Risk-Based Siting Considerations: LNG Terminals

Comparative Perspectives of United States & Europe

Frank A. Licari & C. David Weimer

Mary Kay O’Conner, Process Safety Center
2010 International Symposium
Introduction

. . . . What can be learned and accomplished through a greater understanding of the LNG facility siting processes.

- Siting regulations and industrial standards for liquefied natural gas (LNG) terminals are evolving along different paths within Europe and the United States (U.S.).

- U.S. regulatory agencies uniquely shape technical, safety, risk mitigation, and societal risk perspectives for siting LNG terminals.

- The European approach applies:
  1) assessment and suitability of code compliance,
  2) application of accepted engineering practices,
  3) application of empirical risk assessments and computational modeling to reach risk exposures.
LNG Facility Siting Historical Review

... the impact of expanding global energy needs.

- During the past 30 years, the U.S. technical approach to siting an LNG facility remained unchanged within PHMSA regulations.
  - The general public was protected from the consequences of an LNG spill or flammable gas release by calculating radiant heat and vapor dispersion exclusion zones and establishing LNG facility property lines beyond these zones.

- Since 911 the number and variety of siting analyses increased using both qualitative and quantitative methodologies to ensure societal, environmental, and transportation risks were properly evaluated and appropriately mitigated.

- The period preceding the recent global recession demonstrated the world’s appetite for energy and energy’s importance to the global economy.

- With recession recovery Natural Gas will be an important fuel and the infrastructure to bring it to market will be a main focus point only overshadowed by the application of established industry practices and the evolution of new governmental regulatory regimes.
Today’s Facility Siting Climate

... the perceptions, needs and acceptable tolerances.

- Like the U.S., European Communities Are Vulnerable to Public Opposition In Siting LNG Terminals.

- Better Public Outreach & Enhanced Risk Communication Techniques Needed to Sustain and Improve Public Acceptance.

- An active and continuous public engagement and local community recognition is the best risk management strategy within the project development plan.
  - As LNG project developers and governments in the U.S. and the EU develop and execute energy initiatives
Regulator Analysis

... Prescriptive v. performance based rules.

- Direct Comparison between European and U.S. Siting Methodologies Is Not Simple/Straightforward.

- Appendices compare these methodologies across 26 categories.

- Different perspectives developed:
  - Regulatory precedents formed the initial bases of the regulations
  - Risk mitigation strategies required within each regulatory approach are different

- European approach to facility siting follows a performance perspective while the U.S. applies a more prescriptive approach.

- European approach incorporated a wide array of the industry standards and recommended practices developed within the U.S. and those developed internationally.

- The U.S. Does Not Hold The Same International Content.

- Generalized Observations in Table 1 Provide Insight to Relative Differences.
Facility Siting Regulatory Outlook

... the perspectives, direction and drivers.

  - Cleveland LNG Incident Delayed Expansion
  - 1973 Oil Embargo Underscored Demand for Alternative Energy Sources
  - 911 Highlighted Security Vulnerabilities


- European Market Place, Regulations Will Hold Their Direction To Remain Risk-based And Require Developers And Operators To Demonstrate Identified Performance Standards Are Being Met.

- The Measures Put In Place To Ensure The Standards Are Met Can Be Verified, Measured And Accounted To Be Productive In The Prevention And Mitigation Of Elements Of Risk Exposures.
Perspectives and Considerations

... the market and regulatory drivers and direction.

- Environmental Issues Are Important Factors in Regulatory Change.
- Major Industrial Events Continue to Shape Regulatory Climate and Drive Safety Case Regimes.
Acknowledgements

. . . the assistance from our industry, colleagues and those who govern.

The authors wish to recognize and thank the many contributors to European and U.S. siting regulations and consensus standards who crafted a variety prescriptive and performance standards that safely site, design, construct, and operate LNG terminals to safeguard the public and the environment.
References

... And intensive search for a wide perspective and deep understanding.

- U.S. Regulations
- European Union Standards
- Governmental Agencies and Department Publications
- Industry Rules and Performance Standards
- World Organizations
- Industry Leaders
In Closing

- The Authors by developing the paper hope to provide a roadmap to Key Siting Concepts in Europe and U.S., so readers could individually assess similarities and differences.