WBA 2022

Figure 3 presents electricity generation in the continents of the world. Asia leads in terms of renewable electricity generation globally. In 2019, 43% of all renewable electricity generated was in Asia followed by Americas (30%) and Europe (24%). Africa had a share of 2.4% - mainly due to hydropower which had a share of 80% in the Africa renewable electricity mix. Europe is also the largest producer of biopower with an estimated generation of 304 TWh, accounting for 40% of all bioelectricity generation globally. (Global Bioenergy Statistics 2021, World Bioenergy Association 2022).

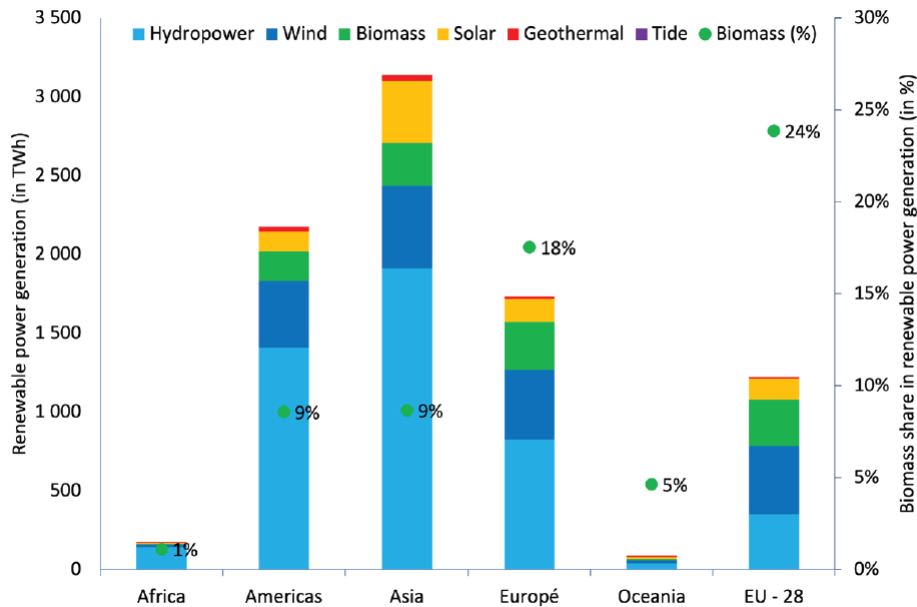


Figure 3 - Renewable power generation in continents in 2019. WBA

Figure 4 presents the estimated global biochar production in metric tonnes (mt) by year based on values reported by Biochar Producer category respondents. Details on calculation approach presented in Methods section. (Source: 2023 GLOBAL BIOCHAR MARKET REPORT)

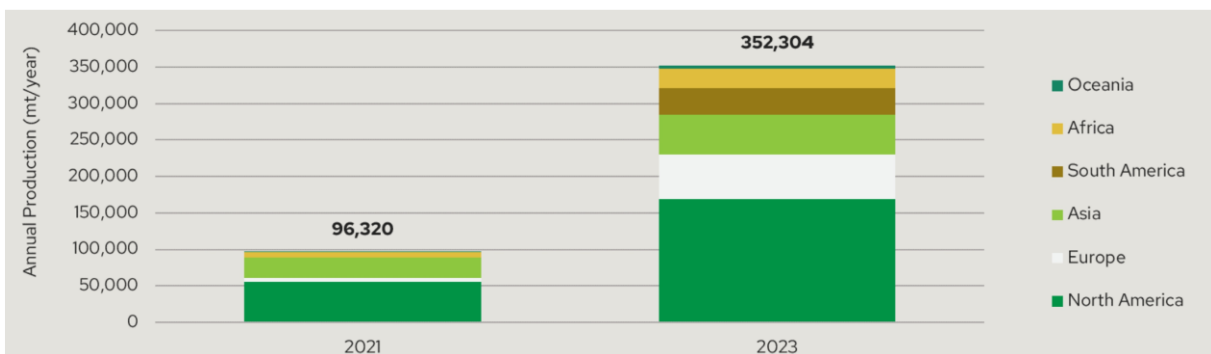


Figure 4. - Global biochar production in metric tonnes (mt)

3. Benefits expected from the work of the ISO/TC

In view of the rapidly increasing international as well as national trade of solid biofuels and pyrogenic biocarbon the need for concise and unambiguous criteria and methods for characterization of the solid biofuels pyrogenic biocarbon has become important for suppliers as well as buyers and consumers. The criteria are both in name and in measure physico-chemical characteristics. The methods for characterization are both in methodology and in technique applied for determination. After a long history of trading and use, solid biofuels appear under a multitude of names as well as a multitude of refinement. In the increasing market of pyrogenic biocarbon several ambiguous terms and definitions exist. The benefits expected from the ISO/TC work is a set of testing, classification, sampling and sample preparation, and safety Standards based on consensus among members applicable to the exchange, trade and use of solid biofuels and pyrogenic biocarbon resulting in elimination of technical barriers.

The testing, classification, sampling and sample preparation, and safety Standards contribute to the process of establishing the environmental or social impact of large-scale use of solid biofuels for energy production and related criteria for certification of carbon credit accounting. The Standards also allow comparison of solid biofuels with other solid fuels.

Some of the Standards are directed towards establishing criteria for safe handling and the potential for health risk exposure resulting in a decrease in accidents and incidents currently experienced with solid biofuels due to the lack of documented knowledge and methods for establishing risk exposure in the trade.

Trade of products transported in large volumes benefit from well defined testing methods.

This result in:

- Elimination of biased testing methods and ill-defined classifications and definitions.
- Reduction of reclamations.
- Less commercial disputes.
- Improved safety in production, handling and storing.
- Less negative impact on energy conversion equipment.
- Emissions kept within the targeted limits.

Several safety aspects such as off-gassing, self-heating and dust explosibility of solid biofuels have been observed under certain circumstances and to some extent included in product Safety Data Sheets (SDS, previously Material Safety Data Sheets (MSDS)). The standards developed by the TC are increasingly cited as normative references within the area of trade with solid biofuels and related health and safety issues during transportation by road, rail and ship and during storage and have become distinct and effective guidelines for design, operation and maintenance of handling and storage facilities for solid biofuels.

The set of standards as selected by the TC members is believed to address the essential aspects of manufacturing, handling and storage but may be amended as the work standards development work progresses and new members contribute with knowledge and experience. With vigorous research and development under way as indicated in section 2.1, it is expected that new forms of solid biofuels and pyrogenic biocarbon will appear as commercial commodities demand further work on standards.

3.1 Representation and participation in the ISO/TC

3.2 Membership

Countries/ISO member bodies that are P and O members of the ISO committee

3.3 Analysis of the participation

The member list represents the bulk of the developed and developing countries where solid biofuels have been established for centuries. In the developed countries the use of solid biofuels has evolved into a highly valuable fuel for production of heat and electrical power driven by environmental factors and the gradual replacement of fossil fuels to mitigate Green House Gas (GHG) emissions. All have signed the Kyoto Agreement but not all have followed through at this time with ratification of the Agreement. Driving forces within many regions are increased carbon credit trading and implementation of various combinations of cap-and-trade and carbon tax regimes. The post-Kyoto Agreement and the more recent Paris Accord are expected to further escalate the use of renewable fuels such as solid biofuels. The gradually increasing dependence on import of foreign fossil fuels from often unreliable sources has been another driver towards locally produced fuels. The increased availability of densified solid fuels such as pellets has also increased the interest for large scale export/import of solid biofuels. Wood pellets are the most transportable of all solid biofuels, but also international trade of wood chips for heat and power production is increasing. Conversion of large coal burning power plants to biomass has spurred trading of very large volumes of pellets, and it is expected to continue to increase over time. Some of the developed countries do not have domestic supply of solid biofuels and are suffering from a limited supply which in turn is spurring a global demand and large investments in new manufacturing capacity in other places for densified solid biofuels.

The membership of ISO/TC238 consists of developed countries and developing countries representing the largest population concentration in the world with a high ambition to develop economically without domestic access to large fossil fuel reserves. They all have fast growing biomass resources due to their geographic locations which is part of the motivation to be part of the activities under the TC.

The ISO/TC 238 will spread information about ongoing work to identified regions and encourage participation in the work. There is an expectation that some of these countries will become either P- or O-members as they learn more about the work under way and the importance of being part of formulating the standards for the future of solid biofuels.

4. Objectives of the ISO/TC and strategies for their achievement

4.1 Defined objectives of the ISO/TC

Standardization of terminology, specifications and classes, sampling and sample preparation, test methods, and safety aspects in the field of raw and processed materials originating from arboriculture, agriculture, aquaculture, horticulture and forestry to be used as a source of thermally and non-thermally treated solid biofuels and pyrogenic biocarbon.

Excluded areas:

- Liquid biofuels
- Fossil fuels
- Peat
- Process ashes
- Solid Recovered fuel (SRF)
- Coal and cokes
- Natural gas
- Sludge recovery

4.2 Identified strategies to achieve the ISO/TC's defined objectives

- All Working Groups and Secretariat to meet at least once every year
- Well implemented communications between Secretariat, Chairman of TC and Working Groups and Project Leaders
- Facilitate the introduction of well researched, validated, and unbiased standards
- Ensure well-structured and co-coordinated participation from participating countries
- Use of existing standards where possible as source documents
- Ensure all members are well acquainted with specific directives through effective communication
- Measure compliance through managed project evaluation
- Use of electronic communication means
- Introduce well defined program, implementation and utilization of resources to facilitate the effective management of the Secretariat
- Formulate organizing committee to plan, organize and execute various requirements in order to ensure effective TC meetings
- Update this Business Plan as required to reflect the business and business environment in which the TC is operating

5. Factors affecting completion and implementation of the ISO/TC work programme

- During the development of the standards research and validation might be needed.
- If research and validation is required, this may affect the time schedule for the work items.
- The diversity of the raw material might cause loss of focus of target for the standard.

Invite National Standards Bodies to designate members from working groups and TG1, or appoint new TC 238 members, with relevant expertise, to contribute to the development of new or revised Standards

Encourage Working Groups and TG1 members to reach out to their respective industry contacts to designate one or two individuals from their organization to be a contact or liaison person with the TG. The objective is to get input and feedback from producers and users of biogenic carbon on New Work Item proposals and on drafts of Standards at various stages of development.

6. Structure, current projects, and publications of the ISO/TC

Information on ISO online

The link below is to the TC's page on ISO's website:

[ISO Technical Committee ISO/TC 238](#)

Click on the tabs and links on this page to find the following information:

- About (Secretariat, Secretary, Chair, Date of creation, Scope, etc.)
- Contact details
- Structure (Subcommittees and working groups)
- Liaisons
- Meetings
- Tools
- [Work programme](#) (published standards and standards under development)

Reference information

[Glossary of terms and abbreviations used in ISO/TC Business Plans](#)

[General information on the principles of ISO's technical work](#)