BUSINESS PLAN
ISO/TC 197
Hydrogen technologies

EXECUTIVE SUMMARY

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 140 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 accorded 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:

2.1.1 Hydrogen has the potential to become a key component of a renewable, sustainable energy system of the future. The benefits of hydrogen make it a versatile energy carrier and a fuel that could be extensively used in the near future. Indeed, hydrogen can be produced using a variety of primary energy sources (sunlight, wind power, hydroelectric power, nuclear power) from water or directly from hydrocarbons (like biomass and fossil fuels), transported, stored and used in a number of energy applications (power generation, distributed as residential CHP, transportation).

2.1.2 When burned directly as a fuel or converted to electricity, its principal by-product is water, which can safely be returned to the environment. Hydrogen has therefore the potential to substantially contribute to the reduction of climate changing emissions and other atmospheric pollutants.

2.1.3 ISO/TC 197 was created to to promote the safe use of hydrogen as an energy carrier and fuel and accompany the development of these new technologies. At present, the only significant use of hydrogen in the energy field is in the space programs. Liquid hydrogen and liquid oxygen are combined as propulsion fuel for the space shuttle and other rockets. Hydrogen is also fed to the fuel cells on board the space shuttle providing heat, electricity and drinking water for the astronauts.

2.1.4 The widespread use of an energy system based on hydrogen faces many economic and technological barriers. Most of the technologies that are required to implement this sustainable energy system are either in their development or demonstration phase, and they have not reached commercialization yet.

2.1.5 On the other hand, hydrogen is currently widely used in the industrial sector. The current major uses of hydrogen are the petrochemical and chemical industries. Hydrogen is produced and used in refineries, and it is widely used for the synthesis of chemical raw materials (production of ammonia, ethylene and methanol). Hydrogen plays a fundamental role in chip industries and therefore in electronics. Hydrogen is also used in smaller quantities in steel and glass making and food hydrogenation..

2.1.6 These existing industrial applications are already covered by a number of regulations. They should not be neglected by ISO/TC 197, but they should be worked on "on an as-needed" basis. With regard to the energy applications, hydrogen is likely to play its first important role as a fuel for distributed power generation and as an electricity storage medium for renewable energy. Hydrogen powered fuel cells and internal combustion engines could be used to provide on-site electricity, home and office heating and even drinking water. In the longer term, hydrogen could be produced from renewable primary sources such as hydropower, sunlight and wind power but also by biological processes from biomasses.. Hydrogen produced from solar and wind power would then be stored and reconverted to electricity when these intermittent renewable sources are not generating power. As an electricity storage medium, hydrogen could also lower the cost of peak electricity. Hydrogen produced from off-peak or surplus power could be used to store energy.

2.1.7 The road vehicle sector is also is potentially the largest industry sector that will lead to an increased use of hydrogen technologies. Indeed, fuel cells for cars are getting close to commercialization. Leading automakers now affirm commercialization will begin in 2010-2015. The use of hydrogen as an additive to existing fossil fuels, primarily natural gas, or as a fuel for internal combustion engines would result in reduced pollution and increased performance. Road vehicles powered with hydrogen fuel cells would meet the requirements of zero-emission vehicles, hence providing an opportunity to significantly reduce the pollution levels in urban areas.

2.1.8 In the long term, hydrogen could also be used as a fuel for commercial airplanes, boats and locomotives. The high energy content per unit of weight of liquid hydrogen makes it an attractive fuel for aircraft.

2.1.9 The introduction of hydrogen in the energy sector will bring to the market place technologies for the production, storage, transport, measurement and use of hydrogen. At present, the production technologies that are mostly used are based on reformation of fossil fuels and dominated by natural gas steam reforming. Electrolysis of water using renewable and nuclear generated electricity has the best potential for producing hydrogen to meet future demands in the medium to long term prospective. Other promising technologies are: the thermochemical technologies (gasification and pyrolysis of biomass) and the biological and photoelectrochemical technologies.

2.1.10 Since safety is a key factor for the acceptability of hydrogen, the development of hydrogen technologies may be accompanied by the development of means to detect hydrogen leaks. Electronic detectors are the options to be considered or recombiners to remove hydrogen to prevent its accumulation to hazardous levels.

2.1.11 With regard to the technologies that will facilitate the progression towards a hydrogen based energy system, fuel cells, internal combustion engines and hydrogen burners are being looked at. However, fuel cells are unquestionably the hydrogen utilization technology that can potentially achieve the highest energy efficiency and provide the biggest environmental benefits to society.

2.1.12 Major factors that may have an impact on the development of the markets

The major factors that may have an impact on the development of the hydrogen technologies are described below.

2.1.12.1 Customer demand

The hydrogen demand for all existing industrial applications is likely to increase in the next years. The market that is expected to have the largest impact on the industrial hydrogen demand is unquestionably the petroleum industry. Indeed, refineries are large-volume producers and consumers of hydrogen. Hydrogen is produced during thermocracking and hydrogen is consumed for the desulphurization and hydrogenation of fuels. Refineries currently use about 40 % of the total gaseous hydrogen production and the increased demand for less polluting petroleum products will have an impact on the refinery hydrogen demand. Indeed, the production of better quality motor fuels requires an increased proportion of hydrogen. In addition, heavy crudes (for example, hydrocarbon extracted from tar sands), which are hydrogen-deficient compared to lighter crudes, are making up an increasing proportion of refinery runs. As a result, the availability of hydrogen as a by-product from petroleum refining is likely to decline in the next years while the hydrogen demand increases.

With regard to the energy applications of hydrogen, the electric power industry is currently experiencing a steady growth in the demand for electricity. The worldwide demand growth is projected to approach 4 % per year through 2015. This projection includes the demand from developing countries including some areas that are not grid connected. Whrere there is no infrastructure in place, the use of hydrogen technologies could be an interesting option.

2.1.12.2 Social considerations

The public demand for green technologies is a potential factor that could lead to a wider use of hydrogen technologies. However, to be accepted by the public, hydrogen must be considered safe; education is therefore needed to overcome the public perception of fear regarding anything that has to do with hydrogen and the general belief that hydrogen is dangerous (the Hindenburg Effect).

On a more speculative basis, the use of a hydrogen based energy system could have a positive effect on the alleviation of poverty. Indeed, by using hydrogen produced from renewable primary sources such as hydropower, sunlight and wind power, developing countries could reduce their spending on petroleum products. Developing countries must therefore be encouraged to participate in the development international standards to ensure that their needs are covered.

2.1.12.3 Environmental considerations

The need for clean urban air and the growing concern with regard to global climate change will force the society to move toward energy resources that minimize the emissions of atmospheric pollutants (Kyoto 2008-2012 in some countries). Hydrogen produced from fossils fuels with sequestration of green house gases in the near-term and hydrogen produced from renewable energy sources such as hydropower, wind power and biomass in the mid-term and virtually inexhaustible supplies of water and sunlight in the long-term has the potential to become the energy carrier and fuel of the future, paving the way for an increased use of hydrogen technologies.

2.1.12.4 Economical factors

The cost of hydrogen and its associated technologies is one of the major barriers to the successful implementation of hydrogen energy systems. The basic cost of hydrogen is currently higher than the cost of conventional fuels. Therefore, reducing the cost of hydrogen and its associated technologies is the biggest challenge of the hydrogen industry. The low cost of natural gas and the fact that carbon dioxide emissions are not currently regulated or taxed have a direct impact on these cost related issues. Nevertheless, the uncertainty concerning the eventual depletion of fossil fuel resources justifies that other sources of energy be looked at; hydrogen could be this replacement fuel.

2.1.12.5 Political changes

As the production of hydrogen from renewable primary sources could reduce the dependence on imported petroleum, ensure security of fuel supply and help the nations that have made the commitment to reduce their emissions of green house gases, governments could adopt measures that would accelerate the introduction of hydrogen technologies.

2.1.12.6 Product innovations

Most of the hydrogen technologies in the energy sector are either in their development or demonstration phase, and they have not reached commercialization yet. More research is required to address the most critical issues, which are to increase the efficiency and reduce the cost of technologies and to ensure that all the relevant safety issues have been adequately addressed.

The goal of the research programs that are currently underway is therefore to develop means of producing economically acceptable hydrogen from renewable primary sources, safe storage technologies for both stationary and mobile applications as well as cost effective and efficient hydrogen utilization technologies in the sectors that were identified as the most promising.

2.1.12.7 Technical barriers to trade and regulatory and legal measures

As hydrogen technologies in the energy sector are in their development and demonstration phase, few regulatory and legal measures cover these applications. Regulatory authorities look at the demonstration projects on an individual basis. Undertaking the development of hydrogen technologies standards at the international level reduce the risk of introducing technical barriers to trade that might otherwise have resulted from the adoption of diverging national and regional standards. However, a lack of international standards in itself to cover the stakeholder needs is a major impediment for the suppliers to bring their technologies to the market place.

With regard to existing industrial applications, the storage and distribution of hydrogen has had to comply with many diverse regulations. Indeed, hydrogen falls into the category of dangerous goods and, as a result, the transport and storage are highly controlled by the regulatory authorities.

Internationally, public and private sectors support the development of international standards and conformity assessment systems as a means of improving efficiency of production and facilitating international trade. Additionally, it is noted that the 1994 World Trade Organization Agreement on Technical Barriers to Trade (WTO TBT), Article 2, affords preferential treatment to international standards and their use in regulations.

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.

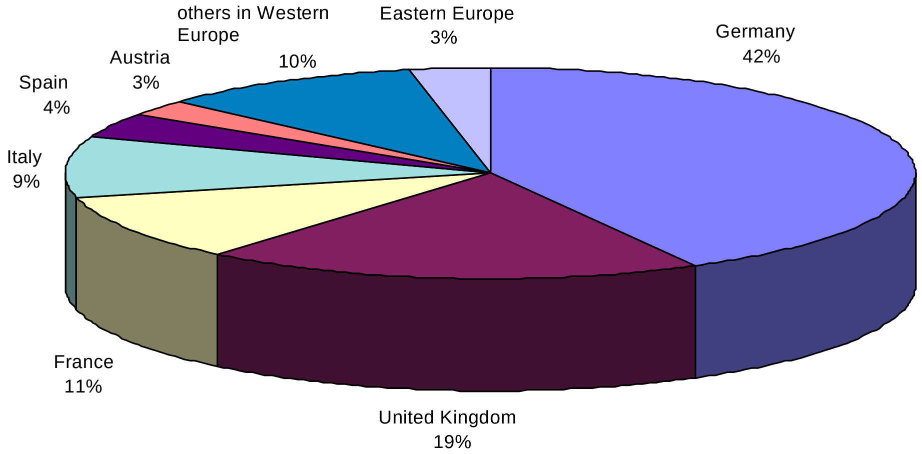
2.2.1 Existing industrial applications

2.2.1.1 Description of the total market (descriptive and quantitative)

2.2.1.1.1 More than 45 000 000 tonnes of hydrogen are consumed around the world each year[1]. The hydrogen demand around the world varies by region. North America is the major user (79%) followed by Europe (14 %) and Asia (7%). The Middle East and South America have the potential for producing large quantities of hydrogen from hydroelectricity and refineries. They could also use large volumes of hydrogen. However, available statistics do not provide information with regard to these regions.

2.2.1.1.2 In Europe, the largest consumer is Germany (42 %), followed by United Kingdom (19 %), France (11 %), Italy (9 %), Spain (4 %), Austria (3 %) as it is shown in the figure below.

Hydrogen demand by regions in Europe

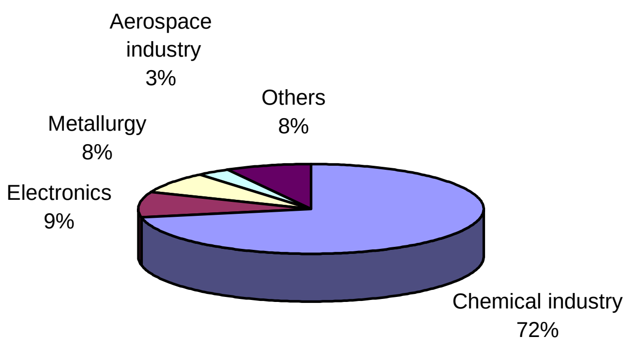


[1] Except where otherwise stated, the information regarding the description of the total market was extracted from the following document: *Le point technique et économique sur les technologies de l'hydrogène : Utilisation – Marchés – Production – Nouvelles applications*, Pierre Hosatte, April 1997

2.2.1.2 Description of the market structure and the major market players

2.2.1.2.1 The hydrogen demand varies with the type of applications. Hydrogen is primarily used in the chemical industry (72 %), more specifically in petroleum refining (32 %), ammonia manufacturing (30 %) and the synthesis of methanol (10 %). The rest of the hydrogen demand is from small-volume consumers. Electronics companies accounts for 9 % of the total hydrogen consumption, the metallurgical industry for 8 %, the aerospace industry for 3 %, and other types of industries such as glass making and food hydrogenation account for the remaining 8 % as it is shown in the following figure:

Consumption of hydrogen by type of applications (1990)



2.2.1.2.2 Most of the world hydrogen produced is consumed at the site where it will be used. As a result, the largest consumers, i.e. the refineries and the manufacturing plants of ammonia and methanol, are also the largest producers of hydrogen. They not only produce hydrogen for their own needs, they also supply hydrogen to small-volume consumers. Hydrogen is also inevitably produced from the production of chlorine. As a result, the chemical and petrochemical industries currently produce about 98 % of merchant hydrogen[2].

2.2.1.2.3 The volumes of hydrogen sold by industrial gas companies[3], represent only a small proportion of the total hydrogen production. The liquid hydrogen business[4] was developed mostly in North America. The first liquid hydrogen plants were built in the United States to supply hydrogen for the U.S. space program. Subsequent plants were built in Canada, where relatively inexpensive energy supplies are available for the energy-consuming liquefaction process.

2.2.1.2.4 The largest part of the hydrogen produced in Western Europe is used captively. Merchant hydrogen, delivered in cylinders or tank containers, is a minor market, accounting for about 2 % of total hydrogen consumption, and is delivered primarily in gaseous form.

2.2.1.2.5 Hydrogen is produced on an industrial scale from natural gas by steam reforming. In this process, thermal energy is used to separate hydrogen from the carbon components of natural gas. Hydrogen is also produced via the partial oxidation of oil products (refineries) and the chlorine-alkaline electrolysis (production of chlorine). Limited quantities of hydrogen are produced from the electrolysis of water. This is presently a very expensive process that is restricted to meeting the needs for extremely pure hydrogen used in manufacturing and in the space programs. Electrolysis of water, however, can play a very important role in the near future in establishing an infrastructure of distributed fuelers for cars and buses, particularly at the beginning of commercialization when a relative number of hydrogen fuel cells cars is small and it is not economically feasible to introduce large centralized fuelling stations.

2.2.2 New energy applications of hydrogen

2.2.2.1.1 With regard to the energy applications of hydrogen, most of the technologies that are required to implement the hydrogen energy system are either in their development or demonstration phase. As they have not reached commercialization yet, few statistics are available to cover these applications.

2.2.2.1.2 Should hydrogen be used as an energy carrier and fuel in the next few years, the market of hydrogen would however be considerably modified. For example, a fleet of 100 000 cars using hydrogen instead of motor fuel would require about 133 tonnes of hydrogen per day, If we assume a storage efficiency of 75 %, a production of over 175 tonnes of hydrogen per day would be required to supply this fleet of cars. Such production of hydrogen would be equivalent to the current consumption of liquid hydrogen in North America.

[2] The merchant portion of hydrogen includes gaseous product delivered by pipelines and liquid and gaseous hydrogen delivered in cylinders and tank containers.

[3] The information with regard to the volumes of hydrogen sold by industrial gas companies was extracted from the Hydrogen abstract of the Chemical Economics Handbooks, SRI International.

[4] Liquid hydrogen is accounting for 20 % of merchant hydrogen.

2.2.3 Customers

2.2.3.1 In industrial applications, suppliers and customers of hydrogen are intimately linked. For this reason, section 2.2.1 provides a complete portrait of the market structure (suppliers and customers).

2.2.3.2 In the energy sector, there are no customers yet. The car industry will likely be one of the largest customers of hydrogen technologies. Indeed, leading car companies are currently investigating hydrogen vehicle systems that use hydrogen stored on board.

3 BENEFITS EXPECTED FROM THE WORK OF THE ISO/TC

3.1 The development of hydrogen technologies in the energy sector is done gradually and this development must be founded on standards, which will guarantee the reliability and the safety of the equipment and the systems that will eventually be brought to the market. The early establishment of standards is likely to guide the technological developments and should accelerate the public acceptance of hydrogen as an efficient and safe energy source. In a context of increased trade, the standards developed by ISO/TC 197 will ensure the harmonization of requirements, namely in terms of performance and safety.

3.2 In the industrial applications, the standardization efforts of ISO/TC 197 should enable a better understanding of the relevant safety issues. The work of ISO/TC 197 could therefore lead to a cost reduction and a larger use of these technologies.

3.3 More specifically in both the energy and industrial applications, the work of ISO/TC 197 is intended to fulfill the following needs:

- to warrant safety by implementing consensual rules to minimize avoidable risks to persons and goods to an acceptable level;
- to eliminate barriers to international trade and to simplify the arduous regulatory process by providing hydrogen-specific standards in order to allow the early implementation of the rapidly emerging technologies;
- to control variety by allowing to select the optimum number and types of products, processes and services to meet prevailing needs;
- to harmonize testing methods and quality criteria for the use of hydrogen in all its forms;
- to ensure protection of the environment from unacceptable damage due to the operation and effects of products, processes and services linked to hydrogen.

4 REPRESENTATION AND PARTICIPATION IN THE ISO/TC

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

4.2 Analysis of the participation

5 OBJECTIVES OF THE ISO/TC AND STRATEGIES FOR THEIR ACHIEVEMENT

5.1 Defined objectives of the ISO/TC

5.1.1 The current standardization effort is focused on new technologies in the energy applications. Since these new technologies are in the development or demonstration stage, the main objective of the technical committee is to help bring these new technologies to the market through performance based standards that are aimed at removing the technical barriers.

5.1.2 The technical committee's efforts are centred on standardizing to ensure safety and meet end-use requirements at an affordable cost. This work should speed-up the regulation process by providing international standards that define the minimum requirements applicable to these rapidly emerging technologies. Thus, the focus of the technical committee's work is cost-effective safety for new end-uses.

5.1.3 More specifically, the objectives of the technical committee in the next years are the following:

1. Elaboration of standards on the product specification of the hydrogen fuel.

2. Elaboration of generic standards that will provide the guidelines for the development of a hydrogen distribution and storage infrastructure. Storage technologies for mobile and stationary applications (multimodal containers, nanotubes and solid state storage systems), refuelling stations, hydrogen pipeline, etc. should be standardized.

3. Elaboration of standards or collaboration to the development of the standards on the end-use applications (fuel cells, internal combustion engines, hydrogen burners).

4. Collaboration for the development of standards on hydrogen devices that may also be used onboard road vehicles (road vehicle fuel tanks, fuelling connectors).

5. Elaboration of standards on the safety considerations related to the use of hydrogen

6. Elaboration of standards on the hydrogen production technologies from renewable primary sources such as hydropower, solar energy, wind power and the small-scale hydrogen production technologies from fossil fuels such as small-scale steam reformers.

7. Elaboration of standards on hydrogen components such as detection devices (electronic detectors) and safety related devices (pressure relief valves, shut-off valves, pressure regulators, etc.) of generic use to be used in hydrogen systems.

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

5.2.1 The priorities of ISO/TC 197 are driven by the hydrogen technologies in the energy sector that are likely to reach the market in the near term. As the distributed power generation and the road vehicle sectors have been identified as the early market niches, all the standards that are required to allow the smooth introduction of the hydrogen technologies in these sectors of activity shall be the top priority of ISO/TC 197.

5.2.2 For hydrogen to be widely used in industrial applications, distributed power generation and road vehicles applications, there was a need to define the specifications of the product to ensure access to a product of quality. ISO 14687 was therefore developed to meet that need of the market. However, as the end-use applications develop, the need to define the characteristics of the hydrogen fuel based on the application may arise. As an example, ISO/TC 197 is allocating the resources to revise ISO 14687 to cover the needs of PEM fuel cell applications for road vehicles.

5.2.3 As the technical committee is responsible for the safety aspects for hydrogen technologies, the development of generic standards on the hydrogen distribution and storage infrastructure should be the top priority of ISO/TC 197. There is definitively a need to implement international standards to harmonize the requirements applicable to refuelling stations and storage technologies of gaseous and liquid hydrogen for both mobile and stationary applications (e.g. multimodal containers). The development of standards on solid-state transport and storage technologies such as nanotubes and metal hydrides should also become a priority when these technologies become more mature.

5.2.4 The next item on the priority list of ISO/TC 197 would be to develop standards or collaborate in the development of the standards on the most promising end-use applications. As fuel cells are seen as the most promising technologies for both distributed power generation and road vehicle applications, ISO/TC 197 should be involved in the development of fuel cell standards to ensure that the relevant hydrogen safety issues of these technologies are addressed. For the same reason, ISO/TC 197 should also collaborate in the development of standards on hydrogen devices dedicated for use onboard road vehicles such as fuel tanks, fuelling connectors.

5.2.5 Moreover, the establishment of general guidelines for the safe use of hydrogen should not be neglected by ISO/TC 197. As the education of the regulatory bodies and the public in general is an important aspect of the acceptance of the hydrogen technologies, ISO/TC 197 has already allocated the resources to make ISO/TR 15916 available.

5.2.6 The elaboration of standards on hydrogen components to be used in hydrogen systems should also be considered by ISO/TC 197. An ad hoc group has been created for the purpose of coming up with a process forward to guide ISO/TC 197 in the standardization of hydrogen components. The result of their work will later be included in the business plan.

5.2.7 Finally, as the hydrogen production technologies from renewable primary sources and the small-scale hydrogen production technologies from fossil fuels develop, ISO/TC 197 should develop standards that will ensure the safe use of these hydrogen production technologies. International standards on small-scale steam reformers (capacity of less than 400 m^3/hr) and electrolyzers are being developed.

5.2.8 In order to keep the interest of its member bodies, ISO/TC 197 holds plenary meetings on an annual basis. With regard to the work that has to be done between the plenary meetings, ISO/TC 197 favours the increased use of the electronic mail. All correspondence to the member bodies is in English with the exceptions of the meeting draft agendas, the resolutions adopted during the meetings that are also translated in French. English is the language used during the meetings.

5.2.9 Drafting of standards should be assigned to working groups under the responsibility of the technical committee, except where the extent of the projects to be done and the need to maintain the efficiency of the technical committee would warrant the creation of subcommittees. The secretariat shall coordinate and facilitate the work within the technical committee, thus implementing conditions for teamwork and synergy. As the number of projects increased, a permanent editing committee was created for the purpose of bringing more efficiency to the editorial work of the technical committee.

5.2.10 ISO/TC 197 cannot delegate its responsibilities when safety issues related to the use of hydrogen are under consideration, and in order to achieve its mandate in a most effective manner, ISO/TC 197 has established liaisons and work in close collaboration with a number of ISO technical committees and other organizations.

5.2.11 Special working agreements with IEC/TC 105, ISO/TC 22 and ISO/TC 58/SC 3 have been made effective considering the strong technical relationships between work items covered by ISO/TC 197 and these technical committees. Similar working agreements may have to be put in place with other technical committees such as IEC/TC 31.

5.2.12 The general ISO procedure is followed in all other cases of liaison and collaboration with other TCs.

6 FACTORS AFFECTING COMPLETION AND IMPLEMENTATION OF THE ISO/TC WORK PROGRAMME

6.1 The lack of International Standards on boilers and pressure vessels has had an influence on the timely completion of the ISO/TC 197 standards that deal with equipment that fall in the pressure vessel category such as multimodal containers, fuel tanks, etc. The work of ISO/TC 11 Boilers and pressure vessels is therefore crucial with regard to this matter.

6.2 The small number of known specialists in the field of hydrogen technologies is an additional factor that can limit the efficiency and the number of work items being processed by ISO/TC 197. Consequently, ISO/TC 197 recognizes that its structure must be kept as lean as possible.

6.3 ISO/TC 197 exists because, given the very specific nature of hydrogen and hazards associated with its use, the hydrogen industry needs international standards to enable it to evolve. This implies that standards are developed ahead of the introduction of the technologies into the market. As a result, because of the development stage inherent to most technologies under interest, it is difficult to process work items within the time limits recommended in the ISO/IEC Directives. The lack of sound technical knowledge (scientific basis or understanding) is another factor that can slow down the work.

7 STRUCTURE, CURRENT PROJECTS AND PUBLICATIONS OF THE ISO/TC

This section gives an overview of the ISO/TC's structure, scopes of the ISO/TCs and any existing subcommittees and information on existing and planned standardization projects, publication of the ISO/TC and its subcommittees.

Reference information

Glossary of terms and abbreviations used in ISO/TC Business Plans

General information on the principles of ISO's technical work