BUSINESS PLAN
CEN/TC 282
INSTALLATION AND EQUIPMENT FOR LNG

EXECUTIVE SUMMARY

Scope of CEN/TC 282 "Installation and equipment for LNG": standardization in the field of plant and equipment used for production, transportation, transfer, storage and regassification of LNG. Drafting of product standards specific to LNG when such standards are not included in the programme of work of another TC. Coordination of questions concerning LNG in the technical work of TC dealing with cryogenic equipment. Standardization begins at the inlet to the liquefaction plant and ends at the outlet from the regassification plant.

Business Environment: The Liquefied Natural Gas (LNG) industry and market show a very strong activity both at European and International levels. For today’s energy world, the LNG market is the most dynamic energy supplier with a high growing potential related to a yearly increasing demand and new identified resources. Within this economical context, numerous projects for LNG production plant and receptions terminals are underway, and many projects are in their last stage of preparation of a Final Investment Decision. Many additional projects are also considered to fill in the anticipated LNG demand beyond 2012. Innovations as new uses of LNG (fuel for trucks and boats), carriage means (trains) or terminals (floating) are part of the development of the LNG uses and market.

Benefits:
To define the necessary standards to be used to perform the desired level of safety for LNG infrastructure and commercial interoperability in Europe considering its significant position in the international market.

- Since 1991, more than 11 standards were adopted and upgraded according to the technical and safety requirements evolutions
- Confidence and social acceptability of LNG infrastructures and uses
- Diversification of imports of natural gas in the European Union
- Value added experience and contribution for the international development of LNG infrastructures and further diversification of suppliers

Priorities:
- Safety first
- Development of the market
- Sharing expertise and experience for the growing international activities
- Addressing innovative markets, uses and technical solutions for LNG
1 BUSINESS ENVIRONMENT OF THE CEN/TC

1.1 Description of the Business Environment

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

The main factors influencing the decision to carry out standardisation activities are the following:

- Political and economical factors:
  Declining North Sea gas reserves, increased production costs and the deregulation of European gas and electricity markets have all combined to create new opportunities for LNG in Europe.

  Further, many European countries rely on a limited number of energy supply sources. Such reliance may create serious issues of security of supply in the future, as evidenced by the recent confrontation between the Ukrainian Government and Gazprom. LNG is more flexible than pipeline gas and is therefore seen as an essential aspect of diversification of energy supply sources. Yet the ability to move LNG to European markets has been constrained by a lack of access to regasification capacity due in part to the limited number of terminals currently in operation as well as to the existence of long-term capacity rights held by a small number of industry participants.

  Many new LNG import terminals have been proposed in recent years in response to the increase in LNG demand. There are currently fourteen LNG import terminals operational in Europe (including Turkey).

  Other terminals in Belgium, France, Italy, Spain and the United Kingdom are under construction or being expanded (Revithoussa LNG Terminal – Greece) and are due to become operational in the next three years. Many other terminals have been proposed in potentially new LNG importing countries such as, Ireland, Germany, the Netherlands and Poland. Some of these proposed terminals are sponsored by companies developing upstream liquefaction in order to secure downstream market access for their LNG and/or by power utilities seeking new gas supplies.

- legal factors : the number of LNG installations in each country being rather limited, the national regulations specific to LNG are very poor; European standards would be appreciated as good references to avoid case by case discussions with local authorities and the subsequent waste of time and risk to increase project costs;

- international trade and standardisation aspects : US standards are predominant outside Europe to design LNG installations; it would be an advantage for European engineering companies to be able to refer to a standard corresponding to the design philosophy prevailing in Europe (based in particular on a safety assessment as required by the “SEVESO” Directive); the European industry, which played from the beginning an important role in that field, has an interest in basing their practise on recognised standards; an ISO standard exists in only one specific case – LNG sampling systems – and describes one particular technology when other technologies exist and can be more accurate.
1.2 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 CEN / TC:

The LNG industry is a rather young one. The real beginning of its development goes back to 1964/65 with the first LNG chain between Algeria, UK and France.

In the first decade of the 21st century, worldwide, there are 26 existing export, or liquefaction, marine terminals, located on or offshore, in 15 countries. In contrast, there are 60 existing import, or regasification, marine terminals, on or offshore, spread across 18 different countries. In addition to these existing terminals, there are approximately 65 liquefaction marine terminal projects and approximately 181 regasification terminal projects that have been either proposed or are under construction all around the world. It is not expected that all of the proposed terminals will be constructed.

Potential impact of unconventional gases on the business environment:

In spite of the fragmentation in the global gas system, the last decade has seen gradual, but unmistakable change in particular due to the unconventional gas revolution in the USA, with ripple effects being felt worldwide. The natural gas system has gone from being comprised of distinct regional or national markets to one where inter-regional trade flows are having a noticeable impact on physical supply-demand dynamics. Global growth in the trade of LNG has underpinned this transformation. Whereas the concept of a ‘world gas market’ was almost unthinkable ten years ago, a surge of new global LNG liquefaction capacity, much of which is inherently destination unspecific (flexible) or ‘self-contracted’, has introduced the first elements of inter-regional gas price competition.

In early 2010, the increasingly globalised LNG market combined with two other key factors to create a ‘perfect storm’ that resulted in a glut of global gas supply, namely the boom in unconventional gas production in the USA; and less than anticipated demand levels as a result of the economic recession.

A conclusion of a study from JRC1 states that overall, the scenario analysis highlights that shale gas does have the potential to extensively impact global gas markets, but only under optimistic assumptions about its productions and reserves.

Regarding the LNG, this study anticipates that the global trade in natural gas, driven by conventional gas, will increase in any scenario. Shale gas development, however, has the potential to moderate the degree of growth, particularly for interregional LNG flows. Low LNG costs would mitigate the reduction in trade resulting from widespread shale gas development. With regards to the trade flows, the structure of EU gas import is very sensitive to the LNG cost assumptions.

Source: The California Energy Commission

Global LNG trade volume and LNG as a percentage of global gas consumption
LNG Prices in Europe:

![Graph showing EU LNG prices from 2005 to 2012.](Image)

Source: Eurostat COMEXT

2 BENEFITS EXPECTED FROM THE WORK OF THE CEN/TC

Benefits expected from the work of CEN/TC 282 are mainly:

- to respond to the recent evolution of the LNG market (new LNG plants, terminals and carriers)

and


For example EN 1473 "Design of onshore installations" gives updated guidelines for the design, construction and operation of all onshore liquefied natural gas (LNG) installations including those for the liquefaction, storage, vaporisation, transfer and handling of LNG. A complementary project is on-going for storage facilities over 200 tons to provide necessary information related to safety issues and guidelines where SEVESO Directive only provides auditing framework without technical solutions.

3 PARTICIPATION IN THE CEN/TC

All the CEN national members are entitled to nominate delegates to CEN Technical Committees and experts to Working Groups, ensuring a balance of all interested parties. Participation as observers of recognized European or international organizations is also possible under certain conditions. To participate in the activities of this CEN/TC, please contact the national standards organization in your country.
4 OBJECTIVES OF THE CEN/TC AND STRATEGIES FOR THEIR ACHIEVEMENT

4.1 Defined objectives of the CEN/TC

CEN/TC282 has fulfilled its initial objectives and published the European standards defined at its creation in 1991 on:

- General characteristics of liquefied natural gas (EN 1160:1996)
- Testing of foam concentrates designed for generation of medium & high expansion foam and of extinguishing powders used on LNG fire (EN 12065:1997)
- Testing of insulating linings for LNG impounding areas (EN 12066:1997)
- Suitability testing of gaskets designed for flanged joints used on LNG piping (EN 12308:1998)
- Suitability testing of LNG sampling systems (EN 12838:2000)
- Design of onshore installations with a storage capacity between 5 t and 200 t (EN 13645:2001)
- Design of onshore installations (EN 1473:2007) (2nd edition)
- Design and testing of marine transfer systems (EN 1474:2008)
  - Part 1: Design and testing of transfer arms (2nd edition)
  - Part 2: Design and testing of transfer hoses
  - Part 3: Offshore transfer systems
- Ship to shore interface (EN 1532:1997)

CEN/TC 282 is continuously reviewing its collection of standards to contribute to that they reflect the state of the art and possible targets in terms of requirements.

The revision of some of its standards with the publication of upgraded versions is part of the process. At the moment, one standard is under revision with EN 1473 and 2 standards through the Vienna Agreement (with ISO/TC 67): EN 1160 (EN ISO 16903) and EN 1474-1 (EN ISO 16904).

New objectives and needs regarding LNG uses and innovations are also identified and the identification of needs is a constant approach in CEN/TC 282:

- Growing of small scale LNG activities (China, EU),
- Storage (LNG tanks for ships, for heavy duty trucks)
- Need in terms of fuelling stations (ISO/PC 252 – CNG/LNG fuelling stations)
- LNG as a fuel for ships (bunkering facilities, LNG test and sampling methods…)
- Gap for over 200t storage capacities
- Gap valves for onshore installation (current adaptation of EN 1626).
- Floating LNG terminals
- Floating Storage and Regasification Units
- LNG by railways, by trucks and loading/unloading aspects,
- Ship to ship transfer

4.2 Identified strategies to achieve the CEN/TC’s defined objectives.

To draft the standards, CEN/TC 282 has two active working groups:

- CEN/TC 282/WG 2 Design of onshore installations (over 200 t)
- CEN/TC 282/WG 5 Design of onshore installations (revision of EN 1473)
CEN/TC 282 Business Plan
Date: 2013-05-22
Page: 7

CEN/TC282 tries to avoid any duplication of work or conflicts in the texts with other CEN or ISO TCs or national regulations in Europe. CEN/TC 282 aims to promote the EN standards in Europe and in the rest of the world, sometimes against American national standards.

In the past, a clear limit has been defined with CEN/TC 326 "Gas supply for Natural Gas Vehicles (NGV)" on the subject of the design of onshore installations with a storage capacity between 5 t and 200 t (WI 282 009), CEN/TC 282 deals with the design of the LNG storage and regasification installation, CEN/TC 326 deals with the interface with the vehicle, and the vehicle itself.

In other cases (cryogenic tanks, valves, pumps,...) CEN/TC282 relies on other existing CEN/TCs which have the best expertise, and gives its comments so that the specific features of LNG are taken into account.

A relationship with ISO/TC 67 "Materials, Equipment and Offshore Structures for Petroleum, Petrochemical and Natural Gas Industries" and CEN/TC 12 "Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries" was established in 2005. The purpose of this collaboration is the promotion at the international level of the equipment related standard of CEN/TC 282.

The creation of ISO/TC 67 WG 10 on LNG Industry was proposed in July 2006 in ISO/TC 67. The effective and productive collaboration of CEN/TC 282 and future ISO/TC 67 WG 10 is one of the main goals of the TC.

A liaison has been recently established with ISO/TC 28 SC5, which develops standards on "Measurement of refrigerated hydrocarbon and non-petroleum based liquefied gaseous fuels"

Liaisons will continue to be part of the strategy, including with ISO committees such as ISO/PC 252 Project committee: Natural gas fuelling stations for vehicles and ISO/TC 22/SC 25 Vehicles using gaseous fuels for tanks for instance.

Other liaisons or relationships have been established or are excepted like with SIGTTO, NFPA, GIIGNL...

4.3 Environmental aspects

The gas supply companies, in the widest sense of their activities (production, transport, distribution) have a long tradition in ensuring that networks and facilities are operated according to well-defined procedures which are the centrepiece of quality management systems. They are based on the general criteria of the series ISO 9000 and currently developed gas-specifically as EQAS (European Quality Assurance System) in CEN/TC 234 in order to adhere more efficiently to the procedures peculiar to the gas activities.

Companies are more and more inclined to take into account environmental aspects, since the series ISO 14000 resulting in EMAS (Environment Management System) have a similar structure, and the measures to be taken are directly linked to the technical operations and therefore cannot be dissociated from them.

Review of the key environmental issues associated with the scope of the work covered by CEN/TC 282:

- Resources used,
- Energy consumption/use
- Emissions to air
- Emissions to water
- Waste
- Nuisances
- Risk to environment by accident or misuse
- Environmental impact on land
- Migration of dangerous substances / Impact on soil

These aspects have been addressed in details in CEN/TC 16388 "Gas-Specific Environmental Document - Guideline for incorporating within standards to minimize the environmental impact of gas infrastructure across the whole life cycle".

Tables regarding the aspects and the processes addressed in the standards help for the environmental review while drafting a European Standard.

The definition of the objectives regarding the addressing of environmental issues and consideration of how to assess progress in achieving those objectives will be part of an ad-hoc group mission for the next years in CEN/TC 282.

5 FACTORS AFFECTING COMPLETION AND IMPLEMENTATION OF THE CEN/TC WORK PROGRAMME

The main factor impacting negatively the completion of the work is the lack of expert resources with only few European countries having an LNG industry. In CEN, only 9 countries (Belgium, Greece, Italy, Norway, Portugal, Spain, France, UK and Sweden) over the 25 CEN members have LNG terminals and only few countries like Germany have LNG equipment manufacturers.

It means that having five countries participating to a new work item or a revision of a standard is very difficult.

Furthermore, the technical expertise needed and the size of the standards (more than 100 pages) make difficult to follow the CEN 3-year-timeframe. Despite the work of the working groups, tolerances had to be requested in the development of the standards currently in the work programme.