



**Asia-Pacific
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Case Studies of LNG Public Education and Information Campaigns in APEC Economies and Development of Best Practice Guidelines



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**Case Studies of LNG Public Education
and
Information Campaigns in APEC Economies
and
Development of Best Practice Guidelines**

(EWG 07/2009A)

Final Report

by

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SUMMARY

Public concerns about the safety of ships, terminals, and storage facilities and the environmental impacts that may be associated with LNG operations are major issues that must be addressed whenever any new LNG project is considered anywhere in the world.

These concerns are legitimate and require an adequate response in the form of public information, consultation, and education.

Engaging the public is critical to the successful development and operation of LNG projects and to the growth of LNG trade in the APEC region and throughout the world. It is essential, therefore, to understand how to engage with stakeholders so the project can proceed – or is terminated for good reasons.

This situation has been recognised by the APEC Energy Ministers who have instructed the APEC Energy Working Group (EWG) and the APEC Energy Business Network Gas and LNG Forum (APGAS) to study how to communicate with and inform the public about the realities of LNG projects. The present study has been commissioned as part of the EWG's response to this instruction.

1. Study Objectives

This report has been prepared as the EWGs response to this instruction.

The overall objectives of this study are to provide information on, and examine in depth, a number of case studies of LNG public education, consultation, and information campaigns conducted in APEC member economies and to develop best practice guidelines for such campaigns that will assist both developed and developing APEC economies in their communications with stakeholders and the public.

Specific objectives include:

- development of Best Practice Guidelines that recognise the different cultural and socio-economic groups and interests in different APEC economies,
- evaluation of credibility issues in public information campaigns and how these can best be addressed,
- identification and description of the different attitudes and approaches to stakeholder engagement of LNG industry proponents and governments in the different APEC economies,
- identification and evaluation of the gender-sensitive aspects of public information and education campaigns relating to LNG development,
- determination of the information dissemination methods and media that are most effective for communicating with different cultural and socio-economic groups and interests.

2. The Case Studies

Detailed case studies have been developed describing a total of thirteen LNG projects and their associated LNG public education campaigns, as follows:

- Browse LNG Production, Australia,
- Gladstone Liquefied Coal Seam Gas (LCSG) Production, Australia (4 projects),
- Guangdong Dapeng LNG Receiving Terminal, China,

- Incheon, Pyongtaek and Tongyeong LNG Receiving Terminals, Republic of Korea (3 projects),
- Rayong LNG Receiving Terminal, Thailand,
- Cameron LNG Receiving Terminal, Louisiana, USA,
- The Energy Bridge Deepwater Port LNG Receiving Terminals, USA (2 projects).

In addition, we have studied the LNG public education campaigns that have been, or are being, mounted by:

- PNG LNG production plant, Papua New Guinea (PNG),
- Tangguh LNG production plant, West Papua, Indonesia,
- Ichthys LNG production plant, Australia,
- Kenai LNG production plant, Alaska, USA,
- Sodegaura and Himeji LNG receiving terminals, Japan,
- Taichung LNG receiving terminal, Chinese Taipei,
- Quintero and Mejillones LNG receiving terminals, Chile,
- Canaport LNG receiving terminal, Canada,
- Dominion Cove Point LNG receiving terminal, USA,
- Dragon and South Hook LNG receiving terminals, UK.

We have also recognised the considerable advances in stakeholder engagement and public education that have recently been made in the wider energy and mining industries and this experience has been incorporated into the development of Best Practices that can be used to assist both the LNG industry and governments in their LNG public education campaigns.

The foregoing case studies illustrate features that vary according to their purpose, configuration, location and stage of development and show that different approaches to LNG public education are necessary to cater for the distinctive features of a project.

The case studies show that different approaches to LNG public education will be necessary for each of these configurations.

LNG production projects are almost always located on the coast and usually remote from urban habitation. The stakeholders most likely to be impacted are mostly local indigenous people and a significant part of the associated LNG public education campaign is directed towards providing these traditional land owners with an understanding of the LNG project. The extent of stakeholder public education required is to a certain extent dependent on the source of the gas. An offshore gas field will normally have less stakeholder impact, particularly if a Floating LNG (FLNG) liquefaction facility is employed, than, for example, an onshore LCSG project where a large number of landowners may be impacted. LNG receiving terminals, on the other hand, are often located in, or close to, an urban or industrial area with access to gas pipeline distribution. The stakeholders most likely to be impacted are again the local residents, but they are more likely to be politically aware, have a higher level of education and to be able to voice their concerns effectively. An LNG public education campaign must, therefore, be tailored appropriately for this type of stakeholder audience.

There are also significant differences between the ways in which different cultures and economies approach public engagement and education. These relate, in large part, to the degree of political influence that is available to each of the stakeholders - and to local residents in particular. For example, in some economies local residents may be summarily relocated to make way for an LNG project, with little or no recourse, whereas in others the

rights and initiatives lie squarely with the local residents. The preferred approach to LNG public education will, therefore, be significantly different in such situations. In an economy where an LNG project is supported by both central and local government the level of public opposition is not great, and a public education program is, perhaps, less important than in an economy where the project is seen to be largely a private sector money making activity. Thus, public education activities that are oriented towards promoting the reliability of LNG operations and have the support of government are acceptable to the public in the cultural environment of an Asian economy.

3. Stakeholder Identification and Characterization

At the 2002 World Summit on Sustainable Development stakeholders were defined as "those who have an interest in a particular decision, either as individuals or representatives of a group". This includes "people who influence a decision, or can influence it, as well as those affected by it". Stakeholders might include local community members, non-government organisations, governments, shareholders and employees. It should be recognised that some stakeholders have different value systems, protocols and customs.

Stakeholders may come from an area that extends well beyond the project's locale and regulatory jurisdiction and it is widely accepted that it is critical to identify and engage all stakeholders in the project lifecycle.

At the local level, stakeholders may include elected and safety officials, regulators, landowners, citizens, civic groups (including environmental, business, and religious groups), business leaders, media, and community opinion leaders.

Further away from the project site, state or regional stakeholders may include elected and appointed officials (e.g. Governors), regulatory agencies, including those with oversight and permitting of pipelines, utilities, natural resources, and environmental protection, economic development groups and environmental and business groups.

At the economy level, stakeholders may include: government agencies, such as environmental and energy agencies, politicians, and their key staff; environmental groups and other individuals in fields that have an interest in the LNG industry, such as the financial community and the legal profession.

Where several government agencies, having different jurisdictions, are involved in their own LNG public education campaigns, these campaigns need to be coordinated, and coordinated with that of the industry operator, to avoid confusing the public. Public education activities that are conducted by government agencies in response to their statutory requirements are limited to those requirements and may not extend further.

In general, however, government agencies are not well suited to providing public engagement in the form of physical displays, such as LNG information centres, and programs to promote an understanding of LNG activities to young people.

From the standpoint of the LNG industry participants, public education campaigns should target those whom the proponent:

- most wants to impress (politicians, journalists, workforce family members and Government and other officials who will be responsible for approvals),
- will have to continue dealing with as project stakeholders and neighbors,
- perceives as antagonistic to the project,
- wants to have as friends for the future (i.e. young people).

- The foregoing case studies did not reveal a large number of gender issues relating to LNG Public Education. Those of primary interest, however, include:
- the important role of women's groups (particularly the Country Women's Association in Australia) in LNG and LCSG Public Education,
- problems involved in communicating with indigenous people in Australia, PNG and Indonesia (West Papua), where cultural customs may require different approaches to LNG public education for men and women,
- differences between the ways in which the benefits of LNG are delivered to men and women based on the different roles each plays in society,
- exclusion of women from some jobs in the LNG industry in certain economies.
- Effective engagement with the community and stakeholders is essential for any successful enterprise. It can also result in a more efficient use of financial resources through:
 - reduced risk of social conflict and associated delays and costs,
 - ensuring compliance with the relevant legislative framework,
 - quicker and smoother permitting and approvals processes,
 - reduced risk of criticism and resistance from outside parties.

Engagement is an ongoing and multi-faceted process that can include:

- providing information,
- capacity building to equip communities and stakeholders to effectively engage,
- listening and responding to community and stakeholder concerns,
- including communities and stakeholders in relevant decision-making processes,
- developing goodwill and a better understanding of objectives and priorities leading to confidence in decisions,
- establishing a realistic understanding of potential outcomes.

Effective engagement requires more than just addressing rights and responsibilities. It cannot be a coerced action but must be an integral part of core business planning.

Engagement should be maintained throughout the life of a project — from the planning stage through to construction/implementation, operation/review and finally through to closure.

4. Effectiveness of Public Education Campaigns

Analysis of the case studies shows that there now seems to be a general consensus – both within the LNG industry and in the wider energy and mining industries – about the ways in which a public information campaign should be configured and conducted. However, the ways in which different campaigns are focused can differ considerably.

Those LNG Public Education campaigns that have achieved success have included the following elements:

- careful stakeholder identification and definition,
- conduct of both one-on-one meetings and public meetings with individual stakeholder groups,
- establishment of static displays and information centres explaining the LNG project,
- ongoing provision of LNG project information on websites, DVD's, television and hard copy publications,

- live demonstrations of LNG industry practice and familiarisation with plant operations,
- effective media outreach.

The following points are emphasised:

- the LNG project proponent should work in harmony with the responsible government agency in pursuing its public education activities to ensure that all information transferred to stakeholders is entirely coherent,
- there should be a focused response to stakeholder requirements that does not overwhelm them with information,
- all information provided should be unbiased – even if it is not favorable to the proponent,
- cultural sensitivity is needed amongst industry players in dealing with different stakeholders, in particular indigenous people. Harmonising stakeholder and corporate cultures can be a key factor in achieving successful stakeholder engagement and negotiations.

There is also general agreement that a successful LNG public education campaign should be targeted at:

- those likely to be most influential in obtaining project approvals, e.g. politicians, journalists, workforce family members all levels of Government, officials who will be responsible for approvals,
- women's groups,
- children and young people,
- community stakeholder committees.

The case studies show that the key stakeholders can be categorised into the following different cultural and socio-economic groups and interests:

- General audiences,
- Targeted audiences,
- Local communities,
- Landowners,
- Indigenous people,
- Young people,
- Project workforce,
- The media.
- Some stakeholders may be represented in more than one group.

The effectiveness of information dissemination and education methods and media vis-à-vis these groups can be summarised as follows:

(i) General Audiences

The General Audience effectively includes the whole range of stakeholders and represents a wide socio-economic spectrum, educational levels and range of interests. The LNG public education methods that have been found to be most effective for this general audience include:

- media (print, radio, TV and internet) engagement,

- Posting regular information bulletins on a dedicated section of the proponent website,
- Posting project information on a dedicated section of a government or Industry Association website,
- Promotion of TV documentaries that are produced by the media rather than proponents,
- Viewpoint presentation and discussion via internet blogs.

(ii) Targeted Audiences

Targeted Audiences include those individuals and groups whose understanding of the project is critical to its progression. These include politicians, journalists, three levels of government officials who will be responsible for approvals, women's groups, NGOs and, possibly, activists.

The LNG public education methods that have been found to be most effective for these targeted audiences include:

- one-on-one meetings,
- LNG plant visits,
- Live demonstrations such as the ConocoPhillips LNG Road Show,
- LNG Resource Centres, Theme Parks,
- Information dissemination via booklets, CD's and DVD's.

(iii) Local Communities

Local communities are usually amongst the most important targets for stakeholder engagement and they are the focus of public consultation requirements. Consequently, a great deal of effort has been devoted to developing a toolkit of methods and media for achieving effective community engagement. Those that have been found to be most effective include:

- public meetings and/or information days,
- one-on-one meetings,
- appointment of dedicated Liaison Officers,
- establishment of representative community committees or liaison groups and working with them on an ongoing basis to keep the community fully informed and updated as the project progresses,
- provision of project development updates via open meetings, open forums and through Community Committees with targeted notifications via email and newspapers,
- establishment of a "shop front" presence at a location central to the community (these are effectively resource centres with static displays providing information about all aspects of LNG production, transportation and end use),
- distribution of posters and pamphlets in remote locations,
- sponsorship of social welfare activities which include provision of financial and material assistance to service groups and charities,
- sponsorship of local and corporate sports teams.

(iv) Landowners

Landowners are frequently amongst the key stakeholders with whom engagement must be established and maintained in the form of a close information sharing relationship with to keep them informed about ongoing activities – particularly for LCSG projects.

The LNG public education methods and media that have been found to be most effective for engaging with landowners include:

- appointment of dedicated Liaison Officers,
- one-on-one meetings,
- public meetings and/or information days,
- establishment of representative community committees or liaison groups and working with them on an ongoing basis to keep landowners fully informed and updated as the project progresses.

(v) Indigenous People

Indigenous people are also frequently amongst the key stakeholders with whom engagement must be established as they are often the Traditional Owners (TOs) of land required for an LNG project development. They may also be required to give their informed consent on highly technical matters before the project can proceed.

The LNG public education methods and media that have been found to be most effective for engaging with indigenous people include:

- appointment of dedicated Liaison Officers,
- one-on-one meetings,
- public meetings and/or information days,
- establishment of representative community committees or liaison groups and working with them on an ongoing basis to keep the indigenous stakeholders fully informed and updated as the project progresses,
- use of visual presentation materials to explain the project,
- LNG plant visits.

(vi) Young People

In most of the case studies, emphasis was placed on LNG public education methods and media that targeted children and young people in order to build up a long term relationship with an informed public sympathetic to LNG activities. The LNG public education methods and media that have been found to be most effective include:

- live demonstrations such as the ConocoPhillips LNG Road Show,
- LNG Resource Centres, Theme Parks,
- LNG plant visits,
- postings on social networking websites such as YouTube, Twitter and Face book,
- sponsorship of education programs for young people, designed to both develop understanding of LNG in particular and to increase education levels in general.

(vii) Project Workforce

The project workforce is regarded by most LNG industry participants as being an essential target of stakeholder engagement. General Audience effectively includes the whole range of stakeholders and represents a wide socio-economic spectrum, educational levels and range of interests.

Spouses and extended family members of the LNG workforce are also regarded as key targets for public education as there is, at least initially, considerable concern about the safety of husbands and wives who are employed in the industry. Some of the LNG public education methods and media that have been found to be effective for workforce engagement include:

- production of a project magazine,
- information dissemination via booklets, CD's and DVD's,
- LNG plant tours,
- staff events held at the plant to familiarise family members, particularly wives and children, with plant activities and safety,

The net result is that staff and their families become effective conduits for the transfer of information and public education about LNG.

(viii) The Media

While many members of the public are often critical of the media it does have a high level of credibility because it engages the attention of the general public and there is a general feeling that if information is in print, or on the radio or television, then it should be believed. There are, therefore, strong arguments for LNG industry proponents to engage media sources closely and to educate them about all aspects of the project.

The media outlets that are considered most reliable seem to be newspaper articles and television Documentaries as these usually contain more information than, for example, news clips.

5. Best Practice Guidelines

The ten best practice guidelines identified in this report identified in this report encapsulate the lessons learned and experience gained by a large number of LNG project proponents and operators over many years together with those from several other energy industries – notably the mining industry. They are articulated in this report as a way of sharing the experience gained to date and to inform future project developers:

- Best Practice 1:** Integrate public outreach into the project management plan.
- Best Practice 2:** Establish a strong public outreach team.
- Best Practice 3:** Identify the project stakeholders.
- Best Practice 4:** Conduct and apply social characterization.
- Best Practice 5:** Develop an outreach strategy and communication plan.
- Best Practice 6:** Develop key project specific messages.
- Best Practice 7:** Develop communication materials tailored to intended audiences.
- Best Practice 8:** Actively manage the public outreach program over the project life.
- Best Practice 9:** Monitor the performance of the public outreach program and changes in public perceptions and concerns.
- Best Practice 10:** Be flexible – refine the public outreach program as warranted.

While there is general agreement in the industry about the best practices that should be pursued for stakeholder engagement and LNG public education activities, the evidence is that some LNG proponents do not fully aspire to these nor put them into practice. What is needed is a sustained effort over time.

Finally, it must be recognised that no amount of stakeholder engagement and public education is necessarily going to convince concerned stakeholders to withdraw their opposition to an LNG project in cases where their concerns are legitimate and cannot be adequately addressed by the industry proponents or government. Consequently, the outcomes of a particular LNG public education campaign may not be those desired by the proponent – even though the campaign may have been conducted to a high standard.

If this occurs, a strong argument can be made for relocating the project and there are several examples of this. Possibly the most noteworthy are:

- the use of deepwater port receiving terminal technology which removes the LNG terminal from the public eye,
- establishment of LNG receiving terminals in another nearby economy that has a more easily negotiable approvals process and delivering gas across the border by pipeline,
- relocation to another site where a particular barrier (such as the approvals required from indigenous stakeholders or local community opposition) does not apply,
- the use of floating LNG technology for the production and distribution of LNG.

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1. INTRODUCTION

This report has been submitted by Gas Advisers, On Yuen Industries Limited, Kowloon, Hong Kong, China as part of APEC project EWG 07/2009A. It investigates how LNG public education campaigns have been developed in APEC economies and identifies best practice guidelines for their conduct.

1.1 Background

In their Hanoi declaration, November 2006, APEC Leaders called for action to improve energy security and reduce greenhouse gas emissions. Increasing the use of Liquefied Natural Gas (LNG) achieves both of these goals and is now seen as the strategy of choice in progressing from a high carbon to a low carbon world in the medium to long term.

A major problem associated with the widespread use of LNG is public concern about the safety of LNG ships, terminals, and storage facilities whenever any new project is considered anywhere in the world. This concern is legitimate and requires an adequate response in the form of public consultation, information input and education about each LNG project. Engaging the public is critical to the successful development and operation of LNG projects and to the growth of LNG trade in the APEC region.

APEC Energy Ministers have recognised these issues and have directed the EWG and the APEC Energy Business Network Gas and LNG Forum (APGAS) to share information on regulations, standards, public education campaigns and other best practices for LNG handling and use and to study how to communicate with and inform the public about the realities of LNG Projects.

The APEC Energy Working Group (EWG) has responded by conducting an information exchange workshop on LNG public education campaigns run by the APEC Expert Group on Clean Fossil Energy (EGCFE) at the SYSU-BP Center for LNG Education, Training and Research at the Sun Yat-Sen University in Guangzhou, China, on November 5-7, 2007. This Workshop was useful as a first step in establishing a communication network in the APEC region and sharing experiences of best practices amongst LNG stakeholders. In addition, APGAS (Appendix 1.1) has conducted an open debate on the LNG project approvals process, of which public engagement and education is an integral part, at its Forum held in San Diego, USA on 16-18 September, 2007.

The present study is intended to build upon the outcomes of these activities.

1.2 Objectives

The overall objectives of this study are to:

- provide information on, and examine in depth, a number of case studies of LNG public education, consultation, and information campaigns conducted in APEC member economies,
- develop best practice guidelines for such campaigns that will assist both developed and developing APEC economies in their communications with stakeholders and the public,
- provide information that will help build capacity in developing APEC economies in the areas of LNG public consultation, information transfer and education.

Specific objectives include:

- development of Best Practice Guidelines that recognise the different cultural and socio-economic groups and interests in different APEC economies,
- evaluation of credibility issues in public information campaigns and how these can best be addressed,
- identification and description of the different attitudes and approaches to stakeholder engagement of LNG industry proponents and governments in the different APEC economies,
- identification and evaluation of the gender-sensitive aspects of public information and education campaigns relating to LNG development,
- determination of the information dissemination methods and media that are most effective for communicating with different cultural and socio-economic groups and interests.

1.3 Project Coverage

Public education is only one element of the much broader and more complex activities involved in stakeholder engagement which can extend to stakeholder negotiations, regulatory compliance, ongoing project monitoring, and the socio-economic development of indigenous people.

In-depth coverage of all aspects of stakeholder engagement is beyond the scope of this study which focuses specifically on public education and the conduct of public education campaigns. In this regard, the study is orientated towards information transfer and covers:

- all activities associated with the supply of natural gas and production, transportation, storage, re-vaporization and direct end use of LNG,
- the risks and benefits of LNG facilities including risk reduction and risk management procedures,
- the reasons for public opposition to LNG projects and how to approach public perception and stakeholder credibility issues,
- the respective roles of national governments, industry, independent agencies and experts and their credibility in the eyes of the public,
- the targets for public information and education – traditional landowners, interest groups, local and regional government, universities, NGO's, and international agencies,
- Identification and communication of the benefits of LNG projects both at the local and national levels, and the information dissemination methods and media that can be employed (e.g., workshops, seminars, reports, internet).

The requirements for, and nature of, public involvement in an LNG project are different at different stages of the project life. These stages are generic to any large industrial activity and do not relate specifically to LNG development. They have, however, been formulated in this context to analyse how stakeholder engagement in general, and public education in particular, will change throughout the following eight project stages:

1. **Scoping** engagements with key stakeholders to inform them of the proposed project and to identify issues of primary concern.
2. **Public consultation** on the Environmental Impact Assessments (EIA) and Social (SIA) Impact Assessments that are usually required for project approval.

3. Targeted **stakeholder education** designed to enable traditional owners, and other stakeholders, to make the decisions necessary to meet the requirements of Informed Consent.
4. The **project construction** stage, during which adherence to agreed conditions and Risk Management Plans is of key interest to stakeholders – particularly traditional owners and environmental groups.
5. The **commissioning phase**, though of short duration, may have the highest associated project risk and there is a need to ensure that key stakeholders are kept fully informed and engaged both for the risk management inputs they can offer and for their own safety.
6. **Ongoing operation** of the project requires a long term “caretaker” engagement with the public.
7. **Changes in project scope**, which may occur from time to time, will require a revisiting of steps 2 to 5 above, but from a much more advanced degree of stakeholder understanding.
8. **Project termination** and **site rehabilitation** require new configurations of public education to ensure that some of the mine abandonment experiences of the past are not repeated.

Not all of these stages have been reached by most of the case studies presented herein, but every attempt has been made to identify the public education issues and activities associated with each.

2.0 LNG INDUSTRY PROFILE AND ASSOCIATED RISKS

2.1 LNG Industry Profile

As of mid 2010 the number of LNG production plants and receiving terminals currently operating, under construction or in various stages of planning were as illustrated in Figures 2.1 and 2.2 for APEC and non APEC economies, respectively (<http://www.globallnginfo.com>).

Worldwide, there are a total of 28 LNG production plants and 70 LNG receiving terminals in operation supplied by a fleet of over 350 seagoing LNG tankers. In addition, there are currently about 250 peak shaving and LNG storage facilities worldwide plus a similar number of small scale LNG production plants – many of which provide LNG as an automotive fuel for large trucks and buses. In the USA, which has the largest number of LNG facilities in the world, there are 113 active LNG facilities of which 57 involve peak shaving and are concentrated mainly in north-eastern USA.

Taking into account all LNG plants under construction or planned, 55% of the production plants and 63% of the receiving terminals are in APEC economies. Also, it is clear from comparison of Figures 2.1a and 2.2a that future LNG production growth will be greater in APEC economies.

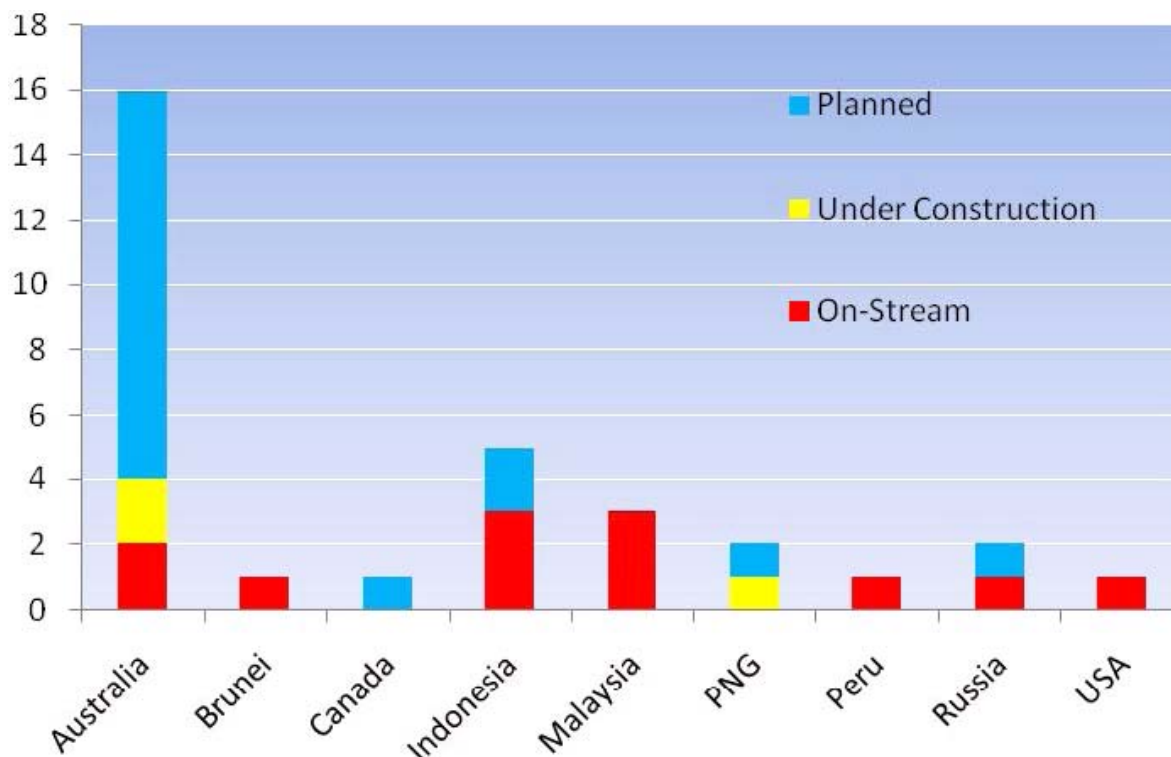


Figure 2.1a: LNG Production Plants in APEC Economies, Mid 2010

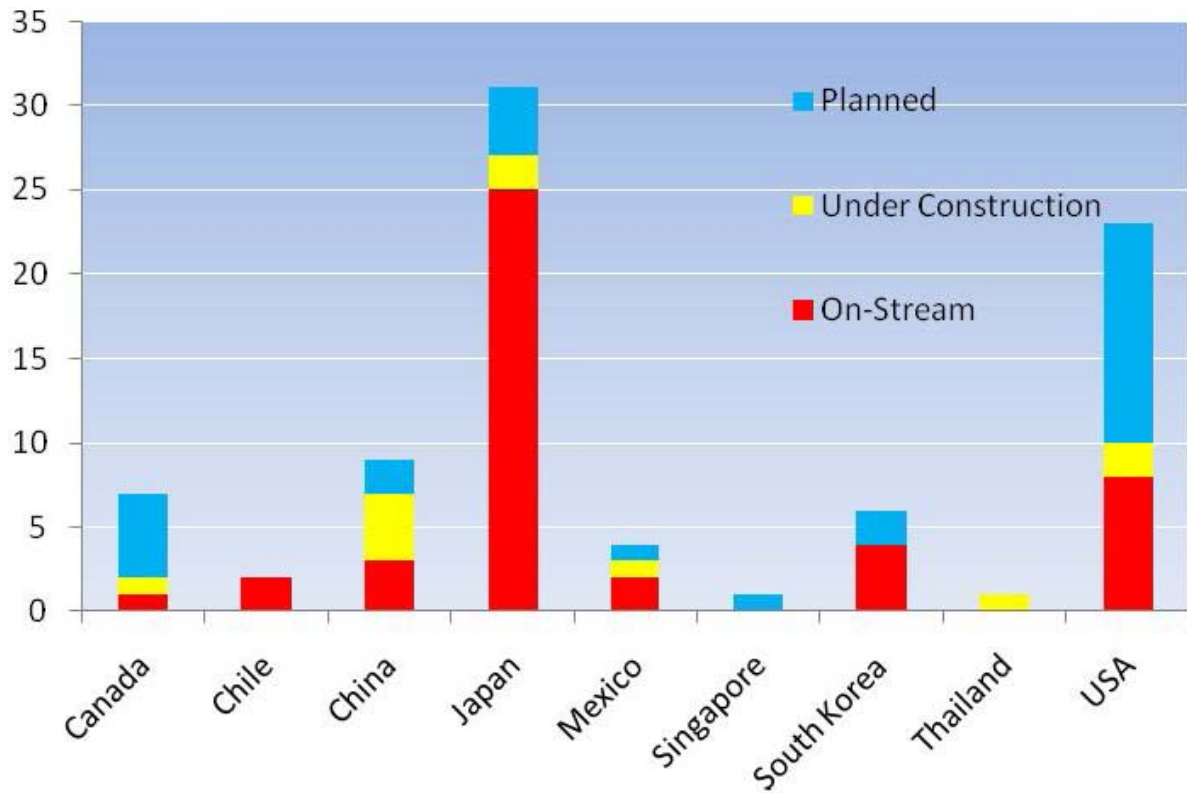


Figure 2.1b: LNG Receiving Terminals in APEC Economies, Mid 2010

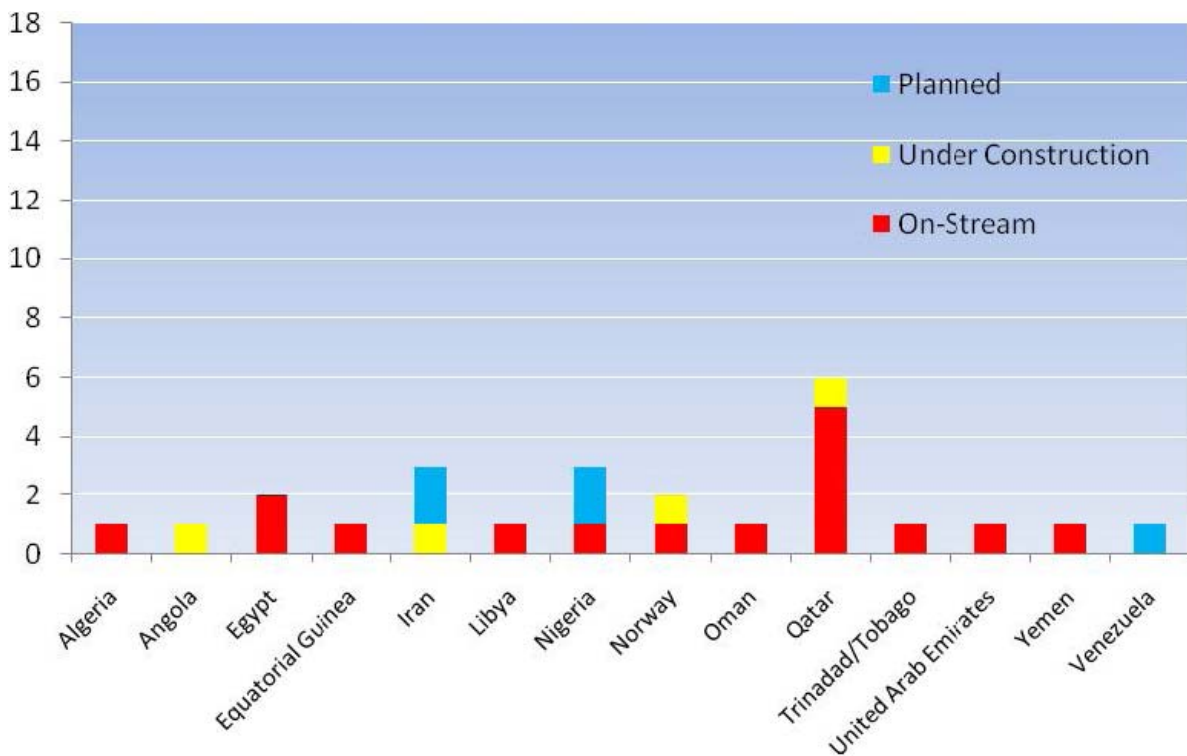


Figure 2.2a: LNG Production Plants in Non APEC Economies, Mid 2010

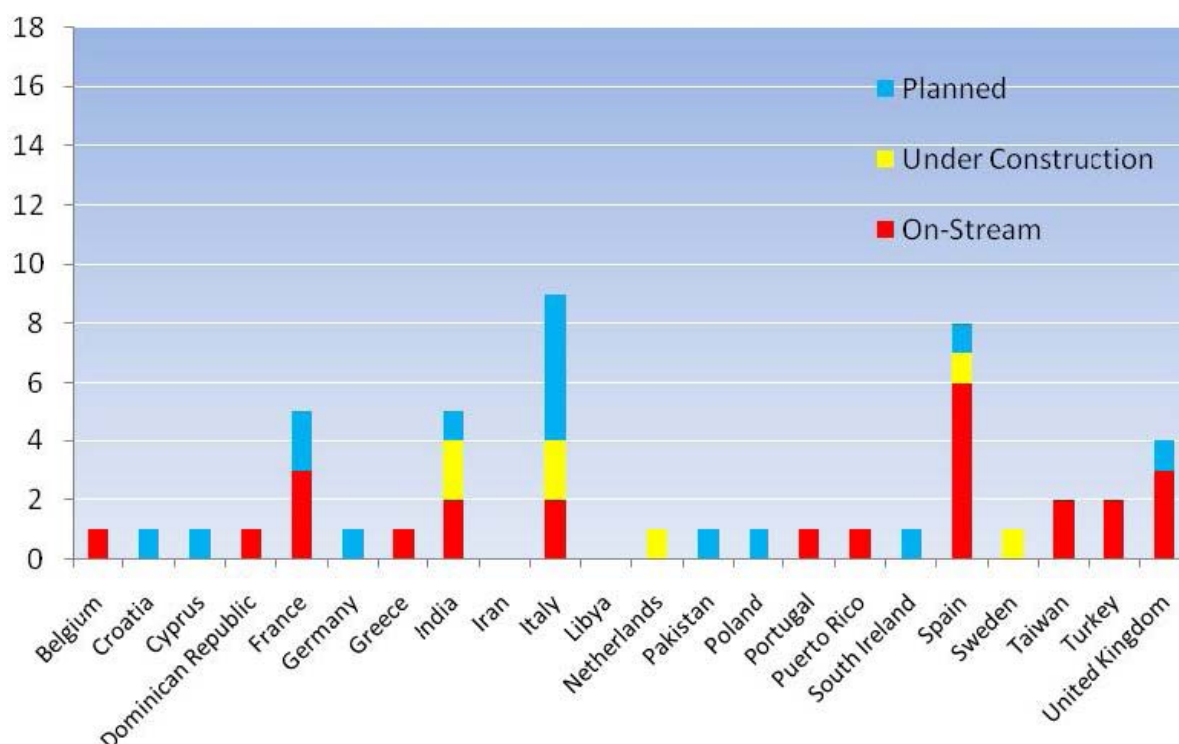


Figure 2.2b: LNG Receiving Terminals in Non APEC Economies, Mid 2010

2.2 LNG Industry Functions

The process of bringing natural gas to market as LNG can conveniently be separated into about eight more or less separate activities which are briefly outlined as follows:

1. Production of natural gas at the wellhead. This may also include some processing such as condensate separation.
2. Natural gas delivery to the LNG plant by pipeline, which may be subsea or over land – or a combination of both.
3. LNG production, which normally is located on shore, although there are several current plans for offshore processing referred to as floating LNG or FLNG.
4. LNG storage and tanker loading. Usually, LNG is stored onshore before being loaded out by pipeline to an LNG tanker moored at the end of a jetty that may be up to several kilometers in length.
5. LNG tanker transportation by sea to market. Transportation distances can be up to 15,000 kilometers (km) for delivery between APEC economies but are normally around 5,000.
6. LNG unloading and storage takes place at a receiving terminal where the LNG is pumped from the tanker into the receiving terminal's storage tanks.
7. Re-gasification (vaporisation) of the LNG by heating it. Several different vaporization technologies are currently in use – most of which do not involve any form of fuel combustion.
8. Natural gas distribution and reticulation.

Steps 1, 2 and 8 are routinely practised as part of the conventional production, transportation, handling and distribution of natural gas and are not specific to LNG activities.

2.3 Properties of LNG

LNG is simply natural gas that has been cooled to its liquid state. The composition of the LNG produced at various plants varies as a result of variations in the composition of the natural gas from which it is produced, the processes used in the course of liquefaction and the length of time it has been in storage.

Source	Methane %	Ethane %	Propane %	Butanes %	Nitrogen %
Liquefaction Plants					
Australia, Karrutha	85.80	7.42	3.43	0.85	2.5
Alaska, Kenai	99.72	0.06	<0.01	<0.01	0.20
Algeria, Skikda	86.98	9.35	2.33	0.63	0.71
Receiving Terminals					
Baltimore G & E	93.32	4.65	0.84	0.18	1.01
New York City	98.00	1.40	0.40	0.10	0.10
San Diego G & E	92.00	6.00	1.00	<0.01	1.00

Table 2.1: Some Examples of Variations in LNG Composition

As can be seen from Table 2.1, LNG consists primarily of methane (CH₄) with up to 12% of higher hydrocarbons, mostly C5 and below, and a few percent of nitrogen.

The physical properties of LNG vary somewhat with its composition, which depends, primarily, on the composition of the original natural gas from which it was derived. These variations are not generally large enough to influence the physical risk profile of LNG.

Typical characteristics of LNG are:

- it is considered to be flammable since the gas released on contact with the atmosphere is flammable in air in the approximate range of 5% (lower flammability limit) to 15% (upper flammability limit) at ambient temperatures,
- it is colourless, odourless, and non-toxic,
- the vapour typically appears as a visible white cloud, because its low temperature condenses water vapour present in the atmosphere,
- the volume occupied by LNG is about 600 times smaller than the same mass in the gaseous phase,
- the boiling point of LNG at atmospheric pressure (1.013 bar or 14.7 psia) is around -162°C (-259.6°F) (as for any liquefied mixture, its boiling point is dependent upon the composition and pressure).
- LNG is most commonly stored and transported at a pressure very slightly above the ambient pressure, but in some instances it is stored and transported at higher pressures, generally not exceeding 7 bar.

2.4 Hazards of LNG

As with any technology, there are a number of potential hazards associated with the production, handling, transportation, and re-gasification of LNG and all of the activities listed in Section 2.2 do have associated hazards that give rise, to a greater or lesser extent, to public concern.

Paramount among these is the physical release of the energy contained in LNG through its vapourisation and subsequent ignition when mixed with oxygen in the atmosphere.

The consequences of an LNG spill or the release of cold gas vaporised from LNG can be categorised into three main types:

- Fire and explosion
- Low temperature consequences
- Asphyxiation

2.4.1 Combustion and Thermal Damage

The most likely hazard resulting from intentional or accidental spillage of large quantities of LNG are injuries and damage to property caused by thermal radiation from vapor cloud fires (flash fires) and pool fires.

In order to be ignited, LNG must first be vaporised (heated and returned to a gaseous state), be mixed with between 5% to 15% of air and come into contact with an adequate source of energy to ignite it.

When LNG is released the heat from the ground or the water onto which it spills initially causes very rapid boiling of the LNG. As the surface cools the rate of boiling reduces. The vapour formation rate is a function of the release rate and the condition of the surface onto which it spills.

The cold vapour produced condenses the water in the surrounding air forming a white vapour cloud. If unhindered, the cloud will drift in the direction of the wind, further mixing with the air and picking up heat from both the ground and the air as it moves. As the vapour cloud warms up, it will become buoyant (lighter than air) and will rise and disperse. Any terrain, obstructions such as trees and buildings will enhance the mixing rate of the vapour and air resulting in more rapid dispersion.

At high wind velocities, the heat from the air, as well as the turbulent mixing of the gas due to the wind, will rapidly disperse the vapour making its lateral travel relatively short. At low wind speeds there is minimal mixing of the vapour and air causing the vapour cloud to travel in a horizontal direction. However, the velocity of the gas cloud is low so the cloud will not travel very fast giving time for people in its path to escape.

Thus, the ambient conditions and the terrain can be as important to the consequences of a spill or release as is the energy available.

2.4.2 Fireballs

For low reactivity fuels such as natural gas, ignition of a vapor cloud will cause the vapor to burn back to the source of the LNG spill. This is generally referred to as a 'fireball', which, by its nature, generates relatively low pressures so will have only a low potential for pressure damage to structures.

2.4.3 Explosions

If the vapor cloud is confined or contains large amounts of heavier hydrocarbons (C2+), then the flame can accelerate and result in an explosion. The magnitude of the explosion and explosion damage will depend on several factors including the quantity of vapor above the lower flammable limit, the presence of obstacles and the degree of confinement, the composition of the vapor cloud, and the strength of the ignition source.

A confined space can be created inside a building, a structure or a vessel e.g. in a tunnel or between the breached inner and outer hulls of an LNG carrier, but an explosion can result in an open air scenario if the conditions are such that sufficient flame acceleration occurs, for example turbulence caused by the configuration of open air structures such as vessels or plant skids.

2.4.4 Rapid Phase Transitions

Rapid Phase Transitions (RFTs) occur when a cryogenic liquid like LNG is suddenly heated by contacting a warm liquid such as water. Explosive boiling of the LNG can occur, resulting in localised overpressure releases. Energy releases equivalent to several kilograms of high explosive have been observed. However, the impacts of this phenomenon will be localised near the spill source and should not cause extensive structural damage (Benedick et al. 1987).

2.4.5 Cryogenic Burn and Damage

In the event of a large volume spill of LNG injury to personnel and damage to equipment can occur as the result of the very low temperature of the LNG.

If LNG contacts the skin, it can cause serious cryogenic burns if it is unable to be vaporised very quickly, for example if it gets inside gloves or boots. Contact of the skin with an un-insulated surface of a pipe or vessel containing LNG can cause the skin to freeze to the surface and result in extremely serious injury.

Many metals cannot withstand low temperatures and will crack if exposed to LNG with serious potential impacts on structures and vessel such as supports, beams, outer jackets of LNG containers, including the outer hulls of LNG carriers etc.

2.4.6 Asphyxiation

Methane has low toxicity to humans but is an asphyxiant and will displace oxygen in the air creating an atmosphere that cannot support life. An LNG spill in a confined space or a large-scale unconfined LNG release can lead to the death of persons in the vicinity through asphyxiation. However, the risk of an ignition is significantly higher and concentrations of methane seldom reach levels at which asphyxiation can occur because the atmosphere has already ignited.

2.5 LNG release

The accidental release of LNG onto land or water due to an industrial or maritime accident has, for many years, been recognised as a realistic possibility. The terrorist attacks in the USA on September 11, 2001, however, have raised critical new security risks and exposure for consideration, not just for the LNG industry but for all major industrial activities and infrastructure facilities in the U.S. and worldwide. Because of their very nature, those involving large amounts of energy, such as the LNG industry, are seen by some as prime targets for terrorist attack or sabotage.

The accidental releases that are most commonly considered include:

- damage to LNG plant or storage tanks due to an industrial accident,
- earthquake, cyclone or tsunami-induced failure of LNG storage tanks, or plant damage,
- release of LNG from a ship's cargo tank as a result of collision with another ship,
- release of LNG from a ship's cargo tank as a result of collision with a jetty or breakwater.

A number of rather colorful scenarios have also been proposed for the **intentional** release of LNG. These include:

- crash of a commercial jet into LNG storage tanks,
- detonation of a truck or car bomb at the base of an LNG storage tank,
- firing a rocket-propelled grenade into an LNG storage tank,
- detonation of a satchel charge close to process equipment,
- crash of a commercial jet into an LNG tanker while at an LNG terminal,
- detonation of a boat bomb near an LNG tanker while at an LNG Terminal,
- firing a rocket-propelled grenade into an LNG tanker ship while at an LNG terminal,
- collision of a terrorist controlled ship with an LNG tanker.

All of these occurrences have been studied, and modeled, in detail and the key overall conclusions, (http://www.iomosaic.com/docs/whitepapers/Managing_LNG_Risks.pdf) are that:

1. As long as an LNG vapor cloud is unconfined, it will not explode.
2. In the highly unlikely event of a very large scale release of LNG on land or water, significant impact will be felt only in the vicinity of the release. The zone of impact will be moderate but will not extend anywhere close to the 30 miles predicted by some activist groups.
3. If the cloud encounters populated areas it will quickly find an ignition source and will burn back to the spill site rather than extending over a larger area.
4. LNG facilities and tankers are not good terrorist targets if the aim is to produce mass casualties.

2.6 The LNG Industry Safety Record

Overall, the LNG industry has an excellent safety record compared to other petrochemical industry operations, such as refineries and crude oil transportation. According to the U.S. Department of Energy, over the life of the industry, eight marine incidents worldwide have resulted in spillage of LNG, with some hulls damaged due to cold fracture, but with no occurrence of cargo fires. Seven incidents not involving spillage were recorded, two from groundings, but with no significant cargo loss because repairs were made quickly and leaks were avoided. There have been no LNG shipboard fatalities. Accidents involving fatalities have, however, occurred at several onshore facilities in the early years of the industry. Those of most concern are briefly reviewed below and summarised in Appendix 2.6.

Cleveland, Ohio, 1944

In 1939 the first commercial LNG peak shaving plant was built in West Virginia and in 1941 the East Ohio Gas Company built a second facility in Cleveland. The peak shaving plant

operated without incident until 1944, when it was expanded to include a larger LNG storage tank. A shortage of nine percent nickel stainless steel alloy during World War II led to compromises in the design of the new tank which failed shortly after it was placed in service allowing LNG to escape and form a vapor cloud that filled the surrounding streets and storm sewer system. The natural gas in the vaporizing LNG pool ignited resulting in the deaths of 128 people in the adjoining residential area. The conclusion of the investigating body, the U.S. Bureau of Mines, was that the concept of liquefying and storing LNG was valid if proper precautions were observed and a recent report has concluded that, had the Cleveland tank been built to current codes, this accident would not have happened. In fact, LNG tanks properly constructed of appropriate materials have never had a crack failure in the 35-year history since the Cleveland incident.

Staten Island, New York, 1973

In February 1972, the operators of the Texas Eastern Transmission Company peak shaving plant on Staten Island, suspecting a possible leak in the LNG storage tank, took the facility out of service. Once the LNG tank was emptied, tears were found in its Mylar lining. During the repairs, vapors associated with the tank cleaning process apparently ignited the Mylar liner. The resultant fire caused the temperature in the tank to rise, generating enough pressure to dislodge a 6-inch thick concrete roof, which then fell on the workers in the tank killing 40 people.

The Fire Department of the City of New York report of July 1973 determined that the accident was a construction accident and not an LNG accident and in 1998, the New York Planning Board, while re-evaluating a moratorium on LNG facilities, concluded that the government regulations and industry operating practices now in place would prevent a replication of this accident. The fire involved combustible construction materials and a tank design that are now prohibited. Although the exact causes may never be known, it is certain that LNG was not involved in the accident and the surrounding areas outside the facility were not exposed to risk.

Cove Point, Maryland, 1979

In October 1979, an explosion occurred within an electrical substation at the Cove Point receiving terminal. LNG leaked through an inadequately tightened LNG pump electrical penetration seal, vaporised, passed through 200 feet of underground electrical conduit, and entered the substation. The natural gas-air mixture was ignited by the normal arcing contacts of a circuit breaker resulting in an explosion. The explosion killed one operator in the building, seriously injured a second and caused about \$3 million in damages.

This was an isolated accident caused by a very specific set of circumstances. The US National Transportation Safety Board found that the Cove Point Terminal was designed and constructed in conformance with all appropriate regulations and codes, however, as a result of this accident, three major design code changes were made at the Cove Point facility prior to reopening. Those changes are now applicable industry-wide.

Bontang, Indonesia, 1983

April 1983, a rupture occurred in LNG Train B as a result of over-pressurization of the heat exchanger caused by a closed valve on a blowdown line to which all the pressure-protection systems were connected. The exchanger was designed to operate at 25.5 psig. When the gas pressure reached 500 psig, the exchanger failed and the explosion occurred. Debris was projected some 50 m and killed three workers. The ensuing fire was extinguished in about 30 minutes. This incident occurred during dry-out and purging of an exchanger with warm natural gas prior to introducing LNG into the system. No LNG was involved or released.

Skikda, Algeria, 2004

In January, 2004, a steam boiler that was part of an LNG production plant Skikda, Algeria, exploded, triggering a second, more massive hydrocarbon gas explosion and fire. The explosions and fire destroyed a portion of the LNG plant and caused 27 deaths, 74 injuries, and material damage outside the plant's boundaries. The initial explosion occurred where propane and ethane refrigeration storage was located when the hydrocarbon refrigerant vapor leaked into a steam boiler inlet. The boiler then overheated and ruptured close enough to the gas leak to ignite the vapor cloud in a confined space and hence cause an explosion. A U.S. government report found that the presence of local ignition sources, a lack of automatic equipment shutdown devices, and a lack of hazard detection devices contributed to the incident.

The experience of the LNG industry demonstrates that normal operating hazards are manageable. No death or serious accident involving an LNG facility has occurred in APEC economies since the Bontang accident, in 1983 and the great majority of accidents that have occurred have not involved LNG directly. It can be legitimately claimed, therefore, that the worldwide LNG industry has compiled an enviable safety record based on diligent safety analysis and the development of appropriate industrial safety regulations and standards. International standards and codes that regulate the LNG industry are still evolving but are determined by four elements that provide multiple layers of protection both for the safety of LNG industry workers and the safety of communities that surround LNG facilities. These are:

1. **Primary containment** is the first and most important requirement for containing the LNG product. This first layer of protection involves the use of appropriate materials for LNG facilities as well as proper engineering design of storage tanks onshore and on LNG ships and elsewhere.
2. **Secondary containment** ensures that if leaks or spills occur at the LNG facility, the LNG can be fully contained and isolated from the public.
3. **Safeguard systems** offer a third layer of protection. The goal is to minimise the frequency and size of LNG releases both onshore and offshore and prevent harm from potential associated hazards, such as fire. For this level of safety protection, LNG operations use technologies such as high level alarms and multiple back-up safety systems, which include Emergency Shutdown (ESD) systems. ESD systems can identify problems and shut off operations in the event certain specified fault conditions or equipment failures occur, and which are designed to prevent or limit significantly the amount of LNG and LNG vapor that could be released. Fire and gas detection and fire fighting systems all combine to limit effects if there is a release. The LNG facility or ship operator then takes action by establishing necessary operating procedures, training, emergency response systems and regular maintenance to protect people, property and the environment from any release.
4. Finally, LNG facility designs are required by regulation to maintain **separation distances** to separate land-based facilities from communities and other public areas. Moving safety zones are also required around LNG ships to reduce the chance of collisions with other ships.

2.7 Environmental Risks

The production and handling of LNG requires the use of a variety of equipment and technology to be deployed in several different environments for example, natural gas and LNG pipelines, LNG production plants, LNG tankers and LNG storage facilities maybe located in such diverse areas as remote pristine regions, in-shore and open oceans, and

populated industrial areas and involve pipeline shore crossings, ocean dredging to establish breakwaters and jetties and local modification of flora and fauna habitat.

The resulting environmental impacts are briefly reviewed as follows.

2.7.1 Atmospheric Emissions

Atmospheric emissions associated with the LNG industry are of two types:

1. Emissions from combustion processes such as in-plant heat and power generation and from LNG tanker propulsion units,
2. Fugitive emissions that can occur in all parts of the LNG supply chain but are most likely to be associated with LNG production and re-gasification plant and natural gas handling facilities. The main atmospheric emissions are in the form of greenhouse gases (primarily CO₂) with much smaller amounts of statutory air pollutants such as SOX, NOX, particulate material and unburned hydrocarbons. Currently, international concern is focused on the reduction of greenhouse gas emissions and in this regard utilization of natural gas in the form of LNG is seen as a transition solution to reducing greenhouse gas emissions which are only about 0.6 and 0.8 times that of coal and crude oil, respectively.

2.7.2 Liquid Effluents

While every effort is made to treat and limit the discharge of liquid effluents derived from LNG processing, transportation, and storage operations there still exists the potential for contamination of groundwater, surface water and sea water. Indeed, it is common practice for treated effluents to be discharged into the sea, although this is usually done some distance off shore.

Probably the greatest concern is the potential impacts of treated effluent discharges into the marine environment on benthic flora and fauna with consequent impacts further upstream in the food chain. There have been however, several instances where there have been surface and ground water associated with LNG processing facilities has been a problem.

2.7.3 Solid Wastes

Solid wastes associated with LNG production transportation, handling and storage include land re-configuration wastes, dredging wastes and sanitary wastes derived from LNG plant and infrastructure operations (e.g. human wastes).

The first two of these are largely site specific rather than dependent on LNG plant configuration. Sanitary waste, however, is not specific to LNG operations but is common to industrial operations in general. Nevertheless, solid waste disposal is frequently regarded as a significantly negative environmental impact by LNG opponents.

2.7.4 Noise

Noise generated by LNG facilities is not normally regarded as a major impact since all plant must conform to strict noise control regulations and plant installations are surrounded by a significant buffer zone thereby providing a significant degree of isolation.

2.7.5 Visual Effects

The visual or aesthetic effects of LNG facilities are very much a subjective matter that will be considered quite differently by different individuals. They are, however frequently cited as being undesirable by opponents of LNG.

2.7.6 Ship Movements

By its very nature there are a number of ship movements associated with the processing and transportation of LNG. The ships involved include LNG tankers, condensate and other natural gas liquid (NGL) tankers and a variety of, largely in-shore, marine service craft. While in, or close to harbor the main environmental concern involves the discharge of toxic materials such as ship board effluents and ballast water – both of which are governed by regulations in most APEC economies.

Off-shore, however, environmental impacts from ship movements relate primarily to disturbance of migration and birthing areas of cetaceans, marine reptiles and even pelagic fish. These can, potentially, be quite severe because of the migratory nature of many marine species so that LNG sea going operations could, in principle, result in a decrease in populations over quite large areas.

2.8 Summary

The points made in this chapter can be summarised as follows:

1. The LNG industry, both within APEC and worldwide, is growing rapidly as the use of natural gas in general, and LNG in particular, are recognised as an immediate way in which the rate of greenhouse gas emissions can be reduced as a step towards renewable energy.
2. Because of its very nature the LNG industry offers a wide variety of potential hazards since it includes LNG production, the deployment of natural gas and LNG pipelines, sea going transportation of LNG, on-shore (and some off-shore) storage of LNG and its regasification and distribution as natural gas. Each of these operations has its own associated risks.
3. The greatest potential LNG industry hazard would involve the release of LNG followed by its vaporization and contact with a source of ignition. Such releases could be accidental or intentional, as the result of terrorist activity or sabotage. In either event the greatest risk would be associated with a resulting fire, however extensive scenario modeling studies have shown that:
 - as long as an LNG vapor cloud is unconfined, it will not explode,
 - in the highly unlikely event of a very large scale release of LNG on land or water, significant impact will be felt only in the locality of the release. The zone of impact will be moderate but will not extend anywhere close to the 19 km (30 miles) predicted by some activist groups,
 - the cloud is very likely to encounter an ignition source and, on ignition, will burn back to the spill site rather than extending over a larger area,
 - LNG facilities and tankers are not good terrorist targets if the aim is to produce mass casualties.
4. Although a fully loaded LNG tanker may contain as much energy as a small to medium sized nuclear device the probability of all of this energy being released in a single explosion is infinitesimal because oxygen cannot diffuse fast enough to the point of combustion to support an explosion.
5. By comparison with effectively all other industrial operations involving the production, processing, transportation and end use of large amounts of energy, the LNG industry has an excellent safety record. Although accidents do from time to time occur, very few of these actually involve an LNG release and have rarely resulted in loss of life.

6. As the LNG industry has matured there have been significant advances in the primary and secondary containment of LNG, in the safeguard systems that backup containment and in the separation distances required for both static and moving LNG facilities. These safety systems are strictly regulated and are contributing to an improving safety record for the LNG industry.
7. There are a variety of potential environmental risks associated with LNG operations. Those of most concern are usually due to liquid effluent discharge, solid waste disposal and ship movement and their impacts upon a variety of local flora and fauna.
8. There is no doubt that LNG industry operations do have associated risks but there is also a lot of strong evidence that these risks are being managed with increasing success and efficiency as the LNG industry matures. It is this basic concept that needs to be understood by the public in general and by specific LNG industry stakeholders in particular and should underpin all future LNG public education initiatives.

3.0 PUBLIC PERCEPTIONS

Today, we live in a world where advances in technology are increasing exponentially with time and the industrial applications of some of these technologies are so complex that only those intimately involved with their operation really have a good understanding of what is actually happening and the sort of risks that might be involved. It is quite understandable, therefore, that the general public has little or no understanding of the LNG industry and its operations.

Certain industries have, however, been identified by the general public as being hazardous – generally due to large scale, well publicised accidents. These would include nuclear power generation, refinery operations, LNG production, transportation and end use, ocean transportation of crude oil by super tanker and, most recently, deep sea oil well drilling.

As indicated in the previous chapter, there are several different potential hazards associated with LNG industry operations depending, primarily, on which part of the supply chain is involved. Public perceptions of these differ considerably and depend on the particular interests involved and amongst the different APEC economies. Thus perceptions relating to the risks associated with LNG production plants, transportation and receiving terminals are quite different because of their different locations, the different concerns involved and the different people expressing those concerns. The wide range of ethnic sociologies encountered in APEC economies means that approaches to LNG public education will differ greatly amongst economies.

In short, there is no one model that fits all LNG projects and APEC economies. This has been recognised in the selection and evaluation of the individual case studies presented in the following chapter.

3.1 The Stakeholders

Most people outside the gas industry know practically nothing about LNG or the LNG industry and have no interest in finding out. The prevailing attitude is that “someone else can worry about it” and that there are more qualified and informed people to do so. A very small percentage of people are, however, either directly or indirectly, impacted by an LNG project, or are promoting a cause that they believe will be impacted by it. These people are the project stakeholders and they come in a variety of configurations and have a variety of interests and viewpoints.

The spectrum of typical stakeholders includes the following:

- Those who are strongly in favor of an LNG project, usually for financial or energy security reasons. These frequently include:
 - central governments,
 - local and regional councils,
 - economic development agencies,
 - the local business community and chamber of commerce,
 - LNG project contractors,
 - the LNG workforce.
- Those who want to ensure that their interests are taken fully into account at all stages of the LNG project. These would include:
 - traditional owners,

- native title holders,
 - landowners,
 - those wishing to preserve site heritage values.
- Those who are reasonably ambivalent about LNG development but need to be in the information loop and fully informed. These would include:
 - central and local government agencies,
 - regulatory agencies,
 - social service providers such as health professionals and agencies,
 - some local community groups.
 - Those who are concerned about LNG and want to be fully informed. These would include:
 - local community groups,
 - universities and museums,
 - indigenous title holders.
 - Those who are opposed to an LNG project but who are prepared to listen and to weigh up its pros and cons. These would include:
 - some local community groups,
 - universities and museums,
 - environmental groups,
 - recreational fishing groups,
 - tourism operators,
 - commercial fishermen,
 - those charged with the protection of heritage values.
 - Those who are opposed to LNG development as a matter of principle and who are likely to be activists: These may include:
 - NGOs which claim that LNG is dangerous and should not be used under any circumstances, e.g. (<http://www.timrileylaw.com>),
 - highly focused environmental groups who wish to preserve, rather than conserve, the local environment in question,
 - tourism, particularly eco-tourism, operators who will oppose any activity that detracts from the pristine environment that they wish to show,
 - commercial fishermen who believe their livelihood will be negatively impacted,
 - indigenous people and landowners.

Obviously, the category into which a particular stakeholder falls will be influenced significantly by the nature of the LNG project and the extent of engagement of their interest.

For the purposes of Public Education, which includes both public consultation and information transfer, the stakeholders in an LNG project are divided between the proponents or promoters and include governments, industry, independent agencies and experts in the field. These are the stakeholders that are sources of Public Education.

The recipients of Public Education include interest groups, local and regional governments, universities, NGOs and international agencies. These include the main agencies, groups and

individuals who make up the “public” whom LNG Public Education Campaigns are designed to engage.

3.2 Stakeholder Concerns

The various physical hazards and environmental risks associated with an LNG project have been discussed in the previous chapter. In addition however, there are a number of social, socio-economic and aesthetic impacts that are of considerable concern to many stakeholders. These are briefly reviewed in the following sections.

3.2.1 Physical hazards

Probably the greatest concern held by many stakeholders relates to the safety of LNG industry operations. Thus, there is a widely held belief that an LNG tanker can explode in the form of a BLEVE (Boiling Liquid Expanding Vapor Explosion) with a force equivalent to a small to medium sized nuclear device and that large urban areas can be engulfed in flames following ignition of LNG from a ruptured storage tank or pipeline at an LNG receiving terminal located in an industrial or port area.

Whilst the severity of such incidents can be greatly over-rated, there is no doubt that potential hazards do exist and can be manifest in the forms of:

- combustion and thermal damage,
- fireballs,
- LNG/Air Explosions,
- rapid phase transitions,
- cryogenic burns and structural damage,
- asphyxiation.

These have been described in Section 2.4 and could result from a release (either accidental or intentional) of LNG from an LNG storage or transport vessel or a pipeline.

3.2.2 Environmental hazards

Stakeholder concerns about the potential environmental impacts associated with an LNG project relate specifically to:

- atmospheric emissions,
- liquid effluents,
- solid wastes,
- ship movements.

Over-arching all of these, however, are the concepts of environmental preservation which champion the idea that no changes should be made – irrespective of whether they be for better or worse. This viewpoint frequently leads to its adherents becoming activists for their cause.

3.2.3 Social and Socio-economic impacts

Stakeholder concerns about the likely social and socio-economic impacts associated with an LNG project are both positive and negative and relate to:

- local and regional development,
- increased economic wealth,

- job creation – both primary and secondary,
- the influx of “foreign” workers,
- rapid cultural change,
- market re-configuration (e.g. small local enterprises being overwhelmed by large chains such as supermarkets),
- an increase in crime.

While these impacts are certainly real, it is worthwhile to note that they are in no way unique to an LNG project but apply to any large Greenfield or Brownfield industrial project.

3.2.4 Aesthetic considerations

Stakeholder concerns about potential aesthetic impacts associated with an LNG project relate, primarily, to:

- noise, which is usually strictly regulated,
- visual effects, which include the actual visual outlines of the LNG facilities and visible emissions there from, normally steam plumes.

Aesthetic impacts are, of course, subjective and will be regarded quite differently by different individuals and in different situations. Thus, concerns about noise will be much less when an LNG facility is located in a remote area with few people or animals living in the vicinity. On the other hand, visual effects are often considered to be more intrusive in remote areas – particularly if an LNG facility is located in a near pristine environment as is the case for some LNG production plants.

3.3 Past Experience

Because LNG is poorly understood by the general public, the industry has faced the constant risk that public perception will be based on fears and falsehoods. This environment allows opposition groups to present catastrophic scenarios as if they have equivalent credibility to professional studies. The consequence-based permitting process employed in many APEC economies, and the United States in particular, unfortunately lends credence to these fears, because it focuses on the worst case rather than providing the public with the full range of scenarios. Since it is virtually impossible to succeed in project development in the face of strong, broad-based opposition, it is imperative that LNG companies engage public stakeholders early, often, openly, and honestly.

Concern about the safety and security of LNG facilities is undoubtedly greatest in the USA where the need for additional natural gas supplies, including the reopening of existing LNG facilities at Cove Point, Maryland and Elba Island, Georgia, has focused public attention. These same or similar concerns, however, apply to natural gas storage and pipeline transportation and distribution and our daily use of natural gas.

More recently, public perception in the United States, coupled with strong “NIMBY” (Not In My Back Yard) tendencies, has resulted in effective opposition to proposed terminals such as SES Long Beach and BHP Cabrillo Port, where protest groups have leveraged the media and recruited film and TV celebrities to publicise their safety and environmental concerns.

Because the public often fails to distinguish between the characteristics of different projects, efforts by developers to pursue proposals in densely populated areas, such as Weaver’s Cove in Massachusetts, can taint LNG projects elsewhere in less contentious locations.

Developers must, therefore, not only educate the public about LNG, but also distinguish their project from unrelated “bad memories” that the local populace might confuse with LNG, such as in Coos Bay, Oregon, where a fuel oil tanker that ran aground in 1999 has been equated to LNG tankers in public discussions.

Experience in the United States has shown that active and continuous engagement of the public and recognition of the local community as the most critical stakeholder represents perhaps the best risk management strategy. For the planning phase, the Federal Energy Regulatory Commission (FERC) has developed tools for planners to manage this risk constructively and has increased the transparency of FERC’s review process. In this regard FERC’s “town hall” meetings provide a forum for a two-way conversation whereby the community can voice its concerns to developers and developers can educate and inform the community about how its LNG project will address those concerns.

This stands in contrast to a July 2006 protest in Trieste, Italy, where complaints were voiced that the government and businesses were ignoring the public’s concerns and were working in collusion. Similarly in Britain, failure to effectively address opposition to the Milford Haven LNG terminal in Wales appears to have emboldened the terminal’s opponents to attack other, previously uncontroversial projects.

One of the lessons learned from past experience of addressing public perceptions is that public relations must be cultivated, and public education continued, over the long term. Thus, the Distrigas LNG receiving facility in Everett, Massachusetts has become a part of its community over the last 35 years, even though the terminal’s location requires vessels to traverse the rivers of densely populated Boston. Distrigas supports community events and engages in educational efforts, paying special attention to the Everett Fire Department, in which local citizens place confidence for their safety in event of an LNG accident. The same strategy applies for the Zebrugge terminal in Belgium, which holds regular meetings with its neighbors to inform them of plans invite them to visit, and in a recent development, attempt to reduce the terminal’s visual impact.

In summary, any terminal or vessel that is close to population centres or sensitive infrastructure like nuclear power plants will always face a public perception problem. It is, therefore, imperative for an LNG developer to engage stakeholders early in the process and to provide all the necessary information via effective use of public and media education. Public perception management is time-consuming and often frustrating, but it is essential for LNG projects to proceed successfully.

3.4 Summary

The points made in this chapter can be summarised as follows:

1. There is often substantial public opposition to new LNG projects due, largely, to lack of public understanding, together with some misconception based on misconception.
2. Public concerns about LNG projects relate to:
 - the potential physical hazards that maybe involved,
 - the environmental risks,
 - likely adverse social and socioeconomic impacts,
 - Unwanted aesthetic impacts.
3. Neither the benefits nor risks associated with an LNG project are well understood by the public.

4. Much of the information provided is adversarial. It includes some scare mongering by LNG project opponents, but there is also some exaggeration of safety records by the LNG industry.
5. Changing public perception requires:
 - Clear identification of the benefits and risks associated with LNG projects,
 - Continual improvement of LNG industry safety and environmental protection procedures to minimise the risks,
 - Public education at all levels and in all media.
6. The sources of public education (the proponents and promoters) are national governments, the LNG industry, independent agencies and experts in the field.
7. The targets of public education (the public) are interest groups, local and regional governments, universities, NGOs and international agencies.
8. Past experience of engagement between LNG companies and public stakeholders has shown that public relations must be cultivated over the long term and should be conducted early, often, openly and honestly.

4.0 CASE STUDIES

4.1 Browse LNG Production, Australia

This case study has been chosen because, while still in the development stage, the Browse LNG project has involved some of the most recent initiatives and protocols in public education. In particular, it illustrates the campaigns that have been mounted independently, but in parallel, by both Governments (Commonwealth and State) and private sector LNG proponents. It also illustrates the complexities of dealing with the rights of indigenous people on whose traditional lands the LNG processing and shipping facilities are to be located.

Australia is rapidly becoming one of the world's largest LNG exporting economies and there are currently twelve LNG production projects at various stages of development. In the Browse Basin, located off the Kimberley coast of Western Australia, there are proven gas reserves of some 0.98 trillion cubic metres (Tcm) (34.6 trillion cubic feet (Tcf)) with 600 million barrels of condensate, making it comparable to the reserves associated with the North West Shelf Venture. The Browse Basin also has probable gas reserves estimated at 1.7 Tcm (60 Tcf).

There are, at present, three projects for the production of LNG fed by gas derived from the several different fields within the Browse basin. These are Browse LNG, Ichthys LNG and Prelude floating FLNG. It is likely that additional projects will be proposed and implemented.

4.1.1 The Browse LNG Project

The Browse LNG Development is a joint venture in which Woodside owns 50%, BP and Chevron each have 16.67%, and Shell and BHP Billiton each have 8.33%. Woodside, as the largest shareholder, is the operator of the permits and is responsible for planning and day-to-day operations in connection with the Browse LNG Development. This includes all proponent initiated public information campaigns.

The drivers for the project are primarily economic as it will deliver large economic benefits not only for the JV partners but also for the Government and people of Western Australia as Woodside expects demand for liquefied natural gas to double by 2020 and to ramp up to about 380 million tonnes per annum - an increase of about 200 million tonnes on current levels.

There are also strong social drivers as the project will provide thousands of jobs for West Australians, thousands of contracts for small to medium-sized businesses and both social and economic benefits for Aboriginal people estimated to be worth \$1.5 billion over 30 years. This income will be put into the areas of health, education and training in the area.

Natural gas will come from the Torosa, Brecknock, and Calliance gas fields, which are located in the Browse basin, around 425 km north of Broome (Figure 4.1). These fields contain a combined contingent resource of about 0.4 Tcm (14 Tcf) of dry gas and 370 million barrels of condensate. The natural gas will be transported onshore by pipeline and converted into LNG for export to international markets.

In 2007 the Western Australian Government set up a taskforce to coordinate the development of gas resources in the Kimberley region by identifying a single precinct site for the co-location of LNG projects. The aim of this process was to ensure that development of Browse Basin gas resources are balanced against the unique environmental and heritage values of the Kimberley.

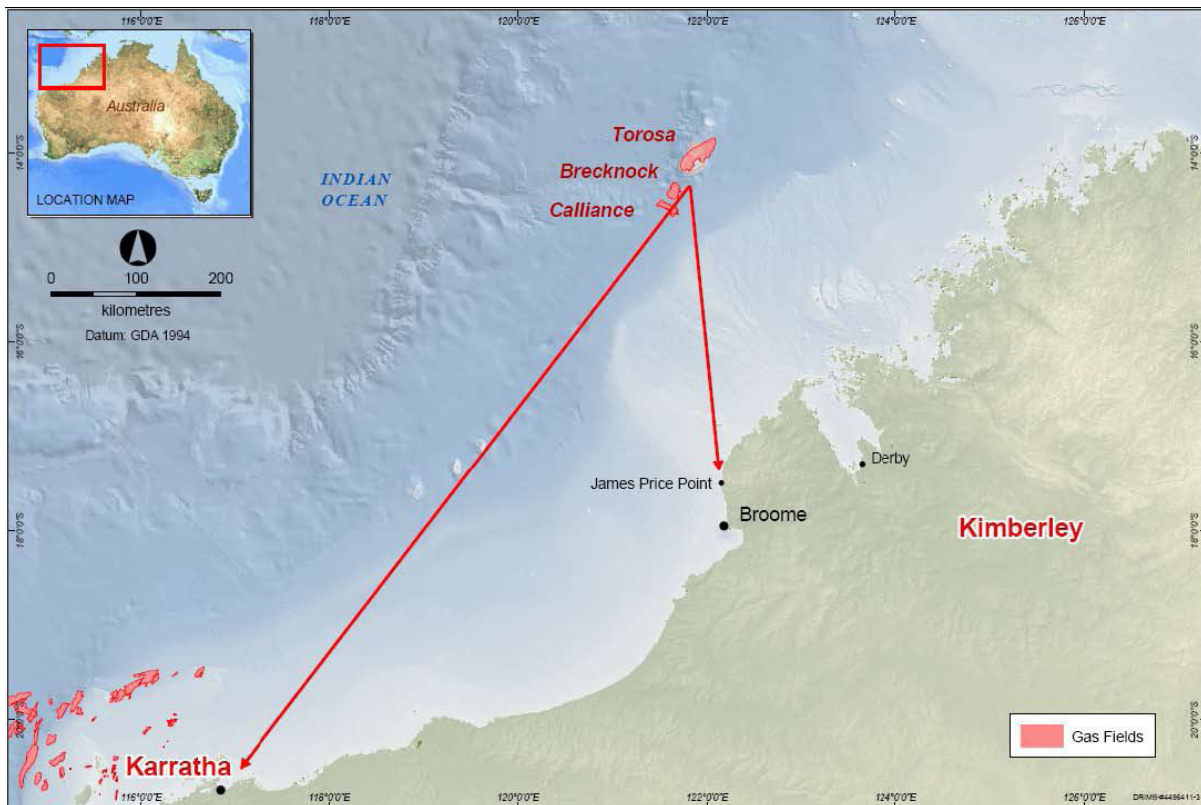


Figure 4.1.1: Location of the Browse LNG Gas Fields and Proposed Plant Sites

The single precinct site concept is intended to avoid ad hoc development by serving multiple operators and providing access to shared facilities thereby minimizing the environmental impact associated with LNG plant development.

After completing an extensive evaluation of 43 Kimberley coast sites over a period of more than 15 months, James Price Point was selected by the Western Australian Government as the preferred location for the proposed Kimberley LNG Precinct. The Minister for State Development is the proponent for the Kimberley LNG Precinct and is responsible for securing land access and the planning and execution of social, environmental and heritage studies to support the precinct development. Woodside, as the Operator of the Browse Joint Venture, has provided support for this site selection and approval process.

The JV proposes to build a plant onshore at James Price Point about 60 km north of Broome on the Kimberley coast, although this location is not yet cast in stone and could change to Woodside's already established LNG processing precinct at Karratha (Figure 4.1). Alternative locations in the Kimberley, such as Point Torment at the head of King Sound near Derby are also under discussion.

As currently configured, the Browse LNG project involves wellhead processing of raw natural gas to extract condensate which will be shipped directly to markets or to an on-shore refinery. The natural gas will then be brought ashore where it will be conditioned and liquefied to LNG and stored in shore based LNG tanks prior to loading out to LNG tankers, moored offshore on a jetty for, export to overseas markets.

The Master Plan for the proposed LNG precinct allows for a total of up to 50 million tonnes per annum of LNG capacity and provides for multiple proponents to build and operate LNG facilities in areas of both exclusive and non-exclusive access.

The **exclusion zone** is proposed to contain:

- a fenced industrial precinct consisting of:
 - two industrial blocks with each block exclusively accommodating stand-alone facilities for the relevant proponent allocated to the block (total of approximately 1,000ha),
 - a common user area (service corridors, lay down areas and internal buffer areas totalling approximately 500 - 1,000 ha).
- fenced land and waters of the port (the exact area is still to be determined but is likely to be approximately 1,000ha).

The **non-exclusion zone**, which will not be fenced, is proposed to contain:

- workers accommodation (up to 200ha),
- light industrial area (up to 200ha),
- access roads,
- a buffer zone around the exclusion zone (approximately 3,000ha).

The **port area** is to be approximately 1,000 hectares which allows for:

- A single breakwater,
- A single shipping channel and ship turning basin,
- Common (shared) integrated marine facility for materials off-loading and other marine support activities.

4.1.2 The Regulatory Framework

Both State and commonwealth legislation requires assessment and Ministerial approval prior to the implementation of proposals that have the potential for significant impacts on the environment, as defined in the Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* (s146(1)) and the Western Australian *Environmental Protection Act 1986* (Part IV). The regulations implementing these acts require submission by the proponent of an Environmental Impact Assessment (EIA) and Ministerial approval prior to project implementation. The EIA, and its supporting documentation, is made available for public comment and submissions as a mandatory part of the approval process.

In addition to the normal statutory process the Commonwealth and Western Australian State governments have signed a Strategic Assessment Agreement (SAA) to produce an overall Strategic Assessment of the likely impacts of the Browse LNG project on the remote Kimberley area where the LNG plant will be located. This is because the State of Western Australia intends to establish an LNG precinct, or hub, on State owned land at James Price Point in the West Kimberley and make this available to one or more LNG developers. Consequently, the State effectively becomes one of the project proponents and must conduct its own impact assessments. The Strategic Assessment of the LNG Precinct requires this assessment to be undertaken under Part IV of the EP Act and s146(1) of the EPBC Act.

The SAA specifies coverage of all environmental, technical, heritage, Indigenous, and social aspects of the Browse LNG development and includes a Social Impact Assessment (SIA) together with assessment of the impacts on several other activities such as tourism, pearl

farming and commercial fishing. These studies have been undertaken by the Western Australian Department of State Development (DSD) (<http://www.dsd.gov.au/7901.aspx>), Woodside Energy Ltd., as the project proponent, and independent expert consultants. The studies are available for public information, together with a comprehensive summary of their content.

Following the formal environmental assessment process, the Browse Upstream Development is subject to Ministerial Conditions and may also be required to seek other relevant approvals prior to commencement of construction and operation. As a minimum, the following secondary environmental approvals may need to be obtained:

- Sea Dumping Permit under the Environmental Protection (Sea Dumping) Act 1981,
- Drilling Environment Plan under the Offshore Petroleum Act 2006,
- Construction Environment Plans under the Offshore Petroleum Act 2006,
- Operations Environment Plan under the Offshore Petroleum Act 2006,
- Decommissioning Environmental Plan under the Offshore Petroleum Act 2006,
- Oil Spill Contingency Plan under the Offshore Petroleum Act 2006,
- Carbon Dioxide injection licence under the Offshore Petroleum & Greenhouse Gas Storage Act 2006.

Whilst the EPBC Act is the principal statute for the protection of environmental matters of national significance, other Commonwealth legislation and regulations relevant to the proposal include:

- The Offshore Petroleum and Greenhouse Gas Storage Act 2006,
- The Petroleum (Submerged Lands) Act Schedule - Specific Requirements as to Offshore,
- The Petroleum Exploration and Production 2005,
- The Petroleum (Submerged Lands) (Management of Environment) Regulations 1999,
- The Petroleum (Submerged Lands) (Occupational Health and Safety) Regulations 1993,
- The Environmental Protection (Sea Dumping) Act 1981,
- The Navigation Act 1912,
- The Civil Aviation Act 1988,
- The Submarine Cables and Pipelines Protection Act 1963,
- The Quarantine Act 1908,
- The Quarantine Regulations 2000,
- The Protection of the Sea (Prevention of Pollution from Ships) Act 1983,
- The Australian Heritage Council Act 2003,
- The Historic Shipwrecks Act 1978,
- The Management of Safety and Offshore Facilities Regulations 1996 (and the subsequent amendments).

The foregoing Commonwealth and Western Australian statutes determine the regulatory framework with which the Browse LNG development must conform. In addition, however, Woodside Energy Ltd is recognizing several relevant additional standards in order to align their EIA with non-mandatory, international guidelines to ensure that the Browse Upstream EIA is more comprehensive and robust than the minimum Australian regulations require.

These additional standards are listed in Appendix B1 and are publicly available. While not mandatory, the in-house standards and guidelines of the Browse Development JV Partners relevant to the EIA and the JVP corporate requirements are also incorporated into the project design and development of the EIS. These documents are not available for public disclosure but in general are in line with industry guidelines listed in Appendix 4.1a.

4.1.3 Project Stakeholders

In general terms the stakeholders in the Browse LNG development are those listed in Section 3.1 of this report. More specifically, however, the key stakeholders are as follows, listed in terms of whether they are sources of public education information or its targets.

The key **Information sources** are:

- Woodside Energy Ltd (Woodside), as the operator of the Browse LNG project.
- DSD, as the owner of the LNG precinct to be located at James Price Point in the West Kimberley.
- The Kimberley Land Council (KLC), which represents the interests of the traditional owners of the land – the indigenous people. The KLC is charged with the responsibility of providing sufficient information and education to enable the traditional owners to give their informed consent for the LNG development to proceed.

The key **targets** for public education and information are:

- the LNG project workforce and their families,
- community groups who are likely to be impacted by the project,
- commercial interests, such as tourist operators, pearl farm operators and commercial fishermen,
- the KLC, which requires information from the project proponents to enable them to pass it on to, and educate their Traditional Owners,
- NGOs, such as Save the Kimberley (<http://www.savethekimberley.com/>) who are opposed to any industrial development that will impact on the, currently undeveloped, wilderness environment of the West Kimberley.

All of these key stakeholders have their own agendas so there is an imperative need for both public education and information exchange to achieve both mutual understanding and mutual agreement if the Browse LNG development is to proceed in a manner that will be acceptable to all.

4.1.4 Project Impacts and Risk Management

The impacts likely to be associated with the Browse LNG development are seen to be:

- physical hazards associated with all LNG projects as explained in Section 2.4,
- environmental risks as listed in Section 2.5. Specifically, these relate to:
 - disturbance of flora and fauna – particularly marine life,
 - modification and pollution of surface water, ground water and inshore marine waters from dredging and effluent discharges,
- social and socio-economic impacts on the remote communities involved - particularly, on the indigenous people resident in the area,
- impacts on existing lifestyle and commercial operations such as:
 - recreational and commercial fishing,

- commercial pearl farming,
- commercial tourism.

As the proponent for the Kimberley LNG Precinct, the Minister for State Development is responsible, through the DSD, for securing land access and the planning and execution of social, environmental and heritage studies to support the precinct development. Woodside, as the Operator of the Browse Joint Venture, has provided support for this site selection and approvals process which includes plans for:

- environmental management,
- noise, Water and Waste management,
- safety, Security and Risk management,
- cultural heritage protection,
- training and employment,
- Business development and contracting,
- Drainage and Watercourse management,
- Waste Water management,
- Fishing, Pearling and Aquaculture Impact mitigation.

These have been summarised in a Public Information Booklet published by the DSD, which includes references and access to all of the supporting studies (http://www.dsd.wa.gov.au/documents/Browse_LNG_Precinct_Public_Information_Booklet.pdf).

In addition, the Master Plan developed by the DSD includes the following initiatives:

- maintaining land and water access in the direct vicinity of James Price Point,
- avoiding or minimising impacts on major creeks (watercourses),
- management of impacts on known heritage sites,
- minimizing the distance to deep water;
- orientation of the site to allow correct spacing and alignment of LNG processing trains (trains oriented lengthways in an east-west direction),
- arranging the geometry and location of the site to allow cryogenic storage tanks (LNG/LPG tanks) to be located as close as possible to the shoreline;
- consideration of required buffer zones and safety distances to prevent public access and to ensure appropriate land use adjacent to the LNG Precinct,
- minimizing impacts on the shoreline.
- Woodside, as the foundation proponent, has also made commitments as part of the agreement including support for:
 - indigenous education;
 - indigenous employment and contracting opportunities;
 - indigenous business development;
 - cultural heritage protection; and
 - cross-cultural awareness programs.

The Commonwealth Government is developing a range of complementary benefits.

4.1.5 The Public Information and Education Program

In the case of the Browse LNG development, the public education campaign is effectively being pursued on three different fronts conducted by:

- Woodside Energy Limited (Woodside),
- The DSD,
- Kimberley Land Council (KLC).

Woodside, the operator of the proposed LNG project, has a long experience of communication with the public since it established Australia's first LNG production plant, North West Shelf LNG (NWS LNG) and commenced operation in 1989. In the early days not too much attention was paid to public education campaigns but this has changed considerably to the extent that Woodside currently operates a very extensive LNG public education campaign designed to go "beyond compliance".

The DSD is the land owner of the Browse LNG precinct and as such is responsible for developing the precinct and keeping both key stakeholders and the public fully informed about all aspects of the development. The DSD was only formed in January 2009 so has little history of conducting LNG public education campaigns, however, its predecessor, the Department of Industry and Resources (DoIR) had long been involved in public education activities relating both to LNG development and a variety of mining activities in Western Australia. The Northern Development Task Force (NDT) was established within the DoIR specifically to oversee the Browse LNG Development and to provide public information on its progress and implications. The recently formed DSD has taken over the role of the NDT in promoting the Browse LNG precinct so the Department effectively has quite a long history of public education campaigns and is currently providing a great deal of information about the Browse LNG development on its website (<http://www.dsd.wa.gov.au/7901.aspx>).

The KLC, as representative of all the indigenous people in the Kimberley, has a special role to play in LNG public education in that it is responsible for educating the Traditional Owners who are stakeholders in the Browse LNG development. This is because, under Australian law (the Native Title Act 1993), Traditional Owners must give their Informed Consent¹ (sometimes referred to as Free Prior and Informed Consent) to the use of land for which they speak as a site for LNG development. In this role the KLC has considerable experience of educating its Traditional Owners about several different developments in the Kimberley but this is the first time they have been involved with LNG development *per se*.

In addition to the LNG information sources identified above it should also be mentioned that there are several non-governmental organisations (NGOs) that are opposed to LNG development in the Kimberley and several of these operate active websites designed to communicate their views about environmental and heritage issues both to the general public and to key stakeholders (e.g. Save the Kimberley <http://www.savethekimberley.com/wp/> and the World Wild Life Fund (<http://www.wwf.org.au/ourwork/oceans/kimberley>). In this regard these organisations can be considered as mounting their own public education campaigns although usually NGOs are regarded as targets for LNG public education campaigns insofar as the project proponents are trying to ensure that NGO viewpoints are founded on sound information.

¹ *Informed consent is a legal condition whereby a person can be said to have given consent based upon an appreciation and understanding of the facts and implications of an action. The individual needs to be in possession of relevant facts and also of his or her reasoning faculties at the time of consenting.*

The aims and objectives of the LNG public education campaigns are somewhat different for the different education providers. Thus, Woodside is primarily interested in obtaining the necessary approvals for the project to proceed and maintaining ongoing harmony with stakeholders throughout its development. The DSD, on the other hand is charged with administering the relevant statutes (the EPBC and EP Acts) which call for public consultation and thus education. The KLC's aim is to provide strong representation for its Traditional Owners and to ensure that they are sufficiently well informed to enable them to exercise their statutory requirement for giving Informed Consent.

4.1.6 Program overview

Public attitudes towards the Browse LNG development in the Kimberley are mixed. Clearly, there is considerable developmental potential associated with such a large project and local government, commercial interests, and community developers are almost universally in favour of it. On the other hand environmental and heritage advocates, and those whose lifestyles and livelihoods are likely to be impacted (e.g. some local and celebrity residents, commercial fishermen, pearl farmers, tourist operators), are largely opposed. To some extent opposition to the project has been reduced as information about it has been effectively disseminated. There is, however, a hard core of opposition, primarily involving NGOs, that is maintaining its opposition on matters of principle relating to maintenance of the Kimberley as a near pristine environment.

The impacts likely to be associated with the Browse LNG development have already been discussed in Section 4.1.4 together with plans for their mitigation and management. In addition to the potential physical hazards associated with any LNG project, however, most public concerns relate to potential environmental impacts and impacts on lifestyles and livelihoods. The associated benefits are extensive and include:

- Wealth creation,
- Regional development,
- Job creation,
- Social and socioeconomic growth for indigenous people.

Public education campaigns, therefore, are designed to provide information to all stakeholders about the perceived risks and benefits associated with the project so that all stakeholders can be fully informed and engaged.

Target groups include:

- The LNG development workforce,
- Local community groups and individuals,
- Indigenous people
- Local business operators (retail traders, service providers, commercial fishermen, Pearl farmers),
- Recreational land and water users,
- Tourism operators,
- Environmental groups,
- Universities,
- NGOs.

4.1.7 Program execution

The public education campaigns that are being conducted as part of the Browse LNG development are quite extensive and multi-faceted and involve the use of a variety of media. In the case of Woodside the following actions and activities are involved:

- Publication of a monthly information magazine for circulation to Woodside employees and their families,
- Establishment of representative community committees and working with them on an ongoing basis to keep the community fully informed and updated as the project progresses,
- Posting regular information bulletins on a dedicated section of the Woodside website,
- Sponsoring and hosting a team of 30 key stakeholders in the Kimberley and flying them down to Karratha for an inspection tour of the NWS LNG operation,
- Establishing the Woodside Visitor Centre at Karratha to be used as a resource centre with static displays providing information about all aspects of LNG production, transportation and end use,
- Invited and employing nominated Traditional Owners (the Indigenous Stakeholders) to be present on site throughout any excavation or land modification activities to keep them informed about the way the land is being re-configured and about any heritage or archaeological discoveries that are made,
- Sponsoring a number of education programs for young people designed both to increase education levels in general and understanding of LNG in particular.

Woodside has noted that its LNG public education activities are based upon the following principles:

- “Too much information is never enough”,
- Public education must go beyond the requirements of compliance,
- Information dissemination should start with the LNG project workforce, then extend to their families and finally to the wider community,
- Targeting young persons is vital to a long term strategy,
- The need to establish community committees that fully represent community interest and concerns,
- Stakeholders should be made to feel respected, wanted and engaged,
- All study results should be shared and both the LNG industry and the State should sing from the same song book, i.e. should give the same messages.

The DSD (and its predecessor the Northern Development Task Force (NDT) has relied quite heavily on publication of information about the Browse LNG project on its website which carries all of the reports that the DSD have commissioned together with a number of fact sheets and information bulletins developed by the DSD itself (Appendix B3). One of the most comprehensive of these is the so called Browse LNG Precinct Public Information Booklet (http://www.dsd.wa.gov.au/documents/NEW_Browse_LNG_Precinct_Public_Information_Booklet.pdf).

This booklet describes the LNG Precinct that will be established at James Price Point, subject to the ultimate execution of the formal Indigenous Land Use Agreement (ILUA). In addition, the DSD, through the NDT has conducted an extensive program of stakeholder consultation meetings as an integral part of its site selection process.

The KLC has also mounted a major public education program designed to inform their Traditional Owners. This has mainly involved a series of meetings involving KLC staff, Traditional owners and invited experts such as consultants. The meetings were not generally open to the public and release of information on their conduct, content and outcomes is quite restricted. Interestingly, the KLC has developed quite effective ways of presenting information which is often conveyed in the form of pictures (almost like a comic strip at times) and in the common English patios spoken by the indigenous people in their daily life. These presentations, an example page of which is provided as Figure 4.1.2, appear to be quite effective and represent an innovative way of tailoring the educational medium to the particular needs of the audience.

Several different information dissemination methods have employed as part of the public education campaigns that have been, and are being employed. These include:

- public meetings with community groups and individuals,
- meetings with community committees established for the purpose of communicating directly with the project proponents,
- notification of public education events by mail, posters, newspapers, radio and television,
- public presentations and seminars,
- periodic press releases,
- televised discussions and documentaries,
- information dissemination via booklets, CD's and DVD's,
- posting information on internet websites,
- distribution of posters and pamphlets in remote locations,
- publication of a monthly in-house magazine for project employees,
- viewpoint presentation and discussion via internet blogs,
- establishment of static LNG information displays – such as the Woodside LNG Resource Centre at Karratha.

4.1.8 Gender Sensitivity

There are a number of gender sensitive issues that are associated with the Browse LNG development and several of these require special recognition within a public education campaign.

Probably the most widespread issue relates to the need to ensure that women in particular are properly informed of the social implications associated with the LNG project. This relates particularly to increased opportunities for both child and adult education but also to everyday activities such as food gathering and cooking. In this regard it is important to engage women's groups and to ensure that information transfer is appropriate to their interest and needs.

From an indigenous land use and heritage perspective both men and women have certain sites/locations that are sacred to their gender. Thus, women have particular birthing areas (equivalent in many ways to a modern maternity suite) whereas men's sites tend to involve spiritual heritage and sites where young boys are initiated into tribal customs and laws as part of their initiation into manhood. Clearly, any public education campaign must be sensitive to these social and heritage requirements.

From a purely practical viewpoint, there are certain rules in aboriginal society which impact directly on the way in which public education is configured. For example it is considered

improper, even rude, for a son in-law to be at a function in the same room as his mother-in-law thereby sometimes making it necessary to hold two separate meetings so both groups can be accommodated. Similarly, there are certain topics and objects (such as some rock art) that are gender specific and cannot be discussed by the opposite sex – again making public education and information activities gender specific.

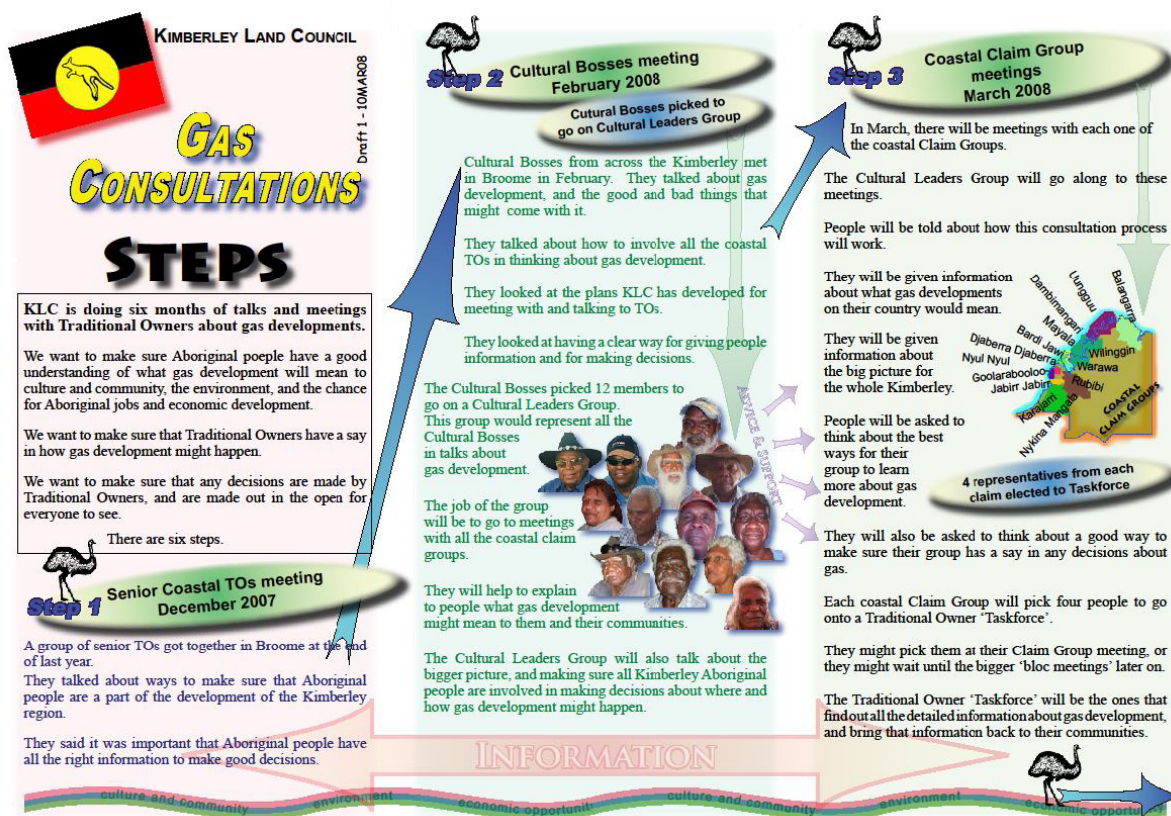


Figure 4.1.2: An Example of Poster Material Used by the Kimberley Land Council to Inform Indigenous People

4.1.9 Project Outcomes and Lessons learned

While the Browse LNG project is still in the development phase several outcomes of the associated public education campaigns can be recognised. These include:

- establishment of an effective working relationship between the DSD and Woodside,
- establishment of effective communication with community groups so that there is widespread understanding of the project and its ramifications,
- identification and isolation of those interests and individuals who still have unresolved issues relating to the project so they can be specifically targeted,
- the success of the KLC in educating and informing its Traditional Owners about the Browse LNG project to a level where they are able to give their informed consent. (It should be noted, however, that certain activist groups are contesting this and claim that the work of the KLC has been inadequate in law),
- opposition to LNG development in the Kimberley continues despite the public education campaign which appears to have made little impression on the more vehemently opposed stakeholders such as environmental groups and NGOs,

- both Woodside and the DSD are now fully aware of the importance of a very well orchestrated public education campaign for ensuring the smooth and cost effective progression of an LNG project in today's society.

Some of the lessons learned are that:

1. Public education and information dissemination is an on-going activity, but one whose configuration will change as the project progresses.
2. LNG public education campaigns should target young persons.
3. Effective communication is established through the formation of community committees as a conduit to wider community groups.
4. A public education program should make stakeholders feel respected, wanted and engaged.
5. Public education and information transfer should go beyond the requirement of compliance.
6. All study results and information should be shared in a fully transparent manner.
7. Industry proponents should work together in the presentation of their public education campaigns.
8. The LNG industry and the state should co-ordinate their public education activities to ensure that the same messages are being given.
9. LNG industry proponents should not be drawn into debates with activists as part of their public education activities. It is much better simply to state the facts with credible references.

4.2 Gladstone LCSG Production, Australia

These case studies have been chosen because, while they are still in the development stage, they include some of the most recent initiatives and protocols in public education activities. The case studies also illustrate the parallel public education campaigns being mounted by the Queensland State Government and private sector LNG proponents. They are of particular interest because they illustrate the high level of information sharing on the corporate websites developed by the LNG proponents. As for the previous case study (Browse LNG) the Gladstone LCSG projects illustrate the complexities of dealing both with current land owners and with the rights of indigenous people on whose traditional lands the LCSG mining, processing and shipping facilities are to be located.

Australia is currently the world leader in developing large scale CSG technology and is the foremost economy in LCSG production. In the Bowen and Surat Basins, located in South East and Central Queensland (Figure 4.2.1), there are proven reserves of some 32.4 trillion cubic feet of Seam Gas which is comparable to the natural gas reserves associated with the North West Shelf Venture.

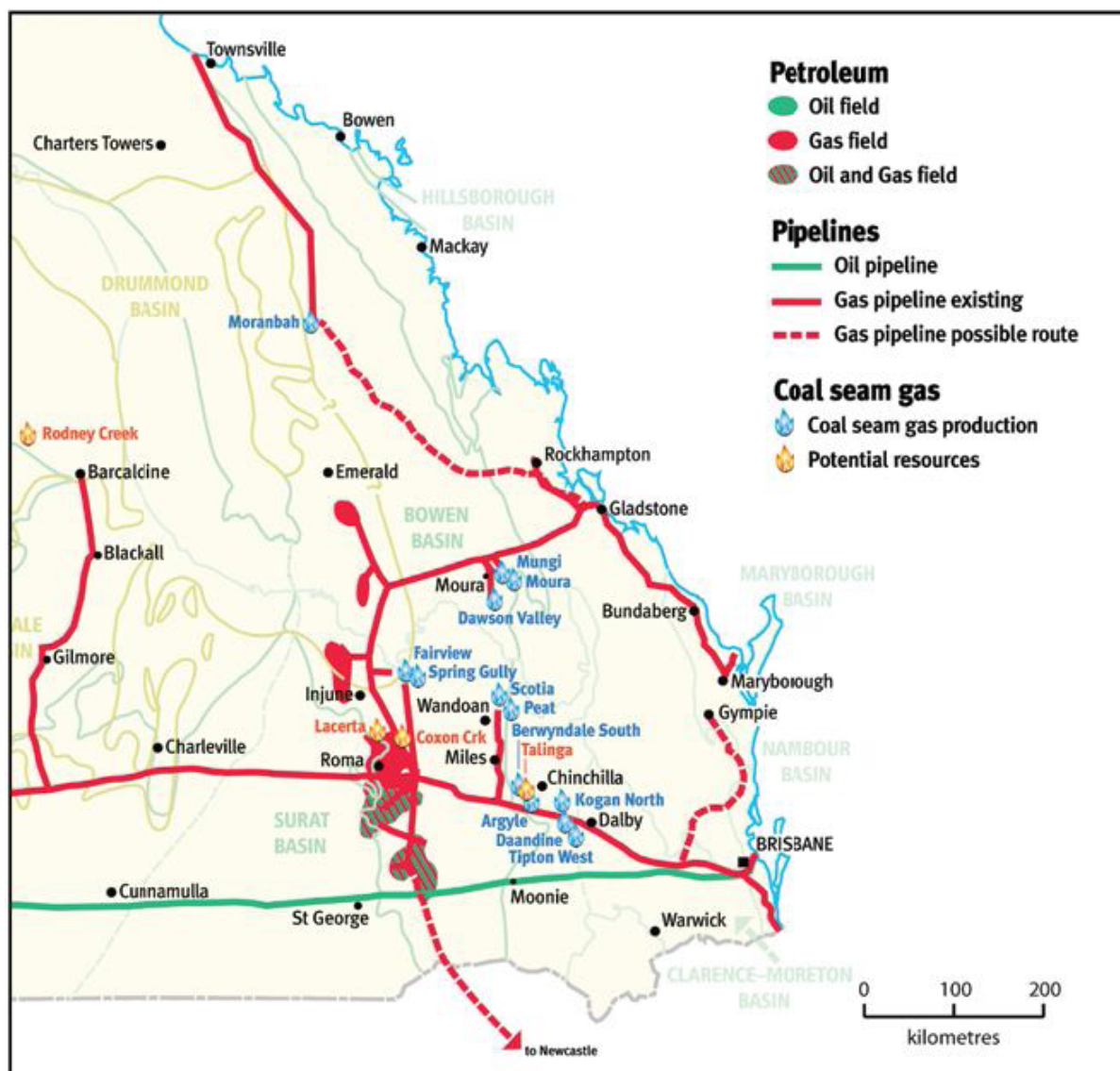


Figure 4.2.1: Location of the Coal Seam Gas Fields and Distribution Infrastructure (Source: GLNG Website)

At present, there are four projects for the production of LCSG fed from the coal fields in the Bowen and Surat Basins. The proponent companies are:

- Gladstone LNG (GLNG),
- Queensland-Curtis LNG (QCLNG),
- Australia Pacific LNG (APLNG),
- Arrow Energy LNG.

Brief descriptions of the configurations of each of these projects are presented in the following sections noting that they are, understandably quite similar since they are based on similar primary energy resources and are closely co-located in South East and Central Queensland. It should be noted, however, that the LCSG industry configuration in Queensland is very dynamic and is changing on an almost weekly basis. Indeed, there is a body of opinion that believes no more than two of the proposed projects will actually come to fruition – even though there is sufficient coal seam gas to support all four projects independently.

The liquefaction and export facilities will be located within a 1,500 ha Gladstone State Development Area (GSDA), administered by the Department of Infrastructure and Planning (DIP), which constitutes the proposed Curtis Island LCSG precinct. The Master Plan for the precinct allows for a total of up to 60 million tonnes per annum of LCSG capacity and provides for multiple proponents to build and operate liquefaction facilities in areas of both exclusive and non-exclusive access. The single precinct site concept will avoid ad hoc development by serving multiple operators and providing access to shared facilities thereby minimizing the environmental impact associated with LCSG plant development. The Minister for Employment, Economic Development and Innovation is the proponent for the Curtis LCSG precinct and is responsible for securing land access and the planning and execution of social, environmental and heritage studies to support the precinct development.

The drivers for the projects are primarily economic as they will deliver large economic benefits not only for the proponents but also for the Government and people of Queensland.

These include:

- significant capital investment through to 2020,
- an increase in Queensland's gross state product of up to \$120 billion between 2010 and 2021,
- generation of substantial royalties and taxes for the Queensland and Australian Governments,
- Creation of a new, long-term gas processing and export industry in Queensland.
- opportunities to increase local skills capacity via apprenticeships, scholarships and vocational training,
- expenditure in regional economies through the purchase and use of local goods and services, where practicable, for the construction and operation of the plant,
- freeing up new supplies of coal seam gas, which has about 40% lower carbon dioxide emissions than coal for the same amount of energy,
- the potential to deliver a new supply of water, a by-product of coal seam gas production, to communities in southern Queensland,
- a new industry for Gladstone to complement its position as one of Australia's leading industrial centres for coal, alumina and cement production.

There are also strong social drivers as each project will provide 4,000-6,000 construction jobs and 1,000 ongoing operational jobs for Queenslanders, thousands of contracts for small to medium-sized businesses and both social and economic benefits for Aboriginal people.

The enhanced income will allow improvements to be made in health, education and training in the area.

4.2.1 The Gladstone LNG (GLNG) Project

Gladstone LNG is a joint venture in which Santos owns 45%, Petronas 35% and Total 20%, (<http://www.glng.com.au/>). Santos, as the largest shareholder is the operator of the permits and is responsible for planning and day-to-day operations in connection with the GLNG Development. This includes the proponent initiated public information campaign. Coal seam gas will come from the Bowen and Surat Basins (Figure 4.2.2) and will be transported by approximately 435 Km of gas pipeline to Curtis Island where it will supply a gas liquefaction plant located at Hamilton Point West. Initial production is targeted at 7.2 mtpa with a maximum of 10 mtpa. At the time of publication of this report the GLNG project has received both Environmental approvals from both the State and Commonwealth governments and a final investment decision (FID) is targeted for December 2010.

In common with the other LCSG projects the Gladstone LNG project will involve:

- construction of a gas pipeline to Curtis Island,
- construction of CSG liquefaction and storage facilities,
- construction of Marine facilities, such as Jetties, on the mainland,
- construction of Jetties, off loading facilities and an LNG carrier terminal on Curtis Island in the vicinity of North China Bay, Hamilton Point and Boatshed Point,
- some localised dredging near each of the marine facilities.

The projects will also require dredging off Port Curtis which is being managed by the Gladstone Ports Corporation to extend the shipping lanes to berth pockets and develop swings basins for LNG carrier loading and manoeuvring.

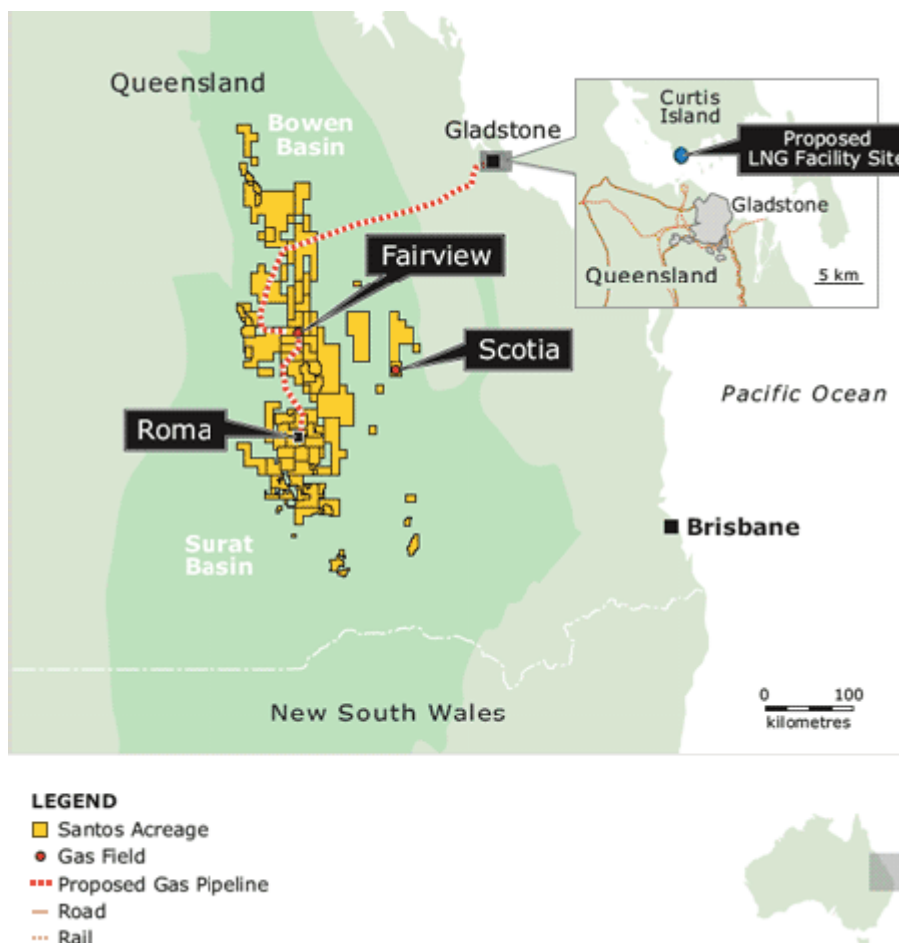


Figure 4.2.2: Location of the GLNG gas fields and proposed plant site (Source: GLNG Website)

4.2.2 The Queensland-Curtis LNG (QCLNG) Project

Queensland-Curtis LNG is owned and operated by the Queensland Gas Company which is a BG Group business (<http://www.qclng.com.au>). QGC is the operator and is responsible for planning and day to day operations including the public information campaigns.

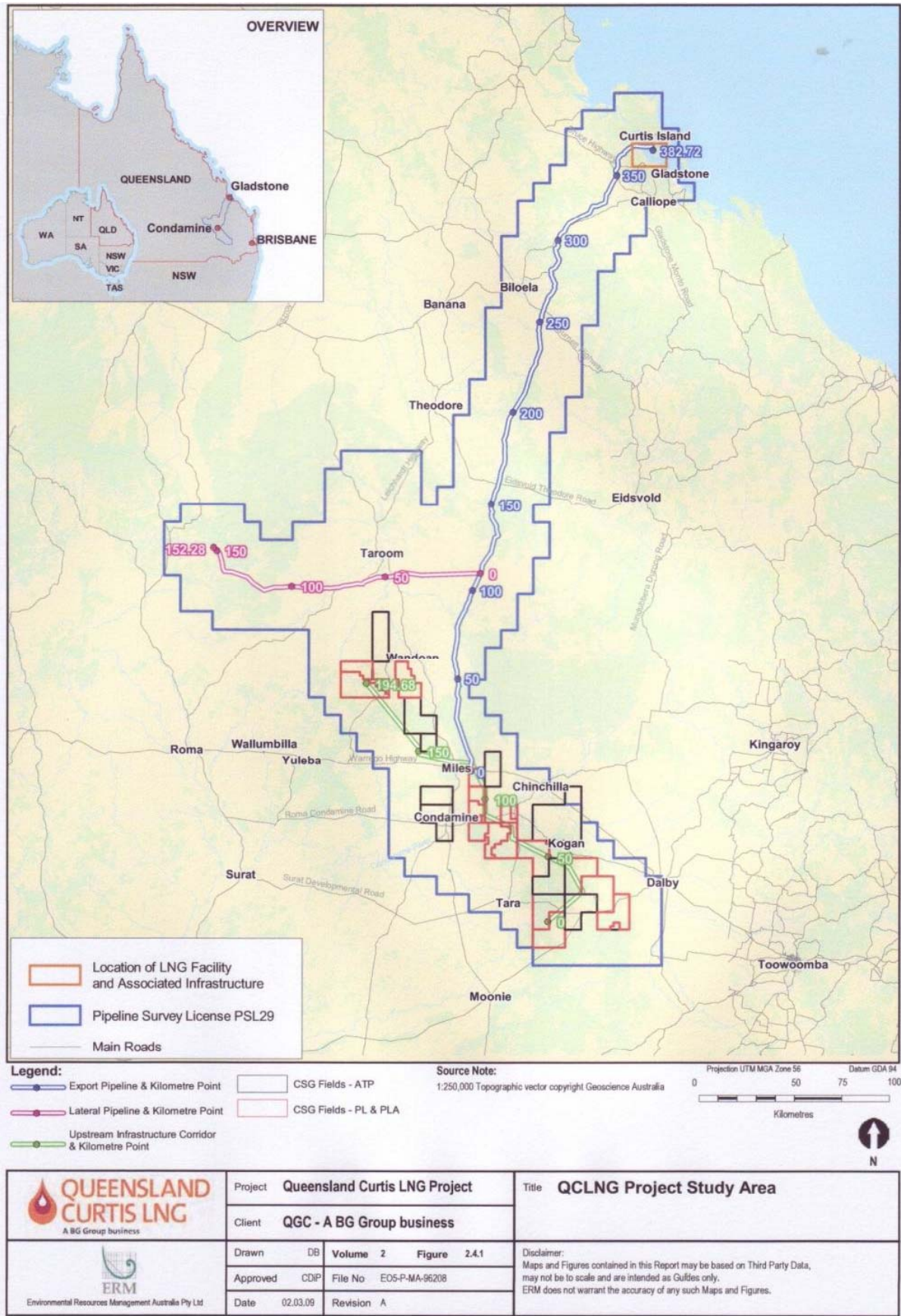


Figure 4.2.3: Location of the QCLNG Gas Fields and Proposed Plant Site (Source: QCLNG Website)

Coal seam gas will come from the Surat Basin (Figure 4.2.3) and will be transported by approximately 380 km of gas pipeline to a liquefaction plant located at North China Bay in the Curtis Island GSDA precinct. Initial LCSG production is targeted at 7.5 mtpa with potential to increase production to 12 mtpa. Environmental approvals have been received from both the State and Commonwealth governments and a final investment decision (FID) had been announced. The first LNG shipment is expected in 2014.

4.2.3 The Australian Pacific LNG (APLNG) Project

Australia Pacific LNG is a 50:50 joint venture between ConocoPhillips and Origin Energy (<http://www.aplng.com.au>). The joint venture is responsible for the public information campaign. Environmental approval has been received from the State.

Coal seam gas will come from the Bowen and Surat Basins and will be transported by approximately 450 km of gas pipeline to Curtis Island (Figure 4.2.4) where it will supply a four train LNG plant at Laird Point in the GSDA precinct. LCSG production of up to 18 mtpa is planned.

4.2.4 The Arrow Energy LNG Project

Arrow Energy LNG (http://www.arrowenergy.com.au/page/Our_Company/Maps/) is owned 50:50 by Royal Dutch Shell and PetroChina and will be the operator of the permits with responsibility for all day-to-day operations including all public information campaigns to be initiated by the project proponents.

Coal seam gas will come from the Bowen and Surat Basins and will be transported by pipeline from near the Bruce Highway to Curtis Island where it will be processed at Boatshead Point in GSDA precinct (Figure 4.2.5). Four 4 mtpa liquefaction trains will be built sequentially to provide a total liquefaction capacity of 16 mtpa.

4.2.5 The Regulatory Framework

The commonwealth legislation covering LNG development has already been presented in Section 4.1.2 for the Browse LNG Case Study. It is also applicable to the Gladstone LNG developments. In addition, however, an LCSG project is subject to further regulatory approvals relating to CSG exploration and production. CSG exploration is carried out under the *Petroleum Act 1923* and the *Petroleum and Gas (Production and Safety) Act 2004*. Coal seam gas production is administered under the *Petroleum Act 1923*, the *Petroleum and Gas (Production and Safety) Act 2004* and the *Mineral Resources Act 1989*. The regulatory situation can be quite complex in cases where there is overlapping tenure between coal and petroleum leases. The way in which these are navigated is illustrated in the flow chart included as Appendix 4.1a.

In addition to the Australian Commonwealth legislation LCSG production is also governed by a number of State Laws and regulations. These are explained in the website of the Department of Employment, Economic Development and Innovation (DEEDI) (http://www.dme.qld.gov.au/mines/coal_seam_gas.cfm).

State regulations are governed by the Queensland State Development and Public Works Act 1971, Petroleum & Gas (Production and Safety) Act 2004 and the Environmental Protection Act 1994. The leading state agencies are the Queensland Department of Infrastructure and Planning (DIP), the Queensland Department of Environment and Resource Management (DERM) and the Queensland Department of Employment, Economic Development and Innovation (DEEDI).

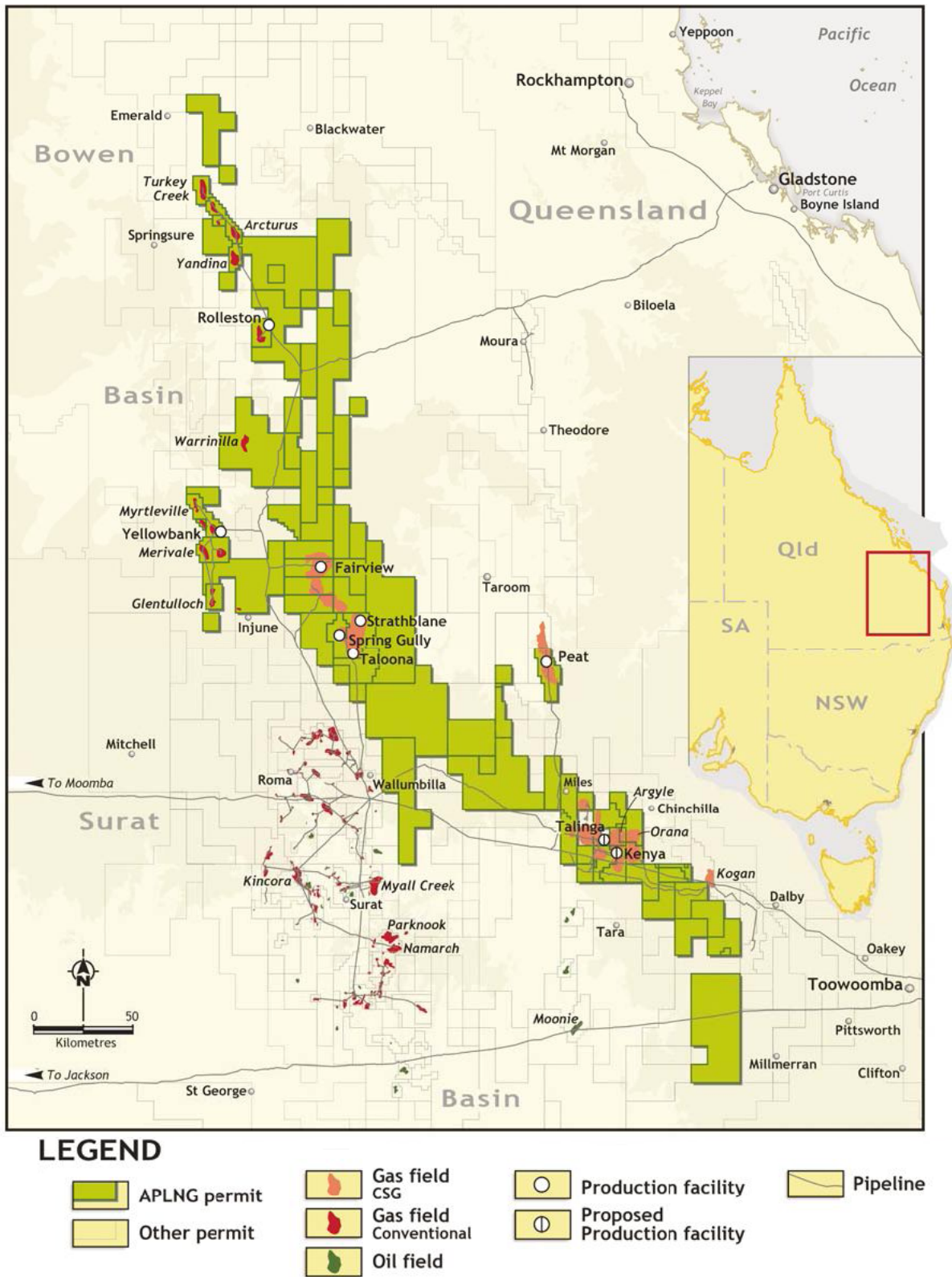


Figure 4.2.4: Location of the APLNG Gas Fields and Proposed Plant Site

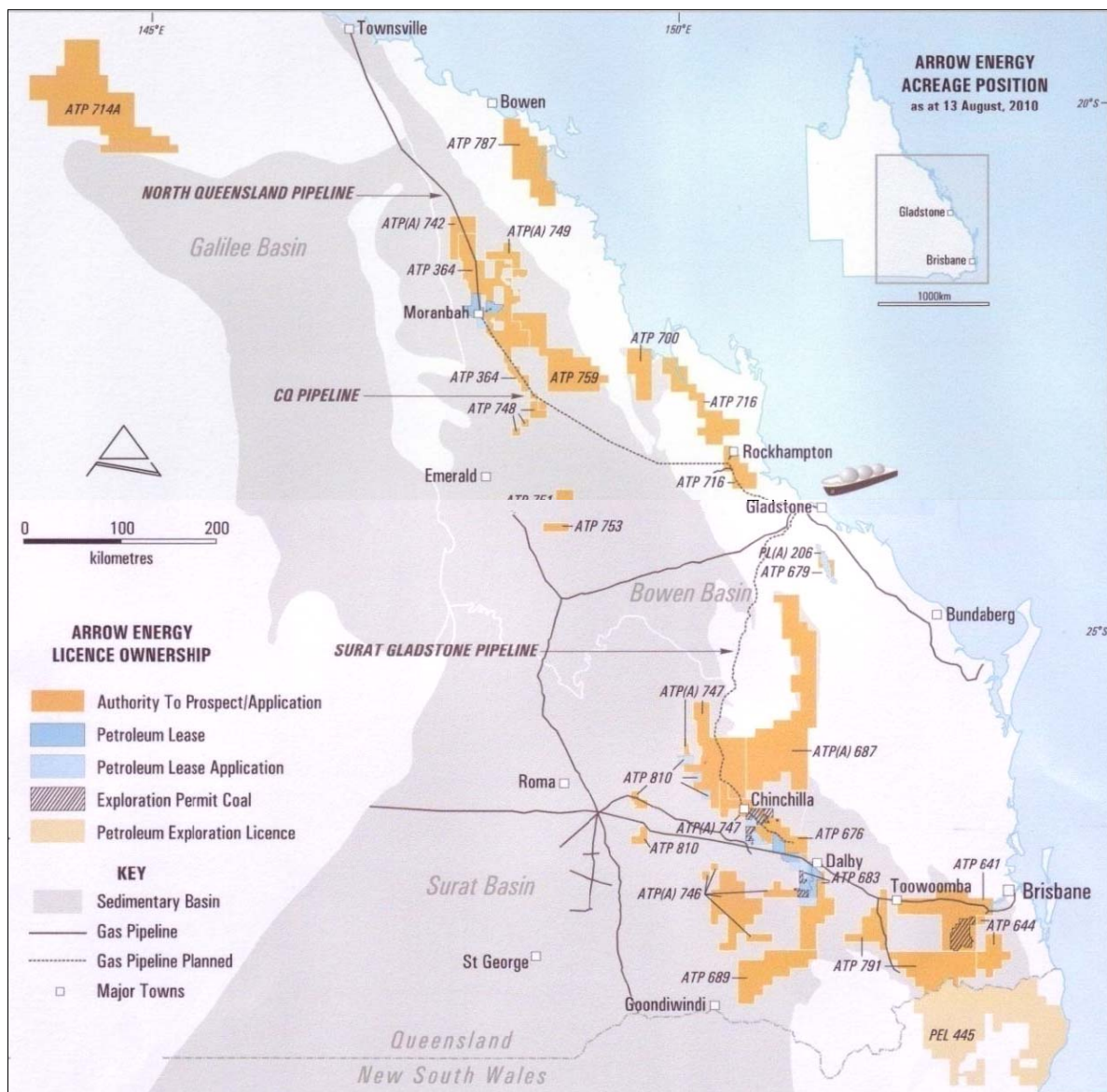


Figure 4.2.5: Location of the Arrow Energy Gas Fields and Proposed Plant Site (Source: APLNG Website)

The Commonwealth's Environment Protection and Biodiversity Conservation Act 1999 also requires that a proponent demonstrates that its activities will not significantly impact matters of national environmental significance.

The State Development and Public Works Organisation Act 1971 (SDPWO Act) provides the Queensland Coordinator-General with the power to declare a project to be a 'significant project', based on one or more of the following criteria:

- complex approval requirements, including local, state and federal government involvement,
- a high level of investment in the state,
- potential effects on the environment and/or infrastructure,
- provision of substantial employment opportunities,
- strategic significance to the locality, region or the state.

Once a project is declared significant, and environmental impact statement (EIS) is usually required to ensure the project's environmental, social and economic impacts are appropriately considered.

Arrow activities are governed by the Queensland State. Both State and Commonwealth legislation requires assessment and Ministerial approval prior to the implementation of proposals that have the potential for significant impacts on the environment, as defined in the Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* (s146(1)). As in the case of Western Australia the implementing regulations require submission by the proponent of an Environmental Impact Statement (EIS) and Ministerial approval prior to project implementation.

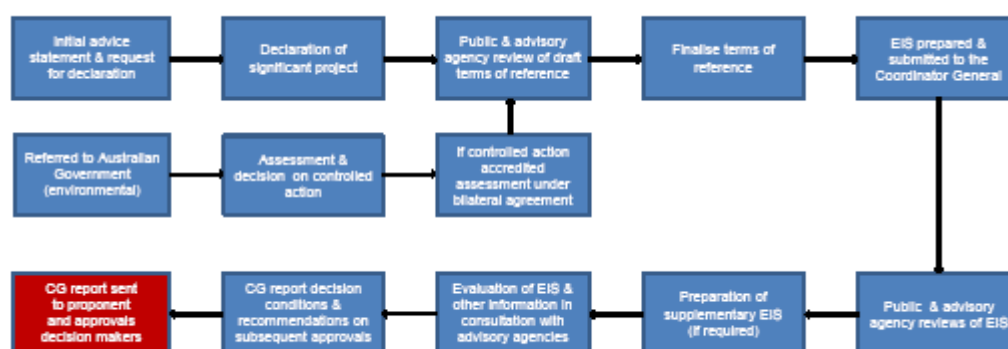


Figure 4.2.6: The LCSG Environmental Impact Statement (EIS) Process (Source: APLNG Website)

The EIS and its supporting documentation is made available for public comment and submissions, as a mandatory part of the approval process, and necessarily involves a considerable amount of public education and information transfer. The way in which the EIS process is negotiated is illustrated in figure 4.2.6 as published in the APLNG website (http://www.dip.qld.gov.au/resources/project/aplng/eis-executive-summary_page-13-19.pdf).

4.2.6 Project Stakeholders

In general terms the stakeholders in the Gladstone LCSG developments are those listed in Section 3.1 of this report. More specifically, however, the key stakeholders are as follows:

- Australian Government departments and agencies,
- Queensland Government departments and agencies,
- affected regional councils,
- local indigenous representatives,
- landowners,
- residents,
- non-government organisations,
- the broader community.

Stakeholder identification and participation continues to evolve throughout the life of the project as new stakeholders emerge and literally hundreds of different stakeholder types and offices can be identified. In the case of the Gladstone LCSG developments a breakdown of the stakeholders identified by QCLNG is included, by way of illustration, as Appendix 4.2b. (<http://qclng.com.au/uploads/docs/eis/vol12/Annex-12.1-Stakeholder-List.pdf>).

Stakeholders can also be classified in terms of whether they represent sources of information for public education purposes or as targets for such education. In this case study the key information **sources** are:

- the operators of the Gladstone LCSG projects,
- the Queensland Department of Employment, Economic Development and Innovation (DEEDI), as the government department responsible for administering the SDPWO Act,
- the Queensland Department of Infrastructure and Planning (DIP) as the owner of the GSDA LNG precinct to be located on Curtis Island.

The key **targets** for public education and information are:

- the LNG project workforce and their families,
- community groups who are likely to be impacted by the project,
- commercial interests, such as farmers, land developers and local businesses,
- Traditional Owners who require information from the project proponents to enable them to give their informed consent,
- NGOs, such as Save Curtis Island (SCI), Property Rights Australia (PRA) and the Queensland Conservation Council (QCC), who are opposed to any industrial development that may impact adversely on the locality and region.

4.2.7 Project Impacts and Risk Management

The impacts likely to be associated with the Gladstone LCSG developments are seen to be:

- physical hazards associated with all LNG projects as explained in Section 2.4,
- environmental risks as listed in Section 2.5. Specifically, these relate to:
 - disturbance of flora and fauna – particularly marine life,
 - modification and pollution of surface water and ground water from gas mining activities and of inshore marine waters from dredging and effluent discharge,
- social and socio-economic impacts on the communities involved - particularly, on rural residents and indigenous people in the area,
- impacts on existing lifestyle and commercial operations such as agricultural and pastoral farming.

Specifically, there are considerable concerns about matters such as:

- disposal of saline waters associated with CSG mining,
- aquifer contamination,
- instability of land due to hydraulic fracturing (fracking) of underground coal seams,
- gas pipeline location,
- diversion of land from traditional agricultural and pastoral purposes.

Of primary concern are the impacts that CSG extraction may have on the State's groundwater resources. Much of the area currently under development for CSG lies within the Great Artesian Basin (GAB) and the aquifers of the basin are an important groundwater supply for Queensland, providing vital water for stock and domestic, urban, industrial and agricultural use, often in areas where there is no alternative water supply source.

In addition to the GAB aquifers, CSG production areas lie both above and below fractured rock aquifers (e.g. tertiary basalts in the Bowen Basin), and the alluvial aquifer systems of the rivers in the Surat and Bowen basins (e.g. the Condamine, Isaac-Connors, and Upper Dawson).

These aquifers are locally and regionally important groundwater resources supporting a range of uses. The Condamine Alluvium, for example, which directly overlies the Walloon Coal Measures, is the most committed groundwater resource in the state.

Under current government policy, CSG water is considered a waste product and it is the responsibility of CSG producers to dispose of this water in an environmentally acceptable way at no cost to the State. Options for disposal of CSG water currently include:

- use of CSG water, either directly or after treatment for purpose, for dust suppression, agricultural or municipal use,
- discharge of treated CSG water to watercourses, dams or weirs,
- injection into underground aquifers of equal or lesser water quality,
- recharging of ephemeral streams.

Disposal of treated CSG water directly to surface waters is not a preferred water management option. Any proposal to discharge treated CSG water to watercourses is required to demonstrate clearly that other preferred management options are not feasible for sound environmental, technological and/or economic reasons.

The predicted growth of the CSG industry will considerably increase the volume of CSG water produced. As part of the application process for an Environmental Authority (EA) to discharge for new large scale CSG projects, the applicant is required to submit an Environmental Management Plan (EMP) which incorporates a Coal Seam Gas Water Management Plan (CSGWMP). The EMP associated with any EA is expected to identify the proposed management of CSG water including the use, treatment, storage and disposal of the water. DERM, as the administrative authority, is required to assess the EIS and EA applications based on the best available information to guide conditioning of the EA for CSG water discharges to surface waters or aquifer injection. The administrative authority will need to consider all management issues including assessment of cumulative impacts and water monitoring and reporting requirements for the environmental authority holder.

The Queensland Government has recognised that while the rapidly developing LCSG industry brings significant economic opportunities for Queensland, there will be potential social and environmental impacts which need careful management. The *Blueprint for Queensland's LNG Industry* identifies the support that the government will provide to the LNG industry, and the mechanisms that will be used for management (<http://203.210.126.185/dsdweb/v4/apps/web/secure/docs/3895.pdf>).

The Blueprint requires that groundwater resources be protected and that impacts on other water users and groundwater dependent ecosystems are managed. In particular the Blueprint recognises the need to manage potential cumulative impacts of CSG extraction on groundwater resources. Consequently, the Queensland Government will improve its regulatory regime to better manage these risks. Legislation is being developed to ensure that CSG producers and the CSG industry 'make good' any impacts, including cumulative impacts, on other groundwater users, groundwater dependent ecosystems and the groundwater resource generally. This will include developing a regional groundwater monitoring, impact modelling and cumulative impact management regime, to be overseen by the Queensland Water Commission (QWC).

4.2.8 The Public Information and Education Program

In the case of the Gladstone LCSG developments, the public education campaigns are effectively being pursued on three different fronts conducted by:

- The Queensland Government, primarily by DEEDI,
- The project proponents:
 - Gladstone LNG (GLNG),
 - Queensland-Curtis LNG (QCLNG),
 - Australia Pacific LNG (APLNG),
 - Arrow Energy LNG.
- NGOs which oppose LCSG development.

The aims and objectives of the LCSG public education campaigns are somewhat different for the different education providers. Thus, the proponents are primarily interested in obtaining the necessary approvals for their projects to proceed and maintaining ongoing harmony with stakeholders throughout their development. DEEDI, on the other hand is charged with administering the relevant statutes (the EPBC and EP Acts) which call for public consultation and thus education.

As explained on the DEEDI website, the Queensland Government has been working with landholders, the community, farming groups and the resources industry to achieve a balance between the interests of the coal seam gas (CSG) and liquefied natural gas (LNG) industries, the environment, landholders and community interests.
(<http://www.industry.qld.gov.au/dsdweb/v4/apps/web/content.cfm?id=15779>).

In order to support and protect regional communities and agricultural land where CSG operations occur, the Government has:

- worked with stakeholders from the agriculture and resource sectors to develop an agreed land access Code of Conduct, which is before the Parliament,
- provided strong legal protection of groundwater interests for landholders based on scientific evidence, to ensure long-term aquifer stability,
- put in place a strong regulatory framework based on best practice to prevent CSG water salts entering the environment,
- strengthened the environmental regulator's enforcement powers and ensured that where the groundwater impacts of different CSG producers overlap, cumulative management areas (CMAs) will be regulated by an independent authority – the Queensland Water Commission (QWC).

These activities fall into the categories:

- protecting water,
- protecting the environment,
- protecting the communities,
- protecting farmland,
- protecting landowners rights,
- ensuring public safety,
- growing local jobs and business.

It is also likely that the Queensland Government will set up an “information mouthpiece” to operate as a State sponsored information outlet.

For the most part, the public education programs being mounted by the LCSG project proponents are quite similar and are designed to provide information to all stakeholders about the perceived risks and benefits associated with the projects so that they can be fully informed. These programs do have some differences, however, and these seem to relate primarily to differences between corporate cultures and philosophies rather than differences in program execution.

Santos, as the operator of the Gladstone LNG project (GLNG) has been operating in the Roma area for 40 years so has built up a considerable stakeholder base and has long experience of communication with local stakeholders and. Consequently, its associated public education campaign is seen by Santos as an extension of that already in place. It is, however, necessary to start from scratch with respect to educating the public on some of the new activities involved. Santos now operates an extensive LNG public education campaign designed to go “beyond compliance” and has invited other LCSG proponents to join it in setting up community committees.

The Queensland Gas Company (QGC) project is currently the most advanced of the four and QGC has already established several community committees as vehicles for achieving public consultation. They have, however, preferred to operate independently rather than collaborating with other LCSG proponents through the same community committees.

ConocoPhillips already has an impressive record of public engagement and education about LNG in the USA. In Australia ConocoPhillips has been foremost in mounting the so called “LNG Road Show” which is designed to provide public education about LNG via practical demonstration of its properties – somewhat like a circus act. The rest of the LNG and LCSG industry appear quite happy to recognise and promote this initiative which is clearly in the collective interest.

The Arrow Energy LNG project is not as advanced as the others and to date Arrow Energy LNG has chosen to operate its public education program separately from the other LCSG proponents. At this point, there are no plans for establishment of shared gas processing facilities although it is likely that there will be a shared pipeline corridor and thus a logical need for some collaboration on public information sharing relating to pipeline construction and operation.

In addition to the LNG information sources identified above it should also be mentioned that there are several non-governmental organisations (NGOs) that are opposed to LCSG development and the establishment of gas processing facilities on Curtis Island. Most of these e.g. Save Curtis Island (<http://www.savecurtisland.com/>), operate active websites designed to communicate their views about environmental and heritage issues both to the general public and to key stakeholders, In this regard these organisations can be considered as mounting their own public education campaigns although usually NGOs are regarded as targets for LNG public education campaigns insofar as the project proponents are trying to ensure that NGO viewpoints are founded on sound information.

4.2.9 Program overview

In all cases the primary aim of a public education program is to provide stakeholders with the information necessary to satisfy mandatory stakeholder consultation requirements of the EIS process and to provide them with sufficient understanding to ensure that there is no uninformed opposition to project approvals. In short, the objective is to obtain the necessary project approvals as efficiently and cost effectively as possible.

In addition, however, all of the proponents involved in the Gladstone LCSG development projects have indicated that there is a need to go “beyond compliance” and to maintain an ongoing engagement with stakeholders to ensure the maintenance of trust and, consequently, smooth project progression.

Public attitudes towards the Gladstone LCSG developments are mixed. Clearly, there is considerable developmental potential associated with such large projects and local government, commercial interests and community developers are almost universally in favour of them. On the other hand environmental and heritage advocates, and those whose lifestyles and livelihoods are likely to be impacted (e.g. some local land owners, farmers and environmental groups), are largely opposed.

To some extent opposition to the projects have been reduced as information about them have been effectively disseminated. There is, however, a hard core of opposition, primarily involving landowners and NGOs, that is maintaining its opposition on matters mainly relating to land use and water quality issues. For the most part these action groups are concerned with procedural matters i.e. how they are dealt with by the energy companies and (by default) the Government.

4.2.10 Program execution

The public education campaigns that are being conducted as part of the Gladstone LCSG developments are both extensive and multi-faceted and involve the use of a variety of media. They include:

- public meetings and/or information days,
- one-on-one meetings,
- appointment of dedicated Liaison Officers,
- media (print, radio, TV and internet) engagement,
- YouTube and Facebook,
- establishment of representative community committees or liaison groups and working with them on an ongoing basis to keep the community fully informed and updated as the project progresses,
- establishment of “shop front” presence in Gladstone (and also in Roma for Santos). These are effectively resource centres with static displays providing information about all aspects of CSG production and LCSG production, transportation and end use,
- engagement with Traditional Owners (the Indigenous Stakeholders) to explain how their land will be used, to establish Indigenous Land Use Agreements (ILUA) and to keep them informed as the projects progress,
- establishment and maintenance of a close information sharing relationship with land owners to keep them informed about ongoing activities,
- posting regular information bulletins on a dedicated section of the proponent website,
- provision of project development updates via open meetings, open forums and through Community Committees with targeted notifications via email and newspapers,
- promotion of TV documentaries that are produced by the media rather than proponents,
- information dissemination via booklets, CD’s and DVD’s,
- distribution of posters and pamphlets in remote locations,

- viewpoint presentation and discussion via internet blogs,
- sponsorship of a number of education programs for young people designed both to develop understanding of LNG in particular and to increase education levels in general.

In all cases (Government, proponents and opponents) the most used educational media involve personal meetings, and website postings - together with physical “shop-front” displays in the case of the proponents. Particular aspects of the ways in which LCSG public education campaigns are executed by the different proponents are as follows:

Santos has noted that its LCSG public education activities are based upon the following principles:

- too much information is never enough,
- public education must go beyond the requirements of compliance,
- information dissemination should start with the LNG project workforce, then extend to their families and finally to the wider community,
- it is essential to “front up and tell the truth – warts and all” – at all times,
- it is essential to portray credibility and honesty noting that the ways to do this vary with both local and corporate culture,
- the need to establish community committees that fully represent community interest and concerns,
- stakeholders should be made to feel respected, wanted and engaged.

In line with the above principles Santos has established a community committee in Roma which includes representation from the Police, Main Roads (responsible for construction and maintenance of all roads and associated infrastructure in Queensland), health and education authorities, AgForce Queensland (a lobbying organisation for sectors of the Beef Cattle organisation), land holders, local and community councils. It also employs land agents specifically to work with landowners so that CSG exploration, production and transportation activities can be programmed to fit with landowner’s needs and timetables.

In addition, management of indigenous affairs has proved to be extremely effective (<http://www.santos.com/blog/archive/2010/08/24/agreements.aspx>) with the recent signing of some 42 agreements for use of aboriginal land including 7 Indigenous Land Use Agreements (ILUAs) Collectively, these agreements are the largest set of agreements with Aboriginal peoples in Australia’s resources sector history. It has been achieved largely through direct personal engagement between Santos’s Indigenous Affairs Manager and each of the traditional owner groups involved and illustrates the value of having a dedicated and committed single point of contact.

Santos has provided up to A\$3,000 in legal aid to land owners to assist them in clarifying their rights. This situation is currently being reviewed by DEEDI with consideration being given to whether such financial assistance should more realistically be provided by the state.

Queensland Curtis LNG (QCLNG) is recognised as having one of the more impressive sets of tools to engage in public education – primarily due to the wide experience of the BG group in LNG public education in other parts of the world. Their approach is, however, somewhat more formal than that of the other proponents and this has resulted in some credibility problems with stakeholders and landowners in particular.

The QGC has recently established a network of community committees across the project area to provide advice to QGC on community development and opportunities and to act as a forum for information exchange with QGC. The committees are:

- **Gas Fields Regional Community Committee:** Includes representatives from three gas field committees listed below,
- **Northern Gas Fields Community Committee:** Wandoan, Miles, Grosmont, Guluguba, Gurulmundi, Glenaubyn, Bogandilla, Clifford, Kowgurna and Dalwagon,
- **Central Gas Fields Community Committee:** Chinchilla, Condamine, Kogan, Columboola, Cameby, Drillham South, Mangram, Crossroads and Hopeland,
- **Southern Gas Fields Community Committee:** Tara, Dalby, Wieimbella, Beelbee, Daandine, Weranga, Goranba, Kumbarilla, Kuann, Halliford and Marmadua,
- **Pipeline Regional Community Committee:** Cracow, Theodore, Thangool, Biloela, Eidsvold and Monto,
- **QCLNG Regional Community Committee:** Communities located within the Gladstone Regional Council area.

These community committees will also help to identify relevant and meaningful indicators for use in monitoring and reporting on QGC's social and environmental performance. QGC worked with staff from the University of Queensland's Centre for Social Responsibility in Mining (<http://www.csr.m.uq.edu.au/>) to develop the structure, membership and terms of reference for the committees.

Each committee consists of a maximum of 10 people comprised of representatives from major interest sectors including local business and industry, environmental groups, community services, health, education and young people, women, landholders and indigenous people. Meetings will also be attended by senior QGC field and project personnel. Once the committees are well established it is intended that a community chair will run them.

The LCSG public education campaign being conducted by Australia Pacific LNG (APLNG) is strongly influenced by the experience of ConocoPhillips and is based on the following principles:

- Be open and transparent and share your information,
- Target those whom you:
 - most want to impress (politicians, journalists, workforce family members, three levels of Government, officials who will be responsible for approvals),
 - will have to continue dealing with as project neighbors,
 - perceive as antagonists (mainly to reduce their effectiveness),
 - want to have as friends for the future (i.e. young people).

One of the more innovative activities used to implement these principles is the ConocoPhillips LNG Story show. This is a live demonstration of the properties of LNG and can be found at the **originoilandgas** site on YouTube (<http://youtube.com/user/Originaloilandgas>).

The show was developed, and is presented, by Peter Micciche who was for many years Operations Manager at the ConocoPhillips LNG Production Plant in Kenai, Alaska and who now concentrates on presenting the LNG show. In Australia ConocoPhillips partners with Wesfarmers Energy who provide the LNG from their small scale plant in Karratha and who

are interested in educating drivers of heavy transport vehicles fuelled by LNG. As part of its LCSG public education campaign, ConocoPhillips have taken the LNG show on the road and recently gave 18 presentations in 9 locations including the Queensland and Northern Territory Parliaments. The show targeted politicians, journalists, key stakeholders and all three levels of Government and officials needed to get project approvals. It also targeted schools and the families of LCSG industry workers and antagonists like the NGO Save Curtis Island.

This so called “LNG Road Show” has proved quite effective in changing the outlook of a number of stakeholders, (particularly journalists) as their level of knowledge about LCSG is increased. The show has been long running in the USA but has not been quite so impacting there – probably because the level of activist lobbying is more extensive.

In addition ConocoPhillips has instituted an Energy Challenge program targeted specifically at young people. It is a research-centred program presented by ConocoPhillips employees to 10th grade students who, with their teachers, are exposed to the details of the oil and gas industry, including exploration, production, drilling, transportation, refining and sustainable development. The students work in teams on their chosen projects, which are judged at the end of the year. The students also tour the Darwin liquefied natural gas facility.

4.2.11 Gender Sensitivity

There are a number of gender sensitive issues that are associated with the Gladstone LNG development and several of these require special recognition within a public education campaign. These include:

- engagement of women’s groups,
- education of workforce family members,
- education of indigenous people.

One of the keys to a successful LCSG public education is generally agreed to be the engagement of women’s groups and foremost amongst these are the local branches of the Country Women’s Association of Australia (CWA). The CWA is the largest women’s organisation in Australia and has 44,000 members across 1,855 branches. Its aims are to improve the conditions for country women and children and to try to make life better for women and their families, especially those women living in rural and remote Australia. The organisation is self-funded, non-party-political and non-sectarian.

CWA members have wide community influence, political influence and influence through pressure on their husbands, local agencies and politicians. They are generally considered to have had a pretty sensible and clear view of the LCSG situation and are a prime target for LNG Education. The same remarks apply to other women’s organizations (e.g. Zonta clubs) but those that are city based are likely to have less appreciation of rural issues.

Spouses and extended family members of the LCSG workforce are also key targets for public education as there is, at least initially, considerable concern about the safety of husbands and wives who are employed on LCSG activities. At least one of the LCSG proponents, ConocoPhillips, recognises this concern and regards its own staff and their families as prime targets for LNG education. In addition to the information transfer activities referred to in Section 4.2.10, above, ConocoPhillips holds family events and tours at its plants to familiarise family members, particularly wives and children, with plant activities and safety. The net result is that staff and their families become effective conduits for the transfer of information and public education about LNG.

The engagement and education of indigenous people in the Bowen and Surat basins seems to be significantly more straightforward than reported for the Browse LNG development in the West Kimberley region of Western Australia. This is possibly because central and south-eastern Queensland is much less remote and basic education levels may be higher amongst the indigenous peoples. The same issues relating to indigenous land use and heritage apply in that both men and women have certain sites/locations that are sacred to their gender, but the experience of Santos, for example, in the successful negotiation of ILUAs and other indigenous land use issues, has involved the engagement and education of both women and men (<http://www.santos.com/blog/archive/2010/08/24/agreements.aspx>).

Probably the most widespread issue relates to the need to ensure that indigenous women, in particular, are properly informed of the social implications associated with the LCSG projects.

These relate particularly to increased opportunities for both child and adult education but also to everyday activities such as food gathering and cooking. In this regard it is, again, important to engage women's groups and to ensure that information transfer is appropriate to their interest and needs.

4.2.12 Project Outcomes and Lessons learned

While the Gladstone LCSG projects are still in the development phase several outcomes of the associated public education campaigns can be recognised. These include:

- development of an effective working relationship between the DEEDI and the LCSG proponents,
- establishment of effective communication with community groups so that there is widespread understanding of the projects and their ramifications,
- identification and isolation of those interests and individuals who still have unresolved issues relating to the project so they can be specifically targeted,
- the success of Santos in educating and informing its Traditional Owners about the Gladstone LCSG project to a level where they are able to give their informed consent to the use of their traditional Lands,
- LCSG Developers have burned a lot of Social Capital in the Bowen and Surat basins and some have lost a lot of credibility,
- opposition to LCSG development in the Bowen and Surat basins continues despite the public education campaigns which appear to have made little impression on some of the more vehemently opposed stakeholders such as environmental groups and some landholders,
- both the LCSG proponents and the DEEDI are now fully aware of the importance of a very well orchestrated public education campaign for ensuring the smooth and cost effective progression of a LCSG project in today's society.

In addition to the information gathered as part of this case study we have also accessed several other sources of information about LCSG and other energy sector public education from which several additional lessons can be learned. These sources include:

- *Working with indigenous communities*, produced for the leading practice sustainable development program for the mining industry (<http://www.ret.gov.au/resources/Documents/LPSDP/LPSDPIndigenousCommunitiesHandbook.pdf>),
- *Best Practices for Public Outreach and Education for Carbon Storage Projects*, published by the National Energy Technological Laboratory, USDOE

(http://www.netl.doe.gov/technologies/carbon_seq/refshelf/BPM_PublicOutreach.pdf),

- *Principles for Engagement with Communities and Stakeholders*, published by the Ministerial Council on Mineral and Petroleum Resources (MCMPR), Australia (http://www.ret.gov.au/resources/Documents/mcmpr/Principles_for_Engagement_with_Communities_and_Stakeholders.pdf).

Some of the lessons learned are:

1. Public education and information dissemination is an on-going activity, but one whose configuration will change as a project progresses.
2. Public education and information transfer should go beyond the requirement of compliance.
3. Those energy companies that don't believe they need to go beyond compliance rapidly lose credibility.
4. Planning is essential and stakeholder analysis is important in a tool kit.
5. Public education campaigns should especially target those whom the proponent:
 - most wants to impress (politicians, journalists, workforce family members, three levels of Government, officials who will be responsible for approvals),
 - will have to continue dealing with as project neighbors,
 - perceives as antagonists,
 - wants to have as friends for the future (i.e. young people).
6. Gender based public education through women's organizations - particularly the Country Woman's Association - should be a key focus.
7. Effective communication is established through the formation of community committees and used as a conduit to wider community groups.
8. A public education program should make stakeholders feel respected, wanted and engaged.
9. The LCSG industry and the state should co-ordinate their public education activities to ensure that the same messages are being given.
10. There may be advantages for Industry proponents to work together in the presentation of their public education campaigns.
11. There is value of involving company experts to provide technical information and senior company executives and decision makers to answer questions at public meetings.
12. Corporate culture is a key element in achieving credibility and stakeholders do not appreciate corporate arrogance. They also don't appreciate NGOs grandstanding, exaggerating and providing inaccurate information.
13. LNG industry proponents should not be drawn into debates with activists as part of their public education activities. It is much better simply to state the facts with credible references.
14. For public meetings:
 - all study results and information should be shared in a fully transparent manner – even if they are not to the proponent's advantage,
 - activists should be allowed to take the platform as the local participants will tell them to stop in due course; communities usually self moderate these meetings and this works well in Queensland),

- celebrities tend to attract as much attention to themselves as they do to the pros and cons of the project and may constitute an impediment to genuine community participation,
- care should be taken to avoid overwhelming stakeholders with information as it annoys them and they lose trust; people should be encouraged to say what they want,
- have an independent public meeting facilitator who has credibility e.g. someone from a university, an independent agency or a research institute,
- use digi-voting (electronic voting and audience response systems) to enabling people to express their preferences at an open meeting while remaining anonymous,
- choice of venue and configuration can be a key element in achieving a successful meeting e.g. check conflicting events, times of day.

4.3 Case Study: Guangdong Dapeng LNG Terminal

This case study has been chosen because it represents a relatively new LNG receiving terminal that has established operations in an APEC economy - China. It provides an insight into the LNG public education activities that have been associated with the construction and operation of the terminal and illustrates the way in which LNG public education has been viewed and conducted in this economy.

The Guangdong Dapeng LNG terminal is the first terminal to be built in China to receive imported LNG. The terminal and the associated gas transmission pipelines form the core of a larger natural gas infrastructure plan for Guangdong Province (The Guangdong LNG Project) being developed by China National Offshore Oil Company Gas and Power Ltd. (CNOOC G&P) and involving a total investment of over US\$4.5 billion (30 billion RMB).

Phase I of the Guangdong LNG Project consists of 14 interrelated projects with independent legal entities. In addition to the LNG terminal and the trunk lines, these include 5 new gas fired combined cycle power plants, one power plant conversion from oil to natural gas, 4 city gas projects, one conversion of a town gas plant from naphtha to natural gas feed and the shipping of LNG from suppliers to the terminal, including the construction of LNG carriers for this purpose.

The second part of the plan - the Zhuhai LNG receiving terminal and associated gas pipelines – commenced construction in November 2010 and, when completed, will supply gas to the trunk line network from the west side of the Pearl River delta, whilst the Dapeng LNG terminal supplies the network from the east side as shown in Figure 4.3.1.

The two other major oil and gas companies in China, China National Petroleum Corporation (CNPC) and China Petroleum & Chemical Corporation Limited (SinoPec) are also developing plans for LNG receiving terminals and related infrastructure in Guangdong Province.



Figure 4.3.1: Map of the Guangdong LNG Terminal and Trunkline Project (Source: GDLNG)

Guangdong Dapeng LNG Company Ltd. (GDLNG) (<http://www.dplng.com/en/index.aspx>) was formed in February 2004 and is responsible for the construction and operating the LNG terminal and the trunk lines. It is a joint venture (JV) with eleven partners (see Table 4.3.1).

CNOOC Gas & Power Group Ltd.	33%
BP – England and Wales Pearl River Delta Investment Ltd.	15%
BP – England and Wales Guangdong Investment Ltd.	15%
Shenzhen Gas Corporation Ltd	10%
Guangdong Yudean Group Co. Ltd.	6%
Guangzhou Gas Company	6%
Shenzhen Energy Group Co. Ltd.	4%
Hong Kong Electric (Natural Gas) Ltd.	3%
Hong Kong & China Gas Investment Ltd.	3%
Dongguan Fuel Industrial General Company	2.5%
Foshan Gas Group Co. Ltd.	2.5%

Table 4.3.1 - Partners in Guangdong Dapeng LNG

CNOOC G&P is the largest shareholder with 33% equity whilst BP, through local subsidiaries BP – England and Wales Pearl River Delta Investment Ltd. and BP – England and Wales Guangdong Investment Ltd is the main foreign partner. The other partners are major Guangdong and Hong Kong consumers of the gas sent out by the terminal.

GDLNG entered into a 25-year LNG Sale and Purchase (S&P) Agreement with the Australian North West Shelf consortium for 3.7 mtpa of LNG on an FOB basis. In the first three years of operation 10 million tonnes of LNG was delivered to Dapeng terminal by the first 2 ships built, largely in China, for the Project, namely the “Dapeng Sun” and the “Dapeng Moon”. Since then the “Dapeng Star” has been added to the fleet. The throughput now exceeds the 3.7 mtpa contracted volume and LNG is additionally being delivered by many different vessels from different countries.

Much of the additional throughput has been generated by the signing of an “LNG Terminal Use Agreement” between GDLNG and CNOOC G&P whereby GDLNG provides LNG carrier berthing, cargo unloading and storage, LNG re-gasification and gas delivery services to CNOOC G&P which is purchasing LNG on the spot market and under short term contracts.

Sixty-five percent of the LNG imported directly by GDLNG is used for power generation by power plants in Guangdong (Huizhou and Zhujiang LNG Power Plants) Shenzhen (QianWan, Eastern and Shenzhen Meishi Power Plants) and Hong Kong (Lamma Power Plant extension) whilst just under 35% is allocated to city gas providers in Shenzhen, Dongguan, Guangzhou, Foshan and Hong Kong (see Figure 4.3.1). A small, but increasing, quantity is sold as LNG and used primarily by the transport sector to fuel vehicles at the Yantian Container Port and bus fleets in Shenzhen and neighboring cities.

The primary objective of the Guangdong LNG Project is to relieve energy shortages in the south eastern coastal area of China which has no indigenous fuel source. Prior to the commissioning of the truck loading facility the region had been importing LNG from as far afield as the north-western province of Xinggang.

The use of imported LNG is not only playing an important role in meeting the energy demands of the region but is also bringing about a noticeable reduction in air pollution, mainly through the construction of efficient gas fired, combined cycle power plants which have replaced older coal fired stations.

Due to the very favourable price obtained for the LNG from the North West Shelf consortium, the use of gas from the terminal has also created significant economic benefits for both energy suppliers and consumers.

4.3.1 The Dapeng LNG Terminal and Trunk Line

The Dapeng LNG Terminal is located on a 40 hectare site at Chengtoujiao on the Dapeng Peninsula in Dapeng Bay, east of the city of Shenzhen. It was initially designed for a throughput of 3.7 mtpa of LNG but this has subsequently been increased to 6.8 mtpa.

Construction of the terminal commenced in late 2003 and was carried out in two phases. Phase 1 was completed in May 2006 and Phase 2 (mainly an additional storage tank, additional regasification equipment, and truck loading facilities) in 2008. The first cargo of LNG was received on May 26, 2006 and commercial operation of the terminal was established by the end of September, 2006.

The terminal has a berth capable of accommodating 80,000 to 217,000 M³ LNG carriers which means it can receive the super LNG Q-Flex carriers. 3 full containment LNG storage

tanks, each of 160,000 M³ capacity provide the LNG storage capacity and 9 sets of vaporisers and these include both open rack vaporisers (ORV) with a capacity of 180 T/hr and submerged combustion vaporisers (SCV) with a capacity of 120 T/hr, the latter being used for peak shaving. 4 metering stations control and monitor the send-out gas and LNG is exported from the terminal through a 20-bay LNG truck loading facility.

The gas transmission pipeline of Phase I of the trunk line is 400km in length, consisting of 193 km long, trunk line, 3 sub-trunk lines of total length 178.3 km and 2 branch lines of total length 14 km. The trunk line begins at the Dapeng LNG terminal and then passes through Pingshan in Shenzhen, Dongguan and Guangzhou before finally terminating at Nansha Island in Guangzhou. In total, 20 off-take stations and 24 valve stations are situated along the pipelines (refer to Figure 4.3.1). The diameters of the pipelines range from 323.9 mm to 914 mm and the operating pressure of the pipelines varies between 3.8 and 9.2 MPa.

The distribution networks supply the cities of Shenzhen, Huizhou, Dongguan, Foshan and Guangzhou. In addition a 92 km subsea pipeline delivers gas to a power plant in Hong Kong and a 34 km subsea pipeline provides feed gas to the steam reformers of Hong Kong's town gas production plant.

The total investment for the receiving terminal and trunk line was over US\$1.2 billion (8 billion RMB).

4.3.2 The Regulatory Framework

The initial approval for the Guangdong LNG Project was granted in December 1999 by the former State Planning Commission (SPC), now the National Development and Reform Commission (NDRC) (<http://en.ndrc.gov.cn>). The NDRC - and formally the State Planning Commission - is an agency under the Chinese State Council having broad administrative and planning control over the Chinese economy. The NDRC's functions are to study and formulate policies for economic and social development, to maintain the balance of economic development and to guide the restructuring of China's economic system.

The NDRC has specific responsibility for the formulation of plans for the development of China's energy sector and the management of national oil reserves. In 2008 the semi-independent National Energy Bureau (NEB) was established under the NDRC to undertake this role

The NDRC is also responsible for the examination and approval of major construction projects, including foreign funded key projects in China and key investment projects by Chinese companies overseas.

As the pilot project for the importation of LNG into China, the Guangdong LNG Project was seen as a key project with foreign funding and also a very significant step in the nation's energy policy. It was therefore approved at the highest national level, rather than at provincial level.

Since the Guangdong LNG Project was the first major LNG project in China no specific Guóbiāo (GB) i.e. national standards, relating to LNG had been developed prior to the commencement of the project. A Workgroup for national LNG standardisation was established in 2000 under an initiative of the National Natural Gas Standardization Committee. The Workgroup consists of sixteen companies and is under the leadership of CNOOC G&P with CNPC and SinoPec acting as associate directors. It is responsible for the study of national LNG standards and related standards that will form a complete guide on the establishment and modification of LNG facilities.

Over the past 10 years the Workgroup has systematically studied international LNG standards, has translated the most important of these standards into Chinese and has incorporated them into relevant legislation. To date 21 special LNG standards have been enacted under Chinese law or are in the process of being enacted (Table 4.3.2).

In addition to the 21 special LNG standards, other Chinese and international general engineering standards that have relevance to various aspects of construction of a major LNG facility were identified. These include 22 standards relating to ports and jetties, 661 standards relating to receiving terminals, 13 standards relating to tanks, 98 standards relating to pipelines and 328 standards relating to Health, Safety and Environment (HSE), making a total of 1143 standards that must be followed when designing, constructing or operating an LNG facility. This provides a very comprehensive engineering framework for all LNG facilities in China.

During the construction of the Guangdong LNG project, CNOOC G&P found that the special LNG standards, together with the adopted general standards, were insufficient, especially in terms of quality management and some specific technical areas. The company therefore developed a series of Enterprise Standards (in-house standards) to meet the identified deficiencies (Table 4.3.3).

4.3.3 Project Stakeholders

- In general terms the stakeholders in The Guangdong LNG Project are those listed in section 3.1 of this report. Specifically:
- The key **information source** is GDLNG as the operator of the Dapeng LNG terminal and the trunk lines,
- The key **targets** for public education and information are:
- Local residents who are likely to be impacted, either positively or negatively, by the project,
- All parties having a stake in the downstream distribution of the gas from the LNG terminal,
- The wider community, many of whom who will be consumers of the gas supplied by the LNG terminal and/or the power produced by gas from the LNG terminal,
- The GDLNG workforce and their families,
- School children.

No.	Topic	Title	Originating International Standard
1	Product	General characteristics of Liquefied Natural Gas.	EN1160:1997
2	Production & Transportation	Production, storage and transportation of LNG.	NFPA 59A
3		Installation and equipment for LNG.	EN 1473
4		LNG vehicular fuel systems code.	NFPA 57
5		Typical design specification of pre-stress concrete structure.	CEB-FIP:1990
6		Liquefied natural gas procedure for custody transfer on board ship.	ISO 13398

7		Design and manufacture of site built, vertical, cylindrical, flat-bottomed steel tanks for the storage of refrigerated, liquefied gases with operating temperatures between 0 °C and -165 °C.	BS/ EN14620
8	Analysis & Measurement	Specification of LNG density calculation model.	ASTMD4784-93
9		Refrigerated hydrocarbon fluids – static measurement calculation procedure.	ISO 6578
10		Refrigerated light hydrocarbon fluids - measurement of liquid levels in tanks containing liquefied gases – electrical capacitance gauges.	ISO 8309
11		Refrigerated light hydrocarbon fluids–measurement of temperature in tanks MOD containing liquefied gases–resistance thermometers and thermocouples.	ISO 8310
12		Liquefied natural gas calibration of membrane tanks and independent prismatic tanks MOD in ships physical measurement.	ISO 8311
13		Refrigerated light hydrocarbon fluids - sampling of liquefied natural gas – continuous method.	ISO 8943:1991
14		Liquefied natural gas calibration of spherical tanks in ships part 1: stereo MOD photogrammetry.	ISO 9091-1
15		Liquefied natural gas calibration of spherical tanks in ships part 2: triangular MOD surveying.	ISO 9091-2
16		Liquefied natural gas measurement of liquid levels in tanks containing liquefied gases MOD float type level gauges.	ISO 10574
17		Refrigerated light hydrocarbon fluids - measurement of liquid levels in tanks containing liquefied gases - microwave-type level gauge.	ISO 13689
18		Static and dynamic measurement of liquid light hydrocarbon.	IP 251/76
19	HSE	Liquefied natural gas facilities: federal safety standards.	49CFR 193B
20		Navigation and navigable waters gas waterfront facilities handling liquefied natural gas and liquefied hazardous gas.	33CFR 127
21		Navigation and navigable waters gas regulated navigation areas and limited access areas.	33CFR 165B

Table 4.3.2 – LNG Special Standards Adopted in China

No.	Topic	Title
1	Basic	Specification for standardization management.
2		Standardization of working instructions.
3		LNG project management manual.
4	Preliminary study stage	Instructions for LNG project site selection report.
5		Instructions for LNG project pre-feasibility report.
6		Instructions for LNG project feasibility report.
7		Instructions for LNG project application for approval report.
8	Design stage	Instruction for LNG project engineering basic design.
9	Checking and manual accepting stage	LNG engineering checking and acceptance of completed installations.
10		Instructions for LNG terminal and trunk line checking, acceptance of completed installations and subsequent appraisal reports.
11	HSE	Compilation of LNG Safety Regulations
12		HSE Management Manual

Table 4.3.3 – CNOOC G&P Enterprise Standards for LNG Receiving Terminal and Trunk Line

4.3.4 Project Impacts and Risk Management

- The impacts likely to be associated with the Guangdong LNG project are primarily, the physical hazards associated with all LNG projects as explained in section 2.4.
- In addition there are some environmental impacts associated with the terminal, the trunk line and the downstream distribution networks, but on the up-side the reduction in atmospheric pollution and greenhouse gas emissions associated with the use natural gas rather than coal and oil are significant. There are also economic benefits to the region in terms of job creation and increased commercial activity.

To ensure all environmental and social impacts meet the national requirements and the best international practice, GDLNG commissioned the South China Sea Institute of Oceanology and Atkins China Ltd. to conduct an Environment and Social Impact Assessment (ESIA) prior to commencement of the Guangdong LNG Project. The ESIA was approved by the State Environmental Protection Administration. During the formal EIA review process, the Project was acknowledged as an environmental improvement initiative since it will ultimately provide a cleaner alternative source of energy to domestic customers and electricity generators alike.

- Risk management within GDLNG focuses on the adoption and compliance with a comprehensive set of engineering standards, including the specific LNG standards, the use of equipment with high integral safety, automated control and monitoring systems and patrols and video surveillance. Health, Safety, Security and the Environment (HSSE) training is given high priority and good performance is recognised and rewarded.

4.3.5 The Public Information and Education Program

- GDLNG itself does not have experience in LNG public education but the foreign partners do have such experience and the JV has clearly assimilated this together with that the Chinese partners from the oil and gas industry, to create an effective LNG public education campaign.
- In common with most other Asian cultures the community is accepting of projects that are established by state enterprises so the need for “winning over” the public to the Guangdong LNG Project is minimal. The primary objectives of the campaign, therefore, are to bring benefits to the communities impacted by the LNG Project and to present GDLNG as a dependable and conscientious operator and a “good corporate citizen”.
- Public attitudes towards the Guangdong LNG Project are generally positive since the location of the Dapeng terminal is remote from any large community and has had little negative impact on members of the public, although it has made a visual impact on the coastline.
- There are, on the contrary, considerable benefits associated with the Project which have made local government, commercial interests and local community representatives almost universally in favour of it. The associated benefits include:
 - Wealth creation,
 - Regional development,
 - Job creation,
 - Social and socioeconomic growth for the community.

The campaign can be defined under two headings – Social Responsibility & Wellness and Education.

4.3.6 Social Responsibility

The Social Responsibility and Wellness program involves sponsorship of a number of social welfare activities in the local community as well as making charitable donations to disaster victims and charitable bodies, both at a local and a national level.

The sponsorship program has included:

- The provision of medical equipment for the local hospital,
- The provision of sports facilities for the local community,
- The provision of water purification facilities for a local village.

The company has also initiated and/or supported various events aimed at enhancing environmental awareness such as:

- An annual harbour day in Shenzhen,
- Shenzhen’s Ocean Day fish proliferation discharge activity.

The charitable donations program has included donations to:

- The Sichuan Earthquake Fund,
- The snow disaster area,
- The Guangdong Poverty-relief Funds Committee for storm and flood victims,
- The Shenzhen Police Force Charitable Fund.
- Annual donations to the Dapeng committee for destitute families in Dapeng town.

The donations to the Dapeng Committee are expressly promoted by GDLNG as a means of maintaining a good relationship with the Committee and of conveying the company's appreciation to the Dapeng community for their understanding and support of the construction and operation of the Dapeng LNG terminal. The company's publications refer to the Dapeng Committee's affirmation, recognition and appreciation of GDLNG's fulfilment of its social responsibility.

4.3.7 Education

The public education campaign is quite extensive and multi-faceted and involves the use of a variety of media. It is designed to:

- Provide information about all aspects of the project and the progress,
- Identify the benefits that the Guangdong LNG Project brings to the development of the region and to the enhancement of the environment,
- Stress the safety aspects of the Project and of the utilisation of natural gas,
- Promote GDLNG as a professional, dependable and responsible corporation that employs and adapts world class technologies and practices and is a leader in China's drive for new and clean energy,
- Boost the awareness of GDLNG's social welfare activities,
- Target young people.

The first element of the public education campaign is the publication of information and the GDLNG website (www.dplng.com/en/index.aspx) is the backbone of this aspect of the campaign. It provides:

- Information about the objectives of the Guangdong LNG Project,
- A profile of GDLNG, the milestones in its establishment, its vision and mission and management principles,
- Fairly detailed technical information about the Dapeng LNG terminal and the trunk line,
- Further details about the various safety features that have been incorporated into the design of the Dapeng LNG terminal and the trunk line,
- Information about LNG stressing its economic and environmental benefits and its inherent safety,
- A Photo Gallery showing pictures of the Dapeng LNG Terminal and the trunk line, as well as fire drills taking place at various locations.

Similar information is contained in a Brochure that is given to visitors and distributed at events in which GDLNG participates.

The company also produces videos covering similar topics, with one specifically focused on the safety aspects of the Project and of LNG in general.

Press releases are issued quite regularly to inform the media about project milestones and interesting events related to the Project and the company.

An E Newsletter, primarily targeted at employees and their families, is issued 3 or 4 times a year.

The second key part of the public education campaign is site visits. GDLNG hosts many visitors every year, mainly to the Dapeng LNG terminal. Visitors are largely from local organisations and from LNG interest groups throughout China, but also include

representatives from the LNG industry worldwide. The Dapeng LNG Terminal has well trained staff and excellent facilities to handle all such visits. Figure 4.3.2 shows visitors to the terminal being guided through a 3-D model of the facilities.



Figure 4.3.2 – Visitors at the Dapeng LNG Terminal Visitor Center (Source: GDLNG Website)

The third key part of GDLNG’s public education campaign is based on community safety programs, such as talks to contractors on safe excavation practices, which have provided an effective communication bridge between the company and the local community.

A core part of this program is the School Education Program in which the company conducts educational activities in schools near the LNG terminal and along the trunk line. These activities are designed to increase education levels on safety and the environment in general and the understanding of the role of LNG in particular. Since the construction period, GDLNG 15 schools have joined the program. Volunteers from GDLNG’s HSE Department and other GDLNG staff visit the schools to give talks and to conduct activity programs which have included an environmental protection week and an essay contest.

Finally GDLNG focuses a lot of effort on the development and well being of its employees through:

- a wide variety of internal and external training courses to improve employees’ knowledge and skills and increase opportunities for promotion,
- employee communication sessions and satisfaction surveys to improve efficient communication between the company and its staff,
- recreation and sports activities organized by the Labour Union of the Administration Department,
- participation in the Foreign-Invested Enterprises Sports Game in Shenzhen,
- a social club to make staff’s leisure life more colourful.

A well trained and satisfied employee not only performs well but projects a good image of the company to his/her family and friends and to the wide community that he/she interacts with. This is a particular effective strategy in small towns and villages where a significant proportion of the community are employed by the company.

4.3.8 Gender Sensitivity

We have been unable to identify any gender issues that have been, or are being, addressed as part of the Guangdong LNG project public education activities.

4.3.9 Project Outcomes and Lessons Learned

The Guangdong LNG project still has some way to go before its completion although the Dapeng LNG Terminal is now well established and operating routinely. Several of the outcomes of its associated public education campaign include:

- Establishment of an effective working relationship between the LNG company operating the project and the local community,
- Establishment of effective communication initiative to provide stakeholders with information so that there is widespread understanding of the project and its ramifications.

Some of the lessons learned are that:

1. Public education and information dissemination is an on-going activity, but one whose configuration changes as the project progresses.
2. A public education program should make stakeholders feel fully informed.
3. An LNG public education campaign should target young persons.
4. Provision of social welfare assistance is an effective way of engaging with the community and creating an environment in which an LNG project is seen as friendly to the community and its stakeholders.
5. In an economy where an LNG project is regarded as a National Project, fully supported by both central and local government, the level of public opposition is not great, and a public education program is, perhaps, less important than in an economy where the project is seen to be a largely private sector activity.
6. The public education activities established by the Guangdong Dapeng LNG Company represent one of the better examples of contemporary practice.

4.4 Case Study: Incheon LNG Terminal, Republic of Korea

This case study has been chosen because it represents a large, well established, LNG receiving terminal operating in the world's second largest LNG importing APEC economy after Japan. It provides an insight into the LNG public education activities that have been associated with establishment and ongoing operation of several LNG terminals and illustrates the way in which LNG public education has been conducted by the Korea Gas Corporation (KOGAS) (http://www.kogas.or.kr/kogas_eng/html/main/main.jsp), which owns and operates 3 LNG receiving terminals in Korea.

The drivers for the widespread introduction of LNG in Korea are largely economic and are predicated on the fact that, like its near neighbor, Japan, Korea has very few indigenous primary energy resources. LNG does, therefore, play a key role in addressing energy demands in a large part of the country.

4.4.1 The KOGAS LNG Projects

Korea has a natural gas transmission system and a city gas distribution network. The natural gas transmission system is owned by KOGAS and now has 9,063 km of main lines and 19,250 km of branch lines. Natural gas is delivered through this network to 17 power

generation plants, owned by 10 electrical power companies and to 29 city gas companies who supply their end users through more than 28,313 km of city gas pipeline network.

KOGAS is a public company that is largely Korean owned. Its shareholders are:

- Central Government: 26.86%
- KEPCO: 24.46%
- Local Governments: 9.81%
- Public Shares (total): 61.13%
- Employees: 4.16%
- Treasury: 6.05%
- Foreigners: 7.02%
- Domestic Individuals & Institutions: 21.64%
- Other Shares (total): 38.87%

KOGAS currently operates three LNG terminals:

- one in the country's north-western port of Incheon about 30 km south west of the capital, Seoul,
- one in the mid-western port of Pyeongtaek in Asan Bay in Gyeonggi Province about 64 km south of Seoul, and
- one at the southern port of Tongyeong about 100km west of Busan.

The most recent LNG terminal to be commissioned in Korea is owned and operated by Pohang Iron and Steel Co. (POSCO) and is sited close to its Kwangyang Works in South Cholla Province. POSCO is the main iron and steel producer in Korea.

KOGAS plans to build an additional a new LNG terminal is under construction at Samcheok on the east coast.

The number of LNG storage tanks, the re-gasification capacities and the footprint for each of these terminals are listed in Table 4.3.1 and their locations are shown in Figure 4.3.1. Future development plans include an additional 6 200,000 m³ storage tanks at both Tongyeong and Pyeongtaek.

Terminal	Number of Tanks	Site Area (m ²)	Storage Capacity (million kl)	Regasification Capacity (ton/hr)
Pyongtaek	12	601,000	1.28	3,376
Incheon	22	992,000	3.00	3,870
Tongyeong	10	1,322,000	1.4	1,530
Kwangyang	2	264,000	0.2	194
Total	46	3,179,000	5.88	8,970

Table 4.4.1 LNG Receiving Terminals



Figure 4.4.1: Korean LNG Terminal Locations

4.4.2 The Incheon LNG Terminal

The Incheon LNG terminal is one of the biggest in the world and commenced operations in 1996 with 3 LNG storage tanks (each 100,000m³) and 360t/hour of re-gasification capacity. The terminal (Figure 4.4.2) has been continuously expanded in order to meet increased LNG demand. It now has 22 LNG storage tanks, 10 of which are above-ground full containment tanks, with the other 12 being in-ground tanks. 2 of the 12 in-ground tanks, each with a capacity of 200,000m³, were commissioned in June 2009 bringing the total storage capacity of the terminal to 3 million cubic meters.



Figure 4.4.2: Model Overview of the Incheon LNG Receiving Terminal (2008) (Source: KOGAS website)

4.4.3 The Regulatory Framework

Following recent gas industry reform, the earlier Ministry of Commerce, Industry and Energy (MOCIE) has now become the Ministry of Knowledge Economy (MKE) and is the ultimate LNG industry regulator in Korea (<http://www.mke.go.kr/language/eng/index.jsp>).

The MKE develops policy, provides project approvals and, together with local provincial government and city councils, regulates energy prices. Provincial governments are responsible for regulating retail energy supply, covering roughly the same tasks that MKE handles nationally.

The regulatory and functional relationships involved are illustrated in Figure 4.4.3.

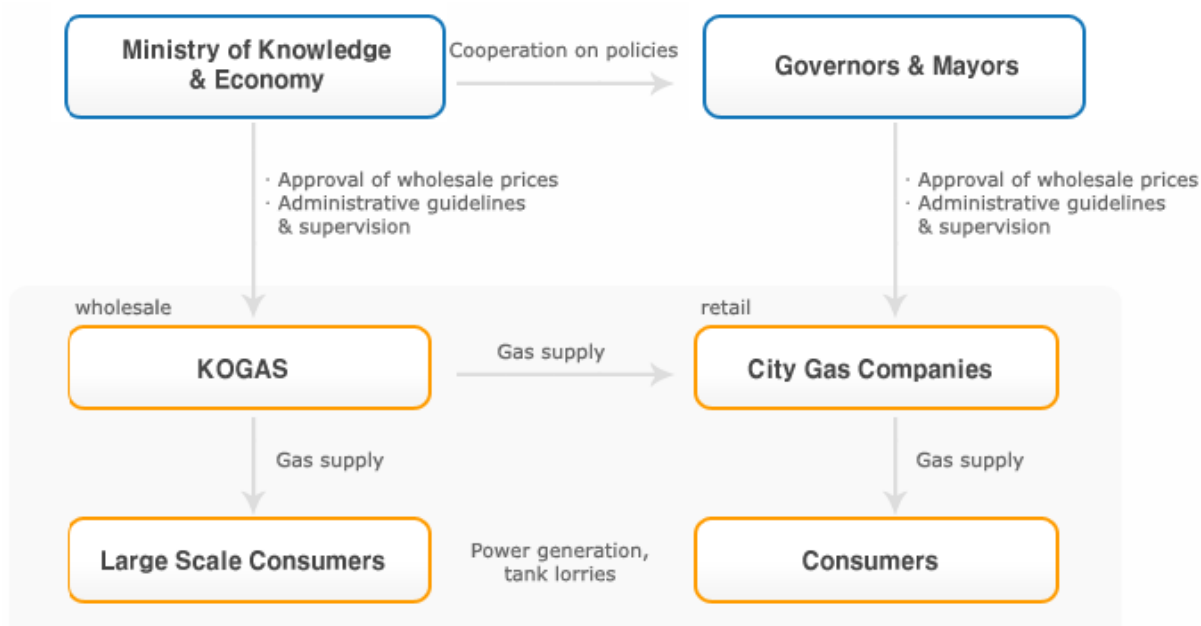


Figure 4.4.3: Regulatory and Functional Relationships of LNG and Gas Supply in Korea (Source: KOGS website)

The legislation governing the Korean gas industry is based on three acts:

- The High-Pressure Gas Safety Control Act (HPGSCA) under its section on “Special Facilities.
- The Safety Control and Business of LPG Act.
- The Urban Gas Business Act.

The regulations governing LNG activities are based mainly Korean Industrial Standards which largely follow international standards such as NFPA 59A (2010), EN 1473 2007), EN14620-1~5 (2006), API 620 App.Q (2008) and RPIS RPAS (2002).

Korean standards and codes are classified into Korean Industrial Standards which are voluntary standards and Korean Gas Safety (KGS) standards which are mandatory. Codes for LNG storage tanks are applied and managed in accordance with the mandatory codes based on the High-Pressure Gas Safety Control Act, and are as shown in Table 4.4.2.

Code No.	Title	Year of Issue
KGS AC 115	Inspection Code for Manufacture of LNG Storage Tanks	2008
KGS PV 015	Code for Full-containment LNG Storage Tanks	2002
KGS PV 000	Code for Above-ground Membrane Storage Tank	2009

Table 4.4.2: Applicable KGS Codes

4.4.4 Project Stakeholders

In general terms, the stakeholders in the Incheon, Pyongtaek and Tongyeong LNG terminals are those listed in Section 3.1 of this report. More specifically, however, the key stakeholders are as follows, listed in terms of whether they are sources of public education information or its targets.

The key **Information sources** are:

- The Ministry of Knowledge Economy, as the government LNG regulatory agency,
- The Korea Gas Corporation (KOGAS) as the operator of the Incheon, Pyongtaek, Tongyeong terminals and the future Samcheok LNG terminal,
- Pohang Iron and Steel Company (POSCO).

Additional stakeholders who can be regarded as sources of information include:

- The Provincial governments of Gyonggi, South Gyeongsang and Gangwon provinces.
- Local Incheon, Pyongtaek, Tongyeong and Samcheok city councils.
- Public research institutes that support ministries with analysis and development of policy measures, including:
 - The Korea Energy Economics Institute (KEEI). KEEI's activities include modelling and forecasting energy trends to support the development of National Energy Plans and Energy Policy. It deals with the electricity and gas sectors.
 - The Korea Institute of Energy Research (KIER). KIER tests new energy technologies as part of the government's certification process.
 - The Korea Energy Management Corporation (KEMCO). KEMCO is responsible for collecting data on the energy sector and developing energy policy for the government.
 - The government also partially owns the wholesale energy production and supply companies, including the Korean National Oil Corporation (KNOC), KOGAS and KEPCO.

The Korea Electric Power Corporation (KEPCO). KEPCO is responsible for power transmission, distribution and sales of power generated from imported LNG. Five private electricity companies have been operating KEPCO's previous generation assets since the power sector reform in 2002.

The key **targets** for public education and information are:

- the LNG project workforce and their families,

- local residents who are likely to be impacted, either positively or negatively, by the project,
- the wider community who will be recipients of the gas supply,
- school children,
- social Welfare recipients,
- the wider international community.

4.4.5 Project Impacts and Risk Management

The impacts likely to be associated with the LNG terminals in Korea are, primarily, the physical hazards common to all LNG projects as explained in Section 2.4.

Risk management currently focuses on improving safety standards, engineering codes of practice and regulations being administered by the Ministry of Knowledge Economy (MKE) and on maintaining high levels of inspection and compliance.

There are some environmental impacts associated with the downstream pipeline distribution network, but these do not seem to have been targeted specifically by the KOGAS public information campaign. On the up-side the atmospheric emissions associated with natural gas use are significant in terms of reduced carbon emissions. There are also economic benefits to the region in terms of job creation and increased commercial activity.

4.4.6 The Public Information and Education Program

In the case of the KOGAS LNG operations, the public education campaign is effectively being pursued only by the proponent and operator – KOGAS. The company has quite a long historical experience of LNG public education but has clearly assimilated a lot of wider industry experience in this area.

The objective of the LNG public education campaign appears to be presentation of a strong and reassuring “good citizen” image to the public.

In common with most other Asian cultures the community is used to accepting projects that are established and supported by government and the philosophy of the LNG Education activities is to provide information about the project and to promote the reliability of the operations. To this end, the program is designed to:

- provide information about all aspects of the project as it progresses,
- target young people,
- contribute to, and engage in, social welfare activities.

4.4.7 Program Overview

Public attitudes towards the KOGAS LNG activities are unclear. Clearly, there is considerable developmental potential associated with such a large project and local government, commercial interests and community developers are likely to be almost universally in favor of it. The associated benefits are extensive and include:

- wealth creation,
- regional development,
- job creation,
- social and socioeconomic growth for the community
- security of energy supply

- limiting atmospheric emissions.

The potential physical, environmental and social impacts associated with LNG in Korea are addressed roughly equally but the public education campaign is designed to provide information about the benefits and benign nature of LNG rather than about its potential or perceived risks. The public education campaign that is being conducted as part of KOGAS's LNG development program is quite extensive and multi-faceted and involves the use of a variety of media including posting information on the KOGAS corporate website (http://www.kogas.or.kr/kogas_eng/html/main/main.jsp) and publication in the media. The central element of the public education campaign is, undoubtedly, KOGAS's Gas Science Museum (http://www.kogas.or.kr/museum_in/eng/01_intro/01.jsp).

KOGAS's overall Public Information program seems to have two different focuses, viz:

- a **Public Education** focus that is designed to teach both stakeholders and the general public all about LNG,
- a **Public Relations**, or company promotion, focus with the objective of presenting a strong and reassuring "good corporate citizen" image to the public.
- Clearly, the two overlap so there is an effective continuum of information being made available.

In common with most other Asian cultures the community is used to accepting projects that are established and supported by government, and the philosophy of the KOGAS LNG educational activities is to provide information about the project and promote the reliability of the company and its activities, rather than trying to address public opposition. To this end, the program is designed to:

- provide information about all aspects of the project as it progresses,
- inform the public about all aspects of LNG and natural gas utilisation,
- target young people,
- contribute to, and engage in, social welfare activities.

4.4.8 Program Execution

The public education campaign involves the use of a variety of media which include:

- physical displays,
- media releases,
- hard copy written and visual material,
- electronic copy,
- Sponsorships.

Foremost amongst these is KOGAS's Gas Science Museum which is located close to its Incheon LNG terminal. This is a campus that includes an 88m tall observation tower with numerous telescopes that provide close up views of different parts of the terminal facilities, a Gas Science Museum and a Science Plaza. Tours lasting one and a half hours are provided free, 6 days of the week. The facility is designed to provide visitors with an understanding of all aspects of the LNG chain including LNG production, transportation, storage and handling, re-gasification and gas send-out and distribution.

The Gas Science Museum is orientated both towards informing the public and to engaging and teaching young people about LNG and how it is used for the benefit of the people of Korea.

Media releases use publication in newspapers and television presentations which include commercials and short film clips providing updates on the events and progress of KOGAS activities. Hard copy information is provided in terms of written brochures and several short video presentations - most of which are also posted on the KOGAS Company website. A report on the sustainability of LNG as a source of energy for Korea explains some of the company's philosophy (<http://www.lacp.com/2009spotlight/8190B.HTM>) in engaging with its stakeholders.

Most of the available information is provided in electronic format and is accessible on the KOGAS website (http://www.kogas.or.kr/kogas_eng/html/main/main.jsp). This website includes a bi-monthly newsletter, short visual presentations and an LNG brochure, together with a number of photographs of KOGAS LNG facilities. It also includes a section designed to engage young persons and to inform and educate them about LNG and how it is used to the advantage of their society (<http://www.kogas.or.kr/child/index.jsp>). In addition to the foregoing, KOGAS also mounts a serious public relations campaign designed, primarily, to present the company image as a 'good citizen' and to build confidence in the company name. This includes:

- promotion of the KOGAS name, logo, mascot, colour scheme and symbols for its social engagement activities,
- explanation of its Environmental, Health and Safety (EHS) programs,
- sponsorship of a number of educational activities, mostly targeted at schools and young people, and designed both to increase education levels in general and understanding of LNG in particular,
- sponsorship of several social welfare activities which include provision of financial and material assistance in the areas of:
 - sports – the KOGAS TaeKwondo team,
 - the Cheong Service Corps which provides funds for specific social projects that are submitted for approval by public proponents,
 - discounts for charities.

4.4.9 Gender Sensitivity

The KOGAS LNG public education activities make a point of noting the advantages that natural gas, imported as LNG, provides to residential consumers and illustrates, in the website, the use of natural gas in homes where women are significant beneficiaries. Apart from this, there does not appear to be any specific targeting of either women or men in the company's LNG public education activities.

4.4.10 Project Outcomes and Lessons Learned

The KOGAS LNG terminals are now well established and bringing benefits to a large number of natural gas consumers in Korea. Several of the outcomes of the associated public education campaign include:

- establishment of effective communication initiatives to provide both the public and other stakeholders with information so that there is widespread understanding of the project and its ramifications,
- establishment of an effective working relationship between the LNG company operating the project and the local community,
- establishment of a program designed to engage and educate young persons about LNG and how it works for the benefit of society.

Some of the lessons learned are:

1. Public education activities that are orientated to promoting the reliability of the operations of a major LNG operator, engaged in these operations with the support of government, are acceptable to the public in the cultural environment of an Asian economy.
2. Establishment of a free information centre (the Gas Science Museum) is a good way to engage and inform the public about LNG.
3. An LNG public education campaign should target young persons.
4. Provision of social welfare assistance is an effective way of engaging with the community and creating an environment in which an LNG project is seen as friendly to the community and its stakeholders.
5. In an economy where an LNG project is regarded as a National Project, fully supported by both central and local government, the level of public opposition is not great and a public education program is, perhaps, less important than in an economy where the project is seen to be a largely private sector activity.
6. The public education activities established by KOGAS represent one of the best examples of contemporary practice in Asian economies.

4.5 Case Study: Rayong LNG Terminal, Thailand

This case study has been chosen because it represents a new LNG receiving terminal being established by a National Energy company, PTT. It provides an insight into the LNG public education activities that are being used in an APEC economy that already has experience in the operation of a natural gas transmission and local supply network.

The PTT Public Company was formed in 2001 with the partial privatization of the Petroleum Authority of Thailand. Its shareholders are:

The Ministry of Finance: 52%

General Public: 33%

Vayupak Fund: 15%

In 1981, the Petroleum Authority of Thailand (PTT) laid Thailand's first natural gas pipeline from the offshore Erawan Gas Field to Ban Nong Fab, Mab Ta Phut, in Rayong Province. This marked the beginning of Thailand's commercial natural gas industry. PTT now operates approximately 2,000 km of offshore gas pipelines and 1,200 km of onshore pipelines through its subsidiary PTT Natural Gas Distribution Company Limited (PTT NGD). It transports over 99 million cubic metres per day (MCM/d) (3,500 MMcf/d) of natural gas which is used for electricity generation, industrial applications and petrochemical feedstock.

Thailand's gas demand is now expected to rise to 146 MCM/d (5.14 billion cubic feet per day (Bcf/d)) in 2015 and imports of LNG are required, in addition to pipeline gas from Myanmar, since gas is now used to generate 70% of the country's electricity.

4.5.1 The Rayong LNG Project

PTT LNG Company Limited (PTTLNG) was established in August 2004 as a wholly owned subsidiary of PTT, to build and operate Thailand's first LNG Receiving Terminal (http://www.pttlng.com/en/st_map.aspx) at a cost of \$700 million. PTT will be the terminal operator and 50% shareholder in PTTLNG with the balance of the equity divided between

the state-owned Electricity Generating Authority of Thailand (EGAT) and the privately-owned Electricity Generating Company (EGCO) in which EGAT is also a shareholder.

The main drivers of the PTT LNG project are national economic development and energy security. Also, increased use of natural gas is seen as a means of limiting greenhouse gas and pollutant emissions. The project is well suited to Thailand's situation because:

- seasonality of energy demand is not great,
- there is already a well established natural gas market,
- there is an established gas transmission pipeline system and supporting infrastructure,
- LNG, combined with pipeline supply options from the Joint Development Area (JDA), through the Trans Thai Malaysia Pipeline (TTM), and from Myanmar, provides flexibility for Thailand's natural gas supply,
- Thailand is strategically located for several major sources of LNG (see Figure 4.5.1).



Figure 4.5.1: Location of the Rayong LNG terminal vis a vis Sources of LNG

4.5.2 The Rayong LNG Terminal

The Rayong LNG terminal is located at the Map Ta Phut Industrial Estate in Map Ta Phut, Rayong province (Figure 4.5.2). It is at the feed end of the 290 Km Fourth Gas Transmission Pipeline which will take gas from the LNG terminal to a tie-in station on the existing Wang Noi to Kaeng Khoi Pipeline in Saraburi Province.

The PTT LNG terminal operations are standard storage and regasification operations as illustrated schematically in Figure 4.5.3. The re-gasification uses open rack vaporisers (ORV) and the use of sea water as a heating medium could give rise to some public concern on environmental grounds.

The LNG terminal is being built in two phases as illustrated in Figures 4.5.4 and listed in Table 4.5.1. The construction of Phase 1 is well advanced and is on target for completion in Q3 2011. Phase 2 is expected to involve the construction of an additional 160,000 m³ LNG tank.

PTT will initially import 1 mtpa of LNG from Qatargas 2 Train 5, with first deliveries scheduled for 2011, but plans to ramp up imports to 2 mtpa by 2014. The Thai government's 15 year power development plan includes importing up to 10 mtpa of LNG. Whilst excess capacity is available, PTT LNG is offering to rent 4 mtpa of the terminal's capacity and is holding talks with a number of LNG producers and LNG purchasers.



Figure 4.5.2: Location of the Rayong LNG terminal at Map Ta Phut

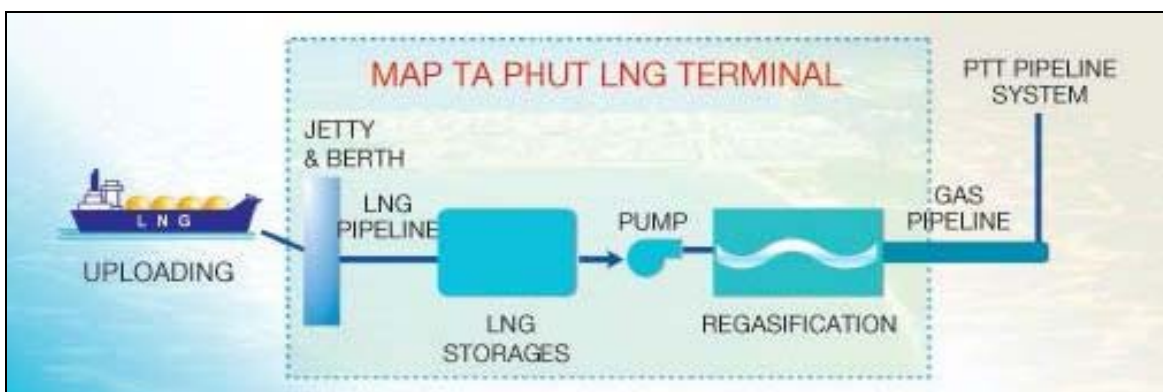


Figure 4.5.3: Schematic Sequence of Operations for Rayong LNG Terminal

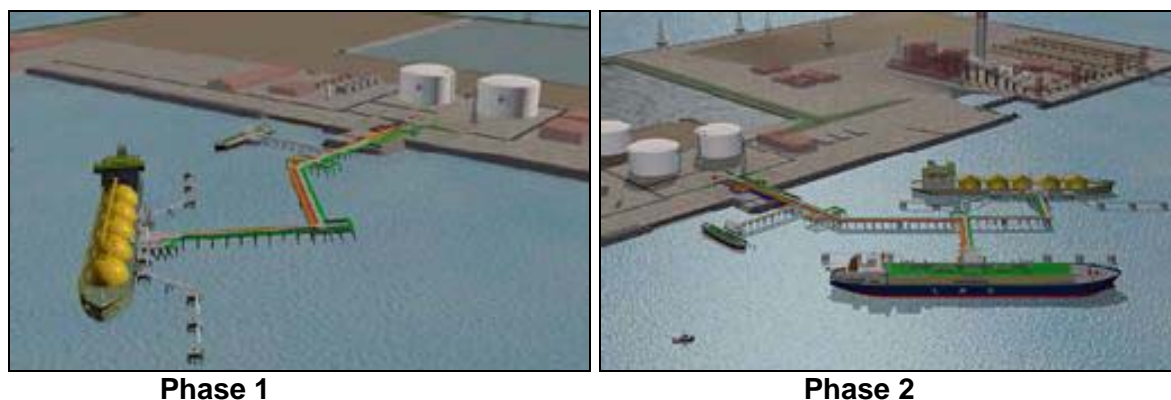


Figure 4.5.4: Model Overview of Rayong Phases 1 and 2 (Source: PTT LNG website)

Facility	After Phase 1	After Phase 2
Jetty	1	1
Berth Capacity (vessel size m ³)	124,000-265,000	124,000-265,000
LNG Receiving Capacity (mtpa)	5	10
LNG Storage Capacity (m ³)	160,000 x 2	160,000 x 3
Vaporisation Capacity (mtpa)	5	5
Commercial Operation Date	Q3, 2011	To be determined

Table 4.5.1: Rayong LNG Terminal Specifications (Source: PTT LNG website)

4.5.3 The Regulatory Framework

The Energy Industry in Thailand is regulated under the Energy Industry Act (B.E. 2550) which came into force in December 2007. The Energy Regulatory Commission (ERC), which was appointed in February 2008, is responsible for regulating the electricity and natural gas (including LNG) industries within the government’s energy policy framework. The Office of the Energy Regulatory Commission (OERC) is the secretariat to the ERC. The key standards and codes on which the governing regulations are based are listed in Table 4.5.2.

Code No.	Title	Source
NFPA 59A	Standard for the Production, Storage and Handling of LNG	USA
EN 1473	Standard for Onshore Installation and Equipment Design for LNG	Europe
SIGTTO	Operating Standard and Best Practices in Gas Tanker and Terminal Operation	International

Table 4.5.2: Key LNG Standards and Codes Adopted in Thailand (Source: PTT LNG website)

4.5.4 Project Stakeholders

In general terms, the stakeholders in the Rayong LNG terminal are those listed in Section 3.1 of this report. More specifically, however, the key stakeholders are as follows, listed in terms of whether they are sources of public education information or its targets.

The key **Information sources** are:

- PTT LNG (http://www.pttlng.com/en/st_map.aspx) as the operator of the Rayong LNG terminal,
- PTT NGD (<http://www.pttngd.co.th/home.asp?sLang=EN>) as the operator of the downstream natural gas distribution system,
- PTT as the major shareholder of PTT LNG and PTT NGD and the LNG importer,
- EGAT and EGCO as shareholders in PTT LNG and the largest consumers of LNG,
- The National Energy Policy Office (NEPO) at (<http://www.eppo.go.th/index-E.html>) as the government LNG regulatory agency.

Additional stakeholders who can be regarded as sources of information include:

- the Provincial Governments of the provinces served by the gas pipeline connecting the Rayong LNG terminal to KaengkhoRayong, namely Chonburi, Chachoengsao, Prachinburi, Nakhonnayok and Saraburi,
- local city councils in Rayong province,
- public research institutes that support ministries with analysis and development of policy measures. These include:
 - the Thailand Institute of Scientific and Technological Research (TISTR),
 - the Energy Research Institute (ERI),
 - the Asian Institute of Technology (AIT),
 - the Thailand Development Research Institute (TDRI).

The key **targets** for public education and information are:

- the LNG project workforce and their families,
- local residents who are likely to be impacted, either positively or negatively, by the project,
- the wider community who will be recipients of the gas supply,
- NGOs concerned about the proliferation of LNG,
- school children.

4.5.5 Project Impacts and Risk Management

The impacts likely to be associated with the Rayong LNG terminal are, primarily, the physical hazards common to all LNG projects as explained in Section 2.4.

Risk management currently focuses on improving safety standards, engineering codes of practice and regulations being administered by the OERC and on maintaining high levels of inspection and compliance.

There are some environmental impacts associated with use of seawater for LNG vaporization and the downstream pipeline distribution network, but these do not seem to have been targeted specifically by the public information campaigns of either PTT LNG or PTT NGD. On the up-side the reduction in atmospheric emissions associated with natural

gas use are significant in terms of reduced carbon emissions and air pollutants. There are also economic benefits to the region in terms of job creation and increased commercial activity.

4.5.6 The Public Information and Education Program

The public education campaign is being pursued primarily by the by the proponent and operator, PTT LNG, and, to a lesser extent by PTT NGD with a focus on downstream natural gas. The latter company has been in the natural gas distribution business for about 30 years as opposed to PTT LNG which has only been in business for about 6 years during the planning and construction phases of the Rayong LNG terminal.

In common with most other Asian cultures the community is used to accepting projects that are established and supported by government, and the philosophy of the LNG Education activities is to provide information about the project, to promote its reliability and to present a strong and reassuring “good citizen” image to the public. To this end, the program is designed to:

- provide information about all aspects of the project as it progresses,
- provide reassurance about the safety and reliability of LNG activities,
- engage young people,
- contribute to, and engage in, social welfare activities.

4.5.7 Program Overview

Public attitudes towards the activities being undertaken by PTT LNG are unclear, but there is no evidence of public protest against the project. Clearly, there is considerable developmental potential and local government, commercial interests and community developers are likely to be almost universally in favor of it. The associated benefits are extensive and include:

- wealth creation,
- regional development,
- job creation,
- social and socioeconomic growth for the community
- security of energy supply
- limiting atmospheric emissions.

The potential physical, environmental and social impacts associated with LNG in Thailand are addressed roughly equally but the public education campaign is designed more to provide information about the benefits and benign nature of LNG, rather than about its potential or perceived risks.

PTT LNG’s overall Public Information program seems to have two different focuses, viz:

1. A **Public Education** focus that is designed to teach both stakeholders and the general public all about LNG,
2. A **Public Relations**, or company promotion, with the objective of presenting a strong and reassuring “good corporate citizen” image to the public.

4.5.8 Program Execution

The public education campaign involves the use of a variety of media which include:

- Media releases,

- Hard copy written and visual materials,
- Electronic copy,
- Sponsorships and community outreach.
- Media releases use publication in newspapers and journals and occasional television presentations which are developed and presented by the media outlets rather than by PTT LNG.

Hard copy information is provided in written brochures and several short video presentations which are mostly in the Thai language so not accessible to those who do not speak Thai.

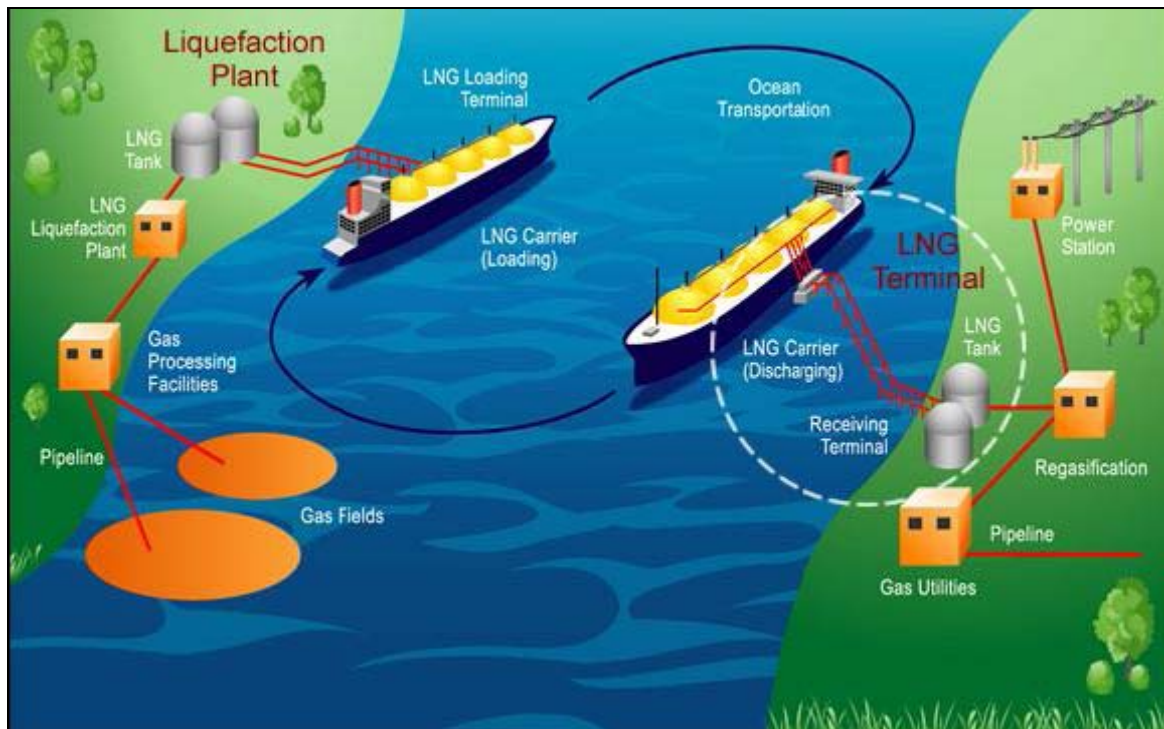


Figure 4.5.4: Presentation of the LNG Value Chain, PTT LNG Website

Most of the information available about LNG activities is provided in electronic format on the PTT LNG Company website (http://www.pttlng.com/en/st_map.aspx). In addition to information about the company, this website presents the project objectives, its composition, an overview of PTT LNG operations, the project milestones and the project journal. It also provides an explanation of what LNG is and how it is brought to market and used as a source of energy. Sections on safety, the environment and corporate social responsibility provide are included together with a number of photographs of PTT LNG facilities. PTT LNG also mounts a public relations campaign designed, primarily, to present the company image as a 'good citizen' and to build confidence in the company name. It includes:

- promotion of the PTT LNG name, logo, colour scheme and symbols for its social engagement activities,
- explanation of its Environmental, Health and Safety (EHS) programs,
- sponsorship of a number of educational activities, mostly targeted at schools and young people, and designed both to increase education levels in general, and understanding of LNG in particular,
- provision of financial and material assistance to several Social welfare activities in the Map Ta Phut local community. These include:

- employment of doctors and medical staff to provide a free health check service and general medical advice,
 - construction of a new, fully equipped, language laboratory and renovation of existing buildings for a local school in the project area,
 - a long term commitment to promote local education by providing scholarships to children in the local coastal fishing community
 - assistance with environmental conservation, particularly of the natural sea resources around the project area, and development of community potential to be more self-sustainable.
- Conduct of specific projects that respond to identified local needs. Examples of projects conducted to date include:
 - a mangrove forest planting project in Chark Mark canal with the involvement of local government, the local community (including voluntary youth), and the IEAT (Industrial Estate Authority of Thailand),
 - establishing a science camp for environmental conservation and rehabilitation. This pilot project not only provides the basic knowledge of science but is also designed to stimulate student consciousness prior to starting a planned coral reef recovery project around Saked Island, which is aimed at protecting, preserving and extending the environmental resources around the LNG terminal area.

4.5.9 Gender Sensitivity

The PTT LNG public education activities do not appear to cater for matters of gender sensitivity. Indeed, the sponsorship of education in schools seems to be more oriented towards boys than girls and most of the job vacancies advertised on the company website specify males only. On the other hand, it would appear that the provision of medical assistance is oriented rather more towards women. Apart from this, there does not appear to be any specific targeting of either women or men in the company's LNG public education activities which have a generally low level of gender sensitivity.

4.5.10 Project Outcomes and Lessons Learned

The Rayong LNG terminal is still being established and its associated LNG public education campaign has been in operation for only about 3 years. Several of the outcomes of the campaign to date include:

- establishment of effective communication initiatives to provide both the public and other stakeholders with information so that there is widespread understanding of the project and its ramifications,
- establishment of an effective working relationship between the LNG company operating the project and the local community,
- establishment of a program designed to engage and educate young persons about LNG and how it works for the benefit of society.

Some of the lessons learned are:

1. In an economy where an LNG project is regarded as a National Project, fully supported by both central and local governments, the level of public opposition is not great and a public education program is, perhaps, less important than in an economy where the project is seen to be a largely private sector activity.

2. Public education activities that are oriented towards promoting the reliability of LNG operations and have the support of government are acceptable to the public in the cultural environment of an Asian economy.
3. Web-based LNG public education initiatives are the main means of information dissemination.
4. An LNG public education campaign should target young people.
5. Provision of social welfare assistance is an effective way of engaging with the community and creating an environment in which an LNG project is seen as friendly to the community and its stakeholders.

4.6 Case Study: Cameron LNG Terminal, USA

This case study has been chosen because it describes the most recently commissioned onshore LNG receiving terminal in the United States of America where opposition to LNG is greater than in most other APEC economies. The associated public education campaign is, therefore, that most recently employed in the USA and represents current best practice in North America.

4.6.1 The Cameron LNG Project

What is now called the Cameron LNG terminal was previously called Hackberry LNG and the two names are sometimes used interchangeably. As described in the Cameron website, (<http://www.sempralng.com>) Cameron LNG was purchased by Sempra Energy from Dynegy in April 2003. In September 2003, FERC issued a permit, and subsequently in April, 2004, authorised the construction of Cameron LNG, one of the first new liquefied natural gas receiving terminals in North America in more than 20 years.

The Cameron LNG terminal is located in Cameron Parish on the Calcasieu Channel, 18 miles from the Gulf of Mexico in Hackberry, La., which is approximately 148 miles east of Houston, Texas, and 230 miles west of New Orleans, Louisiana (Figure 4.5.1). Construction began in August 2005 and commercial operations began in July 2009.



Figure 4.6.1: Location of Existing and Proposed Gulf Coast LNG Projects (Source: Sempra Website)



Figure 4.6.2: Cameron LNG Terminal Site Overview (Source: Sempra Website)

In January 2007, Sempra gained approval from FERC to expand the LNG receiving terminal to 2.65 Bcf/d send-out capacity. The primary upgrades included:

- widening and enlarging the LNG ship unloading slip,
- adding a 518 m (1,700 ft) diameter turning basin integrated into the slip with a depth of 14m (45 ft),
- moving the eastern edge of the slip (and berthed LNG ship) an additional 27m (90 ft) away from the edge of the channel for a total offset of 76 m (250 ft),
- expanding the berthing capability to accommodate LNG carriers having capacities of up to 200,000 m³.

These are depicted in Figure 4.6.2.

The Cameron LNG terminal is 100% owned by Sempra Energy and represents a capital investment of about US\$900 million. It has three full-containment storage tanks, each of 160,000 cubic meters capacity, and two ship berths (Table 4.5.1) and is located only 56 Km (35 miles) from a major pipeline hub that provides access to nearly two-thirds of all U.S. natural gas markets (Figure 4.5.1). The terminal is fully permitted and has 40% of its gas throughput, approximately 17 million MMcmd (600 million cubic feet per day (MMcfd)), contracted through a 20 year Capacity Agreement with ENI S.p.A.

Facility	Cameron LNG	Expansion
Number of berths for LNG ships	2	2
Number of LNG storage tanks	3	4
Peal gas throughput (Bcf/d)	1.5	2.65
Commercial operation date	Q3, 2009	2010

Table 4.6.1: Cameron LNG Terminal Configuration (Source: Sempra Website)

Sempra Pipelines & Storage has also constructed a 58-Km (36-mile) pipeline to transport natural gas from the facility to the existing interstate pipelines to the north.

The drivers for establishment of the Cameron LNG terminal are primarily economic as it provides flexible access to valuable US gas markets and LNG plays a key role in addressing energy demands in a large part of the country.

Specifically, the terminal:

- provides a needed supply of natural gas,
- back-feeds the existing delivery system,
- supplements the regional pipeline system,
- increases the diversity of supply sources,
- strengthens the region’s energy security,
- helps mitigate price volatility.

Other benefits include stimulating the local economy, increasing the tax base for the Cameron, Beauregard and Calcasieu parishes, and having a Fortune 500 company in the community that has demonstrated itself to be a good corporate neighbor. Imported LNG also provides clean and cost-effective natural gas to major urban and industrial consumers thereby reducing greenhouse gas emissions and improving environmental air quality across the region.

4.6.2 The Regulatory Framework

The federal regulatory environment governing LNG in the USA is quite complex and involves several different agencies whose jurisdiction has changed over time and is different for onshore and offshore facilities. In addition, each state jurisdiction has its own regulatory requirements which differ between states. Before discussing the regulatory framework, it is therefore useful to examine how each of the key federal regulatory agencies has evolved.

The four federal agencies that primarily regulate LNG use in the USA are:

- the Federal Energy Regulatory Commission (FERC),
- the U.S. Department of Transportation (DOT),
- the U.S. Coast Guard (USCG),
- the Maritime Administration (MARAD) of the DOT.

In addition, some regulatory powers are also vested in:

- the Environmental Protection Agency (EPA),
- the Fish and Wildlife Service,
- the Army Corps of Engineers,
- the Minerals Management Service,
- the Department of Labour, Occupational Safety & Health Administration (OSHA).

The ways in which the primary regulatory agencies have evolved into their current jurisdictions are briefly covered as follows.

In response to the energy crisis of the 1970s, the US Congress passed the DOE Organization Act (1977), which consolidated various energy-related agencies (the Federal Energy Administration, the Energy Research and Development Administration, the Federal Power Commission, and programs of various other agencies) into a Department of Energy (DOE). Congress insisted that a separate independent regulatory body be retained, and the former Federal Power Commission (FPC) was renamed the Federal Energy Regulatory Commission (FERC), thereby preserving its independent status "within" the Department. In 1978, FERC was given the additional responsibility of regulating wellhead gas sales in both the intrastate and interstate markets and administering a program to foster new cogeneration and small power production under the Public Utilities Regulatory Policy Act of 1978. In 1983, Congress ended federal regulation of wellhead natural gas prices and FERC was tasked with bringing greater competition to both the natural gas and electric industries.

The Energy Policy Act (EPA), 2005 expanded FERC's authority to impose mandatory reliability standards on the bulk transmission system and to impose penalties on entities that manipulate the electricity and natural gas markets. The Energy Policy Act also gives FERC additional responsibilities as outlined in FERC's Top Priorities and updated Strategic Plan (<http://www.ferc.gov/about/about.asp>). As part of these responsibilities, FERC:

- regulates the transmission and sale of natural gas for resale in interstate commerce;
- approves the siting and abandonment of interstate natural gas facilities, including pipelines, storage and liquefied natural gas.

The Zeus Virtual Library provides an excellent summary of the current LNG regulatory framework and administration in its public domain introduction to its LNG Regulatory Database (<http://www.zeuslibrary.com/LNG/regulatory/FederalRegulations.asp>).

This summary, reproduced verbatim as follows, is acknowledged in italics:

Permitting Authority for Onshore Terminals

- **FERC** is the lead agency when it comes to authorizing construction and siting of onshore LNG facilities under Section 3 of the Natural Gas Act. FERC performs an environmental and safety review of a proposed LNG plant and prepares an Environmental Impact Statement (EIS), which is required under the National Environmental Policy Act (NEPA).

- **The U.S. Department of Transportation (DOT)** Office of Pipeline Safety has authority over safety regulations and standards for the transportation and storage of LNG in interstate commerce or foreign commerce under the pipeline safety laws (49 USC Chapter 601).
- **The U.S. Coast Guard**, in connection with onshore facilities and vessels, is responsible for safety and security of port areas under the Magnuson Fishery and Conservation Act (50 USC Section 191), the Ports and Waterways Safety Act of 1972, as amended (33 USC Section 1221, et seq.), and the Maritime Transportation Security Act of 2002 (46 USC Section 701), and has authority for facility security plan review and siting as it pertains to the management of vessel traffic in and around an LNG facility.

States' Rights in Authorizing LNG Facilities

While FERC has exclusive authority under the Natural Gas Act to authorize the siting of facilities for the import or export of LNG; that authorization is conditioned upon the applicant's satisfaction of other statutory requirements. In particular, a state can effectively "veto" an LNG facility by denying permits associated with the Clean Water Act, the Coastal Zone Management Act, and the Clean Air Act. Nothing legislated in the Energy Policy Act of 2005 changed the authority of the states in this regard. What follows are brief descriptions of the three acts mentioned above:

- **Coastal Zone Management Act:** Under Section 307(c), an LNG project developer, or sponsor, must certify that the proposed activity in a designated coastal zone complies with the policies of the affected state's coastal zone management program. If the state does not concur with the certification, a FERC approval to construct will not be granted.
- **Clean Water Act:** Under Section 401, certification of compliance with the state's water quality standards is required from the responsible state agency for any activity that might result in a discharge into navigable waters, including construction and operation of an LNG facility. If the 401 certification is denied, the LNG facility cannot be constructed. Also, under Section 404, a permit is required from the U.S. Army Corps of Engineers for discharge of dredged and fill material.
- **Clean Air Act:** Under Section 502, a permit is required for any person to operate a source of air pollution, as detailed in the Act. If the responsible state agency does not issue the permit, the project cannot go forward.

Beyond its authority based on these Federal statutes, the state also has the ability to be a cooperating agency with FERC during the review of a project under the National Environmental Policy Act (NEPA), and can contribute to the complete environmental review of the proposal.

The FERC Review Process and Oversight of Construction and Operation

Prior to a FERC decision regarding an LNG application, the FERC Office of Energy Projects (OEP) staff prepares an Environmental Assessment (EA) or an EIS under the requirements of the National Environmental Policy Act (NEPA) to inform both the public and the permitting agencies of potential adverse and/or beneficial environmental and safety impacts of a proposed project and its alternatives.

Prior to a project developer/sponsor filing an LNG-related application, its representatives typically meet with OEP staff to explain the proposal and solicit advice. OEP staff will review conceptual designs of planned LNG facilities, provide guidance on resolving potential

environmental, safety, and design issues; and explain the level of design detail and safety analysis required for a complete application.

Projects under review can proceed through either one of two processes: (1) the more formal Pre-Filing process or (2) the Traditional process. Roughly 80% of currently proposed LNG projects go through the pre-filing process while 20% go through the traditional process. The end result of the review process is an EIS that addresses both environmental and safety concerns. Upon FERC approval, the developer will receive: (1) a FERC Order stating its decision on whether to approve construction and operation of the LNG terminal; (2) market rate authority; and (3) conditions that must be met prior to construction. The developer must also secure the following prior to construction from the state in which construction will occur Section 401 permits and Coastal Zone Management clearance.

FERC also monitors the design and construction of the approved LNG project and its commercial operation after commencement of service. After a company receives FERC approval for a project and has met all pre-construction conditions required by a FERC Order, the Director of the OEP will authorize the commencement of construction, after which the developer/sponsor will be required to file monthly reports detailing construction activity; the status of any outstanding project permits; an updated project schedule; and details of compliance with environmental conditions. Also, Staff will visit the project site as it deems necessary throughout the construction phase. Prior to commencement of commercial operations from the LNG facility, the developer/sponsor must receive written approval from the Director of the OEP. Only after complying with all pre-operation conditions set forth in the FERC Order would a company receive authorization to begin operation.

Also, each LNG facility under FERC jurisdiction is required to file semi-annual reports to summarize plant operations, maintenance activity; and abnormal events for the previous six months. In addition, staff periodically conduct inspections of an LNG facility throughout its operational life.

The pre-application stage mentioned above is designed to streamline project approvals. It gives potential applicants the early opportunity to confer with FERC, MARAD and the USCG to provide an overview of their proposed project, discuss the intricate details of the federal and state application and licensing process, introduce key personnel, and discuss specific financial requirements. Applicants are encouraged to conduct similar meetings with state and local agencies to review and discuss state requirements and interests. Similarly, approvals can be expedited by combining the federal and state environmental review processes which follow the sequence:

- public notification,
- data gathering and analysis
- submission of the Draft Environmental Impact Study (DEIS),
- public meetings and consultation to discuss the DEIS,
- submission of the final Environmental Impact Study (EIS),
- issue of a Commission Order for the project to proceed.

The following regulations provide guidelines for the design, construction and operation of LNG facilities. A summary of the regulations can be found in a paper entitled “LNG Safety and Security” published by the Center for Energy Economics (CEE). (http://www.beg.utexas.edu/energyecon/lng/documents/CEE_LNG_Safety_and_Security.pdf) American standards include the following:

1. 49CFR Part 193 *Liquefied Natural Gas Facilities: Federal Safety Standards* – This section covers siting requirements, design, construction, equipment, operations, maintenance, personnel qualifications and training, fire protection, and security.
2. 33CFR Part 127 *Waterfront Facilities Handling Liquefied Natural Gas and Liquefied Hazardous Gas* - This federal regulation governs import and export LNG facilities or other waterfront facilities handling LNG. Its jurisdiction runs from the unloading arms to the first valve outside the LNG tank.
3. NFPA 59A *Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)* – This is an industry standard issued by the National Fire Protection Association (NFPA). NFPA 59A covers general LNG facility considerations, process systems, stationary LNG storage containers, vaporization facilities, piping systems and components, instrumentation and electrical services, transfers of natural gas and refrigerants, fire protection, safety and security. It also mandates alternative requirements for vehicle fueling for industrial and commercial facilities using American Society of Mechanical Engineers (ASME) pressure vessel containers. This standard includes requirements for LNG facilities to withstand substantial earthquakes. The NFPA standard for level of design means that the LNG facilities are strongly fortified for other events such as wind, flood, earthquakes and blasts. The latest update of NFPA 59A was published in 2010.
4. NFPA 52 *Vehicular Fuel Systems Code* – This standard incorporates NFPA 57 – (*Liquefied Natural Gas (LNG) Vehicular Fuel Systems Code*), which is now obsolete. In the sections on LNG it covers vehicle fuel systems, LNG fueling facilities, installation requirements for ASME tanks, fire protection, safety and security for systems on board vehicles and infrastructure storing 70,000 gallons of LNG or less.

European standards include the following:

5. EN 1473 - The European Norm standard EN 1473 *Installation and equipment for Liquefied Natural Gas - Design of onshore installations* evolved out of the British Standard, BS 77742 in 1996. It is a standard for the design of onshore LNG terminals. This standard is not prescriptive but promotes a risk-based approach for the design.
6. EN 13645 - *Installations and equipment for liquefied natural gas - Design of onshore installations with a storage capacity between 5 t and 200 t.* is used for the design and operation of smaller LNG facilities such as satellite stations and refuelling stations. It also adopts a risk based approach.
7. EN 1160 – *Installation and equipment for liquefied natural gas – General characteristics of liquefied natural gas* contains guidance on properties of materials commonly found in LNG facility that may come into contact with LNG.
8. EEMUA 14743 - *Recommendations for the design and construction of refrigerated liquefied gas storage tanks.* This document contains basic recommendations for the design and construction of single, double and full containment tanks for the bulk storage of refrigerated liquefied gases (RLGs) down to -165°C, covering the use of both metal and concrete materials.

Regulations applicable to LNG ships include:

9. 33 CFR 160.101 *Ports and Waterways Safety: Control of Vessel and Facility Operations.* This U.S. federal government regulation describes the authority exercised by District Commanders and Captains of the Ports to insure the safety of vessels and waterfront facilities, and the protection of the navigable waters and the

resources therein. The controls described in this subpart are directed to specific situations and hazards.

10. 33 CFR 165.20 *Regulated Navigation Areas and Limited Access Areas: Safety zones* (<http://www.hse.gov.uk/hid/land/comah/level3/5C39A0F.HTM>). A safety zone is a water area, shore area, or water and shore area to which, for safety or environmental purposes, access is limited to authorised persons, vehicles, or vessels. It may be stationary and described by fixed limits, or described as a zone around a vessel in motion. It is commonly used for ships carrying flammable or toxic cargoes, fireworks barges, long tows by tugs and events like high speed races.
11. 33 CFR 165.30 *Regulated Navigation Areas and Limited Access Area: Security Zones*. This section defines a security zone as an area of land, water, or land and water that is so designated by the Captain of the Port or District Commander for such time as is necessary to prevent damage or injury to any vessel or waterfront facility, to safeguard ports, harbours, territories, or waters of the United States or to secure the observance of the rights and obligations of the United States. It also determines the purpose of a security zone – to safeguard vessels, harbours, ports, and waterfront facilities from destruction, loss, or injury from sabotage or other subversive acts, accidents, or other causes of a similar nature in the United States and all territory and water, continental or insular, that is subject to the jurisdiction of the United States. Generally, it covers ships with flammable or toxic cargoes, cruise ships, naval ships, and nuclear power facilities and airports.

The major Permits, Approvals and Consultations required for the Cameron LNG terminal are as listed in Appendix 4.6.

It is apparent from the extent of this section that the regulatory regime governing the establishment and ongoing operation of LNG facilities in the USA is much more extensive, and complicated, than is the case in other APEC economies. The regulations require significant engagement with both stakeholders and the general public – primarily through public consultation and the requirement that the DOE must provide public education – but the philosophy seems to be that the regulations will ensure a high level of public and environmental safety.

4.6.3 Project Stakeholders

In general terms, the stakeholders in the Cameron LNG terminal are those listed in section 3.1 of this report. Specifically, however, the key stakeholders are as follows, listed in terms of whether they are sources of public education information or its targets.

The key **Information sources** are:

- Sempra LNG, as the operator of the Cameron LNG terminal,
- the Center for LNG (CLNG) as the LNG industry association,
- FERC, as one of the responsible government LNG regulatory agencies,
- *the U.S. Department of Transportation (DOT), Office of Pipeline Safety*, as one of the responsible government LNG regulatory agencies,
- MARAD, as one of the responsible government LNG regulatory agencies,
- USCG, as one of the responsible government LNG regulatory agencies,
- the Pipeline and Hazardous Materials Safety Administration (PHMSA).

Additional stakeholders who can be regarded as sources of information include:

- the other federal agencies listed in Section 4.6.2, above,

- the other state agencies referred to in Section 4.6.2, above,
- Public research institutes that support ministries with analysis and development of policy measures,
- the Natural Gas Association (NGA).

The key **targets** for public education and information are:

- the LNG project workforce and their families,
- the local and regional fire services,
- local residents who are likely to be impacted, either positively or negatively, by the project,
- the wider community who will be recipients of the gas supply,
- the wider international community.

4.6.4 Project Impacts and Risk Management

The impacts likely to be associated with the Cameron LNG terminal are, primarily, the physical hazards common to all LNG projects as explained in Section 2.4. In this regard it is noted that the physical hazards associated with an LNG receiving terminal located onshore are often of concern to quite a large local community.

Risk management currently focuses on continually improving safety standards, engineering codes of practice and regulations and on maintaining high levels of inspection and compliance.

There are some environmental impacts associated with the downstream pipeline distribution network, but these are already addressed by the regulations and do not seem to have been targeted specifically by the Sempra LNG public information campaign.

On the up-side the atmospheric emissions associated with natural gas use are significant in terms of reduced carbon emissions. The economic benefits, in terms of job creation and increased commercial activity as LNG is used to supplement US natural gas supply, are also substantial.

Most of the concerns relate to:

- the dangers of LNG vapor clouds,
- LNG gas quality specifications,
- questions, about who has primary jurisdiction over LNG development and regulation,
- issues concerning the composition and calorific value of the gas,
- Not-In-My-Back-Yard (NIMBY) attitudes.

In addition, many members of the public are currently concerned that large LNG transport ships, their valuable cargoes, and associated LNG terminals may be potential terrorist targets. As discussed in Section 2.4, this concern is largely unfounded but, clearly, constitutes an area where public education is needed.

4.6.5 The Public Information and Education Program

In the case of the Cameron LNG operations, the public education campaign is being pursued jointly both by US Government agencies – mainly the DOE, Office of Fossil Energy – and by Sempra LNG.

The Energy Policy Act of 2005 requires the Secretary of Energy to convene a series of LNG forums to provide public education and foster dialogue among Federal officials, State and local officials, the general public, independent experts, and industry representatives. The purpose of the forums is to identify and develop best practices for addressing the issues and challenges associated with LNG imports.

To date, four of these forums have been held in areas of the USA where LNG import facilities are under consideration. The first LNG forum was held on March 10, 2006 in Boston, Massachusetts, the second on March 28, 2006 in Astoria, Oregon, the third on June 1, 2006 in Los Angeles, California and the fourth on November 29th, 2006 in Houston, Texas. These regional meetings were held to provide an opportunity for the public to attend and participate but only that held in Houston, Texas, relates to the Cameron LNG operation.

Federal pipeline safety regulations also require pipeline operators to conduct continuing public awareness programs to provide pipeline safety information to four stakeholder audiences:

- those members of the public likely to be affected,
- emergency response officials,
- local Public officials,
- excavators.

Current regulations (49 CFR 192.616 and 49 CFR 195.440) require pipeline operators to develop and implement public awareness programs consistent with the requirements of the Pipeline Safety Improvement Act (PSIA) of 2002 and the guidance provided by the American Petroleum Institute (API) Recommended Practice (RP) 1162, "*Public Awareness Programs for Pipeline Operators*".

Under these regulations, pipeline operators must provide the affected public with information about how to recognise, respond to, and report pipeline emergencies. Emergency officials and local public officials must be provided information about the location of transmission pipelines to enhance emergency response and community growth planning. Affected municipalities, school districts, businesses, and residents must be advised of pipeline locations. Of particular significance is the requirement that operators must periodically review their programs for effectiveness and enhance the programs as necessary.

As a regulatory requirement, API RP 1162 was developed through the collaborative efforts of pipeline industry representatives, federal and state pipeline safety regulators and the public. This industry consensus standard provides guidance and recommendations to pipeline operators for the development and implementation of enhanced public awareness programs. It addresses various elements of such programs, including the intended audiences, the kinds of information to be communicated, frequencies and methodologies for communicating the information, and evaluation of the programs for effectiveness. A nonprintable electronic copy of API RP 1162 may be viewed and downloaded from the American Petroleum Institute.

The public education campaign mounted by the Cameron LNG terminal operator, Sempra LNG, started with the public consultation meetings held as part of its statutory requirement to inform the public as part of the project approval process. Following project approval its public education activities appear to have been directed primarily towards promotion of the company as a good citizen and safe operator of the Cameron facilities and providing information about the project as it progresses.

There has, however, been considerable opposition to the terminal location with the main objectors being other port users. As a direct manifestation of this opposition, the Lake

Charles Harbour Safety Committee, spurred largely by CITGO Petroleum and other major channel users, commissioned a “*Calcasieu Channel Passing Study*” for the facility and several other safety studies were later commissioned directly by stakeholders such as CITGO. The results of these several studies seem to be at variance but not all have been released and there is still some concern about safety involving the large number of ships that pass the terminal.

4.6.6 Program Overview

In overview, the public education program and activities in the USA are largely led by Government agencies as explained in the previous section. The philosophy seems to be that the considerable regulatory framework that has been established will be sufficient to ensure that public and that engagement with, and input from, the public must be according to the rules of the lead government agencies.

Apart from the statutory requirements for consultation with the public LNG proponents and operators, such as Sempra LNG, seem to be focused on providing information via the internet and interacting with the public through funding of local social projects. In this regard, it is noted that the Cameron LNG public education campaign is really part of a much wider Public Relations activity designed to promote the company name and corporate image.

This philosophy is somewhat different from that followed by most other APEC economies but fits well with the highly regulated, and legally focused, framework that operates in the USA.

The information that is presented on the websites of both the government agencies and Sempra LNG is very informative but it does not seem to address the sorts of questions that the general public would like answered about matters relating to safety and potential environmental impacts. Rather, it is focused on what the information providers think the public need to know, and will be interested in, and is orientated towards explanation of the technology and the benefits.

As noted in previous case studies, there is considerable developmental potential associated with such a large project and local government, commercial interests and community developers are likely to be almost universally in favor of it. The associated benefits are extensive and include:

- wealth creation,
- regional development,
- job creation,
- social and socioeconomic growth for the community
- security of energy supply
- limiting atmospheric emissions.

It is the promotion and delivery of these benefits that are the focus of the LNG Public Education campaign currently being pursued by Sempra LNG.

It should be noted, however, that a number of the stakeholders who use the Calcasieu Channel did not feel that their concerns were fully addressed so to this extent neither the public consultation nor engagement beyond compliance phases of the stakeholder engagement process were considered to be satisfactory. Indeed, there is still a body of opinion that feels the approvals were given before engagement with stakeholders had reached a reasonable conclusion.

4.6.7 Program Execution

The LNG public education campaign involves the use of a variety of media which include:

- Presentation of Public Forums,
- Media releases,
- Hard copy written and visual material,
- Electronic copy.

The Public Forums were designed to enhance public education and knowledge on the subject of LNG, and to provide the public with the factual information that forms the basis for informed decision-making. They addressed the following issues:

- LNG: What it is, where it comes from, and why we need it,
- LNG siting and environmental review processes,
- LNG federal safety and security requirements,
- LNG risk management.

Panel discussions, presentations, and questions pertaining to the siting of specific LNG projects were considered to be beyond the scope of these forums which were intended to be educational events rather than public hearings related to any siting or licensing proceedings.

In addition, the Pipeline and Hazardous Materials Safety Administration (PHMSA) hosted a workshop, in February 2005 that examined recent developments concerning LNG and the information requirements of communities where LNG facilities are proposed. During that workshop, it was learned that the fire services did not have an impartial, concise source of information about LNG. In response, the PHMSA partnered with the National Association of State Fire Marshals (NASFM), other Federal agencies, universities, and industry to explain LNG in a style readily understood by emergency responders. In June 2005, the NASFM published "*An Overview of the LNG Industry for Fire Marshals and Emergency Responders*". Presentations from that February 2005 workshop, a meeting summary and other related links are available on the internet (<http://primis.phmsa.dot.gov/comm/lng.htm>).

Media releases use publication in newspapers and television presentations which include commercials and short film clips providing updates on the events and progress of the Cameron LNG terminal activities.

Hard copy information is provided in the form of written brochures and several short video presentations - most of which are also posted on the websites of the government agencies and Sempra LNG.

In an effort to continue and grow communications with the community, Cameron LNG formed a Community Advisory Committee in late 2006. The committee is comprised of seven community and business leaders who reflect a cross-section of the demographic and business characteristics of Cameron Parish.

Both as a group and as individuals, the members:

- serve as a sounding board, ensuring greater access by the company to a broader perspective on items including community involvement opportunities,
- provide perspectives on issues and activities impacting the community,
- receive updates on the progress of the Cameron LNG terminal,
- exchange ideas and information and address any community concerns.

Cameron LNG has also established a Community partnership program, administered by the parent company, Sempra Energy that focuses on five key areas in which Sempra considers it can make a difference through the investment of its resources, talents and energy. These are in the areas of:

Environment

Partnerships promoting environmental stewardship, recycling and conservation efforts, and natural resource management are targeted and include:

- supporting wetlands restoration. The company has created more than 100 acres of new wetlands which may be enhanced with the planting of native species and will be maintained and monitored for the next 20 years,
- funding programs that help wetlands thrive, create more waterfowl foraging habitats, improve fisheries and provide for better birding,
- supporting local schools and community groups in community clean up events and efforts to educate residents on environmental stewardship.

Health & Safety

Partnerships promoting health, safety and prevention, and efforts to help people facing adversity are targeted. These include:

- sponsorship of a variety of programs from flu shot clinics to anti-drug programs for students.

Education & Leadership Development

Partnerships promoting programs in the areas of math, science and agriculture as well as student achievement and leadership development are targeted. These include:

- partnering with local schools in Cameron and Calcasieu Parishes to support programs in math, science and agriculture,
- working directly with teachers and school administrators to fund specific programs and projects for individual schools.

Community & Business Development

Partnerships promoting economic vitality in the local community and region are targeted. These include:

- working with community partners such as Hackberry School, Hackberry Community Center, and Hackberry Recreation Center, to take a leadership role in developing two popular local events - Hackberry Summer Splash and Hackberry Holidays,
- helping to bring business to the local community.

Employee Giving & Volunteerism

Support of employee involvement in their local communities is targeted. This includes:

- a matching gift program with schools, and arts and culture groups; and through a volunteer incentive program with non-profit organizations,
- serving the community through volunteer activities such as rebuilding the Hackberry Rodeo Arena concession stand or volunteering time for charities.

Most of the educational information available about LNG activities generally, and Cameron LNG in particular, is provided in electronic format and is accessible on DOE's LNG Website,

FERC's LNG Website, DOT's Pipeline and Hazardous Materials Safety Administration LNG Website and Sempra LNG's website (<http://www.sempralng.com>).

In general terms, probably the most comprehensive website is that of the Center for LNG (CLNG) (<http://www.lngfacts.org>). This website contains a great deal of information about LNG and has links to the websites of all LNG terminal operators in the USA. In the case of the Cameron LNG terminal, however, no additional public education information is provided other than through the Sempra LNG website.

It is also interesting to record that the CLNG has recently established a presence on Facebook and Twitter – no doubt in an attempt to extend its LNG public education campaign to young people. Its Facebook page can be accessed by visiting the CLNG fan page (<http://www.facebook.com> and search for the Center for Liquefied Natural Gas) and its Twitter feed can be accessed at LNGfacts.

4.6.8 Gender Sensitivity

The Cameron LNG public education activities note the advantages that natural gas, imported as LNG, provides to residential consumers of which women are significant beneficiaries. Apart from this, there does not appear to be any specific targeting of either women or men in the LNG public education activities of either the Government or Sempra LNG.

4.6.9 Project Outcomes and Lessons Learned

The Cameron LNG terminal is now well established and bringing benefits to a large number of natural gas consumers in the USA. Several of the outcomes of the associated public education campaign include:

- establishment of an effective working relationship between Cameron LNG and the local community,
- utilization of a Government led program designed to educate the public about LNG and how it works for the benefit of society,
- establishment of an industry-wide clearing house (CLNG) that provides comprehensive information for public education,
- a feeling that stakeholder engagement was not completed to their satisfaction prior to approvals being given for the Cameron terminal.

Some of the lessons learned are:

1. Public education activities that are conducted by government agencies in response to their statutory requirements are limited to those requirements and may not extend further.
2. Where several government agencies, having different jurisdictions, are involved in their own LNG public education campaigns, these campaigns need to be coordinated, and coordinated with that of the industry operator, to avoid confusing the public.
3. Stakeholder engagement may be quite adversarial, and possibly inadequate, in a highly legalistic regulatory regime such as that which operates in the USA.
4. Government agencies are not well equipped to provide public engagement in the form of physical displays, such as LNG information centres, and programs to promote an understanding of LNG activities to young people.
5. The public education campaign mounted by Sempra LNG is strongly oriented towards promoting its corporate image and, as such, is really more of a Public Relations campaign.

6. An Industry Association, such as CLNG, can provide a cost effective means of disseminating information about LNG but is not really effective in engaging with individual stakeholders.
7. The CLNG's recent establishment of a presence on Facebook and Twitter is an innovative attempt to modernise its image and communicate with young people.
8. A public education campaign that is appropriate in the USA is not necessarily applicable to other APEC economies – largely due to the high degree of legal prescription that governs and regulates the LNG industry in the USA.

4.7 Case Study: Northeast and Gulf Gateway LNG Terminals, USA

This case study has been chosen because the LNG terminals utilises Floating Storage and Regasification Units (FSRU), a technology whereby the LNG receiving terminal may be located at a distance offshore, out of sight from land and remote from sensitive receivers. The Northeast and Gulf Gateway terminals are also two of the most recently commissioned LNG receiving terminals in the United States of America where opposition to LNG is historically greater than in other APEC economies. The associated public education campaigns, can, therefore, be expected to represent recent best practice in North America.

4.7.1 The LNG Terminals

Excelerate Energy is a private company owned jointly (50% each) by George B. Kaiser, who founded it in 2003, and the RWE Group (RWE) which is a major European integrated electricity and natural gas company whose operations are focused on Germany, the United Kingdom and Central Eastern Europe. Excelerate Energy has adopted proprietary technology for the storage and re-gasification of LNG onboard specially designed vessels known as shuttle regasification vessels (SRVs) or Energy Bridges. The Excelerate LNG carriers are equipped with their own regasification plant and shuttle backwards and forwards between the LNG production source and the point of use. There is no need for a permanently moored Floating Storage and Regasification Unit (FSRU) or Floating Regasification Unit (FRU) or for ship to ship transfer of LNG.

Until such time as this practice becomes widely adopted there will be risks associated with vessel availability unless vessels are dedicated to a project. However, it can be used effectively to provide an option for meeting peak demand.

It has the benefit of low CAPEX and potentially low OPEX, is flexible and can respond easily to seasonality in consumption as well as long term demand trends.

The gas send out is via Submerged Turret Loading (STL) buoys to a subsea pipeline and thence into the natural gas grid.

Excelerate has, in the last five years, built three such LNG receiving facilities, two of which, the Gulf Gateway and the Northeast Gateway, are in the USA. The Northeast Gateway is the first LNG terminal to be built on the US East coast in 25 years. Excelerate Energy owns and operates the two US deepwater LNG terminals.

The Gulf Gateway is located 186 Km (116 miles) off the coast of Louisiana in the U.S. Gulf of Mexico (Figure 4.7.1). Offshore construction was completed in February 2005, at a cost of approximately 70 million dollars, and the first LNG cargo arrived in March 2005, Gulf Gateway consists of a subsea mooring buoy at a depth of 91 m (298 ft), and a metering platform that allows connection to multiple downstream pipelines which provide access to the Henry Hub natural gas market. Because of its access to downstream gas processing

plants, Gulf Gateway can accommodate virtually any LNG composition up to 1,200 Btu per standard cubic foot (Btu/scf) gross heating value.



Figure 4.7.1: Location of the Gulf Gateway Deepwater Port (Source: Excelebrate Media Release)

The Northeast Gateway is located in Massachusetts Bay approximately 21 km (13 miles) from shore, and provides access to northeastern U.S. gas markets (Figure 4.7.2). The first LNG shipment arrived in May 2008. The physical infrastructure of the Northeast Gateway consists of a dual subsea buoy system at a depth of 82 m (270 ft) and approximately 26 km (16 miles) of pipeline connecting it to the existing HubLine pipeline operated by Algonquin Gas Transmission. Northeast Gateway can accept any specification of liquefied natural gas (LNG) not exceeding a gross heating value of 1,110 Btu per standard cubic foot (Btu/scf) or a Wobbe Index of 1,400.

The delivery rates and throughput capacities for each of the Energy Bridge LNG terminals are listed in Table 4.7.1. The drivers for establishment of these two Energy Bridges are primarily economic as both provide flexible access to valuable US gas markets and LNG plays a key role in addressing energy demands in a large part of the country. Also, imported LNG provides clean and cost effective natural gas to major urban and industrial consumers, thereby reducing greenhouse gas emissions and improving environmental air quality across the region.

Some of the additional advantages, specifically noted by the Northeastern Gas Association (NGA), but applicable to both Energy Bridges, are that they:

- provide a needed supply of natural gas,
- back-feed the existing delivery system,
- supplement the regional pipeline system,
- increase the diversity of supply sources,
- strengthen the region's energy security,
- help mitigate price volatility.

However, possibly the greatest driver for these projects relates to the technology itself which enables an LNG receiving terminal to be established well away from human habitation and at low cost. It is understandable, therefore, that several more LNG receiving terminals are currently at various stages of development using the deepwater port technology.

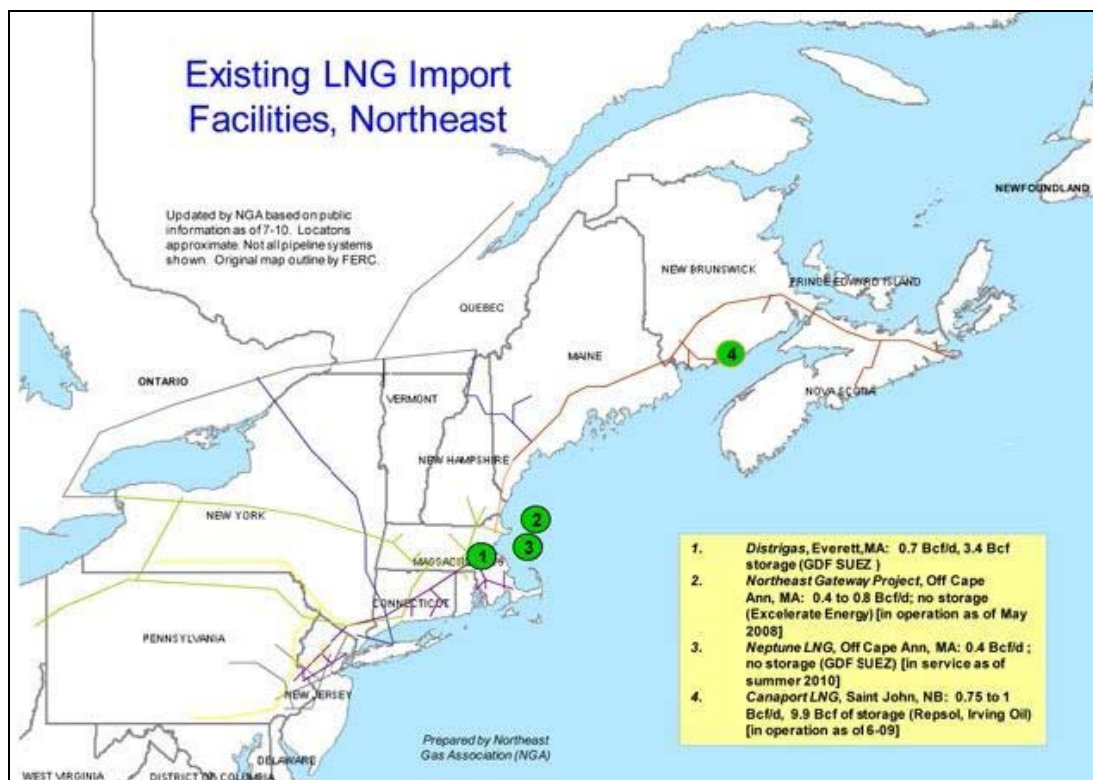


Figure 4.7.2: Location of the Northeast Gateway Deepwater Port (Source: Northeast LNG Association)

Facility	Gulf Gateway	Northeast Gateway
Number of buoys	1	2
Base load gas throughput (mmscf/d)	500	400 – 600
Peak gas throughput (mmscf/d)	690	800
Commercial operation date	Q1, 2005	Q2, 2008

Table 4.7.1: Energy Bridge LNG Terminals Information (Source: Excelerate Website)

4.7.2 The Regulatory Framework

As explained in Section 4.6.2 of the previous case study (Cameron LNG), the federal regulatory environment governing LNG in the USA is quite complex and involves several different agencies whose jurisdictions have changed over time and is different for onshore and offshore facilities. In addition, each state jurisdiction has its own regulatory requirements which differ between states.

Primary regulatory jurisdiction for the Energy Bridge deepwater ports lies with the US Coast Guard (USCG) which is responsible for all offshore activities under the Deepwater Port Act (DWPA). The Deepwater Port Act was enacted in 1974 to establish a licensing system for the construction, ownership, and operation of deepwater ports in the U.S. territorial sea. Initially dealing exclusively with oil, rather than natural gas, only one project was ever constructed under this act prior to Gulf Gateway.

The DWPA was amended in 2002. This amendment transferred jurisdiction over offshore natural gas facilities from the FERC to the Maritime Administration (MARAD) of the DOT and the US Coast Guard (USCG). This enabled the permitting of offshore liquefied natural gas (LNG) receiving facilities in the federal waters of the United States and triggered a wave of project development in the Gulf of Mexico and around the country. Excelerate Energy's Gulf Gateway Energy Bridge deepwater port was one of the first facilities to seek approval under this regulatory regime, and has since become the first offshore LNG facility to be constructed and placed into service worldwide.

The regulatory framework and administration governing offshore terminals has been summarised very well in the Zeus Virtual Library Database (<http://www.zeuslibrary.com/LNG/regulatory/FederalRegulations.asp>).

This summary, is reproduced verbatim as follows, and is acknowledged in italics,

Permitting Authority for Offshore Terminals

- **The U.S. Coast Guard** has principal authority over construction and siting of offshore LNG facilities and oversees the preparation of an EIS that examines the potential impact of a new facility, which is required under the National Environmental Policy Act (NEPA) and the Deepwater Port Act of 1974 (DWPA), as amended (33 USC 1501 et seq). Coast Guard oversight of an offshore facility continues as long as the facility is operational, since the agency is responsible for the safety and security of LNG facilities and vessels in U.S. coastal waters.
- **The Maritime Administration (MARAD)** of the DOT has authority over the licensing of deepwater ports, based on an application process administered jointly by the Coast Guard and MARAD, under provisions in the DWPA as amended by the [Maritime Transportation Security Act \(MTSA\) of 2002](#) to include LNG facilities developed offshore. New maritime anti-terrorist regulations that became effective on July 1, 2004 directly affect operations at US LNG terminals. All vessels and ports worldwide that engage in international trade must comply with the International Ship and Port Security code. In addition, foreign-flagged vessels entering US waterways.

In the case of the Northeast Gateway deepwater port, an Environmental Notification Form was filed with the Executive Office of Environmental Affairs (EOEA) in the State of Massachusetts to establish a coordinated environmental review process that satisfied the requirements of the Massachusetts Environmental Policy Act (MEPA) and the National Environmental Policy Act (NEPA). By combining the MEPA and NEPA processes, channels of communication were established between all reviewing agencies so as to facilitate a more efficient, thorough and logical review process for all parties involved, including the public at large. In addition, the process provides the means whereby the Governor of Massachusetts can act affirmatively on an application for approval.

As noted in the previous case study (Cameron LNG) the regulatory regime governing the establishment and ongoing operation of LNG facilities in the USA require significant engagement with both stakeholders and the general public. Such engagement is, however, much simpler in the case of a deepwater port terminal located offshore.

4.7.3 Project Stakeholders

In general terms, the stakeholders in the Gulf and Northeast Gateway deepwater port LNG terminals are those listed in Section 3.1 of this report. However, the location of the LNG Gateways offshore, and out of sight of the general public, means that there are likely to be

fewer stakeholders representing public concerns. More specifically, however, the key stakeholders are as follows, listed in terms of whether they are sources of public education information or its targets.

The key **Information sources** are:

- Excelerate Energy, as the operator of the Gulf and Northeast Gateway Energy Bridge LNG terminals,
- FERC, as one of the responsible government LNG regulatory agencies,
- U.S. Department of Transportation (DOT), Office of Pipeline Safety, as one of the responsible government LNG regulatory agencies,
- MARAD, as one of the responsible government LNG regulatory agencies,
- USCG, as one of the responsible government LNG regulatory agencies.

Additional stakeholders who can be regarded as sources of information include:

- the Pipeline and Hazardous Materials Safety Administration (PHMSA),
- the other federal agencies listed in Section 4.6.3, above,
- the other state agencies listed in Section 4.6.3, above,
- public research institutes that support ministries with analysis and development of policy measures,
- the Natural Gas Association (NGA),
- LNG industry associations such as the Northeastern LNG Association.

The key **targets** for public education and information are:

- the LNG project workforce and their families,
- the local and regional fire services,
- local residents who are likely to be impacted, either positively or negatively, by the project,
- the wider community who will be recipients of the gas supply,
- the wider international community.

4.7.4 Project Impacts and Risk Management

The impacts likely to be associated with the Energy Bridge LNG terminals in the USA are, primarily, the physical hazards common to all LNG projects as explained in Section 2.4. In this regard it is noted the physical hazards associated with an LNG receiving terminal located offshore are significantly lower and essentially isolated to the location of the deepwater port rather than involving a, possibly large, onshore community.

Risk management currently focuses on continually improving safety standards, engineering codes of practice and regulations and on maintaining high levels of inspection and compliance. The environmental impacts associated with a deepwater port LNG receiving terminal are less than, and different from, those for an onshore terminal. Excelerate Energy claims that its Gulf and Northeast facilities have:

- reduced NOx emissions by >90%,
- reduced sea water usage by 98% by using closed loop re-vaporisation technology (note: this is not exclusive to Energy Bridge technology),
- integrated state-of-the-art marine mammal detection technology with its LNG fleet operations,

- reduced the potential for whale/vessel strikes,
- provided conditions that are advantageous for recovery of the endangered North Atlantic right whale.

There are some environmental impacts associated with the downstream pipeline distribution network, but these are already addressed by the regulations and do not seem to have been targeted specifically in the case of the Excelerate Energy Bridge public information campaign.

On the up-side the atmospheric emissions associated with natural gas use are significant in terms of reduced carbon emissions. There are also economic benefits in terms of job creation and increased commercial activity as LNG is used to supplement US natural gas supply.

In general, however, the public are primarily concerned that large LNG transport ships, their valuable cargoes and associated LNG terminals are potential terrorist targets.

Most of the concerns relate to:

- the dangers of LNG vapor clouds,
- LNG gas quality specifications,
- questions, about who has primary jurisdiction over LNG development and regulation,
- issues related to LNG composition and calorific value,
- Not-In-My-Back-Yard (NIMBY) attitudes.

Not all of these apply to the Energy Bridges which are offshore and out of sight.

4.7.5 The Public Information and Education Program

As in the case of the Cameron LNG project, the public education campaign associated with the Energy Bridge LNG operations is being pursued primarily by US Government agencies – mainly the DOE, Office of Fossil Energy and has already been covered in Section 4.6.5

The public education campaign mounted by the Energy Bridge operator, Excelerate Energy started with the public consultation meetings held as part of its statutory requirement to inform the public as part of the project approval process. Following project approval its public education activities have been directed more towards promotion of the company name as a good citizen and safe operator of the Energy Bridge facilities and providing information about all aspects of the project as it progresses.

4.7.6 Program Overview

In overview, the public education program and activities in the USA are largely led by Government agencies as explained in the previous section. The philosophy seems to be that the considerable regulatory framework that has been established will be sufficient to ensure that engagement with, and input from, the public must be according to the rules of the lead government agencies. Apart from the statutory requirements for consultation with the public LNG proponents and operators, such as Excelerate Energy, seem to be focused, primarily, on providing information via the internet.

This philosophy is rather different from that followed by most other APEC economies but fits well with the highly regulated, and legally focused, framework that operates in the USA.

The information that is presented on the websites of both the government agencies and Excelerate Energy is very informative but it does not seem to address the sorts of questions that the general public would like answered about matters relating to safety and potential environmental impacts. Rather, it is focused on what the information providers think the public need to know, and will be interested in, and is orientated towards explanation of the technology and the benefits.

As explained in Section 4.6.6 in relation to the Cameron LNG terminal case study, there is considerable developmental potential associated with such a large project which accounts for the fact that local government, commercial interests and community developers are strongly in favor of it.

4.7.7 Program Execution

The public education campaign involves the use of a variety of media as described in Section 4.6.7 and includes:

- presentation of Public Forums,
- media releases,
- hard copy written and visual material,
- electronic copy.
- Media releases use publication in newspapers and television presentations which include commercials and short film clips providing updates on the events and progress of the Energy Bridges activities.

Hard copy information is provided in terms of written brochures and several short video presentations - most of which are also posted on the websites of the government agencies and Excelerate Energy.

Most of the information available about LNG activities is provided in electronic format and is accessible on DOE's LNG Website, FERC's LNG Website, DOT's Pipeline and Hazardous Materials Safety Administration LNG Website, U.S. Coast Guard's Deepwater Ports Website and Excelerate Energy's website (<http://www.excelerateenergy.com>).

4.7.8 Gender Sensitivity

The Energy Bridge LNG public education activities note the advantages that natural gas, imported as LNG, provides to residential consumers of which women are significant beneficiaries. Apart from this, there does not appear to be any specific targeting of either women or men in the LNG public education activities of either the Government or Excelerate Energy.

4.7.9 Project Outcomes and Lessons Learned

Both the Gulf and Northeast Gateway Energy Bridge deepwater port LNG terminals are now well established and bringing benefits to a large number of natural gas consumers in the USA. Several of the outcomes of the associated public education campaign include:

- establishment of an effective working relationship between Excelerate Energy and the local community,
- establishment of a Government led program designed to educate the public about LNG and how it works for the benefit of society,
- recognition of the fact that obtaining the regulatory approvals for establishment of a deepwater port LNG terminal is much simpler than for an onshore terminal as there are many fewer concerned stakeholders.

Some of the lessons learned are:

1. Public education activities that are conducted by government agencies as part of their statutory requirements are generally limited to those requirements.
2. Where several government agencies, having different jurisdictions, are involved in their own LNG public education campaigns, these campaigns need to be coordinated, and coordinated with that of the industry operator, to avoid confusing the public.
3. Offshore LNG facilities such as the Gulf and Northeast Energy Bridges which are out of sight of land attract much less public attention and concern than onshore facilities.
4. Public education campaigns can be conducted at a much lower level if the LNG facility is located remote from human habitation.
5. A public education campaign that is appropriate in the USA is not necessarily applicable to other APEC economies, and vice versa however, in the case of deepwater port facilities there is high potential for transferability of experience even though they may not be located in international waters.

5. CASE STUDY ANALYSIS AND EVALUATION

The foregoing case studies provide considerable insight into, and understanding of, the factors that contribute to a successful LNG public education campaign. To extend the information base, however, we have gone beyond these case studies and have included in our analysis and evaluation the stakeholder engagement and public education activities that have been conducted in association with the following LNG production plants and receiving terminals:

- PNG LNG production plant, Papua New Guinea (PNG),
- Tangguh LNG production plant, West Papua, Indonesia,
- Ichthys LNG production plant, Australia,
- Kenai LNG production plant, Alaska, USA,
- Sodegaura and Himeji LNG receiving terminals, Japan,
- Taichung LNG receiving terminal, Chinese Taipei,
- Quintero and Mejillones LNG receiving terminals, Chile,
- Canaport LNG receiving terminal, Canada,
- Dominion Cove Point LNG receiving terminal, USA,
- Dragon and South Hook LNG receiving terminals, UK.

The analyses show quite clearly that effective engagement with the community and stakeholders is essential for any enterprise to be successful. It can also result in a more efficient use of financial resources through:

- reduced risk of social conflict and associated delays and costs,
- ensuring compliance with the relevant legislative framework,
- quicker and smoother permitting and approvals processes,
- reduced risk of criticism and resistance from outside parties.

As a general observation it is noted that public concern about any major project generally follows a profile such as that depicted in Figure 5.1. This figure shows that public concerns rise, based on lack of understanding, and then fall as the information inputs sought are made available.

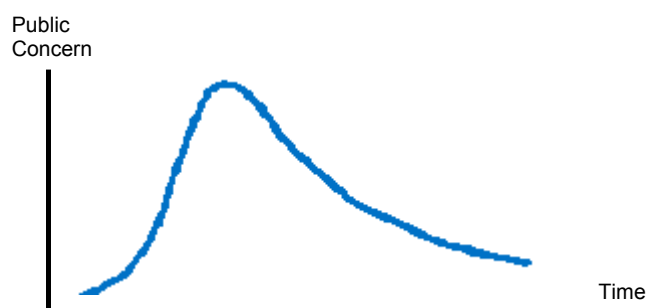


Figure 5.1: Profile of Public Concern

Clearly, there is a strong case for starting an LNG public education campaign at an early stage in the project development.

5.1 Project Types

The foregoing case studies illustrate features that vary according to their configuration, location and stage of development and show that different approaches to LNG public education will be necessary to cater for their distinctive features.

LNG production projects are almost always located on the coast and usually remote from urban habitation. The stakeholders most likely to be impacted are mostly local indigenous people and a significant part of the associated LNG public education campaign is directed towards providing these traditional land owners with an understanding of the LNG project.

The extent of stakeholder public education required depends largely on the source of the gas. Thus, an offshore gas field will normally have less stakeholder impact (particularly if FLNG technology is employed) than, for example, an onshore LCSG project where a large number of landowners may be impacted.

LNG receiving terminals, on the other hand, are mostly located in, or close to, an urban or industrial area with access to gas pipeline distribution. The stakeholders most likely to be impacted are again the local residents, but in this case they are likely to be politically aware, have a higher level of education and are able to voice their concerns effectively. An LNG public education campaign must, therefore, be tailored appropriately for this type of stakeholder audience.

There are also significant differences between the ways in which different cultures and economies approach public engagement and education. These relate, in large part, to the degree of political influence that is available to each of the stakeholders - and to local residents in particular. For example, in some economies local residents may be summarily relocated to make way for an LNG project, with little or no recourse, whereas in others the rights and initiatives lie squarely with the local residents. The preferred approach to LNG public education will, therefore, be significantly different in such situations.

As discussed in Section 1.3 the nature of public education, and thus the way in which it is best achieved, will also vary throughout the life of an LNG project and this is reflected by the activities that are being, and have been, pursued in the different case studies. In analyzing the foregoing case studies it is interesting to note that there now seems to be a general consensus – both within the LNG industry and in the wider energy and mining industries – about the ways in which a public information campaign should be configured and conducted. However, the ways in which different campaigns are focused can differ considerably. The points that emerge are discussed in the following sections.

5.2 Key elements of LNG Public Education

Analysis of the case studies shows that all LNG public education campaigns necessarily involve a number of different actions which need to be achieved successfully. These include:

- development of a public education plan,
- stakeholder identification,
- initial stakeholder engagement,
- meeting compliance requirements,
- activities beyond compliance,
- ongoing stakeholder engagement.

In general, the ways in which these activities have been pursued are quite similar, even for LNG projects having quite different configurations, and there now appears to be a general understanding of the elements necessary for a successful LNG public education campaign.

5.2.1 Successful Public Education Activities

For the case studies considered herein those LNG Public Education campaigns that have achieved success have included the following elements:

- careful stakeholder identification and definition,
- conduct of both one-on-one meetings and public meetings with individual stakeholder groups,
- establishment of static displays and information centres explaining the LNG project,
- ongoing provision of LNG project information on websites, DVD's, television and hard copy publications,
- live demonstrations of LNG behaviour and acquaintance with plant operations,
- effective media outreach.

There is general agreement that a successful LNG public education campaign should be targeted at:

- those likely to be most influential in obtaining project approvals and those whom the proponent wants to impress e.g. politicians, journalists, workforce family members, all levels of Government, others whose decisions or influence can affect the project,
- women's groups,
- children and young people,
- community stakeholder committees.

The conduct of a successful LNG public education campaign is characterised by the several elements referred to in the previous sections but the following points are emphasised:

- the LNG project proponent should work in harmony with the responsible government agency in pursuing its public education activities to ensure that all information transferred to stakeholders is entirely coherent,
- there should be a focused response to stakeholder requirements that does not overwhelm them with information,
- provision of unbiased information – even if it is not favourable to the proponent,
- the need for cultural sensitivity in dealing with different stakeholders and, particularly, indigenous people. Harmonising stakeholder and corporate cultures can be a key factor in achieving successful stakeholder engagement and negotiations.

5.2.2 Unsuccessful Public Education Activities

Several actions that clearly detract from the success of an LNG public education campaign have been identified and should be avoided. These include:

- using a hard-nosed approach and exercising corporate arrogance when engaging with stakeholders,
- failure to go “beyond compliance”,

- failure to consider alternative project configurations in response to stakeholder concerns,
- withholding information or provision of information which is either incomplete or biased,
- failure to provide adequate opportunities for input from target audiences,
- use of bad meeting configurations and incompatible presenters or negotiators.

5.3 Roles and Attitudes of the Key Players

The way in which any project is viewed and progressed will be quite different for each of the key players and will be governed by the objectives and designated functions of each.

5.3.1 The Roles of Governments, Industry, Independent Agencies and Experts

The respective roles of the key players on whom a successful LNG industry depends are outlined as follows.

Governments

The overall objective of any government is to ensure that the establishment and operation of an LNG project is in the interests of its economy and that the project can be sustainable throughout its life.

Once these criteria are met, the primary role of governments is to establish and administer an appropriate regulatory regime that will govern the safe and orderly operation of the LNG industry. In some economies however, the government may itself be involved in industry operations (e.g. as the owner of an LNG production precinct or through a state owned energy company) and may also be actively involved in LNG public education.

Industry

The objective of the LNG industry proponents is to make money for their shareholders, but to do so in a way which contributes to the social wellbeing of the community. Their role, therefore, is to develop and operate an LNG project in a cost effective and timely manner while maintaining ongoing engagement with the project stakeholders and the community. This necessarily involves establishing a basis for public consultation not only at the project outset, but also maintaining an ongoing relationship throughout its life.

Independent Agencies

There are a number of, more or less, independent agencies that have an interest in particular LNG projects and roles to play in their development and conduct. Some examples include:

- agencies that represent the interests of particular stakeholders or stakeholder groups, e.g. the Kimberley Land Council in the Browse LNG development,
- industry associations, such as the Center for LNG (CLNG) in the USA and the Australian Petroleum Production and Exploration Association (APPEA) (<http://www.appea.com.au>),
- non-governmental organisations (NGOs) such as the World Wildlife Fund (WWF), Sierra Clubs, Greenpeace, and specifically targeted environmental groups such as Save Curtis Island (SCI).

There are a very large number of such agencies whose objectives are to promote their own particular interests and agenda. Their roles are to draw attention to particular concerns

associated with an LNG project and to alert both industry participants and the public of these so that an informed debate can take place.

Experts

There are also numbers of different individuals or groups whose expertise can be made available to an LNG project. Some examples include:

- universities,
- research Institutes,
- consultants,
- standards Organisations.

Their roles are to provide expert advice, undertake research and to act as independent arbitrators in situations where additional or third party input is needed. In general, consultants are employed by governments and industry proponents to assemble the detailed information required for the EIS and other expert reports, whereas Universities and Research Institutes are engaged in situations where third party independence is a prerequisite. Each of these roles, however, can involve a significant LNG public education contribution.

5.3.2 Attitudes and Approaches of LNG Industry Proponents

Different LNG industry proponents have different attitudes and approaches to stakeholder engagement and several are apparent in the case studies presented in Chapter 4.

In terms of attitudes, the case studies include examples of:

- sensitive treatment of stakeholders as equal project participants whose concerns and viewpoints are recognised and respected,
- proponents sponsoring a range of social and community projects to gain stakeholder appreciation and enhance corporate image,
- stakeholders being regarded as a necessary evil to be tolerated and avoided where possible,
- proponents using their financial strength to buy out stakeholder interests,
- proponents exercising their legal rights to disregard stakeholder interests and concerns,
- corporate bullying.

Interestingly, several of these attitudes are sometimes exhibited by the same proponent – although usually in different situations.

The reasons underlying the different attitudes of industry proponents to stakeholder engagement appear to relate to:

- corporate culture,
- proponent nationality,
- stakeholder culture.

It is well known that any business activity has its own associated “corporate culture” or way of looking at and doing business. This culture is, quite naturally, reflected in the attitude of each proponent to stakeholder engagement.

Similarly, the nationality of the proponent also has a significant bearing on its approach to stakeholder engagement and poor stakeholder engagement is usually enhanced in cases where the LNG project is located in an economy that is different from the origin of the LNG proponent. This is not always the case, however, as there are examples of foreign proponents exhibiting high levels of stakeholder sensitivity and appreciation of stakeholder engagement.

The stakeholder culture and economy in which the LNG project is located has a strong bearing on the attitude and approach to stakeholder engagement assumed by a proponent. Thus, if the economy is one in which stakeholders – particularly indigenous people – are poorly represented and have little political influence, they are likely to be treated accordingly, with less attention being paid to effective engagement by a proponent.

In terms of the approaches of proponents to stakeholder engagement, these are more or less a reflection of their attitudes and the importance they place on such engagement. Thus, there are examples of LNG industry proponents who:

- fulfil their social duty as good community citizens and go a long way beyond compliance in terms of stakeholder engagement,
- go beyond compliance but stop short of being an integral member of the community,
- engage with stakeholders primarily to promote their own corporate image,
- engage with stakeholders only to the extent required to obtain project approvals,
- remain aloof from stakeholder engagement as much as possible.

It is important to note that there are usually very real reasons for each of these approaches and that none can be regarded as a fatal project flaw. They do, however, result in significant differences in the ease with which a project is progressed.

5.3.3 Attitudes and Approaches of Governments

Just as LNG industry proponents have different attitudes and approaches to stakeholder engagement, so also do governments and several are apparent in the case studies presented in Chapter 4.

The different government attitudes to stakeholder engagement encountered in the case studies include examples of:

- proactive promotion by government ministers and officials,
- government requirement for the proponent to be responsible for stakeholder engagement,
- government leaving stakeholder engagement entirely to the proponent,
- government showing no great interest in stakeholder engagement except as a reactive response to stakeholder unrest.

As in the case of the project proponents, the approaches of governments to stakeholder engagement are more or less a reflection of their attitudes and the importance they place on such engagement. Thus, there are examples of governments who:

- are actively involved because they are project proponents,
- are actively involved in order to promote project development,
- quite rigidly prescribe requirements for stakeholder engagement as part of the regulatory approvals process,

- prescribe requirements for stakeholder engagement but leave it to the industry proponent to decide how to achieve compliance,
- leave it to the industry proponent to do what it thinks necessary to progress the project in a cost effective manner,
- Governments ultimately determine whether an LNG project should proceed and the regulatory approval process usually requires some form of stakeholder engagement.

In general, however, governments in western economies are much more proactive and involved in stakeholder engagement than those in Asian economies where people are accustomed to a higher degree of state control. Latin American economies are intermediate. This is effectively a reflection of the political systems that operate in each economy.

5.3.4 Credibility of Key Players

There is no simple formula for determining the level of credibility attributable to each of the key players involved in LNG public education since it all depends upon who is communicating with whom. Thus, a source of information may be highly credible to one type of stakeholder (who probably wants to be a believer) but is accorded little credibility by another to whom the information is unpalatable. Credibility, therefore, really needs to be established on a case by case basis.

The foregoing remarks notwithstanding, the case studies have illustrated several general trends, as outlined below, and these are discussed, together with their exceptions, for each of the key players involved in LNG public education and information transfer activities.

Governments

In general, governments and government agencies have only moderate credibility with most stakeholders. In part this is simply a reflection of the fact that most people do not hold governments in high regard and often believe that they have a vested interest and hidden agenda. This is certainly so in cases where a government has confirmed its involvement in, and preference for, a project.

A current example of this anti government feeling is in the Gladstone LCSG project where landholders are closing off access to their land and environmentalists are questioning the credibility of the Environmental Impact Study (EIS) approvals process required by both the Commonwealth and State governments. At least in the eyes of environmentalists, the government has very low credibility.

Also as a general rule, Central governments seem to attract more credibility than State or local government. This is probably just a reflection of the fact that credibility tends to decrease with proximity.

In situations where there is direct conflict between government and some stakeholder groups, such as in PNG, the question of credibility is overtaken by an adversarial situation in which any statements or information forthcoming from government are accorded little credibility.

In Asia, governments normally keep out of LNG public education activities and consequently achieve a higher level of credibility by remaining more remote than their western counterparts.

Industry

The credibility given to LNG industry proponents seems to vary considerably depending, primarily, on the recipient stakeholder, the track record established by the proponent and the extent of stakeholder engagement involved. Familiarity, demonstrated safety record, cultural sensitivity and the proponent's social contributions seem to be key elements.

Clearly, different stakeholders will assign different levels of credibility to an LNG proponent and this will depend very much on their attitude towards the LNG project. If they are strongly opposed they will tend to disbelieve much of what the proponent tells them, whereas if they are in favor of the project they will assign a higher level of credibility. For the majority of stakeholders, who are interested only in learning more about the project and how it might affect them, the credibility of an LNG industry proponent will depend largely on the manner of presentation and engagement as indicated in Sections 5.2.1 and 5.2.2, above.

If the industry proponent has a demonstrated track record of dealing fairly and honestly with stakeholders and providing useful, unbiased, information its credibility will be greatly enhanced. For this reason, a project that is well established, and has a history of engagement between the industry proponent and stakeholders, will enjoy a much higher level of proponent/operator credibility than one that is only in the early stages of development. This situation is encountered in several of the case studies.

Similarly, the quality of stakeholder engagement is recognizable as an important factor in achieving LNG industry credibility in several of the case studies. In this regard, probably the most critical requirement for achieving industry credibility is truthfulness and transparency. Unfortunately, there are many examples of LNG industry proponents providing only partial information, strategically timing its release, biasing the information or presenting it with an interpretation that favors the industry. There is clear evidence that those industry proponents/operators who have established strong stakeholder engagement tend to be much more open and honest and they benefit from having greater credibility as a consequence.

Some additional points about industry credibility that are forthcoming from the case studies are that:

- National Energy companies and local operators are perceived to have greater credibility than large international companies – possibly because the International companies are held in some awe because of their size and influence,
- Asian LNG companies are considered to be more credible - probably because they tend to do more to engage the community. The KOGAS Gas Science Museum and Science Plaza and the extent of involvement of KOGAS in the local community are an example,
- Credibility is achieved by involving stakeholders and the public in practical experiences that teach them about LNG and the LNG industry. Both the KOGAS Gas Science Museum and Science Plaza and the ConocoPhillips LNG Road Show are examples.

Independent Agencies

The credibility given to independent agencies depends entirely on the type of agency in question, its objectives and agendas and who is listening to the information that it is disseminating.

There are a number of, more or less, independent agencies that have an interest in particular LNG projects and roles to play in their development and conduct. Some examples include:

- Agencies that represent the interests of particular stakeholders or stakeholder groups, e.g. the Kimberley Land Council in the Browse LNG development. Their credibility depends entirely on their agendas and on the stakeholder recipients. In cases where the stakeholder has a vested interest in line with the objectives of a particular agency its credibility is likely to be quite high. Where the agency objectives are at variance with stakeholder interests credibility is much lower,
- Industry associations, such as the Center for LNG (CLNG) in the USA and the Australian Petroleum Production and Exploration Association (APPEA). These associations tend to have higher credibility than the industry members they represent, mainly because they are regarded as being one step removed from the actual project and thus more likely to be objective. Unfortunately, none of the Industry Associations encountered in the case studies are heavily involved in LNG public education so they represent a potentially under-utilised resource,
- Non-Governmental Organisations (NGOs) such as the World Wildlife Fund (WWF), Sierra Clubs, Greenpeace, and specifically targeted environmental groups such as Save Curtis Island (SCI). Those organisations that have international standing are generally considered to have a moderate to high degree of credibility, although it is recognised by all stakeholders that NGOs have their own particular viewpoints and agendas.

Experts

As indicated in Section 5.3.1 there are a number of different individuals or groups whose expertise is available to an LNG project.

Generally, such sources of expertise (some of which can also be regarded as independent agencies) are considered to have a high level of credibility, but this is often linked directly to who is paying them.

Consultants are, by definition, paid fees and are usually employed by governments and industry proponents to assemble the detailed information required for the EIS and other expert reports. Their credibility is not normally in question although adversarial stakeholders note that their terms of reference are prepared by whoever is commissioning the work so have the potential to contain biases.

Similarly, expert groups such as universities, research institutes and standards organisations are normally engaged under contract so, again, their credibility will be linked to the credibility of their paymaster.

As a general rule, experts have their greatest credibility when engaged by the stakeholders themselves, or by government, as an arbitrator in situations where additional or third party input is needed.

Media

While many members of the public are often critical of the media it does have a high level of credibility because it engages the public attention and there is a general feeling that if information is in print, or on the radio or television, then it should be believed. There are, therefore, strong arguments for LNG industry proponents to engage media sources closely and to educate them about all aspects of the project.

The media outlets that are considered most reliable seem to be newspaper articles and television Documentaries as these usually contain more information than, for example, news clips.

Celebrities

In several of the case studies stakeholder groups engaged the services of celebrities to promote their case. This has proved to be a powerful lobbying tool as celebrities, by definition, have a high level of recognition – and usually credibility – in the eyes of the public.

It should be noted, however, that celebrities are recognised for their image rather than their expertise in LNG activities and their celebrity status is almost entirely dependent on the media. Consequently, without media support celebrities have little credibility as spokespersons on LNG issues.

5.4 Gender Issues

The foregoing case studies did not reveal a large number of gender issues relating to LNG Public Education. Those of primary interest, however, include:

- the important role of women's groups (particularly the Country Women's Association in Australia) in LNG and LCSG Public Education,
- problems involved with communicating with indigenous people in Australia, PNG and Indonesia (West Papua), where cultural customs may require different approaches to LNG Public Education for men and women,
- differences between the ways in which the benefits of LNG are delivered to men and women based on the different roles each plays in society,
- exclusion of women from some jobs in the LNG industry in certain economies.

One of the most important issues is the role that women's groups can play in LNG public education through their community influence, political influence and influence that they can bring to bear on their husbands, local agencies and politicians. Country women's groups, in particular, are generally considered to have a pretty sensible and clear view of matters relating to LNG development and are, therefore, a prime target for LNG education. The same remarks apply to other women's organizations but those that are city based are likely to have less appreciation of rural issues.

Spouses and extended family members of the LNG workforce are also key targets for public education as there is, at least initially, considerable concern about the safety of husbands and wives who are employed in the industry. Several of the industry proponents recognise this concern and regard their own staffs and their families as prime targets for LNG education. In addition to LNG information transfer activities, some industry operators hold family events and tours at their plants to familiarise family members, particularly wives and children, with plant activities and safety. The net result is that staff and their families become effective conduits for the transfer of information and public education about LNG.

Probably the most widespread issue relates to the need to ensure that women in particular are properly informed of the social implications associated with an LNG project. This relates particularly to increased opportunities for both child and adult education but also to everyday activities such as food gathering and cooking. In this regard it is important to engage women's groups and to ensure that information transfer is appropriate to their interest and needs.

There are certain rules in some indigenous societies that impact directly on the way in which public education is configured. For example it may be necessary to hold two separate meetings for men's and women's groups so both groups can be accommodated. Similarly, there are certain topics and objects that are gender specific and cannot be discussed by the opposite sex – again making public education and information activities gender specific.

Apart from the gender issues forthcoming from the case studies, useful gender insights can be gained from several publications in the wider mining and energy industries. One of these is “*Why Gender Matters*”, developed as a resource guide for integrating gender considerations into communities work, prepared for Rio Tinto by the Centre for Social Responsibility in Mining at the University of Queensland, Brisbane, Australia (http://www.riotinto.com/documents/ReportsPublications/Rio_Tinto_gender_guide.pdf).

A key element of this work is the idea that gender integration contributes to the diversity of a community and thereby to greater robustness of any community activity. To achieve this, gender, diversity and human rights considerations must be integrated into the management and planning of all communities work and across all sections of an LNG project. Such considerations further reinforce the idea that women should be targeted in any LNG Public Education campaign.

In developing an LNG public education campaign that recognises gender issues it is important to ensure that women and men from different social groups are consulted and can participate in engagement and development in meaningful ways. The approach can be divided into four inter-related phases as follows:

Scoping

- develop gender insights through specific consultation with women's and men's groups and discuss the findings with community members,
- integrate gender issues into all baseline assessments - Baseline Communities Assessments (BCAs), Social Impact Assessments (SIAs) and Social Risk Assessments (SRAs),
- consider gender impacts for different stages of the project life (including closure),
- identify barriers and constraints to participation along gender lines.

Planning and Implementation

- consider and integrate gender issues in the multi-year plans,
- align gender considerations in the community engagement strategy multi-year plans with other operational plans within the business unit,
- use gender sensitive methodologies to plan and implement community engagement and program initiatives,
- develop other operational plans and standard operating procedures with potential gender impacts in mind.

Monitoring and Evaluation

- use a monitoring framework that includes gender sensitive indicators, underpinned by credible data, which is updated regularly,
- plan community engagement programs and projects to promote gender equality, and to measure progress against gender sensitive indicators,
- develop participatory monitoring and evaluation processes that are, where possible, inclusive of both women and men.

Reporting

- publicly report on what action the project proponent/operator is taking to address gender issues and the outcomes of these actions,
- present gender-disaggregated data for key performance areas in project reports,
- communicate this information to the community.

Wherever practical, gender considerations should be integrated into existing processes for social baselines, impact and risk assessment.

5.5 Effectiveness of Education Methods and Media

Analysis of the case studies suggests that the key stakeholders can be divided into the following different cultural, socio-economic and interest groups (some stakeholders may be represented in more than one group):

- General audiences
- Targeted audiences
- Local communities
- Landowners
- Indigenous people
- Young people
- Project workforce

The effectiveness of information dissemination and education methods and media vis-à-vis these groups can be summarised as follows:

General Audiences

The General Audience effectively includes the whole range of stakeholders and represents a wide socio-economic spectrum, educational levels and range of interests.

The LNG public education methods that have been found to be most effective for this general audience include:

- media (print, radio, TV and internet) engagement,
- posting regular information bulletins on a dedicated section of the proponent's website,
- posting project information on a dedicated section of a government or Industry association website,
- promotion of TV documentaries that are produced by the media rather than proponents,
- viewpoint presentation and discussion via internet blogs.

Targeted Audiences

Targeted Audiences include those individuals and groups whose understanding of the project is critical to its progression. These include politicians, journalists, three levels of government officials who will be responsible for approvals, women's groups, NGOs and, possibly, activists.

The LNG public education methods that have been found to be most effective for these targeted audiences include:

- one-on-one meetings,
- LNG plant visits,
- Live demonstrations such as the ConocoPhillips LNG Road Show,
- LNG Resource Centres, Theme Parks,
- information dissemination via booklets, CD's and DVD's.

Local Communities

Local communities are usually amongst the most important targets for stakeholder engagement and they are the focus of public consultation requirements. Consequently, a great deal of effort has been devoted to developing a toolkit of methods and media for achieving effective community engagement. Those that have been found to be most effective include:

- public meetings and/or information days,
- one-on-one meetings,
- appointment of dedicated Liaison Officers,
- establishment of representative community committees or liaison groups and working with them on an ongoing basis to keep the community fully informed and updated as the project progresses,
- provision of project development updates via open meetings, open forums and through Community Committees with targeted notifications via email and newspapers,
- establishment of "shop front" presence at a location central to the community. (these are effectively resource centres with static displays providing information about all aspects of LNG production, transportation and end use),
- distribution of posters and pamphlets in remote locations,
- sponsorship of social welfare activities which include provision of financial and material assistance to service groups and charities,
- sponsorship of local and corporate sports teams.

Landowners

Landowners are frequently amongst the key stakeholders with whom engagement must be established and maintained in the form of a close information sharing relationship with to keep them informed about ongoing activities – particularly for LCSG projects.

The LNG public education methods and media that have been found to be most effective for engaging with landowners include:

- appointment of dedicated Liaison Officers,
- one-on-one meetings,
- public meetings and/or information days,
- establishment of representative community committees or liaison groups and working with them on an ongoing basis to keep landowners fully informed and updated as the project progresses.

Indigenous People

Indigenous people are also frequently amongst the key stakeholders with whom engagement must be established as they are often the Traditional Owners (TOs) of land

required for an LNG project development. They may also be required to give their informed consent on highly technical matters before the project can proceed. The LNG public education methods and media that have been found to be most effective for engaging with indigenous people include:

- appointment of dedicated Liaison Officers,
- one-on-one meetings,
- public meetings and/or information days,
- establishment of representative community committees or liaison groups and working with them on an ongoing basis to keep the indigenous stakeholders fully informed and updated as the project progresses,
- use of visual presentation materials to explain the project,
- LNG plant visits.

Young People

In most of the case studies, emphasis was placed on LNG public education methods and media that targeted children and young people in order to build up a long term relationship with an informed public sympathetic to LNG activities. The LNG public education methods and media that have been found to be most effective include:

- live demonstrations such as the ConocoPhillips LNG Road Show,
- LNG Resource Centres, Theme Parks,
- LNG plant visits,
- postings on social networking websites such as YouTube, Twitter and Face book,
- sponsorship of education programs for young people designed both to develop understanding of LNG in particular and to increase education levels in general.

Project Workforce

The project workforce is regarded by most LNG industry participants as being an essential target of stakeholder engagement. General Audience effectively includes the whole range of stakeholders and represents a wide socio-economic spectrum, educational levels and range of interests.

Spouses and extended family members of the LNG workforce are also regarded as key targets for public education as there is, at least initially, considerable concern about the safety of husbands and wives who are employed in the industry. Some of the LNG public education methods and media that have been found to be effective for workforce engagement include:

- production of a project magazine,
- information dissemination via booklets, CD's and DVD's,
- LNG plant tours,
- staff events held at the plant to familiarise family members, particularly wives and children, with plant activities and safety.

The net result is that staff and their families become effective conduits for the transfer of information and public education about LNG.

5.6 Wider Industry Experience in Public Education

While the objective of the present study is to focus solely on LNG public education, it should be recognised that considerable experience has been gained in progressing public education in several other major industrial activities. In particular, the mining industry has, in the last few years, made considerable advances in the development of stakeholder engagement and public education and this is already well documented. Several particularly good sources of information are listed in Section 4.2.12. In particular, we refer to the Australian Ministerial Council on Mineral and Petroleum Resources (MCMPR) publication entitled “*Principles for Engagement with Communities and Stakeholders*” (http://www.ret.gov.au/resources/Documents/mcmpr/Principles_for_Engagementwith_Communities_and_Stakeholders.pdf).

This authority makes the point that, in order to qualify for a social licence to operate a company must contribute not only economically but also socially and environmentally. It must, therefore:

- operate to accepted world’s best environmental practices,
- demonstrate an overriding commitment to the health and safety of its employees and the communities in which it operates,
- consult effectively with communities on decisions that may affect them,
- create economic benefits for shareholders, employees and local communities as well as the nation.

The outcomes of this additional experience are summarised in the following sections.

5.6.1 The Objectives of Consultation

Key consultation objectives include:

- enhancing positive relationships with communities and stakeholders,
- maximising stakeholder opportunity to provide information and feedback,
- maximising understanding and timely involvement of stakeholders in company decisions that may affect the local community, including their social well-being, environment and economy,
- enhancing the evaluation of company consultation processes.

Engagement is an ongoing and multi-faceted process that can include:

- providing information,
- capacity building to equip communities and stakeholders to effectively engage,
- listening and responding to community and stakeholder concerns,
- including communities and stakeholders in relevant decision-making processes,
- developing goodwill and a better understanding of objectives and priorities leading to confidence in decisions,
- establishing a realistic understanding of potential outcomes.

Effective engagement requires more than just addressing rights and responsibilities. It cannot be a coerced action but must be an integral part of core business planning. Engagement should be maintained throughout the life of a project - from the planning stage through to construction/implementation, operation/review and finally through to closure.

5.6.2 Principles of Engagement

The key principles for effective community and stakeholder engagement can be summarised under the headings:

- Communication
- Transparency
- Collaboration
- Inclusiveness
- Integrity elements

These ways in which each of these elements should be pursued are summarised as follows:

Communication

Communication must be two-way between those engaged in the dialogue. The lessons forthcoming from both the case studies and wider industry experience are:

- foster co-ownership of the communication process,
- clearly define lines of communication,
- maximise community and stakeholder opportunities to say what they want and to provide information and feedback,
- ensure company representatives take part in consultation and are accessible to communities and stakeholders,
- demonstrate active listening by responding to the issues of each community and stakeholder group and being sensitive to their concerns,
- determine and use the right channels of communication to ensure that the method of communication is appropriate to the relevant communities and stakeholders,
- identify appropriate individuals and contacts to ensure that the right people are engaged. Ensure the contacts are representative of their group,
- build and maintain honest working relationships through the provision of accurate and timely information,
- understand individual and group capacities to participate and incorporate this into planning,
- recognise the importance of engaging at the most direct level and ensure the level is appropriate for the purpose.

The types of information that communities and stakeholders want to know must be carefully determined. In order to do this successfully a proponent should:

- identify and assess all relevant social, environmental and economic effects of activities,
- provide information and analysis (where appropriate) that is technically or scientifically sound and relevant,
- provide information in a form that is understandable by the target audience and in a way that genuinely assists people to understand and make informed decisions,
- use independent expert advice when appropriate,
- ensure that the information provided is delivered in a culturally appropriate manner,

- provide opportunities for communities and stakeholders to ask questions, to seek clarification of information provided and to contribute their own experiences and information.

The timing of engagement with stakeholders is integral to a successful public education campaign. In this regard both the case studies and industry experience indicate that a proponent should:

- seek community and stakeholder views as early in the proposal development stage as possible,
- understand and recognise the need to build relationships, capacity and knowledge before making decisions,
- allow enough time for community and stakeholder issues to be raised and addressed and for stakeholders to review and respond to information,
- establish clear and realistic timeframes for community and stakeholder input,
- maintain engagement throughout the life of the project, from the planning stage through to construction/implementation, operation/review and finally through to closure,
- respect timeframes that will allow community and stakeholder representatives to consult appropriately with their constituencies,
- provide information within appropriate timeframes and contexts and identify the reporting period. Make any critical deadlines and timeframes clear to communities and stakeholders,
- ensure timing is convenient to allow adequate community and stakeholder representation,
- recognise, respect and accommodate changes to timeframes where necessary.

Transparency

Transparency involves having clear and agreed information and feedback processes and ensuring that none of the information is in anyway biased. To achieve this, a proponent should:

- clearly identify company objectives for the project. Clearly articulate the preferred outcomes of the engagement process,
- identify the objectives of the community and stakeholders,
- clearly explain, or negotiate where required, the decision-making processes and ensure that communities and stakeholders understand company objectives,
- clearly outline, and negotiate where required, the boundaries of the engagement process, commitment of resources and level of influence of the various parties involved in the process,
- clearly articulate the preferred outcomes of the project (e.g. operating conditions, environmental objectives),
- clearly set out the process and provisions for two-way feedback,
- reinforce the expected outcomes throughout the process. Provide information immediately in response to any changes in the expected outcomes,
- report openly the input from all communities and stakeholders and include feedback on their input.

Transparency also includes a reporting function such that a proponent should:

- document decisions and outcomes of meetings with communities and stakeholders,
- report appropriate performance information on the consultation through an agreed process,
- when appropriate and practicable, support performance information with verification.

Collaboration

Collaboration involves working cooperatively to seek mutually beneficial outcomes. Experience suggests that a proponent should:

- share expertise,
- work in cooperation,
- establish joint ownership of outcomes, seeking mutually beneficial outcomes where feasible,
- comprehensively deal with the issues and seek community and stakeholder input into responses,
- if appropriate, take an active role in local community affairs,
- consider independent mediation processes to deal with disagreements and disputes.

Initially, however, proponents should determine the capability of the stakeholders and community groups to participate in the consultation process and locate sources of support for both community groups and individuals where needed. Recognise that adequate time and resources are needed by industry, governments and communities to engage effectively.

Inclusiveness

A proponent should recognise, understand and involve communities and stakeholders early and throughout the process and should:

- identify the relevant communities and stakeholders, recognising they may change over time,
- identify and, where possible understand, community issues, interests, aspirations and concerns to define what matters most to the community,
- facilitate, where appropriate, community and stakeholder engagement,
- acknowledge and respect the diversity of communities and stakeholders,
- ensure that gender issues are identified and given full recognition,
- respect the culture and heritage of local communities, including the traditional owners of the area,
- accept the different agendas of different communities and stakeholders and ensure that dominant groups are not the only voices heard,
- ensure there are appropriate systems for minorities and other marginalised groups to have equitable and culturally appropriate ways to engage, so groups that may be under-represented or hard to reach can take part,
- acknowledge that, in few circumstances, it is feasible to involve the entire community,
- prepare a consultation plan and tailor engagement strategies to meet the needs of community groups, their accessibility and information needs.

Integrity

Integrity is a key requirement for achieving a successful public education campaign and proponents should:

- conduct engagement in a manner that fosters mutual respect and trust,
- agree on the ground rules for the process and obey them - explain what the process is trying to achieve,
- be open about the nature of the engagement process and make it clear from the beginning what decisions are outside the scope of the process,
- clearly articulate what is negotiable and what is not negotiable in the engagement process and give reasons,
- ensure that realistic expectations are set and agreed early in the process,
- take responsibility for company actions and live up to promises,
- report often on progress - accurately and promptly,
- ensure that the proclaimed values of company policies and codes of conduct at the corporate level are consistent with practice on the ground,
- ensure that all community opinions and rights to object or support a project/policy are respected. Acknowledge and respond to community concerns and treat people fairly and without discrimination,
- respect legal, ethical, and human rights,
- be honest, even when the news is not good or does or does not favour the proponent.

5.7 Summary

The following points are noted by way of summary of the material presented in this chapter:

1. The requirements for LNG Public Education campaigns are now well understood and quite widely practised.
2. Different approaches to LNG public education will be necessary for LNG production and receiving terminal projects and for different stages of project development. Approaches will also be different for different cultures.
3. The necessary elements for a successful LNG public education campaign include:
 - selection of appropriate target audiences,
 - provision of adequate opportunities for feedback and input from target stakeholders,
 - matching responses to stakeholder requirements,
 - deployment of a range of educational and information transfer resources,
 - demonstrably exercising absolute integrity and transparency in all dealings with stakeholders,
 - achieving stakeholder respect and trust,
 - effective media outreach.
4. Those elements that do not contribute to a successful LNG public education campaign include:
 - corporate bullying,
 - withholding information or providing biased information,
 - lack of cultural sensitivity.

5. There is a great deal of experience that can provide a sound protocol for stakeholder engagement in industries outside the LNG industry. In particular recent advances in stakeholder engagement that have been introduced in the mining and wider petroleum industries are very relevant to LNG public education.

6. BEST PRACTICES IN LNG PUBLIC EDUCATION

In the foregoing sections a number of actions have been identified that contribute to successful LNG Public Education campaigns. As indicated earlier, however, similar principles apply to any large industrial project and are not unique to the LNG Industry. There is no single formula for conducting effective engagement; however, success typically relies on having the following:

- a strong, capable stakeholder engagement team,
- a good working relationship with the project's technical and regulatory teams,
- extensive preparation that involves listening to the community,
- readily accessible information that explains the project and addresses local concerns,
- frequent monitoring of the project and stakeholder engagement team performance,
- the flexibility to make changes as conditions warrant.

In formulating Best Practices for LNG Public Education campaigns we have used as a template the treatment of Best Practice published by the US National Energy Technology Laboratory (NETL) in its manual entitled "*Best Practices for Public Outreach and Education for Carbon Storage Projects*"

(http://www.netl.doe.gov/technologies/carbon_seq/refshelf/BPM_PublicOutreach.pdf).

A continuing theme throughout this report is that stakeholder engagement must take into account the needs and concerns of the target audience as well as the extent to which the proponent already has relationships in the community. In some cases, it may be appropriate to emphasise certain best practices over others. This can only be determined on a case-by-case basis.

The following ten best practices are intended to serve as a framework to aid LNG industry proponents in designing and implementing effective stakeholder engagement programs.

Best Practices 1 through 4 in the following sections relate to "doing the homework" necessary to understand the community in which a project, and many of the stakeholders, will be located.

Best Practices 5 through 7 relate to developing plans for stakeholder engagement and materials that reflect what has been learned about the community and its concerns.

Best Practices 8 through 10 generally relate to the operational steps of stakeholder engagement and LNG public education, including implementation, assessment, and refinement as necessary.

Although these best practices are presented in a sequential order, experience indicates that they will most likely be utilised in an iterative manner.

6.1 Best Practice 1: Integrate Public Outreach with Project Management

One of the most valuable lessons learned is that stakeholder engagement needs to be incorporated as an integral component of LNG project management - ideally starting at the time of project conceptualization. By including stakeholder engagement in the critical path of

an LNG project, engagement activities will be more effective, coordinated with other key project stages, and beneficial to the overall project.

The key components for integration are as follows:

- Sufficient time must be allowed to accomplish the various steps in advance of engaging the public.
- How and when to engage stakeholders need to be established as part of the overall project management plan. This will be especially critical during the early project stages.
- Project personnel should seek (and may be legally required) to interact with the public at various stages of its development and particularly when it becomes highly visible.
- It is preferable to proactively implement stakeholder engagement in order to avoid having to act in a reactive or responsive mode, so it is important that the public does not learn of a project before stakeholder engagement has officially begun.
- The project team must be flexible as it may need to adjust the nature and timing of some activities if events do not go as planned (e.g., the public learns about the project before it has been announced).
- An effective outreach program should include measures for handling early notice by the public.
- As part of the site selection process, it is important to ensure that the key project steps are fully understood for the jurisdiction in which a potential site is located.
- Stakeholder engagement points often coincide with times of high exposure for a project. To prepare for high visibility outreach points and required engagement activities, it is useful to review the full range of regulatory permits and approvals that the project must obtain. This includes developing a clear understanding of the regulatory process.
- Internal processes should be established for the final review and production of outreach materials. This will assist the project team in taking a proactive approach to project management.
- A final point of public contact that must be considered in planning is a potential crisis event. Although it may not be possible to anticipate all occasions, events, or circumstances that require public outreach at the inception of a project, early and ongoing consideration of these matters will help the project team define areas where more information is needed and ensure that outreach efforts are coordinated with other activities throughout all project stages.

6.2 Best Practice 2: Establish a Strong Outreach Team

Stakeholder engagement is integral to implementation of an LNG project. It is, therefore, essential to establish a strong outreach team with a clearly defined structure that delineates roles and responsibilities covering both internal and external communication.

LNG projects involve many individuals from the operating company and, potentially, from several other companies. These include plant managers, scientists, government relations officers, company spokespersons and communications personnel, safety personnel, onsite supervisors, technical service providers, and other personnel who are key decision makers in project communications. These individuals become the face of the project - whether in the community where the project is located or at other levels (e.g., state or Federal); their words

and conduct can have a direct influence on the public's perception of whether the project is being carried out professionally and in a safe, transparent manner.

The key requirements for a strong public outreach team are as follows:

- It is imperative that the outreach team includes individuals who are involved in and knowledgeable about the technical details of the project, as well as some who have backgrounds in communication, education, and community relations.
- In cases where multiple companies are involved, it is valuable to include employees who have some knowledge of the local community and can help to identify opinion leaders, interested citizens, and other key stakeholders. These employees may also be able to help identify benefits to the community and may know other individuals or groups who can provide a better understanding of community values.
- Given that the outreach team will consist of individuals who also have other responsibilities, care must be taken to ensure coordination of efforts, consistency of information, sensitivity to major concerns, and awareness of good communication practices.
- A communications plan should be developed that clearly identifies team member roles and responsibilities, key messages, communication protocols, and other information. This plan should be shared with all outreach team members so that all communications reflect a common understanding of stakeholder concerns and perceptions.
- An accountability structure should be established for the outreach team to identify "message developers" and spokespeople, as well as those to provide follow-up information. This will help team members understand their roles and responsibilities.
- Many companies have adopted safety as a core element of their corporate culture. In these companies, each individual has a role in ensuring and promoting safety. Ideally, public outreach should also become a facet of the corporate culture for companies participating in an LNG project. In this way each individual will understand his or her role in helping the public to have confidence in LNG.

6.3 Best Practice 3: Identify the Stakeholders

Stakeholders can be defined as parties who believe they are affected by the decisions involved in an LNG project. They may come from an area that extends well beyond the project's locale and regulatory jurisdiction and it is widely accepted that it is critical to identify and engage all stakeholders in the project lifecycle.

At the local level, stakeholders may include elected and safety officials, regulators, landowners, citizens, civic groups (including environmental, business, and religious groups), business leaders, media, and community opinion leaders.

Further away from the project site, state or regional stakeholders may include elected and appointed officials (e.g., Governors); regulatory agencies, including those with oversight and permitting of pipelines, utilities, natural resources, and environmental protection; economic development groups; and environmental and business groups.

At the economy level, stakeholders may include: government agencies, such as environmental and energy agencies; politicians, and their key staff; environmental groups;

and other individuals in fields that have an interest in the LNG industry, such as the financial community and the legal profession.

The following sections present a brief description of various stakeholder groups and strategies for identifying them. Not all of these groups may be relevant in a specific community but it is valuable to work with a partner having an excellent reputation in the community to identify stakeholders and their concerns.

Government Officials

These are individuals at the local, regional, state, or economy level who represent the community, or who have special interests in matters such as energy, climate change, the economy, or the environment. This may include elected or appointed individuals, individuals serving in volunteer capacities, executive boards, and others.

Officials will be especially sensitive to activities that may affect their constituents and will want to be informed beforehand so that they can answer any questions raised. It may be valuable to talk with officials to help sort out who has jurisdiction over what area of decision-making in instances where government is multi-layered. For example, there may be several jurisdictions involved in giving approval and each jurisdiction may have different requirements - for example, in one jurisdiction the Mayor may have authority over road use and in another it might be a Township Trustee or a Regional Engineer.

Insight into how the community makes official decisions, how it is governed, and how it relates to surrounding communities can help an LNG project to proceed smoothly. Some officials may have a strong influence on a project, even if their explicit permission is not required to move ahead with the project. For example, the Head of Public Health may not have jurisdictional authority over a project but may have a leadership role if something goes wrong and could, therefore, have a strong opinion about the project from the outset.

Consequently, it is prudent to identify and work with officials who may become involved as well as those with direct responsibilities. Such individuals can be identified through:

- state, county, and community websites,
- local telephone directories,
- interviews with stakeholders in this category,
- local newspapers.

Regulators

In many administrations there will be more than one agency that will have regulatory oversight of an LNG project and others may have either review authority or may govern other aspects of the project. For example, regulatory officials in charge of land management, fisheries and wildlife, water, solid waste, air emissions, or other areas of jurisdiction may have permitting or oversight roles. Permits may also need review for potential impacts on coastal zones, historic sites, and other protected features.

Such economic development professionals may be elected or appointed officials and could also hold volunteer or non-governmental posts. They can be identified through government websites or directories and stakeholder interviews.

Business Interests

Business groups in a community will have a keen interest in a large LNG development project. This interest can range from a broad interest in long-term community development to

contracting opportunities and/or concerns about secondary impacts on their businesses. In most cases there will be synergistic relationships with the local business community, particularly if the area supports other related economic development activities. Business stakeholders can be identified through:

- the local chamber of commerce,
- local telephone and business directories,
- stakeholder interviews,
- local newspapers.

Landholders and Neighbors

These are the individuals most likely to be directly impacted by, and therefore interested in, the project even though LNG industry activities may not be familiar to them initially. It is important to identify neighbors along transportation routes for project-related materials and/or to whom site activities will be visible, as well as neighbors from whom access may be required for conducting a survey or who fall within a regulatory Area of Review.

Open communication with neighbors ensures they have an opportunity to learn what steps are involved as the project proceeds and to voice any questions or concerns they may have. Landholders and neighbors can be identified through:

- local outreach team members,
- town or county clerks, surveyors,
- fieldwork, e.g. driving around the site to find out who the neighbors are.

Civic Groups

Even small communities can house hundreds of non-profit civic groups. Some of these groups will have an interest in an LNG project and may often function as a vehicle for communicating with members of the community and learning about their concerns, e.g. Women's clubs and Service clubs like Rotary, Elks and Kiwanis, garden clubs. Such Civic groups can be identified through:

- the local Chamber of Commerce,
- local economic development personnel,
- local telephone and business directories,
- their group websites.

Environmental Groups

Both local and international environmental groups and are usually interested in LNG development projects. At the local level, an important subset could be environmental justice groups, particularly if there are "legacy issues" in the community as a result of past emissions/discharges or insufficient reclamation from industrial or governmental operations. It is common to find environmental groups, at all levels, that offer cautious support for LNG development because of its role in addressing climate change imperatives and continued reliance on coal or other factors, but there are also some that oppose such development out of concern for the local environment. Environmental groups can be identified through:

- stakeholder interviews at local level,
- website reviews,
- local newspapers,
- local outreach team members.

Senior Citizens

Senior citizen groups are becoming increasingly involved in both local, economy wide and international issues and the views held by these organizations can vary as much as those of any other segment of the community. Their interest in serving as community guardians can range from activism in environmental protection to monitoring the size and role of government. Senior citizen groups can be identified through:

- local Chambers of Commerce,
- local outreach team members,
- local newspapers,
- website reviews.

Religious Groups

In some communities, the strong social networks of religious groups provide a means for information exchange. Many religious groups have an environmental stewardship focus within which they promote reduced GHG emissions and reduced impact on the environment. These groups can be located by asking local religious leaders to help identify them.

Educators

Educators are key disseminators of information in a community. They often serve as a conduit for current events and have the opportunity to interact with multiple stakeholder groups. They can also provide information specifically related to a particular local project once they become informed on the subject and they have the unique capability of educating the young. Educators can be identified through:

- state and local boards of education,
- schools and community colleges.

6.4 Best Practice 4: Characterise the Stakeholders

Social characterization is an approach for gathering and evaluating information to obtain an accurate portrait of stakeholder groups, their perceptions, and their concerns about an LNG project. This can be applied to identifying the factors that will likely influence public understanding of the project within a specific community.

The information gathered enables the project team to develop better insights into the range of diversity among community members, local concerns and potential benefits, and assists in determining which modes of stakeholder engagement and communication will be most effective.

Social characterization should be initiated in the early stages of an LNG project and continued throughout the project life. The level of effort necessary varies based on the community characteristics and the extent to which the developer has existing community relationships.

Information that should be collected for the purpose of social characterization should aim to answer the following questions:

Local Economic Conditions

- What are the major industries employing individuals in the community?
- Is the base more service-oriented or industrial?
- How is the economic health of the community and the region?

- What is the tax base?
- What are local energy costs?
- What are the local perceptions of the likely benefits and role of the project in the community?

Local Empowerment

- How established are local property owners?
- Do community members feel that they have a voice in making decisions that impact the community?
- What is the community's experience with industry or environmental concerns?

Underlying Views

- How do local residents view the role of the central government in regulating the LNG industry?
- Can any overarching views on climate change, fossil fuel-based energy, alternative energy sources, coal mining, drilling, oil and gas production, natural gas storage, and emissions trading be identified?
- Is there a history of royalty payments for mineral or other property rights?

Environment

- Has a community experienced environmental damages in the past?
- How was this issue resolved?

Energy

- What are the local and regional sources of energy?
- What role does energy play in the economy?

Trust

- Who do the stakeholders trust?
- Why are these individuals trusted?
- Do stakeholders trust regulators, project developers, and the Federal government?
- Are there any key community gatekeepers?
- Do community members look to local universities or environmental groups for unbiased information?

Media

- Is there a strong local media presence?
- What forms of media are common in the community?
- Where do individuals get their information?

Local education

- What educational resources are in the area - community colleges, universities, schools?
- Are there academic stakeholders who can be brought into the project?

- Are there opportunities to collaborate with the local schools in implementing educational programs, or with a local community college in developing training opportunities and future employment for local youth?

Local traffic conditions

- What are the likely impacts of project construction and implementation on local traffic congestion and safety?
- How will these impacts affect community opinion about the project?

Local hazards

- Is there a history of seismic activity at the project site?
- What is the meteorological history of the site?
- Does the community believe there are any other local hazards?

6.5 Best Practice 5: Develop a Strategy and Communication Plan

The purpose of a stakeholder engagement, or outreach, strategy and communications plan is to tie together the information, planning, and preparation referred to in Best Practices 1 through 4, above. The outreach strategy formulates an approach to engagement that is tailored to the stakeholder needs and concerns about a particular LNG project. The strategy should inform the overall plan to manage and monitor stakeholder engagement throughout the duration of the project. Specifics will include:

- the outreach objectives,
- the outreach tasks, and events that coincide with the project stages,
- a timeline for stakeholder engagement activities,
- the roles and responsibilities of the outreach team,
- identification of key stakeholders and messages,
- establishment of the timelines, roles, and responsibilities for producing outreach materials and managing outreach events.

A component of the outreach strategy is a communications plan that focuses on representing the project both directly to the public and through the media. It should include plans for everyday communications, high visibility communication periods, and communications in the event of a crisis. Crisis communications should cover who has responsibility for specific tasks in the event of an emergency, how emergency services will be handled, and what safety procedures will be followed. A documented outreach strategy is valuable because it enables the outreach team to:

- implement a “no surprises” engagement plan that starts early and publicly defines the project before the media and other outside sources of information,
- develop an approach to public outreach that allows stakeholders to:
 - learn about the LNG project and how it can provide benefits for the economy and the country,
 - learn about the project early in its development and be assured that the project developer has the appropriate expertise and capacity to conduct the project safely,
 - express their views to project team members in a manner with which they are comfortable,
 - form relationships with project team members,

- proactively and constructively address stakeholder concerns,
- monitor the success of outreach activities and events.

As noted in Best Practice 1, there are several key points of interaction with the public as an LNG project progresses. These include:

- announcement of the project location and configuration,
- permit applications,
- site characterization activities,
- construction and infrastructure development,
- LNG plant commissioning,
- routine operation and permit compliance activities,
- project closure.

A public outreach strategy can be viewed as a series of plans tailored to the particular technical stages of a project. To be effective, the outreach team should use a systematic approach for identifying and interacting sequentially with stakeholders, and gradually building up the necessary information base.

The elements related to each event include:

- Timeframe.
- Stakeholder group.
- Research – focus groups, media clips, etc.
- Outreach objective(s) for each stakeholder.
- Activities and performance metrics.
- Needed materials/logistics.
- Responsibility.
- Follow-up.

The outreach strategy should include a timeline of activities that parallel the project development steps. This can be derived by working backwards from the expected date of the key steps that will involve interaction with the public. For example, a critical path item is the Environmental Impact Study (EIS) process shown in Table 6.1. This activity entails public disclosure of substantial project detail, for which the outreach team may wish to conduct briefings with community leaders and elected officials. The lack of adequate coordination among planners can inadvertently put the outreach team into a reactive, catch-up mode.

Table 6.1 depicts a typical time sequence for public consultation activities and the following sections provide additional details about the types of activities that are likely to take place during various stages of a project.

Detailed planning should commence several months in advance of any planned interaction with the public and the outreach team will need to establish protocols for developing and reviewing outreach materials. Ideally, print and web materials should be developed by the outreach team in consultation with the technical team, and reviewed by the site host, others in the management team, government officials, and sometimes, external peer reviewers. This review process can take a substantial amount of time and must be accounted for in the planning phase.

Pre-EIS Engagement	Draft Terms of Reference	EIS Assessment	EIS Report	EIS Public Release	Final EIS Report
Stakeholder identification	Letter to Stakeholders	Letter to Stakeholders	Land holder consultation	Letter to Stakeholders	Letter to Stakeholders
Newsletter 1	Newsletter 2	Newsletter 3		Newsletter 4	Newsletter 5
Initial stakeholder meetings	Stakeholder meetings	Stakeholder meetings	Stakeholder meetings	Stakeholder briefings	Stakeholder meetings
	Poster book	Open project office		Information Centre	
Website development		Website updates	Website updates	Website updates	Website updates
	Fact sheets	Fact sheets			
	Agency briefings	Agency interviews		Community info sessions	
Indigenous consultation	Indigenous consultation	Indigenous consultation	Indigenous consultation	Indigenous consultation	Indigenous consultation
				Free phone call	
				Email address	

Table 6.1: Time Sequence for EIS Public Consultation Activities

Slide presentations should follow a similar, although somewhat abbreviated, development cycle. Typically, a project involves various parties with different interests and areas of expertise, such as the research team, the host company and, in some instances, technology providers. All individuals and companies working on the project should be familiar with the outreach strategy and communication plan and, ideally, use a sign-off sheet to ensure that staff have read and understood the plan.

Engaging the Media

News media are a particularly important community stakeholder group because - despite the best outreach efforts - a large portion of the public is likely to hear about a project, an event, or an incident associated with an LNG project through the media, and individuals are likely to form their opinions based on media coverage.

The strategic trade-off inherent in media engagement is that the media provide wide distribution of project information in exchange for the loss of control over the message.

The best chance of the media conveying the message desired by the project team results from well-prepared and well-executed media outreach efforts, but no effort can ensure success and ill-prepared efforts heighten the risk of unfavorable coverage.

In the news business, media types are generally categorized as “print” (e.g., newspapers and magazines) and “broadcast” (e.g., radio and television). Similarly, the internet media are similarly divided, with blogs and Twitter akin to print and video sites, such as YouTube, akin to broadcast. The nature and depth of stories for print and broadcast media differ and the associated outreach team preparations for media engagement should differ accordingly.

Media interest is dependent upon the interests and instincts of reporters and their editors. In small communities, individual reporters may cover many types of story. For major daily newspapers in metropolitan areas, reporters have topical “beats,” and an LNG project could be covered by a reporter specializing in science, energy, environment, business, or even human interest (in which case the project could be explained through a story on a profiled individual from a project team).

It is useful, therefore, to be familiar with a reporter’s beat assignment and the types of stories he or she has previously written on the LNG industry, if any, or more broadly on industry and government initiatives to promote and regulate LNG development. A media member will report on a project as he or she sees it. The outreach team must provide an adequate understanding so that reporters can relate the story to others; however, providing too much detail can overwhelm busy reporters and the story could be dropped in favor of others that can be quickly completed.

Journalism training - and human nature - suggests that every story has at least two sides, and as a result, despite efforts by the outreach team to be objective, it is common for news stories to contain quotes or viewpoints from a project opponent or sceptic, even though their familiarity with the LNG project may be minimal.

Deadlines and timely news govern the media world. Reporters are often writing on short deadlines and do not normally provide drafts of their stories for technical review in advance of publication. Magazines may occasionally provide drafts for review or conduct fact checking, but daily newspapers operate on such short time cycles that this is impractical. Consequently, it is common to find factual errors and lost nuances.

Furthermore, reporters sometimes dispense with the qualifications on information typically provided by scientists, such as the preliminary nature of data or limits on the applicability of

findings or conclusions. Consequently, success is defined as having the major facts and messages about the project come through clearly and correctly in any given story. An understanding of the news media's business environment can assist the outreach team in crafting and supplying project information in a manner that eases the reporter's task in understanding the key elements of the news, writing the story, and building relationships for further news coverage.

6.6 Best Practice 6: Develop Key Messages

An LNG project is technically complex, involving advanced science, public policy relating to energy, the environment and the economy and issues such as risk, safety, and financial assurance. Identifying a set of key messages that can be repeated consistently in outreach activities and materials can help stakeholders develop a clearer understanding of the project and how their concerns will be addressed.

The following is a list of potential topics and key messages that can be used in outreach activities and materials. Each LNG developer will have to determine the key messages that are appropriate for their project.

Potential topical areas include:

- The role of LNG in mitigating the build-up of Greenhouse gases (GHGs) in the atmosphere.
- The foundation of experience in production, transportation and use of LNG, including other projects and practices.
- Standard practices used to ensure project safety.
- The role of government in overseeing/regulating the LNG industry.
- The experience of the project team.
- The likely costs and benefits to the community from the LNG project.

Potential messages include:

- Protecting public safety is a priority for these projects.
- LNG production and use has been practised for 70 years and has an excellent safety record,
- Ocean transportation of LNG is a mature and safe technology.
- Pipeline transportation of natural gas is a mature technology.
- There is a well understood approach to LNG project site selection to ensure that conditions are suitable and that a project is conducted safely.
- Concerns about massive LNG explosions have no scientific foundation.
- There are similarities between the major expansion of oil and natural gas systems after World War II with respect to pipeline and natural gas storage location development and the production, transportation and use of LNG.

6.7 Best Practice 7: Develop Appropriate Outreach Materials

The development of outreach materials must be tailored to the intended audience such that the amount of information and level of technical detail provided matches the degree of interest, education, and time constraints of the audience.

All concerns that have been identified, including perceived risks, should be addressed in language and formats suited to the intended audiences. In some instances, stakeholders may need to hear information more than once and in a different format in order to gain an understanding of the subject matter. Having multiple types of materials available provides the outreach team with the flexibility to use different options, depending on the audience's makeup and interests.

It is appropriate, therefore, to develop a broad array of fact sheets, PowerPoint briefing slides, physical models, videos, websites, posters, and other information materials that are available either as examples or for use by others. Collectively, these materials should describe the LNG project configuration, provide specific details about the project proponent/operator and outline the general processes and mechanics involved in LNG production, transportation, storage and re-gasification – focused on the LNG project involved.

The primary objective should be to craft materials that are readily understandable, jargon-free, and contain information that is technically accurate and addresses common concerns, such as safety.

6.8 Best Practice 8: Proactive Program Management

LNG public education programs should be actively managed throughout the project life to ensure that consistent messages are being communicated and that requests for information are fulfilled. Actions that are crucial for success include:

- identification of an outreach leader or coordinator to manage, coordinate, and direct the program,
- full participation and management support by the outreach team and other project team members.

As a project unfolds, public perception will be influenced by the extent to which the project and the project team are well coordinated and responsive.

Pro-active engagement can contribute to a sense of project openness and transparency so the project team should:

- seek out opportunities to engage stakeholders,
- make an effort to inform the media and respond to media requests for information.

Experience has shown that some stakeholders may be sceptical about whether the government or the project developer will provide accurate information. This underscores the need to present unbiased, accurate information and to seek opportunities to partner with spokespeople who have gained the public's trust.

6.9 Best Practice 9: Monitor Program Performance and Outcomes

Monitoring the performance of an LNG public education program allows the project team to stay abreast of how the community perceives the project and to gauge the effectiveness of the outreach activities. It can also help identify any misconceptions about the project or about particular LNG activities so that strategies can be developed to correct them.

Monitoring can be accomplished through:

- informal telephone calls and/or routine interviews with key stakeholders both within the local host organization and in the community,

- maintaining a close watch on the tone of local media coverage. This also applies to the social media (e.g., blogs, You Tube, Facebook and Twitter,) whose role in discussion of community concerns is becoming increasingly common.
- websites that discuss the project and provide a platform for more spontaneous public interaction.

Program monitoring should take into account changes in local conditions, such as economic fluctuations or other significant impacts, which may influence the perception of an LNG project. Consequently, the same activities used in social characterization (Best Practice 4) will be useful in monitoring project performance and identifying potential areas of concern to be addressed in ongoing public engagement as a project moves from conceptualization to implementation.

6.10 Best Practice 10: Be Flexible and open to Program Modification

The outreach team must be ready to adapt to changes in information about the project site, unexpected events, and other conditions that may have a strong influence on the public's perception of an LNG project during its implementation. It may be necessary, therefore, to modify the public education program in response to the resulting changes in public perception.

Key elements relating to an effective response include:

- developing processes to collect, analyze, and respond to feedback gathered through outreach so as to continually improve the overall performance of the project and the outreach team in increasing public acceptance,
- maintaining a series of monitoring activities designed to identify changes in public perception (Best Practice 9),
- having plans in place that appropriately link feedback and response processes,
- ensuring that feedback from monitoring is used to improve the performance of the LNG public education program by making necessary operational changes,
- updating both external outreach processes and materials and internal project communications as needed to reflect project progress, lessons learned, and communication improvements identified through target audience feedback,
- ensuring that communications materials clearly explain why some concerns cannot be addressed if such cases arise.

6.11 Summary

The ten Best Practices presented herein encapsulate the lessons learned and experience gained by a large number of LNG project proponents and operators over many years. The following points are noted by way of summary:

1. The primary lesson is that public outreach should be an integral component of LNG project management.
2. Although effective public outreach will not necessarily ensure project success, it can make important contributions to schedule adherence, cost controls, and community goodwill.
3. Effective public outreach involves listening to individuals, sharing information, and addressing concerns through proactive community engagement.
4. These best practices represent a way of sharing the experience gained to date and informing future project developers.

7. CONCLUSIONS

A number of conclusions can be drawn and lessons learned from the foregoing review of selected LNG public education campaigns that are being pursued in several APEC economies. They are categorised in line with the topical coverage of each report chapter.

7.1 LNG Industry Characteristics

1. The LNG industry, both within APEC and worldwide, is growing rapidly as the use of natural gas in general, and LNG in particular, is recognised as an immediate step in reducing the rate of greenhouse gas emissions and as a step towards renewable energy.
2. By comparison with all other industrial operations involving the production, processing, transportation and end use of large amounts of energy, the LNG industry has an excellent safety record. Although accidents do from time to time occur, very few of these actually involve an LNG release and have rarely resulted in loss of life.
3. There are a variety of potential environmental risks associated with LNG operations. Those of most concern are usually associated with liquid effluent discharge, solid waste disposal and ship movements and the impacts of these on a variety of local flora and fauna.
4. There is no doubt that LNG industry operations do have associated risks but there is also a lot of strong evidence that these risks are being managed with increasing success and efficiency as the LNG industry matures. It is this basic concept that needs to be understood by the public in general and by specific LNG industry stakeholders in particular and should underpin all future LNG public education initiatives.

7.2 Public Perceptions

5. The public does not have a good appreciation of the local and global economic, social, and environmental implications of energy production and use, especially the role that LNG has as a bridge to a cleaner, more secure, global energy future and the barriers that stand in the way.
6. Neither the benefits nor the risks associated with an LNG project are well understood by the public and there is a genuine need for both the public, in general, and stakeholders in particular, to be better informed.
7. The public will not support what it does not understand. It is insufficient for the leading industry players to know what is best (for example, that LNG is the cleanest of the fossil fuels, that it is a very safe resource, and is a key solution to supply/demand imbalances in consumer economies) if the public does not hold the same view.
8. Public concerns about LNG projects relate, primarily, to:
 - the potential physical hazards that maybe involved,
 - the environmental risks,
 - likely adverse social and socioeconomic impacts,
 - unwanted aesthetic impacts.
9. Public opposition to new LNG projects is due mainly to lack of public understanding, coupled with some misinformation and misconception.

10. Much of the information provided is adversarial. It includes some scare mongering by LNG project opponents, but there is also some selective presentation of information and exaggeration of safety records by the LNG industry.
11. Changing public perception requires:
 - Clear identification of the benefits and risks associated with LNG projects,
 - Continual improvement of LNG industry safety and environmental protection procedures to minimise the risks,
 - Public education at all levels and in all media.

7.3 Public Education Campaigns

12. Public education and information dissemination is an on-going activity, but one whose configuration will change as the project progresses.
13. Public education and information transfer should go beyond the requirement of compliance with the regulatory requirements for public consultation. Those energy companies that do not go beyond compliance rapidly lose credibility.
14. Effective communication with stakeholders can be established either directly or through community committees that are formed to act as a conduit to wider community groups.
15. Gender based public education through women's organizations - particularly country Women's groups - should be a key focus.
16. A public education program should make stakeholders feel respected, wanted and engaged and should provide adequate opportunities for their input to the process.
17. Corporate culture is a key factor in achieving credibility. Stakeholders do not appreciate corporate arrogance. They also do not appreciate NGOs grandstanding, exaggerating and providing inaccurate information.
18. All study results and information should be shared in a fully transparent manner.
19. Establishment of a free information centre (e.g. the KOGAS Gas Science Museum) is a good way to engage and inform the public about LNG.
20. Provision of social welfare assistance is an effective way of engaging with the community and creating an environment in which an LNG project is seen as friendly to the community and its stakeholders.
21. In an economy where an LNG project is supported by both central and local government the level of public opposition is not great, and a public education program is, perhaps, less important than in an economy where the project is seen to be a largely private sector activity.
22. Public education activities that are oriented towards promoting the reliability of LNG operations and have the support of government are acceptable to the public in the cultural environment of an Asian economy.
23. Web-based LNG public education initiatives are the main means of information dissemination.
24. Where several government agencies, having different jurisdictions, are involved in their own LNG public education campaigns, these campaigns need to be coordinated, and coordinated with that of the industry operator, to avoid confusing the public.
25. Public education activities that are conducted by government agencies in response to their statutory requirements are limited to those requirements and may not extend

further. In general, however, government agencies are not well suited to providing public engagement in the form of physical displays, such as LNG information centres, and programs to promote an understanding of LNG activities to young people.

26. An Industry Association, such as CLNG, can provide a cost effective means of disseminating information about LNG but is much less effective in engaging with individual stakeholders.
27. Offshore LNG facilities, such as the Gulf and Northeast Energy Bridges, which are out of sight of land, attract much less public attention and concern than onshore facilities. Consequently, public education campaigns can be conducted at a much lower level if the LNG facility is located remote from human habitation.
28. A public education campaign that is appropriate in one APEC economy is not necessarily applicable to other APEC economies – largely due to different cultural attitudes and levels of legal prescription that govern and regulate the LNG industry in different economies.

7.4 Lessons Learned

29. Planning is essential and stakeholder analysis is important in a tool kit.
30. There is considerable value in involving company experts to provide technical information and senior company executives and decision makers to answer questions at public meetings.
31. Public education campaigns should target those whom the proponent:
 - most wants to impress (politicians, journalists, workforce family members, three levels of Government, officials who will be responsible for approvals),
 - will have to continue dealing with as project stakeholders and neighbors,
 - perceives as antagonistic to the project,
 - wants to have as friends for the future (i.e. young people).
32. Different approaches to LNG public education will be necessary for LNG production and receiving terminal projects and for different stages of project development. Approaches will also be different for different cultures.
33. The necessary elements for a successful LNG public education campaign include:
 - selection of appropriate target audiences,
 - matching responses to stakeholder requirements,
 - deployment of a range of educational and information transfer resources,
 - demonstrably exercising absolute integrity and transparency in all dealings with stakeholders,
 - achieving stakeholder respect, trust and engagement.
34. Those elements that do not contribute to a successful LNG public education campaign include:
 - corporate bullying,
 - failing to provide adequate opportunity for target stakeholder input
 - withholding information or providing biased information,
 - lack of cultural sensitivity.
35. There is a great deal of experience that can provide a sound protocol for stakeholder engagement in industries outside the LNG industry. In particular, recent advances in

stakeholder engagement that have been introduced in the mining and wider petroleum industries are very relevant to LNG public education.

36. In order to facilitate LNG projects, there must be a proactive process of public education to build public trust. The process of public education will be slow but greater efforts need to be made.

7.5 Best Practices in LNG Public Education

37. The ten Best Practices presented herein encapsulate the lessons learned and experience gained by a large number of LNG project proponents and operators over many years. They have been developed as a way to share the experience gained to date and to inform future project developers as follows:

- Best Practice 1:** Integrate public outreach into the project management plan.
- Best Practice 2:** Establish a strong public outreach team.
- Best Practice 3:** Identify the stakeholders.
- Best Practice 4:** Conduct and apply social characterization.
- Best Practice 5:** Develop an outreach strategy and communication plan.
- Best Practice 6:** Develop key messages.
- Best Practice 7:** Develop communication materials tailored to audiences.
- Best Practice 8:** Actively manage the public outreach program over the project life.
- Best Practice 9:** Monitor the performance of the public outreach program and changes in public perceptions and concerns.
- Best Practice 10:** Be flexible – refine the public outreach program as warranted.

38. The primary lesson is that public outreach should be an integral component of LNG project management.
39. Although effective public outreach will not necessarily ensure project success, it can make important contributions to schedule adherence, cost controls, and community goodwill.
40. Effective public outreach involves listening to individuals, sharing information, and addressing concerns through proactive community engagement.

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GLOSSARY OF TERMS AND ABBREVIATIONS

A comprehensive glossary of terms and abbreviations used in the LNG industry has been compiled by Price, Waterhouse, Coopers (<http://www.pwc.com/gx/en/oil-gas-energy/liquefied-natural-gas/publications-lng-liquefiednatural-gas-glossary-terms.jhtml>).

Some additional terms and abbreviations used in this report are as follows:

A\$	Australian dollars
ACT	Australian Capital Territory
AIT	Asian Institute of Technology
APEC	Asia Pacific Economic Cooperation
API	American Institute of Petroleum
APLNG	Australia Pacific LNG
APPEA	Australian Petroleum Production and Exploration Association
ASEAN	Association of South East Asian Nations
ASME	American Society of Mechanical Engineers
BCA	Baseline Communities Assessments
Bcf	Billion cubic feet
Btu	British Thermal Units
°C	Degrees Centigrade
CD	Compact Disc
CH ₄	Methane
CLNG	Center for LNG
CMA	Cumulative Management Areas
Cm/d	Cubic meters per day
CNG	Compressed natural gas
CNOOC	China National Offshore Oil Corporation
CNPC	China National Petroleum Corporation
CO ₂	Carbon dioxide
CSGWMP	Coal Stream Gas Water Management Plan
Cu.m	Cubic Meters
CWA	Country Women's Association
DEEDI	Department of Employment, Economic Development and Innovation
DIP	Department of Infrastructure and Planning
DoIR	Department of Industry and Resources
DOT	U.S. Department of Transportation
DSD	Department of State Development
DVD	Digital Video Disc or Digital Versatile Disc

DWPA	Deepwater Port Act
EA	Environmental Authority
EBN	Energy Business Network
EGAT	Electricity Generating Authority of Thailand
EGCFE	Expert Group on Clean Fossil Energy
EGCO	Electricity Generating Company
EHS	Environmental Health & Safety
EIA	Environmental Impact Assessment
EIS	Environmental Impact Study
ELPC	Environmental Law & Policy Center
EMP	Environmental Management Plan
EOPA	Executive Office of Environmental Affairs
EP Act	Environmental Protection Act
EPA	Environmental Protection Agency
EPBC	Environmental Protection and Biodiversity Conservation
ERI	Energy Research Institute
ESD	Emergency Shutdown
EWG	Energy Working Group
°F	Degrees Fahrenheit
FERC	Federal Energy Regulatory Commission
FID	Final Investment Decision
FLNG	Floating Liquefied Natural Gas
FOB	Free on Board
GAB	Great Artesian Basin
GHG	Greenhouse gas
GSDA	Gladstone State Development Area
ha	Hectare
HPGSCA	High-Pressure Gas Safety Control Act
I & M	Inspection & Maintenance
ILUA	Indigenous Land Use Agreement
ISO	International Standards Organisation
KEEI	Korea Energy Economics Institute
KEMCO	Korea Energy Management Corporation
KEPCO	Korea Electric Power Corporation
KGS	Korean Gas Safety
KIER	Korea Institute of Energy Research

KLC	Kimberley Land Council
km	Kilometre
KNOC	Korean National Oil Corporation
KOGAS	Korea Gas Corporation
LCSG	Liquefied Coal Seam Gas
LLC	Limited Liability Corporation
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MARAD	Maritime Administration
MMcmd	Million Cubic Meters per Day
MCMPR	Mineral and Petroleum Resources
MKE	Ministry of Knowledge Economy
MOCIE	Ministry of Commerce, Industry and Energy
MTPA or mtpa	Million tonnes per annum
MW	Megawatt
NASFM	National Association of State Fire Marshalls
NDT	Northern Development Task Force
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NGA	Natural Gas Association
NGL	Natural Gas Liquids
NGO	Non Governmental Organization
NIMBY	Not in My Back Yard
NOX	Oxides of Nitrogen
NRDC	National Development and Reform Commission
NWS	North West Shelf
OEP	Office of Energy Projects
OERC	Office of the Energy Regulatory Commission
OPEC	Organisation of Petroleum Exporting Countries
ORV	Open Rack Vaporiser
OSHA	Occupational Safety & Health Administration
PGU	Peninsula Gas Utilisation
PHMSA	Pipeline and Hazardous Materials Safety Administration
PNG	Papua New Guinea
PNGV	Petronas NGV
POSCO	Pohang Iron and Steel Company

PRA	Property Rights Australia
PTT	PTT Exploration and Production Public Company
PTT NGD	Natural Gas Distribution Company
psia	Pound per square inch absolute (including atmospheric pressure)
PSIA	Pipeline Safety Improvement Act
QCC	Queensland Conservation Council
QCLNG	Queensland Curtis LNG
QWC	Queensland Water Commission
R&D	Research and Development
RPT	Rapid Phase Transition
SAA	Strategic Assessment Agreement
scf	Standard Cubic Feet
SCI	Save Curtis Island
SDPWO	State Development and Public Works Organization
SIA	Social Impact Assessments
SOX	Oxides of Sulfur
SRA	Social Risk Assessments
Tcf	Trillion cubic feet
Tcm	Trillion cubic meters
TDIR	Thailand Development Research Institute
TISTR	Thailand Institute of Scientific and Technological Research
TO	Traditional Owner
TV	Television
UK	United Kingdom
US	United States
USA	United States of America
US\$	United States dollar
USCG	US Coast Guard
USDOE	US Department of Energy
USEPA	US Environmental Protection Agency
WWF	World Wildlife Fund

APPENDICES

The following Appendices are numbered to correspond to the report sections in which they are referenced.

Appendix 1.1 - APGAS

The APEC Gas and LNG Forum (APGAS) is a gas industry body originally conceived by the APEC Energy Business Network (EBN). It was formed in 2004 in response to the APEC Energy Ministers' endorsement of the facilitation of a competitive, open and transparent marketplace for gas.

APGAS seeks to create consensus on the steps necessary to promote cross-border trade in natural gas by bringing together APEC Member States, energy policymakers, regulators, NOCs, oil and gas suppliers and consumers, traders, and pipeline and ship owners/operators to discuss regional gas and LNG trade issues and to identify technical and commercial barriers to the creation of fully operational and interconnected gas markets.

Stakeholder representatives from governments, regulators, industry, financiers and communities critically examine the functioning and interaction of both regional and global gas markets to determine how the various players can contribute to the development of gas industry 'best practice' in the Asia-Pacific region.

APGAS provides a mechanism for government and industry to collaborate on issues that are critical to the facilitation of a vibrant regional trade in natural gas.

Appendix 2.6: Major LNG Incidents

Incident Date	Ship / Facility Name	Location	Ship Status	Injuries / Fatalities	Ship / Property Damage	LNG Spill / Release	Comment
1944	East Ohio Gas LNG Tank	Cleveland	NA	128 deaths	NA	NA	LNG peak shaving facility. Tank failure and no earthen berm. Vapour cloud formed and filled the surrounding streets and storm sewer system. Natural gas in the vaporizing LNG pool ignited.
1964	Methane Progress	Arzew, Algeria		No			During loading operations lightning struck the forward vent riser of the Methane Princess and ignited vapour which was being routinely vented through the ship venting system. A similar event happened early in 1965 while the vessel was at sea shortly after leaving Arzew. In both cases the flame was quickly extinguished by purging with nitrogen through a connection on the riser.
1965		Canvey Island, UK	A transfer operation	1 seriously burned		Yes	
1965	Jules Verne	Arzew, Algeria	Loading	No	Yes	Yes	LNG liquid spill caused by the overflowing of a cargo tank that resulted in fracture of the cover plating of the tank and adjacent deck plating.
1965	Methane Princess		Disconnecting after discharge	No	Yes	Yes	LNG discharging arms were disconnected prematurely before the lines had been completely drained, causing LNG liquid to pass through a partially opened valve and onto a stainless steel drip pan placed underneath the arms. This caused a star-shaped fracture to appear in the deck plating in spite of the application of seawater.
1969		Portland, Oregon, USA					An explosion occurred in the LNG tank under construction. No LNG had ever been introduced into the tank. The cause of the accident was attributed to the accidental removal of blinds from the natural gas pipelines which were connected to the tank. This led to the flow of natural gas into the tank while it was being constructed.
1971	LNG ship Esso Brega, La Spezia LNG	Italy	Unloading LNG into the storage tank	NA	NA	Yes	This accident was caused by “rollover” where two layers of LNG with different densities and heat content form. The sudden mixing of these two layers results in the release of large volumes of vapour discharged from the tank safety valves and vents over a period of a few hours, damaging the roof of the

Incident Date	Ship / Facility Name	Location	Ship Status	Injuries / Fatalities	Ship / Property Damage	LNG Spill / Release	Comment
	import terminal.						tank. There was no vapor ignition.
1972		Montreal. Quebec, Canada					A back flow of natural gas from the compressor to the nitrogen line occurred during defrosting operations at an LNG liquefaction and peak shaving plant in Montreal East. The valves on the nitrogen were not closed after completing the operation. This caused over-pressurization of the compressor and the natural gas entered the control room (where operators were allowed to smoke) through the nitrogen header. An explosion occurred when an operator tried to light a cigarette.
1973	Texas Eastern Transmission LNG Tank	Staten Island, NY, USA	NA	40 killed	No	No	Industrial accident unrelated to the presence of LNG (construction incident). During the repairs vapors associated with the cleaning process apparently ignited the mylar liner. Fire caused temperature in the tank to rise, generating enough pressure to dislodge a 6-inch thick concrete roof, which then fell on the workers in the tank.
1973		Canvey Island. UK	NA	No	Yes	Yes	Glass breakage. Small amount of LNG spilled upon a puddle of rainwater and the resulting flameless vapour explosion caused a rapid phase transition (RPT) causing loud "booms". No injuries resulted.
1974	Massachusetts		Loading	No	Yes	Yes	After a power failure and the automatic closure of the main liquid line valves, 40 gallons of LNG leaked as it was being loaded on a barge. The LNG leaked from a one-inch nitrogen purge globe valve on the vessel's liquid header, causing several fractures in the deck plates.
1974	Methane Progress		In port	No	Yes	No	Touched bottom at Arzew
1975	Philadelphia Gas Works		NA	No	Yes	NA	Not caused by LNG. An iso-pentane intermediate heat transfer fluid caught fire and burned the entire vaporizer area.
1977	Arzew	Algeria	NA	1 worker frozen to death	NA	Yes	Aluminium valve failure on contact with cryogenic temperatures. Wrong aluminium alloy used on replacement valve. LNG released but no vapour ignition (LNG liquefaction facility).

Incident Date	Ship / Facility Name	Location	Ship Status	Injuries / Fatalities	Ship / Property Damage	LNG Spill / Release	Comment
1977	LNG Aquarius	Bontang, Indonesia	Loading	No	No	Yes	During the filling of a cargo tank, LNG overflowed through the vent mast serving that tank. The incident may have been caused by difficulties in the liquid level gauge system. The high-level alarm had been placed in the override mode to eliminate nuisance alarms.
1978		Das Island, U.A.E.					An accident occurred due to the failure of a bottom pipe connection of an LNG tank. The tank had a double wall (a 9% nickel steel inner wall and a carbon steel outer wall). Vapor from the outer shell of the tank formed a large heavier-than-air cloud which did not ignite.
1979	Columbia Gas LNG terminal	Cove Point, Maryland, US	NA	1 killed 1 seriously injured	Yes	Yes	An explosion occurred within an electrical substation. LNG leaked through an LNG pump electrical penetration seal, vaporized, passed through 200 feet of underground electrical conduit and entered the substation. Since natural gas was never expected in this building there were no gas detectors installed in the building. The normal arcing contacts of a circuit breaker ignited the natural gas-air mixture, resulting in an explosion. (LNG regasification terminal).
1979	Mostefa Ben Boulaid Ship	Cove Point, Maryland, US	Unloading	No	Yes	Yes	While discharging cargo at Cove Point, Maryland, a check valve in the piping system of the vessel failed, releasing a small quantity of LNG. This resulted in minor fractures of the deck plating.
1979	Pollenger Ship		Unloading	No	Yes	Yes	Valve leakage. Tank cover plate fractures.
1979	El Paso Paul Kayser Ship		At sea	No	Yes	No	Stranded. Severe damage to bottom, ballast tanks, motors water damaged, bottom of containment system set up.
1980	LNG Libra		At sea	No	Yes	No	Shaft moved against rudder. Tail shaft fractured.
1980	LNG Taurus		In port	No	Yes	No	Stranded. Ballast tanks all flooded and listing. Extensive bottom damage.
1984	Melrose		At sea	No	Yes	No	Fire in engine room. No structural damage sustained – limited to engine room.
1985	Gradinia		In port	No	Not	No	Steering gear failure. No details of damage reported.

Incident Date	Ship / Facility Name	Location	Ship Status	Injuries / Fatalities	Ship / Property Damage	LNG Spill / Release	Comment
					reported		
1985	Isabella		Unloading	No	Yes	Yes	Cargo valve failure. Cargo overflow. Deck fracture.
1987		Mercury, Nevada, USA					In August 1987 an accidental ignition of an LNG vapour cloud occurred at the US Department of Energy Nevada Test Site during large-scale tests involving spills of LNG. The cloud was accidentally ignited and damaged and propelled polyurethane pipe insulation outside the fence.
1989	Tellier		Loading	No	Yes	Yes	Broke moorings. Hull and deck failures.
1990	Bachir Chihani		At sea	No	Yes	No	Sustained structural cracks allegedly caused by stressing and fatigue in the inner hull.
1993	Indonesian liquefaction facility	Indonesia	NA	No	NA	NA	LNG leak from open run-down line during a pipe modification project. LNG entered an underground concrete storm sewer system and underwent a rapid vapour expansion that over pressured and ruptured the sewer pipe. Storm sewer system substantially damaged.
2002	LNG ship Norman Lady	East of Strait of Gibraltar	At sea	No	Yes	No	Collision with a U.S. Navy nuclear-powered attack submarine, the U.S.S. Oklahoma City. In ballast condition the ship suffered a leakage of seawater into the double bottom dry tank area.
2003		Bintulu, Malaysia					A major fire occurred in the exhaust system of the propane gas turbine in the first train (Train number 7) of the MLNG Tiga project at the Petronas LNG Complex.
2004	Sikida 1	Algeria	NA	27 killed 56 injured	NA	NA	On January 2004 a steam boiler that was part of an LNG production plant exploded, triggering a second more massive vapour-cloud explosion and fire. The explosions and fire destroyed a portion of the LNG plant and caused material damage outside the plant's boundaries, although it did not damage the loading facilities or three large LNG storage tanks also located at the terminal. (The casualties were mainly due to the blast, few casualties due to fire)

*Sources: University of Houston - "LNG Safety and Security", October 2003. (<http://www.beg.utexas.edu/energyecon/lng/>)
Sonatrach - "The Incident at the Skikda Plant: description and Preliminary Conclusions", March 2004*

Appendix 4.1a: Applicable LNG Standards, Policies and Guidelines and other Obligations

CATEGORY	TITLE
International Agreements and Conventions	<p>Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979</p> <p>United Nations (UN) Convention on the Law of the Sea 1982</p> <p>UN Convention on Biological Diversity 1992</p> <p>London (Dumping) Convention 1972</p> <p>MARPOL 73/78 (International Convention for the Prevention of Pollution from Ships (1973) as modified by its Protocol of 1978)</p> <p>Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and Their Disposal 1989</p> <p>Vienna Convention on the Protection of the Ozone Layer 1985</p> <p>Montreal Protocol on Substances that Deplete the Ozone Layer 1987</p> <p>UN Framework Convention on Climate Change 1992</p> <p>Kyoto Protocol 1997</p> <p>The Convention on Civil Liability for Oil Pollution Damage (CLC) 1992</p> <p>Convention on the International Maritime Organization 1948</p> <p>Japan Australia Migratory Birds Agreement (JAMBA)</p> <p>China Australia Migratory Birds Agreement (CAMBA)</p> <p>Republic of Korea Australia Migratory Bird Agreement (ROKAMB)</p>
Industry Guidelines	<p>Australian Petroleum Production & Exploration Association (APPEA) Code of Practice 2008</p> <p>Australian Ballast Water Management Requirements 2001 (AQIS)</p> <p>International Association of Oil & Gas Producers (OGP) – Environmental Management in Oil and Gas Exploration and Production, 1997</p> <p>International Petroleum Industry Environmental Conservation Association (IPIECA) – various publications</p> <p>International Association for Impact Assessment (IAIA) Policies and Guidelines</p>
Other International Standards	<p>International Finance Corporation (IFC): Environmental, Health and Safety Guidelines for Offshore Oil and Gas Development 2007</p> <p>IFC: Equator Principles</p> <p>IFC Performance Standards, including:</p> <ul style="list-style-type: none"> • Performance Standard 1: Social and Environmental Assessment Management System • Performance Standard 3: Pollution Prevention and Abatement • Performance Standard 4: Community Health, Safety and Security • Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management • Performance Standard 7: Indigenous Peoples

CATEGORY	TITLE
	<ul style="list-style-type: none">• Performance Standard 8: Cultural Heritage World Bank Pollution Prevention and Abatement Handbook World Bank Operational Policies, including: <ul style="list-style-type: none">• OP 4.01 - Environmental Assessment• OP 4.02 - Environmental Action Plans• OP 4.04 - Natural Habitats• OP 4.07 - Water Resources Management• OP 4.09 - Pest Management• OP 4.10 - Indigenous Peoples <ul style="list-style-type: none">• OP 4.11 - Physical Cultural Resources

Appendix 4.1b: Browse Joint Venture Partners Standards and Guidelines

JOINT VENTURER	TITLE
Shell	<p>Impact Assessment Issue 1.0 November 2004</p> <p>Technical Guidance for Environmental Assessment, 2000</p> <p>EP 95-0378 Impact Assessment: Guidance on Integrated Impact Assessment (Shell International Exploration and Production B.V.)</p> <p>EP 95-0370 Integrated Impact Assessment: Environmental Impact Assessment Module (Shell International Exploration and Production B.V.)</p> <p>EP 95-0371 Impact Assessment Guidelines: Social Impact Assessment Module (Shell International Exploration and Production B.V.)</p> <p>EP 95-0372 Impact Assessment Guidelines: Health Impact Assessment Module (Shell International Exploration and Production B.V.)</p> <p>EP 95-0373 Sustainability Assessment Guide (Shell International Exploration and Production B.V.)</p> <p>EP 2005-0300-PR-20 Volume 3: Procedure: Impact Assessment</p> <p>EP-2005-0300-PR-20 Volume 3: HEMP Requirements, Tool and Techniques</p> <p>HSE Global Environmental Standards (Issue 8, July 2007)</p>
Chevron	<p>GU ESHIA Guidance (Version 1.0, October 2007)</p> <p>GU Environmental, Social and Health Impact Assessment (Version 1.0, October 2007)</p>
BHP	<p>Billiton HSEC Guideline No G60: Environmental and Social Impact Assessment (Rev 2.0, October 2007)</p> <p>HSEC Management Standards (Issue No. 3, October 2007)</p>
BP	<p>Group Practice: Environmental Requirements for New Projects</p> <p>Group Practice: Annex I Environmental Impact Management Process</p> <p>Group Practice: Annex II Environmental Performance Requirements</p> <p>Group Practice: Social Requirements for New projects</p>

Appendix 4.1c: Department of State Development Publications -Browse LNG

Public Information Booklet

Information about the site and the selection process for the Browse LNG Precinct is available in the Public Information Booklet and appendices and summarised in fact sheets.

Browse LNG Precinct - Public Information Booklet (PDF 5.76MB)

Browse LNG Precinct Appendix 2 (PDF 8.1MB)

Browse LNG Precinct Appendix 3 (PDF 14MB)

Fact Sheets

Overview Brochure (PDF 327KB)

Factsheet 1: The Government's Role and Precinct Details (PDF 1.6MB)

Factsheet 2: Site Selection, Approvals Required and Decision Timeline (PDF 3.1MB)

Factsheet 3: Native Title and Indigenous Heritage (Updated September 2010, PDF 1.0MB)

Factsheet 4: Benefits to the Kimberley (PDF 3.7MB)

Factsheet 5: Social Impact Assessment (PDF 5.9MB)

Factsheet 6: Final Site Selection and Public Information Booklet (PDF 5.1MB)

Factsheet 7: Strategic Assessment Agreement (PDF 2.8mb)

Kimberley LNG Project Presentation (PPT 8.64MB)

Strategic Assessment

The State Government entered into an agreement with the Commonwealth Government to undertake a strategic assessment of a preferred Precinct site and an assessment of the national heritage values of the West Kimberley region.

Preface to the Scope of the Strategic Assessment (PDF 355kb)

Scope of the Strategic Assessment (PDF 4.2mb)

Appendices to Scope of the Strategic Assessment (PDF 7.05mb)

Strategic Assessment and Approval Process and Timelines (as at January 2010) (PDF 55kb)

Strategic Assessment Agreement Presentation - 17 June 2009 (PPT 4.35MB)

Native Title and Indigenous Heritage Issues

Native title issues including negotiations and land access.

Native Title and Indigenous Heritage Questions and Answers (PDF 170KB)

Heads of Agreement signed for Kimberley LNG Project

Master Plan

Browse LNG Precinct - Master Plan Report (PDF 47MB)

The Master Plan is a particularly large document (47MB) due to a number of figures and maps. A copy of the Master Plan on CD can be obtained by contacting the Department of State Development on phone (08) 9222 0555, (08) 9222 0555.

Environmental Studies

Vegetation and Flora Survey of James Price Point: Wet Season 2009 (PDF 4542kb)

Supplementary Terrestrial Flora and Vegetation Assessment - James Price Point (released 2010) (PDF 10.5MB)

James Price Point Terrestrial Fauna Survey: Wet Season 2009 (PDF 6655kb)

Supplementary Terrestrial Fauna and Habitat Assessment - James Price Point (released 2010) (PDF 9.5MB)

Previous environmental studies were released by the Northern Development Taskforce and are available under Archived Documents.

Social Impact Assessment

There are three reporting stages of the Social Impact Assessment (SIA), as follows:

Volume I: Kimberley Browse LNG Strategic Social Impact Assessment Scope and Profile

Volume II: Browse LNG Assessment of Impacts and Specialist Studies:

- Aboriginal Social Impact Assessment
- Tourism Impact Assessment
- Fishing, Pearling and Aquaculture Impact Assessment
- Infrastructure Assessment
- Volume III: Browse LNG Social Impact Assessment Management Plan

Volumes II and III will be publicly released once they have been finalised.

Browse Liquefied Natural Gas Precinct - Infrastructure Assessment Study (PDF 6.5MB)

Kimberley Browse Strategic Social Impact Assessment – Vol I: Scope and Profile, December 2009 (PDF 3.59MB)

Fishing Industry Impact Study and Economic Analysis (Department of Fisheries):

Tourism Impact Assessment - Kimberley Liquefied Natural Gas (LNG) Project (PDF 5.56MB)

Kimberley LNG Strategic Social Impact Assessment (Word 52KB)

Social Impact Assessment Presentation - 17th June 2009 (PPT 2.32MB)

Site Assessment for Supply Base

Site Assessment for Supply Base to Support the Browse Basin Report (PDF 19MB)

Maps

Kimberley Projects Map (PDF 2265kb)

Kimberley Projects Map (including parks, reserves and local government and pastoral boundaries) (PDF 1880kb)

Browse Basin Distance to Processing Map (PDF 491kb)

Archived Documents

In January 2009, the coordination of issues related to the development of a precinct for processing Browse Basin gas in the Kimberley passed from the former Northern Development Taskforce to the newly established Department of State Development. The following documents were produced by the Northern Development Taskforce between June 2007 and December 2008.

Final Report

The final report of the Taskforce as released in December 2008 (PDF 286kb)

Site Evaluation Reports

Northern Development Taskforce Site Evaluation Report Part A (PDF 205kb)

Northern Development Taskforce Site Evaluation Report Part B (PDF 918kb)

Appendix 1: Gaffney Cline and Associates Reports 1-3

GCA Report 1 Reviews the site selection process undertaken by proponents, Report 1 (PDF 1,137kb) & Addendum to Report 1 (PDF 144kb)

GCA Report 2 Review of proposed concepts for the development of the Browse Basin gas reserves, Report 2 (PDF 2,395kb)

GCA Report 3 Reviews the potential for an on-shore LNG hub development, Report 3 (PDF 248kb)

Appendix 2: Broome workshop presentations

DAY 1: Objectives of Workshop - Duncan Ord (PPT 811kb)

DAY 1: Terrestrial Environment. Coastal Geomorphology - Ian Elliot (PDF 1.50mb)

DAY 1: Terrestrial Environment. Flora and Vegetation - Kevin Kenneally & Tim Willing (PDF 5.23mb)

DAY 1: DEWHA Regional Environmental and Heritage Perspective. EPBC Act Strategic Assessment - Mark Flanigan, Paula Tomkins & Terry Bailey (PPT 9,524kb)

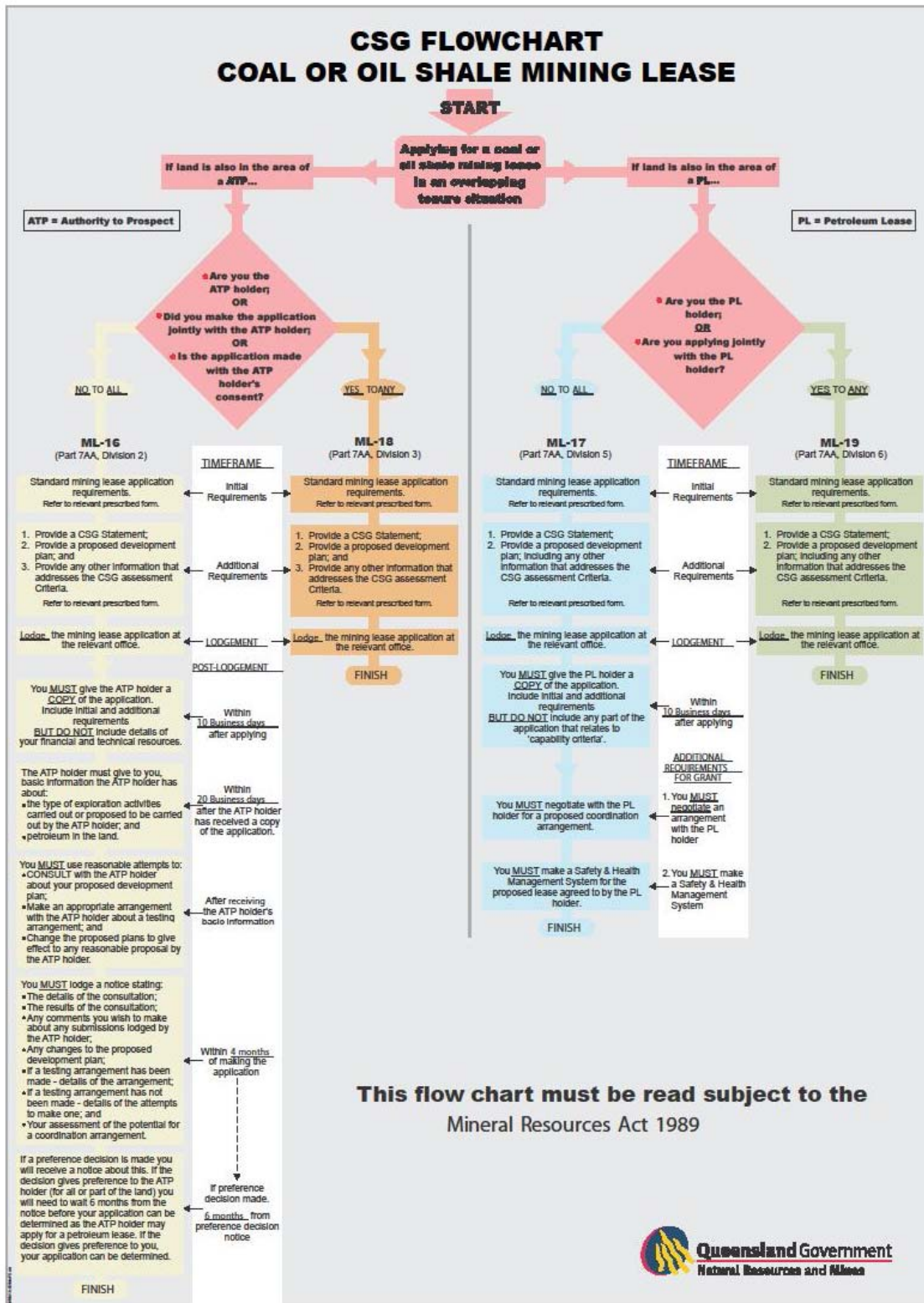
DAY 1: DEWHA Regional Environmental and Heritage Perspective. Heritage System Kimberly - Terry Bailey (PPT 4,021kb)

DAY 1: DEWHA Regional Environmental and Heritage Perspective. Standard National Heritage Listing Process (PDF 26kb)

DAY 1: Terrestrial Environment. Fauna of the Kimberly - Mitch Ladyman (PPT 5,476kb)

- DAY 1: Terrestrial Environment. Overview - Gary Whisson (PPT 12,670kb)
- DAY 1: Marine Environment. Marine Environmental Considerations - Ray Masini (PPT 13.7mb)
- DAY 2: Fisheries Working Group - Tim Bray (PPT 558kb)
- DAY 2: General Environment. Choosing the Future - Maria Mann (PPT 17,080kb)
- DAY 2: General Environment. Natural Values of the Kimberly - Josh Coates (PPT 4,839kb)
- DAY 2: General Environment. Selecting a LNG Hub Site in the Kimberly - Tim Nicol (PPT 14,305kb)
- DAY 2: Northern Development Taskforce Site Evaluation - Inpex (PDF 9,132kb)
- DAY 3: Community Reference Group - Klari Kadar (PPT 1,490kb)
- DAY 3: Department of Indigenous Affairs. Heritage - Pam Thorley (PPT 826kb)
- DAY 3: Summary Session and Reporting to TO Taskforce - Duncan Ord (PPT 1,451kb)
- DAY 3: Tourism. Vaughan Davies (PPT 7,671kb)
- DAY 3: Workshop Summary (PPT 907kb)

Appendix 4.2a: CSG Mining Lease Flowchart



Appendix 4.2b: Gladstone LCSG Stakeholder Categories

STAKEHOLDER CATEGORY	REPRESENTATIVE MEMBER
<p>Commonwealth Government</p> <ul style="list-style-type: none"> - Commonwealth Government Representatives - Commonwealth Government Agency and Departmental Representatives 	<p>Member for Flynn Member for Maranoa Member for Toowoomba South Member for Toowoomba North Gladstone Area Water Board Great Barrier Reef Marine Park Authority</p>
<p>Queensland Government</p> <ul style="list-style-type: none"> - Queensland Government Representatives - Queensland Opposition - Queensland Government Agency and Departmental Representatives 	<p>Attorney-General and Minister for industrial Relations Minister for Community Services and Housing Minister for Women Minister for Health Minister for Infrastructure and Planning Minister for Employment and Economic Development Minister for Natural Resources, Mines and Energy Minister for Trade Minister for Tourism and Fair Trading Minister for Primary Industries, Fisheries and Rural and Regional Queensland Minister for Climate Change and Sustainability Minister for Main Roads Minister for Transport Minister for Police Corrective Services and Emergency Services Minister for Local Government and Aboriginal and Torres Strait Island Partnerships Minister for Public Works and Information and Communication Technology</p> <p>Member for Callide Member for Gladstone Member for Darling Downs to the Condamine Member for Southern Downs and Opposition Leader Member for Warrego</p> <p>The Co-ordinator General, Major Projects Branch Office of the Queensland Premier Office of the Queensland Deputy Premier Department of Premier and Cabinet Treasury Department Department of Communities Department of Community Safety Department of Education and Training Department of Employment, Economic Development and Innovation Department of Environment and Resource Management Environmental Services Central Coast Region Capricornia Regional Terrestrial Parks, QLD Parks and Wildlife</p>

STAKEHOLDER CATEGORY	REPRESENTATIVE MEMBER
<p>Government-Owned Corporations/ Organisations</p>	<p>Department of Infrastructure and Planning Co-ordinator General and Director General Economic Development LNG Project Group State Development Areas LNG Infrastructure Development Major Projects Significant Projects Coordination Property Services Group Department of Tourism, Regional Development and Industry Department of Transport and Main Roads Maritime Safety Queensland Queensland Health Queensland Police</p> <p>Gladstone Ports Corporation Ltd, Port Planning and Development Gladstone Economic and Industry Development Board (includes GPC, GRC, GAWB, DS DTI, GAPD, DIP) Gladstone Regional Development Centre</p>
<p>Local Government</p> <ul style="list-style-type: none"> - Gladstone Regional Council - Western Downs Regional Council - Banana Shire Council - North Burnett Regional Council - Torres Strait Island Shire Council and Regional Authority 	<p>Mayor, CEO and Councillors Gladstone Community Advisory Service Gladstone Community Services Gladstone Airport Central Queensland Local Government Association</p> <p>Mayor, CEO and Councillors Director of Corporate Services Director of Community and Culture Director of Economic and Community Development Director of Engineering Services Director of Planning and Environment Chinchilla Customer Service Centre Dalby Customer Service Centre Miles Customer Service Centre Tara Customer Service Centre</p> <p>Mayor, CEO and Councillors Manager Technical Services</p> <p>CEO Director Development, Environment & Planning Manager of Development Services</p> <p>Mayor and CEO</p>
<p>Utility Service Providers</p>	<p>Ergon Energy Energex Telstra Optus Powerlink</p>
<p>Environmental Groups and Associations</p>	<p>Australian Conservation Council (Brisbane) Boyne Island Environmental Education Centre Boyne Island Tannum Sands Coastcare Capricorn Conservation Council Condamine Alliance</p>

STAKEHOLDER CATEGORY	REPRESENTATIVE MEMBER
	Condamine Catchment Management Association Conservation Volunteers Australia (Gladstone) Environmental Property Protection Association (EPPA) Fitzroy Basin Association Gladstone Healthy Air Project Great Artesian Basin Advisory Council Great Barrier Reef Marine Park Authority - Gladstone Local Marine Advisory Committee Greenpeace (Sydney) Institute for Sustainable Regional Development (CQU) Landcare Maranoa-Balonne Catchment Group National Murray Darling Association QLD Conservation Council QLD Murray Darling Committee Save Curtis Island Group Tara and District Landcare Group Wildlife Preservation Queensland WWF (Sydney and Brisbane)
Recreational Groups	Boyne Tannum HookUp Fishing Committee Gladstone Sportfishing Association Gladstone & District Sports Foundation Trust Wanderers Fishing Club
Community and Service Groups/ Associations	Dolphin Sea Scouts Group (Gladstone) Calliope Scouts Group Gladstone Area Group Apprentices Ltd Historical Societies and Museums: Banana Historical Society Calliope River Historical Society Museum Chinchilla Historical Museum and Historical Society Gladstone Maritime Museum and Maritime Historical Society Gladstone Museum Juandah Historical Society Miles Historical Village and Historical Society Miriam Vale Historical Society Museum Taroom Historical Society and Historical Village. Kareeba Scout Group (Gladstone) Progress Associations QCWA Quota International Inc Australian Red Cross Roseberry Community Services Rotary clubs Volunteer Marine Rescue Zonta clubs Gladstone Central Committee for the Ageing (includes Port Curtis Seniors Centre and Gladstone Heritage Retirement Village)
Educational Institutions and Scientific Community	Central Queensland University (CQU) Centre for Environmental Management (CQU) Centre for Sustainable Resource Minerals Institute, University of Queensland (UQ) Chinchilla State High School Dalby State High School Gladstone Area Maths, Science & Engineering Teachers (GAMSET) Gladstone Region Primary and High schools Great Barrier Reef Marine Park Authority – Gladstone Local Marine

STAKEHOLDER CATEGORY	REPRESENTATIVE MEMBER
	Advisory Committee EPA (scientific unit)
Health Institutions	Queensland Health - as noted above Gladstone Hospital Chinchilla Hospital Chinchilla Medical Practice Taroom Hospital Tara Hospital Tara Medical Centre Miles Hospital Dalby Hospital
Businesses and Industry Bodies	<p>AGFORCE Australian Marine Pilots Association Callide Valley Agricultural and Pastoral Society Capricorn Lodge, Curtis Island South End Chinchilla Chamber of Commerce Chinchilla Economic and Tourism Development Association Dalby Chamber of Commerce Dawson Valley Development Association Enterprise Biloela Association Inc Future Food Queensland Gladstone Engineering Alliance Gladstone Area Pomotion and Development Limited Gladstone Industry and Economic Development Board Gladstone Chamber of Commerce People Resourcing Pty Ltd Queensland Seafood Industry Association Shire of Tara Development Association Surat Basin Development Corporation Tara Business and Industry Group Toowoomba & Golden West Regional Tourist Association Ltd Western Downs Regional Economic Development Forum</p> <p><i>The Project is registering local equipment supply businesses in a Consultation Manager Stakeholder Database. This list will be provided to key contractors at the appropriate time. QGC is also registered with ICN, which is assisting Bechtel in sourcing appropriate potential bidders for future contracts.</i></p>
Local Residents	LNG Facility: Gladstone Regional Council LGA Gas Field: Western Downs Regional Council LGA Pipeline Route: Banana Shire Council / North Burnett Regional Council LGAs Landholders
Indigenous Groups	Wulli Wulli/Djaku-nde Jangerie Jangerie Gangulu Wakka Wakka Port Curtis Coral Coast (an amalgamated claim of 4 previously registered claims, being Gooreng Gooreng, Bailai, Taribelung Bunda and Gurang) Iman Mandandanje Bigambul BCJMY (inclusive of Western Wakka Wakka, Barunggam, Yiman, Cobbe Cobbe and Jarowair) People Resourcing Pty Ltd
Emergency Services	Fire & Rescue Ambulance Police

Appendix 4.6: Permits, Approvals and Consultations Required for the Cameron LNG Project

FEDERAL	
<p>U.S. Army Corps of Engineers (COE) *Participant in the EIS Process</p>	<p>Authorization for activities that will occupy, fill, or grade land in a floodplain, streambed, or channel of a stream under Section 10 of the Rivers and Harbours Act of 1899 (33 USC § 403).</p> <p>Authorization to discharge dredged or fill material into waters of the United States under Section 404 of the Clean Water Act (CWA) (33 USC § 1344)</p>
<p>U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) Office of Coastal Zone Management NOAA Fisheries *Participant in the EIS Process</p>	<p>Federal Consistency Certification (1465 and 15 CFR Part 930, 16 USC §§ 145) (permitting authority delegated to the Louisiana Department of Natural Resources Coastal Management)</p> <p>Consultation regarding compliance with Section 7 of the Endangered Species Act; the Magnuson-Stevens Fishery Conservation and Management Act; and the Marine Mammal Protection Act (16 USC §§ 1856 et seq.)</p>
<p>U.S. Department of the Interior U.S. Fish and Wildlife Service *Cooperating Agency in the EIS Process</p>	<p>Consultation regarding compliance with Section 7 of the Endangered Species Act, the Migratory Bird Treaty Act, and the Fish and Wildlife Coordination Act (16 USC § 1531 et seq.)</p>
<p>U.S. Environmental Protection Agency *Provided Comments on the EIS</p>	<p>Water Quality Certification under Section 401 of the CWA, (33 USC § 1341, 40 CFR § 131) (permitting authority delegated to the Louisiana Department of Environmental Quality) National Pollutant Discharge Elimination System (NPDES) permits for storm water and wastewater under Section 402 of the CWA, (33 USC § 1342 and 40 CFR §§ 122-125), (in conjunction with Louisiana) Section 404 of the CWA (veto power for wetland permits issued by COE)</p>
<p>U.S. Department of Homeland Security U.S. Coast Guard *Participant in the EIS Process</p>	<p>Letter of Intent (33 CFR 127); Waterfront Facilities Handling Liquefied Natural Gas and Liquefied Hazardous Gas; Permission to establish Aids to Navigation (33 CFR Part 66, 14 USC §§ 84-86)</p>
STATE	
<p>Louisiana Department of Natural Resources Coastal Management Division *Participant in the EIS Process</p>	<p>Federal Consistency Review with CZMP Program Policies</p>

<p>Louisiana Department of Environmental Quality *Participant in the EIS Process</p>	<p>Water Quality Certification pursuant to Section 401 of the CWA</p> <p>Louisiana Pollution Discharge Elimination System (LPDES)</p> <p>Permit to Discharge Industrial Wastewater</p> <p>Notice of Intent for Stormwater Discharges Associated with Industrial Activity under the LPDES Multi-Sector General Permit</p> <p>Notice of Intent to Discharge Stormwater Associated with Construction Activity</p> <p>Notice of Termination of Coverage under LPDES General Permit for Storm water Discharges Associated with Construction Activity</p> <p>LPDES Notice of Intent to Discharge Hydrostatic Test Wastewater</p> <p>Part 70 Air Permit</p>
<p>Louisiana Department of Wildlife and Fisheries *Participant in the EIS Process</p>	<p>State-listed threatened and endangered species consultations</p>
<p>Louisiana Department of Culture, Recreation, and Tourism – Division of Archaeology & Historic Preservation *Participant in the EIS Process Louisiana Department of Transportation</p>	<p>Review and comment on undertakings potentially affecting cultural resources (Section 106, National Historic Preservation Act)</p> <p>Road Crossing Permits</p>
<p>LOCAL</p>	
<p>Beauregard Parish Police Jury Calcasieu Parish Police Jury Cameron Parish Police Jury</p>	<p>Road Crossing Permit</p> <p>Road Crossing Permit</p> <p>Road Crossing Permit</p>

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