

International Standards for the Global Oil and Natural Gas Industry – An Update Paper

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Introduction

A complete set of international standards for a wide selection of vital oil and gas industry materials, equipment and offshore structures is emerging from the international standards organizations, ISO and IEC. These standards are primarily the responsibility of ISO TC67 and IEC TC18. They are developed using a consensus process that includes more than a thousand O&G industry experts from around the globe and an international review and approval process.

Over 110 ISO standards have now been issued, including 16 revised or new published in 2004. A further 20 are planned for revision/publication in 2005. About 2/3 of these standards are based on familiar API specifications and the remaining 1/3 on other industry documents. IEC is also publishing important standards for the offshore industry.

The international O&G industry and national standardization organizations support these standards for worldwide applications. American, Chinese, European and other standards bodies are now adopting them for regional and national use. For industry, they will reduce costs and delivery time, and facilitate trade across national borders. For regulators, they offer support for goal-setting and functional regulations, while achieving higher levels of safety through better design.

These standards are now being implemented widely in oil and gas provinces around the world, replacing existing industry, regional and national standards and eliminating or reducing the need for company-specific specifications.

The oil industry key standardisation bodies are the ISO Technical Committee 67, the CEN TC12, API and national standards institutions.

ISO Technical Committee 67

ISO TC67, "Materials, equipment and offshore structures for the petroleum, petrochemical and natural gas industries," has the responsibility of establishing standards for most capital equipment used in all streams of the oil business. This is the hardware portion of the equipment used for exploration, production, transportation, and refining of crude oil or natural gas products as well as for petrochemical industries. The TC was reactivated in 1989, with the secretariat delegated to API through its affiliation with American National Standards Institute (ANSI). The structure of the ISO TC67 is shown in Fig. 1.

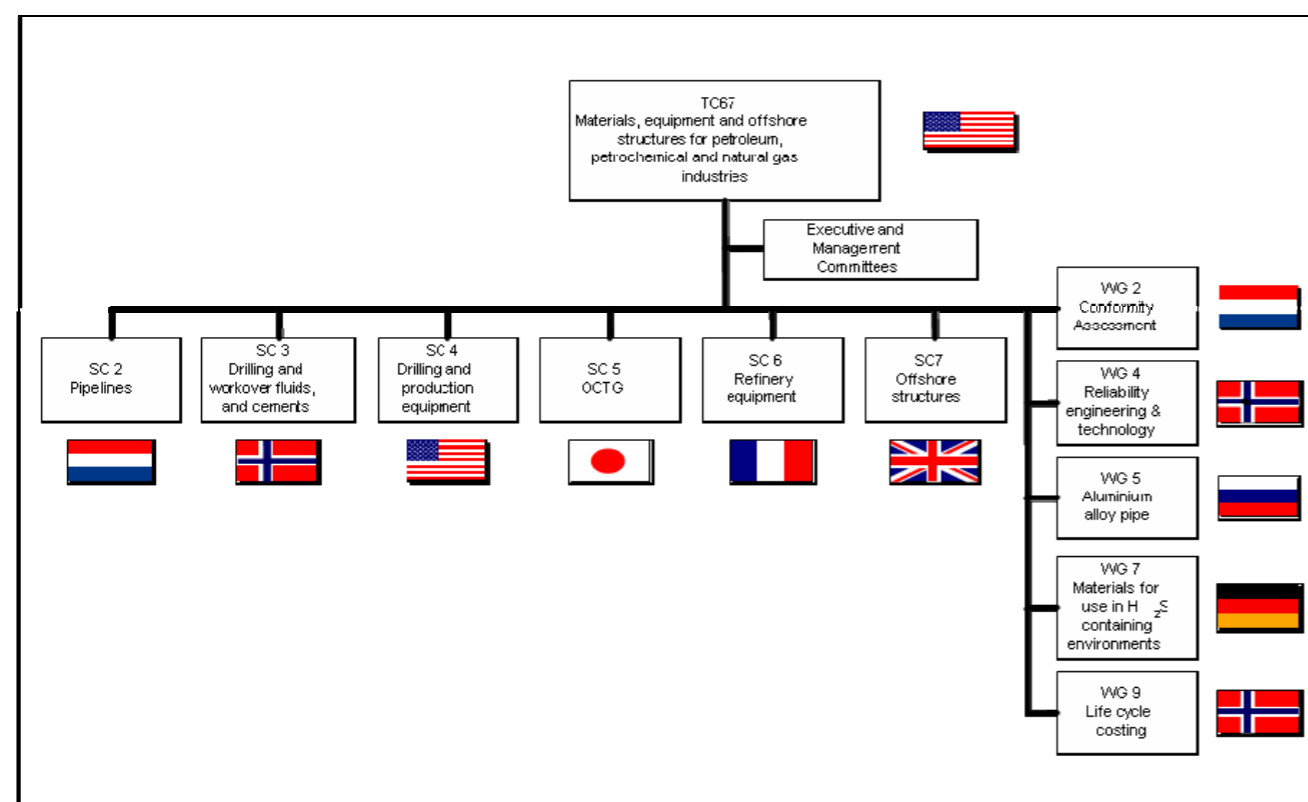


Fig 1: Structure of the ISO TC67 Committee

TC67 has member countries for all six continents/geographic regions of the world. In 2004, the participating members (24 P-members) are: Argentina, Brazil, Canada, China, Denmark, Finland, France, Germany, Indonesia, Italy, Japan, Kazakhstan, Mexico, Netherlands, Norway, Portugal, Republic of Korea, Republic of South Africa, Romania, Russian Federation, Spain, UK, USA, Venezuela. The observing members (23 O-members) are: Australia, Austria, Belgium, Bulgaria, Colombia, Cuba, Czech Republic, Ecuador, Egypt, Hungary, Iran, Malaysia, Mongolia, Poland, Saudi Arabia, Serbia and Montenegro, Slovakia, Sweden, Switzerland, Thailand, Trinidad and Tobago, Ukraine, Viet Nam. The corresponding members (2 C-members) are: Hong Kong (China) and Moldova.

The TC has established three external liaisons with The World Customs Organization, International Association of Drilling Contractors (IADC), and International Association of Oil and Gas Producers (OGP).

The major objectives to which the TC operates are stated in four encompassing goals: 1) prepare standards required by the petroleum, petrochemical and natural gas industries; 2) prepare standards that can be adopted worldwide by other regional and national standards organisations, such as CEN, API, CPSC and etc.; 3) publish standards that enable companies to minimise their specifications, and 4) deliver standards to the target dates set on the agreed work programme." The principal vision for the entire work programme and all participants is for "global standards used locally worldwide". To TC67 this means a reduction in national standards, regional standards, industry standards and company standards by a coordinated market-driven standardisation programme. TC67 has a slogan that is often used in these situations – "do it once, do it right, do it internationally."

ISO TC67's standardization volunteers (more than 1000) continue to demonstrate strong work efforts that have resulted in an increasing number of published international standards. The hard work of the volunteers led to a record 98 documents published since 1999. Seventeen ISO standards have been published in year 2004, and other 17 are potential to be published during year 2005. These are shown in schematic form in Fig. 2 for 2004 and for 2005 will be shown during the presentation of this poster. A significant part of the standards needs of the oil and gas industry is now covered by ISO standards, and more is following quickly.

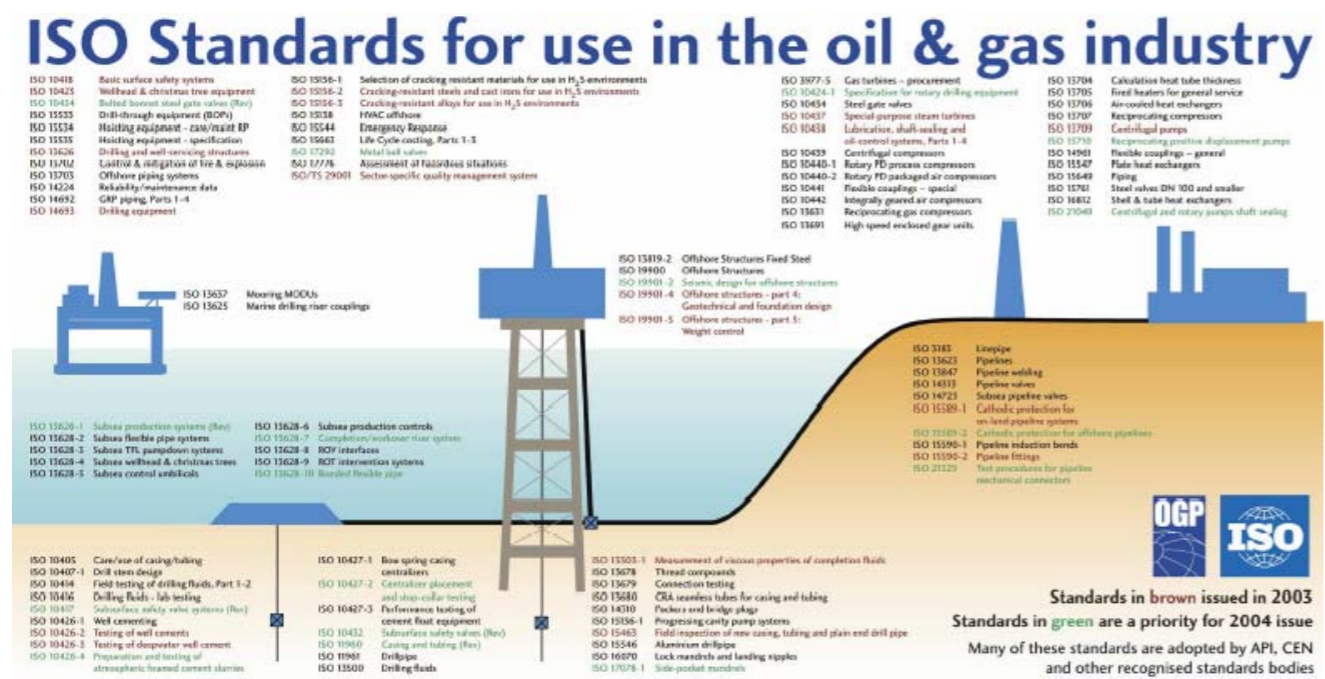


Fig 2: ISO TC 67 published standards

In order to promote the work of international standardization development in the petroleum and natural gas industry the ISO Focus magazine highlighted the industry and its respective ISO technical committees in the April 2004 edition².

Further information on the activities of the ISO TC67 and its subcommittees can be accessed via the corresponding websites at www.iso.ch, www.api.org, www.tc67.net, www.pngis.net (Fig. 3).

Key Regional, Industry and National Standards Organizations

CEN Technical Committee 12. CEN TC12 acts in Europe as the mirror Committee of ISO TC67. CEN TC12 is responsible for the adoption back in Europe of the standards developed by ISO TC67 within the framework of the Vienna Agreement, mainly to fulfil the Public Procurement Directive, to be sure that the adopted back ISO standards are not in conflict with any Essential Safety Requirements of any relevant New Approach Directive and to avoid any duplication of work. Once a standard is introduced as a new work item in ISO TC67, the CEN TC12 takes a vote to incorporate it onto its work program.

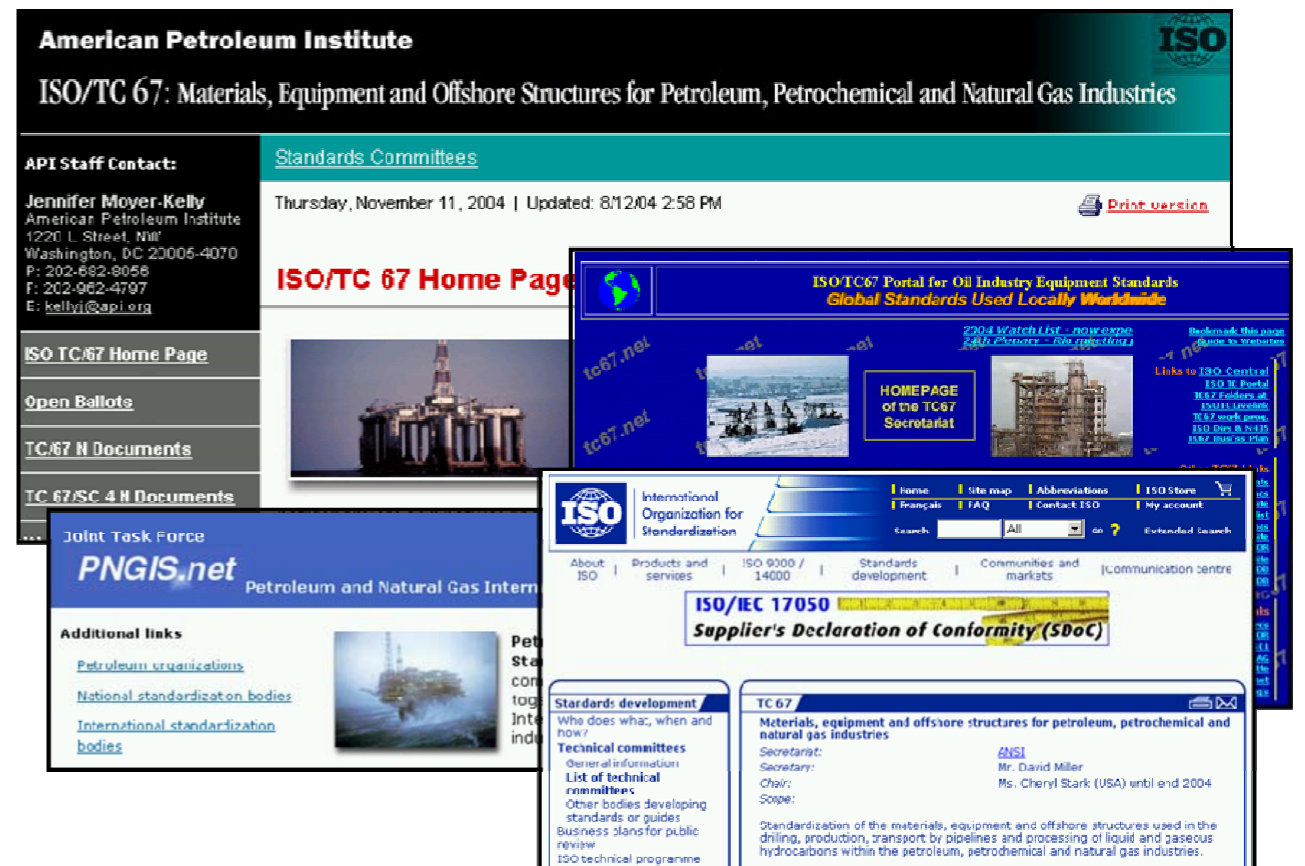


Fig 3: ISO TC67 websites

CEN TC12 has primary responsibility for administering the adoption of the ISO TC67 standards as European standards, designated EN ISO. This results in automatic adoption as national standards, within six month for example UNI EN ISO in Italy. The European Union has recently expanded to 25 member countries and the CEN to 28 members.

The adoption mechanism implies that enough European experts (at least 5 from different countries) participate in the work done by ISO and then each common ISO/CEN item is voted in both entities (ISO and CEN). The technical provisions of the standards remain unchanged, but national forewords may be added as well as informative annexes. Approval in ISO usually results in approval within CEN, and at present CEN has adopted 69 of the ISO/TC67 published standards.

Further information on the activities of the CEN TC12, including public information, can be accessed via the corresponding website at www.cenorm.be.

American Petroleum Institute (USA). API is a US-based trade association whose membership includes oil company operators, service & supply companies, and manufacturers. API in its standardization role acts on behalf of ANSI for dealing with oil and gas industry standards. Since 1923, API has played a leadership role in the development of standards for the global petroleum industry. API's perspective is that in general, the global oil and gas industry receives the greatest benefit from common technical standards for material and equipment that allow manufacturing interchangeability, rather than from operations oriented or management standards that are subject to varying regional conditions and/or regulatory requirements. Therefore, while API is committed to advancing its appropriate material and equipment standards as the basis for international work, it will consider other standards on a case-by-case basis.

It has been agreed that ISO, CEN, API and similar bodies should cooperate and not compete. This need for cooperation has become more acute due to the shrinking base of industry technical experts brought on by industry consolidation and demographics. Due to the historical tradition of API inside the oil and gas industry activity, approximately 60% of the original work items of ISO TC67 were based on existing API standards, as primary documents forming the basis for the ISO standards. For this reason and by the reason of the large intellectual resources within the US industry, it is very important to ensure that API and API members commitment to the ISO TC67 process is retained.

API has started adopting back the ISO standards into API as the next revision of the API standards (for example, API Spec SCT / ISO 11960 for steel pipes for use as casing and tubing). The API implementation is worked in two methods – one an adopt-back with or without amendments, or two, jointly developed between API and ISO. At present, API has 36 co-branded standards, which carry the ISO, ANSI and API trademarks. API is also working collaboratively with several other international organizations in a variety of areas. These organizations include the International Association of Oil and Gas Producers (OGP), the International Petroleum Industry Environmental Conservation Association (IPIECA), the Institute of Petroleum (IP, now known as the Energy Institute), the International Lubricant Standardization and Approval Committee (ILSAC), and the World Petroleum Congress (WPC).

Chinese Petroleum Standardization Committee - CPSC (China). China is making an effort to develop its economy and technology. Technical standards of all aspects are playing a more important role in this development. One proper approach is the adoption of ISO standards. Currently nearly one half of China's 19278 national standards are reportedly based on international standards. China's goal is to have more of its national standards based on international standards within 5 years.

Guided by the China state policy of adopting international standards and foreign advanced corporate standards, the Chinese petroleum industry started as early as in 1990 sending representatives to participate in the standardization activities of ISO TC67. For over ten years, it has been a goal of the Chinese petroleum industry to link directly with ISO TC67. All contacts are processed through the CPSC, which is authorized by the Chinese government to administer the petroleum standardization in China and to work with international and foreign standards.

It was reported that some twenty ISO TC67 published standards besides its large program of standard development, have been transferred to China national (GB) or industrial standards (SY). About another forty are in the process of transfer.

Along with the adoption of more ISO standards as the Chinese national standards and petroleum industrial standards, the Chinese petroleum industry planned a strategy in three phases. With the accomplishment of such a strategy, the Chinese petroleum industry shall transfer 100 ISO standards, adopt 100 foreign advanced corporate standards, integrate 100 Chinese petroleum industrial standards, and develop 50 Chinese-English bilingual standards. ISO TC67 published standards are central points of this strategy.

At the 2003 ISO TC67 annual meeting in Italy, CPSC announced its full participation in its activities and most of ISO TC67 standards will be simultaneously reviewed and transferred as China national standards or petroleum industrial standards.

KAZMEMST (Kazakhstan). Kazakhstan is considered a new frontier in the world oil industry. The Kashagan offshore field, located in the North Caspian Sea and operated by ENI (Agi KCO), is one of the largest and most exciting hydrocarbon discoveries for many decades in the world, and will make a major contribution to the development of Kazakhstan's economy and future prosperity.

While developing the Kashagan field, it came to be realized that adoption by the Kazakhstan authorities of international oil field practice represented a critical factor for success, and that this would have a significant impact on both costs and schedules. Preliminary discussions with the Kazakhstan authorities identified that a number of national standards existed for onshore oil field development, but did not address offshore developments. These standards were largely a legacy from the former Soviet Union, and were very prescriptive

and, in many cases, dated back to the 1970s and 1980s. National standards are often more stringent than International Standards mainly because of specific local and regional industrial conditions.

No formal standards approval process was in place in Kazakhstan and, as a result, each and every project had to draw up a list of standards to be applied. All standards applied need to be translated, expertized against the equivalent corresponding Kazakhstan standards, and registered with the Kazakhstan authorities. The regulatory approval process of standards at federal, regional and municipal levels can result in significant delays up-front of any project. Just to give an idea of the challenge involved, the number of standards included in the Kashagan project is of the order of 1200.

Considerable time and effort have been spent by Agip KCO and ISO TC67 to create the right environment for the adoption of International Standards and de facto International Standards in Kazakhstan. Numerous presentations, workshops and meetings have been held and attended with Kazakhstan ministries, government agencies and their national standards organization KAZMEMST on the potential benefits for them participating in this work. New perspectives of Kazakhstan's oil and gas industries were shown taking into account that Kazakhstan has formally applied for membership of the World Trade Organization. Government requirements towards utilization of domestic oilfield equipment in joint international projects (no less than 40%) are also indicate a necessity to use petroleum and natural gas international standards.

The President's 2004 State of the Nation Message stresses an importance of transition of Kazakh enterprises to ISO international standards: "From now on the performance of each minister and governor will be strictly evaluated based on how international standards will be introduced in the area of their activities. It is necessary to complete the transition to a model of technical regulation used in international practice. This year the draft law on technical regulation will be adopted and changes and amendments will be made to 50 current laws."

As a consequence KAZMEMST set up a new technical committee as the mirror committee of ISO/TC 67 to represent Kazakhstan interests within ISO TC67, to facilitate the process of adoption of International Standards for the oil and gas business, and to assist in the development of new International Standards through ISO TC67. Following the formation of the committee, Kazakhstan became a Participating member of ISO TC67 at the end of 2002. It nominated specialists to participate in the TC67 new work item on Arctic Structures.

The Fig. 4 illustrates a big interest of Kazakhstan in the development of ISO standard for offshore arctic structures. The future standard will have a special regional Annex for the Offshore Structures in North Caspian Sea. This standard also illustrates an importance of each country in a development of international standards. The corresponding ISO/TC67/SC7/WG8 has started its work only when the Russia and Kazakhstan jointed this project. This standard would have a very limited application without technical requirements to offshore structures in the Russian arctic shelf and North Caspian.



Fig 4: Exploration drilling in the North Caspian Sea

A formal process for the registration of standards was initiated in mid-2002. Agreements were made with several Kazakhstan Government-approved institutes for translating, expertizing and registering international (or de-facto international) standards for use by Agip KCO on their projects. To date, a total of 120 standards have been registered with the authorities.

Federal Agency for Technical Regulation and Metrology (Russia). The status of regulatory regimes and standardisation in the Eastern European countries are an important issue for the International oil business in general, and for the European oil and gas sector in particular. International, national and industrial standards are commonly considered to be voluntary but this is not the case in these countries. The Commonwealth of Independent States (CIS) have historically followed the USSR model and enshrined many of their standards into specific national legislation. Failure to comply with these requirements can have serious penalties with the authorities and a major impact on the project schedule and costs. Only due to a lack of effective standardization system foreign oil companies are usually evaluate a possible delay for a project development in this region about 1 year.

A standards strategy in these projects is a use of international standards for all high integrity process facilities and pipelines both offshore and onshore. The transfer of technology through the use and application of International Standards is considered to be strategic to the development and growth of local manufacturers and suppliers for the oil and gas business within CIS countries.

However, this region is now in a transition period from a mandatory standardization system to a voluntary model. The corresponding Russian Federal Law No. 184-ФЗ "On Technical Regulation" has been approved by Council of Federation in 2003, valid from June 2003. According to this law 2000 new technical regulations shall be developed and 25000 existing standards shall be revised till 2010. Furthermore, the State Committee of the Russian Federation for Standardization and Metrology (GOST R) is reorganised in to the Federal Agency for Technical Regulation and Metrology (see www.gost.ru). Eastern European countries are moving energetically towards the liberalization of their regulation and standardization systems.

Russian oil companies, manufactures, service companies and standardization body technical committees do not have a good knowledge how to coordinate all voluntary activities related to standardization and regulation for oil and gas sector in general, and for drilling/production material and equipment in particular, to harmonise them with corresponding EU/International standardization/regulation activities.

This information gap can have a priority for a development in the ISO/TC67 and CEN/TC12 reducing costs and adding value to industry and consumers.

Benefits Expected from the International Standardization

The overall oil and gas industry investment in materials and equipment is estimated to be around \$150 to \$200 billion (million-million U.S. dollars) annually. The provision of consensus standards eliminates duplicate and triplicate work by all interested parties. Company specifications are reduced, manufacturing and inventory costs are minimized, and regulatory authorities are incorporating these standards by reference rather than restating in regulations. Multiple grades or ratings are incorporated in most standards and the use of a particular grade is an agreement between supplier and user. The adoption of standards is entirely voluntary, but companies estimate savings in the millions (U.S. dollars) through having a common set of agreed standards.

The following long-term general benefits (taking into account significant short-term costs) from international standards are accepted by oil companies: cost reduction – increase business efficiency (economical benefits), enhance technical integrity, establish a common technology base and support legislation where linked (for example, procurement legislation and European Directives). The Fig. 5 illustrates a possible hazard of non-optimal standards.

German Institute for Standardisation carried out a research project on the economic efficiencies businesses perceive they receive from the use of technical standards. The results were derived from a survey of over 4000

companies in Germany, Austria and Switzerland. Results of the macroeconomic analysis show the economic benefits of standardisation to be approximately 1% of the company expenditure.

Total worldwide oil industry expenditure covered by the ISO TC67 focus standards is about 20 000 million USD per year. If only 1% is saved by the use of ISO/TC67 standards, then benefit is about 200 million USD per year. As a consequence, oil companies reported benefit/cost from ISO TC67 participation is about 200 : 8 = 25 : 1 (200 million USD is the 1% benefit from the operating expenditure and an grossly estimated 8 million USD is the investment in the international standards development per year). The benefits are maximised when all oil companies will use the same common international standards.

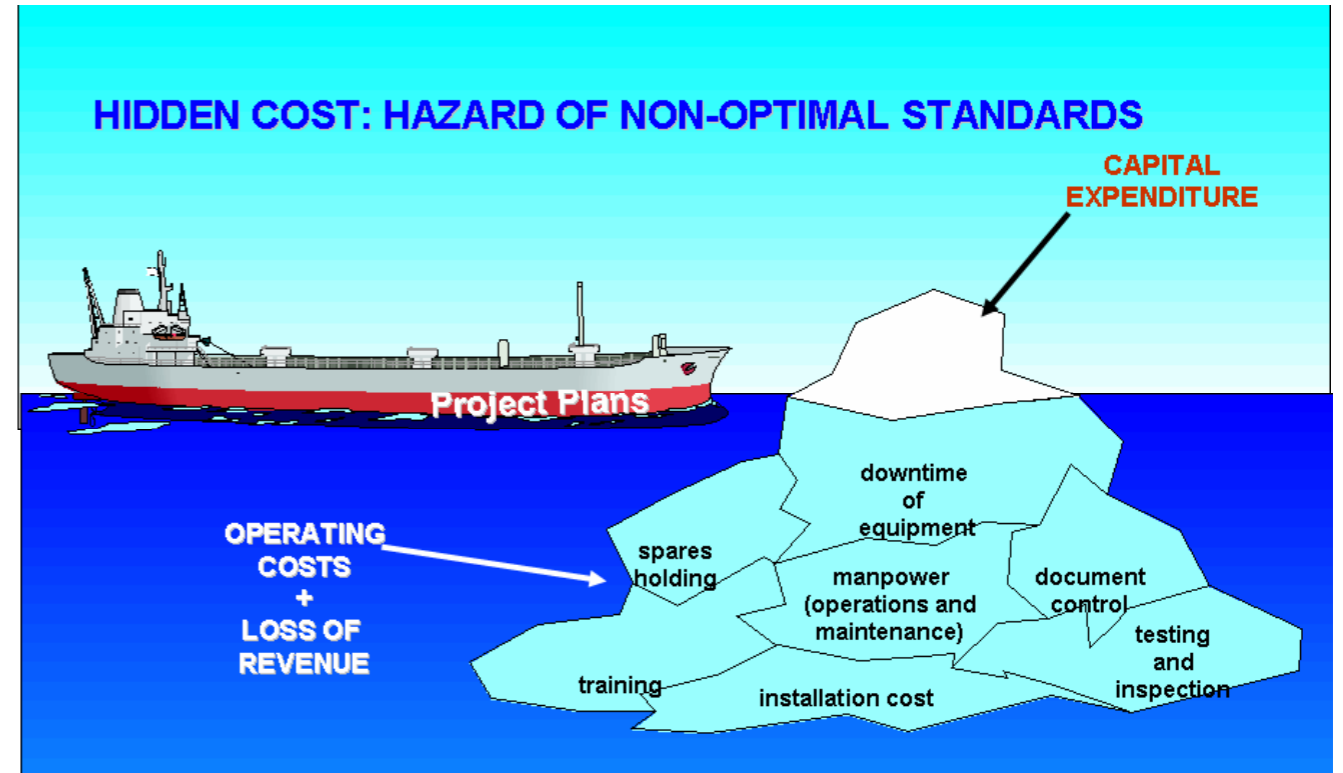


Fig 5: Oil company standards strategy

The use of European standards in petroleum and natural gas industries will also lay down minimum safety requirements and eliminates technical barriers to trade in Europe. Referencing the appropriate requirements to EN standards, the specifications prepared by oil companies will comply automatically with the requirements of the Public Procurement "Utilities" Directive and assure that there is no major conflict with any ESR of New Approach Directives.

As an example from the Hydro "Ormen Lange" offshore gas development project off the coast of Norway: The main pipeline "Langeled" is a 1200 km long subsea gas pipeline from the shore terminal to England with a budget cost of about 2,5 billion USD. Utilizing the results from ISO 13623:2000 standard development, supplemented by the DNV pipeline standard, the savings in this project alone have been around 150 million USD. The savings are related to significant reduction in seafloor preparation (removing underwater rock, gravel dumping etc) because of a more optimum design and longer allowable freespans.

Association of Oil and Gas Producers (OGP)

ISO TC67 maintains strict relationships with other industry organization in order to keep the focus on the industry needs and consequently revises the work program if necessary. External industry organizations such as the OGP (where its members produce half of the world oil and about 1/3 of the gas) encourage and give support to ISO TC67 activities. These organizations have been granted formal liaison status with ISO TC67 or its Subcommittees as appropriate. The OGP Standards Committee (SC) monitors, co-ordinates and influences the development of international standards to meet the needs of OGP members. There is close communication between the national associations, particularly the API. The Committee also monitors and influences European standards under CEN.

In order to promote the internationalisation of key standards used by the petroleum and natural gas industries OGP SC issues the annual International Standards Bulletin³ (Fig. 6).



Fig 6: OGP SC standards bulletins

OGP SC also arranges workshops in the most perspective petroleum regions (Denmark, November 2004; China, April 2004; Russia, November 2003; Brazil, December 2002) to discuss international standardization and adoption of ISO TC67 standards by the national industries. The workshops are well attended, for example, the workshop in China attracted more than 200 delegates from the Chinese oil and gas industry, the governmental reform commission, the national standards organisation and other bodies⁴.

The OGP strongly supports the internationalisation of key standards used by the petroleum and natural gas industries. The OGP's goal is to foster the development of standards on an international level for the broadest possible application. The aim is to produce one set of words and: "Do it once, do it right, and do it internationally."

Such standards should be developed in conjunction with the regulators as an alternative to prescriptive national legislation, which may inhibit the supply or movement of equipment and materials across borders. All international standards should be published by the International Organization for Standardization (ISO) or the International Electrotechnical Commission (IEC).

Further information on the activities of the OGP SC and other OGP committees, including freely downloadable publications, can be accessed via the OGP website at www.ogp.org.uk (Fig. 3).

Conclusions

1. ISO TC67 standards should be promoted as a powerful tool to reduce the barriers to trade, to facilitate health, safety and environmental precautions, and to reduce the costs for oil and gas industry, manufacturers and society in general.
2. The activity of ISO TC67 is becoming increasingly visible in terms of published standards covering a significant part of the oil and gas industry needs.
3. Now as the ISO standards are becoming published, the oil and gas industry should use them in order to gain the benefit. Company specifications should be reduce to the minimum, and if required, written as amendments to ISO standards.
4. Countries moving energetically towards the liberalization of their regulation and standardization systems require support from international standards organisations and petroleum and natural gas industry.
5. A still wider participation is desirable in order to accomplish a greater consensus on worldwide basis.