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CARGO OF FIRE: A CALL FOR STRICTER REGULATION OF LIQUEFIED NATURAL GAS SHIPMENT AND STORAGE

*Philip Weinberg**

I. Introduction

The imminent prospect of importation of large quantities of liquefied natural gas (LNG) through congested harbors and its storage in huge tanks in densely-populated urban areas provides a classic instance of our technological reach exceeding our grasp. The severe danger of widespread fire impels an exhaustive examination of the need to import LNG through busy harbors and to store it within cities. Such conveyance and storage expose millions of persons and millions of dollars of property to extraordinary harm. Three aspects of proposed importation of LNG are particularly disturbing: (1) the federal government's insistence on promoting LNG importation prior to an adequate investigation of alternatives to such importation; (2) the risks posed by marine shipment of LNG under current inadequate government supervision; and (3) the gas industry's penchant for constructing LNG storage tanks in densely-populated urban areas.

History, although silent on maritime tragedies involving LNG tankers, provides two examples of the severe consequences which storage of LNG presents. In 1944, an LNG storage tank in Cleveland ruptured and the resulting fire and explosion caused 133 deaths and the devastation of adjacent residential and industrial sections of the city.[1] Due to this catastrophe, ordinary steel is no longer used in LNG tank walls, and diking is constructed around such tanks as an added precaution.[2]

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1. SPECIAL AND CHEMICAL HAZARDS COMM. OF THE AM. INS. ASS'N, *Cryogenic Natural Gas*, SPECIAL HAZARDS BULL., Dec., 1972, at 1 [hereinafter cited as SPECIAL HAZARDS BULL.].

2. *See* Napier, *Natural Gas and the Environment—Before Combustion* in OUTLOOK FOR NATURAL GAS—A QUALITY FUEL 199, 206-07 (P. Hepple, ed. 1973). *See also* DISTRIGAS CORP., DISTRIGAS OF N.Y. CORP. & DISTRIGAS PIPELINE CORP., COMMENTS TO THE DRAFT ENVIRONMENT STATEMENT ISSUED BY THE BUREAU OF NATURAL GAS, FEDERAL POWER COMMISSION IN EASCOGAS LNG INC. ENVIRONMENTAL IMPACT STATEMENT, EPA No. CP 73-47, vol. 2, app. D, at 2-3 [hereinafter cited as IMPACT STATEMENT].

The second incident occurred on Staten Island, New York in 1973 when an empty LNG tank exploded and caught fire apparently because the insulation material used had absorbed methane.[3] Forty workers died as a result of this disaster.[4]

Despite the severity of these two calamities, neither incident resulted in the most serious consequences which could stem from an accident involving an LNG tank.

This Article will consider the consequential risks of embarking upon a program of marine importation and urban storage of LNG. It will also examine the inherent volatility of LNG, the technological deficiencies of present modes of transoceanic shipping and aboveground storing of LNG, and the lack of a viable, coordinated federal and state policy with respect to such shipping and storing.

A. LNG Importation: Is this Trip Necessary?

Before considering the need for governmental intervention, it is necessary to examine the inherent hazards in shipping LNG and the probability of any resultant perils from such transportation. The highly "inflammatory" nature of LNG is the keystone of a discussion of its hazards. To be liquefied, natural gas must be reduced to a temperature -258° F and kept at that temperature.[5] If the temperature rises above that point, natural gas boils, and its molecules rapidly expand in a fashion similar to that which occurs when water becomes steam. Unlike water, however, LNG is highly flammable. It consists mostly of methane, with small amounts of ethane, butane, nitrogen, and other components.[6] When LNG boils, the water vapor present in the air will condense and cause a cloud of gas to be formed.[7] Since the cold gas vapor from LNG is 1.5 times heavier than air, it tends to travel along the ground while mixing with air.[8]

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3. For a discussion of this disaster and subsequent settlements of certain suits arising therefrom, see N.Y. Times, March 25, 1976, at 25, col. 5. *See also* BUS. WEEK, March 29, 1976, at 40.

4. BUS. WEEK, March 29, 1976, at 40, col. 2.

5. COMPTROLLER GENERAL, NATURAL GAS SHORTAGE: THE ROLE OF IMPORTED LIQUEFIED NATURAL GAS 24 (1975) [hereinafter cited as COMPTROLLER GENERAL REP.].

6. SPECIAL HAZARDS BULL. 2-3.

7. *Id.* at 31.

8. *Id.*

An LNG cloud will rise when its density falls below that of the surrounding air.[9] LNG spilled on water or land will vaporize rapidly and a flammable mixture of LNG and air will spread downwind and then retreat.[10] A mixture of vaporized LNG and air will ignite upon contact with any open flame[11] and the resulting fire will almost inevitably spread rapidly through the entire LNG cloud, ending only when the level of gas dispersion renders flame transmission impossible.[12]

A fire resulting from any contact of an LNG cloud with open flame would be of enormously high intensity. Assuming a five mile per hour wind, a leak caused by the failure of a 400' x 400' above-ground LNG tank would result in a vapor cloud traveling a mile in twelve minutes; and, in the event of ignition, any person within 900 feet would suffer skin blistering after 30 seconds.[13] Wood, paper, plastic, grass, or any other combustible material would ignite within 500 feet.

Fortunately, we have not as yet had experience with a collision involving an LNG vessel.[15] In the only comparable incident, the *Yuyo Maru*, with a cargo of liquefied propane gas and naphtha, collided with another ship off Tokyo in 1974, causing a severe fire.[16] The ship was towed several miles offshore and sunk by gunfire.[17]

The risk of widespread fire from a collision involving LNG is real. Reasonable estimates of the result of such a maritime or ship-to-shore collision are that its impact might rupture the skin of even a double-hulled tanker or barge containing LNG, releasing a rapidly vaporizing cloud which, upon the slightest exposure to open flame, would transform the vessel into a drifting holocaust.

These traits of LNG make it dangerous in ways akin to explosives, nuclear materials, and other substances universally recognized as hazardous. It is, therefore, reasonable to ask why it should be

9. *Id.*
10. *See id.* at 31-32.
11. COMPTROLLER GENERAL REP. 31.
12. SPECIAL HAZARDS BULL. 32.
13. *Id.*
14. *Id.*
15. COMPTROLLER GENERAL REP. 31.
16. MARITIME SAFETY AGENCY OF THE JAPANESE GOV'T, REP. ON THE OUTLINE OF COLLISION BETWEEN JAPANESE TANKER *Yuyo Maru No. 10* AND LIBERIAN FREIGHTER *Pacific Ares* 1,4 (1975).
17. *Id.* at 3, 22-23.

shipped into congested harbors, such as New York's, or stored in tanks in heavily populated areas. This author is convinced that it should not be. In the first place, the supposed need for the LNG importation program deserves skeptical scrutiny—not only because of the admitted dangers inherent in transporting this ultrahazardous substance but also because of the extraordinary costs of its shipment and storage. Moreover, in contrast to other proposals to alleviate our energy shortage, LNG importation tends to perpetuate our dependence on sources in Algeria and other mideastern countries—the very dependence which led to sharp price increases in 1973 and the resulting oil shortage. If that crisis taught one lesson, it is that reliance on imported fuels is very risky. To promote dependence on an imported fuel which increases the risk of catasrophe in shipment and storage is to incur additional dangers without alleviating the original threat.

B. Natural Gas Regulation and Supply

The claimed need to import LNG stems from the recent shortage of natural gas.[18] This, in turn, has led to refusals by utilities to supply new commercial and industrial customers and to contingency plans calling for cut-offs to non-residential customers who have alternate sources of heat available.[19] It has been contended that prices set by the Federal Power Commission (FPC) are artificially low, and that the solution lies in deregulation, which would provide greater incentive to drill and to seek new sources of gas.[20] This solution might be a cure worse than the disease, however, since deregulation might raise the price of gas precipitously to customers already beset with increasing oil and gasoline costs. Nonetheless, such price rises would have one virtue since they would probably reduce unnecessary use of the fuel and act as a spur to conservation.

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18. *See, e.g.*, COMPTROLLER GENERAL REP. 11-22.

19. N.Y. Pub. Serv. Comm'n, Restrictions on Attachment of New Gas Customers, Cas. No. 25-766, at 26-27 (Oct. 19, 1971).

20. *See* COMPTROLLER GENERAL REP. 19-21, 23; Breyer & MacAvoy, *The Natural Gas Shortages and the Regulation of Natural Gas Producers*, 86 HARV. L. REV. 941 (1973); Roddis, *What Is the Inferior Use of Gas?*, PUB. UTIL. FORT., Oct. 14, 1971, at 90; Note, *Natural Gas and the Federal Power Commission*, 47 IND. L.J. 725 (1972). *Contra*, Douglas, *The Case for the Consumer of Natural Gas*, 44 GEO. L.J. 566 (1956).

In order to weigh whether deregulation makes sense, it is necessary to examine the development of natural gas supplies. Surprisingly, gas was never actually sought by fuel explorers until quite recently. It was almost always a by-product of oil companies' search for oil, since it was frequently found in the same fields and it is a geologically older form of the same chemically transformed plant life as oil. Gas was at first sold almost wholly intrastate, and regulated purely on a local basis by public utility commissions, like telephone service and electricity. Intrastate sales of gas in New York are still regulated in the same manner.[21] As interstate sales of gas increased, the cost of transporting such gas by pipeline "became a significant . . . factor in determining consumer rates."[22] Therefore, in order to control prices effectively, states had to confront the issue of whether the regulation of interstate pipeline companies was prohibited under the commerce clause of the United States Constitution. The Supreme Court found "that the transportation of gas through pipe lines from one State to another is interstate commerce," and that such interstate commerce did not cease until the gas was in the transmission lines of the local, intrastate distributor.[23] Pressure mounted for federal legislation which would control

21. *See* N.Y. PUB. SERV. LAW § 65 (McKinney 1955). This law authorizes New York's Public Service Commission to regulate gas prices to consumers and to forbid unreasonable discrimination and preferences.

22. Bagge & Hynan, *Liquefied Natural Gas Imports and the United States Energy Crisis: A Regulatory Response*, 4 LAW & POLICY IN INT'L BUS. 37, 41 (1972).

23. Public Util. Comm'n v. Landon, 249 U.S. 236, 245 (1919). In *Landon*, the Court held that a state could regulate the price of gas charged by independent local distributors despite an agreement between such distributors and an interstate pipeline company which had fixed the pipeline's compensation as a percentage of the distributor's gross profits.

In Pennsylvania Gas Co. v. Public Serv. Comm'n, 252 U.S. 23 (1920), the Court distinguished *Landon* and permitted state regulation where gas companies in Pennsylvania supplied gas directly to consumers in Jamestown, New York. The Court allowed New York to regulate gas prices to the Jamestown consumers on the basis that the object of New York's regulation was "local" in character due to the direct pipeline between the Pennsylvania suppliers and the New York consumers. *Id.* at 28-29.

In two subsequent cases, however, the Court indicated that *Pennsylvania Gas* was to be construed narrowly. In Missouri v. Kansas Natural Gas Co. 265 U.S. 298, 308 (1924), the Court again considered state regulation of an interstate pipeline company which sold gas to local distributors. It distinguished *Pennsylvania Gas* on the ground that the Pennsylvania Gas Co. had been engaged in a purely local activity, retail sales of gas, while the case at bar and *Landon* involved wholesale sales of gas. *Id.* at 308-09. The Court in *Kansas Natural Gas* opined:

> The contention that, in the public interest, the business is one requiring regulation, need not be challenged. But Congress thus far has not seen fit to regulate it, and its

effectively the interstate pipeline companies.[24] Congress' response was the Natural Gas Act.[25]

The Natural Gas Act expanded the jurisdiction of the FPC from hydroelectric plants[26] to include sales in interstate commerce of natural gas for resale. However, this jurisdiction did not apply to the production of gas.[27] Throughout this period the liquefaction of gas was unknown and it was accepted as axiomatic that "[t]here is only one known method of transporting natural gas in commercial quantities and that is by pipe line under pressure."[28] Technology has made that statement as anachronistic as an interurban trolley schedule. But the regulatory authority of the FPC and our other energy and environmental agencies has not kept pace with these scientific advances.

From the start, the FPC was criticized by gas producers seeking total deregulation of gas prices and by consumer spokesmen urging stricter regulation.[29] Although the courts recognized the purpose of the Natural Gas Act to be the protection of consumers from exces-

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silence, where it has the sole power to speak, is equivalent to a declaration that particular commerce shall be free from regulation.

Id. at 308.

Similarly, in Public Util. Comm'n v. Attleboro Steam & Elec. Co. 273 U.S. 83 (1927), the Court decided that *Kansas Natural Gas* and not *Pennsylvania Gas* was the controlling precedent in a case involving the wholesale sale of electricity from a company in one state to a company in another state. *Id.* at 87-89. On the basis of this decision and *Kansas Natural Gas* it was apparent that interstate pipeline companies selling gas to local, intrastate distributors were free from any form of governmental price regulation.

24. Bagge & Hynan, *supra* note 22, at 41.

25. 15 U.S.C. §§ 717-717w (1970). In Phillips Petroleum Co. v. Wisconsin, 347 U.S. 672 (1954), the Court noted:

There can be no dispute that the overriding congressional purpose [of the Natural Gas Act] was to plug the "gap" in regulation of natural-gas companies resulting from judicial decisions prohibiting, on federal constitutional grounds, state regulation of many of the interstate commerce aspects of the natural-gas business.

Id. at 682-83 (footnote omitted).

26. 16 U.S.C. §§ 791a-828c (1970).

27. 15 U.S.C. § 717(b) (1970) provides:

The provisions of this chapter shall apply to . . . the sale in interstate commerce of natural gas for resale . . . but shall not apply to . . . the production or gathering of natural gas.

28. FTC, 1936 GAS. REP. *quoted in* Dungan, *Jurisdiction of the Federal Power Commission over Importation of Liquefied Natural Gas*, 4 NATURAL RESOURCES LAW. 276, 277 (1971).

29. *See* sources cited in note 20 *supra*.

sive charges,[30] FPC regulation has failed to prevent the vices of an uncompetitive market shared by a small number of huge producers.[31] Yet the pressure from the industry has been unrelenting to deregulate natural gas at the wellhead. Although both Presidents Truman[32] and Eisenhower[33] vetoed legislation aimed at achieving that result, the drumbeat in favor of deregulation has resumed in recent years.

The inequality in bargaining power between gas producers and consumers needs no underscoring here. Nearly every consumer of gas, from the consumer with a gas stove to an electric utility with gas-fired generators, has a substantial investment in gas-burning equipment. This investment renders every consumer of gas a captive user, at least to some extent. Moreover, gas pipeline companies and public utilities are by their very nature incapable of competing geographically, and thus they must simply thrust their costs on to the ultimate consumer with little incentive to bargain with producers.[34]

Proponents of deregulation argue that price controls have failed to prevent monopolization and have in fact reduced production by eliminating incentives.[35] One commentator favoring deregulation argued recently that[36]

> [the present] shortage is a direct result of FPC regulation of producers' prices and . . . the shortage has been disproportionately borne by home consumers. . . . [T]he losses arising from the shortage have been so great that they cannot rationally be worth the pursuit of whatever valid purposes might be served by lower user prices.

In an effort to resolve this paradox, the FPC has differentiated between "new" and "old" gas. In the past decade, it has permitted higher prices for newly-produced gas, while setting area ceilings

30. *See, e.g.*, Atlantic Refining Co. v. Publ. Serv. Comm'n, 360 U.S. 378, 388 (1959); Phillips Petroleum Co. v. Wisconsin, 347 U.S. 672, 685 (1954).

31. These huge producers are principally oil companies which began to market natural gas only after accidentally discovering it in the course of oil exploration. While 5500 companies produced gas for resale in interstate commerce in 1954, 70% of the total amount was produced by 35 of these companies. Douglas, *supra* note 20, at 579-80.

32. *Id.* at 571-72.

33. *Id.* at 566.

34. These points are trenchantly discussed in *id.* at 580-87.

35. COMPTROLLER GENERAL REP. 23.

36. Breyer & MacAvoy, *supra* note 20, at 943.

when price ceilings for individual companies proved unwieldy.[37]

While these controls kept gas prices somewhat lower for consumers, the use of gas by industry increased as gas prices became cheaper than oil. Some commentators have argued that this contributed to the present shortage by fostering a demand for gas by industries which outbid the interstate pipelines supplying commercial and residential consumers.[38] Certainly a shortage of domestic natural gas now exists,[39] requiring utilities to discourage new users and to insist that large commercial gas-heat users develop plans to switch to oil in case of interruptions in service. This shortage has led companies to allocate gas use to insure a continuous supply for homes, schools, and hospitals, sometimes at the expense of industrial users.[40]

As with many of our energy problems, conservation could have helped to avoid this impasse.[41] For decades thoughtful students of energy management have been aware that the lack of a comprehensive conservation oriented policy was causing us to drift toward the rocks. Yet the FPC adamantly refused to consider conservation or even to distinguish, until recently, between inferior uses of gas, where substitutes are readily available, and superior uses where they are not. As long ago as 1944 the prescient Justice Jackson, concurring in *FPC c. Hope Natural Gas Co.*,[42] warned that "the wealth of Midas and the wit of man cannot produce or reproduce a natural gas field."[43]

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37. These practices were upheld in the Permian Basin Area Rate Cases, 390 U.S. 747 (1968).

38. Breyer & McAvoy, *supra* note 20, at 979.

39. COMPTROLLER GENERAL REP. 21-23.

40. This practice was upheld in FPC v. Louisiana Power & Light Co., 406 U.S. 621 (1972). The Court sustained the FPC's approval of such an allocation plan insuring supplies of Louisiana gas to out-of-state residential users as against a challenge by a local company. It noted that state regulation of supplies of interstate gas is impracticable and that FPC control is necessary to avoid conflicts between gas-producing and consuming states. *Id.* at 640-41. For a thoughtful discussion of this case and its rationale, see 61 GEO. L.J. 833 (1973) pointing out that unless the shortage is alleviated, producing states will insist "that the FPC consider the impact of curtailments on their economies." *Id.* at 842. Such insistence works against the interests of consumers in gas-importing regions like the Northeast.

41. As early as 1927, prior to the passage of the Natural Gas Act, the Federal Trade Commission warned: "Conservation is the first problem that demands attention." FTC, UTILITY CORPORATIONS, S. REP. No. 92, 70th Cong., 1st Sess., pt. 84-A, at 608 (1927) (Submitted to Congress Dec. 31, 1935), *quoted in* Stowe, *Conservation and The Commission: The Growth of Regulation of the End Use of Natural Gas by the Federal Power Commission*, 3 ENVIRONMENTAL AFFAIRS 527, 530 (1974).

42. 320 U.S. 591 (1944).

43. *Id.* at 629 (Jackson, J., concurring). Notwithstanding this early recognition of the need

Despite early Supreme Court recognition of the need to conserve gas,[44] the gas producers' indifference to conservation mirrored that of the FPC. Only since 1973, when the Organization of Petroleum Exporting Countries (OPEC) oil embargo dramatized the recklessness of our lack of an energy policy to even the most obtuse, have gas producers and the federal government become cognizant of conservation. Such "cognizance" was usually manifested as a mere hurriedly paid obeisance to conservation in preface to a plea for deregulation of prices at the wellhead.

The Federal Energy Administration estimates that price deregulation would not result in substantial increases in gas production until 1980.[45] Until that time, LNG importation, together with offshore exploration for gas and oil, are being touted as solutions to our shortage, while serious conservation measures still remain untried.

Although a full discussion of proposed offshore oil and gas development is beyond the scope of this Article, it is evident that offshore oil and gas exploration must be conducted under stringent safeguards. It is an extremely hazardous venture, risking lasting damage to substantial parts of this country's shell fishing beds, commercial and recreational fishing industries, beaches, harbors, and coastal wetlands through spills, industrialization, and the building of ephemeral boom-towns. This is a steep price to pay for a short-lived resource.

Until serious public commitment is made to revitalize rail transportation for both passengers and freight and to improve building insulation standards, federal and state governments cannot say that they have addressed themselves to large-scale energy conservation. Moreover, until such action has been taken, pressure to pursue short-sighted policies of importation and offshore exploration for oil and gas, with their consequential risks to environment and public health and safety, will undoubtedly continue.

In addition to energy conservation, the federal government is only now developing sensible alternatives to our country's

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for natural resource conservation, government failed to respond quickly in a positive fashion. One commentator noted, in 1956, that the FPC "has thus far failed to discharge this responsibility [to conserve] in a forceful and consistent manner." McGrath, *Federal Regulation of Producers in Relation to Conservation of Natural Gas*, 44 GEO. L.J. 676, 693 (1956).

44. 320 U.S. at 613. *See* FPC v. Hope Natural Gas Co., 320 U.S. 591, 613 (1944).

45. COMPTROLLER GENERAL REP. 3.

overdependence on gas and oil. Since a substantial portion of the gas consumed in this country is used for the generation of electricity and for space heating, the existence of alternative fuels must be considered[46] and weighed against the economic and environmental costs of LNG importation and deregulation. Such alternatives include coal and solar energy.[47]

The construction of giant cryogenic tankers and storage facilities for LNG, in light of their immense costs of construction and consequential risks, raises serious questions which should be considered. Moreover, since consumers must ultimately bear these costs while being potential victims of any mishaps, they deserve the right to decide if these costs should be incurred.

II. LNG Import Proposals: The New York City Problem

LNG is currently being brought into Everett, Massachusetts; Cove Point, Maryland; and Savannah, Georgia. Plans are afoot to construct storage tanks and ship it into locations near several other American coastal cities. In 1972 two importers, Distrigas and Eascogas, announced plans to ship LNG from Algeria to terminals on Staten Island, New York; Everett, Massachusetts; and Providence,

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46. For a discussion of alternative energy sources, see *id.* at 36-37. Congress has recognized the need to

> require effective action to develop, and increase the efficiency and reliability of use of, all energy sources to meet the needs of present and future generations, to increase the productivity of the national economy and strengthen its position in regard to international trade, to make the Nation self-sufficient in energy, to advance the goals of restoring, protecting, and enhancing environmental quality, and to assure public health and safety.

42 U.S.C. § 5801(a) (Supp. IV, 1974).

47. Although the use of coal poses its own substantial environmental problems stemming from the effects of strip-mining, coal is plentiful and need not be imported. It is easily and cheaply transported by rail or barge, and it can be used to generate electricity in areas which do not have seriously degraded air quality at considerable cost savings and without causing serious adverse effects on either the environment or the public health. The problems engendered by strip-mining, however, are real, but they can be solved by vigorously enforced legislation.

Continued research and development of solar heat, solar generation of power, and the harnessing of tides and geothermal sources of energy hold the promise of future alternatives to fossil fuels. Congress has appropriated $40 million dollars to the Energy Research and Development Administration for these salutary purposes under the Solar Heating and Cooling Demonstration Act of 1970. 42 U.S.C. §§ 2473, 5501-17 (Supp. IV, 1974). For an excellent discussion of these issues, see Commoner, *Energy,* THE NEW YORKER, Feb. 2, 1976, at 38; *id.*, Feb. 9, 1976, at 38; *id.*, Feb. 16, 1976, at 64.

Rhode Island. The plans called for the storage of gas in two Staten Island tanks and envisioned that the gas would be supplied to the Public Service Company of New Jersey by pipeline and to two major New York utilities, the Brooklyn Union Gas Company and Consolidated Edison, by both pipeline and barge. Distrigas has already built two storage tanks on Staten Island.

It would have been difficult to choose a location which would pose a greater threat to human life. Over 300,000 people live on Staten Island and another 600,000 in nearby areas of New Jersey. Only slightly farther away are Brooklyn's 2,800,000 people. The site lies between two small airports, Staten Island's Miller Field (6.5 miles away) and Linden, New Jersey (4 miles away). Moreover, numerous flights bound to or from Kennedy, La Guardia, and Newark airports traverse Staten Island daily, and 220,000 vessels per year pass this site while crossing New York Harbor, the busiest harbor in the United States. More than 11,500 vessels annually pass this site while traveling along the Arthur Kill, separating Staten Island from New Jersey.[48]

The Distrigas plan envisages 70 tanker deliveries per year. Originally, it also proposed 138 barge shipments to Brooklyn Union and Con Edision. These barges would have traveled directly across the main shipping lanes of New York Harbor and under three heavily-trafficked bridges. Since the Coast Guard requires that all major harbor traffic be halted in the channel used by an LNG tanker, this would mean effectively closing down the Port of New York to large ships as frequently as one day out of every five days. The port presently averages five serious collisions per year involving ships of over 1,000 tons displacement.[49] Under the Distrigas plan, tankers of 36-foot draft must traverse the Arthur Kill which is scarcely deeper. Fortunately, the ill-conceived plan to barge LNG has been cancelled by its proponents due to Distrigas' financial difficulties and in light of strong opposition by the State of New York and by environmental and civic groups.

The siting of LNG storage tanks in areas remote from cities is

48. IMPACT STATEMENT, vol. 1, at 2-14 (1974).
49. *Id.* at 3-34.

absolutely vital in order to reduce the perils of fire and marine collision. Savannah, Georgia provides a striking contrast to New York in this regard. Its LNG terminal is several miles downriver from the city, in a virtually unpopulated area. While a comparable site near New York City would be difficult, if not impossible, to find, LNG terminals need not be located in urban areas since gas can easily be transported by pipeline over long distance at minimal risk. Thus there is little reason to expose hundreds of thousands of people and hundreds of ships to LNG's hazards when more remote sites are available. The additional costs are a sound and relatively small investment in public safety.

Although those who resist more stringent tanker safety controls shrug off the risks of collision or fire as unlikely, there have been over 550 tanker collisions in the United States in the decade 1960-70; four-fifths of the collisions involved ships entering or leaving port.[50] Furthermore, control over tanker traffic in oil and LNG remains inadequate in several respects.

III. Methods of Long Distance Transportation of LNG

A. Historical Perspective

Until an economic means of transporting gas over long distances was developed, natural gas which could not be used locally was usually flared off at the wellhead. Although pipelines provided an inexpensive means of shipping natural gas overland, there was no practical way to transport gas produced in the Middle East to American and European markets until cryogenic technology was able to develop the LNG tanker, a craft capable of transporting large quantities of gas in liquefied form. Since LNG can be shipped in 1/630 the space needed for gas in vaporized form, its transportation by tanker makes economic sense—provided it can be done safely.

Ironically, in view of subsequent events, the transportation of LNG by tanker commenced in 1959 when a cargo was exported from Louisiana to England.[51] The United States Coast Guard and the American Bureau of Shipping, a private trade group, have adopted standards for LNG tankers and the handling of their cargoes, but

50. R. NIXON, *Special Message to the Congress on Marine Pollution from Oil Spills* in PUB. PAPERS OF THE PRESIDENTS, RICHARD NIXON 1970, at 443 (1971).

51. SPECIAL HAZARDS BULL. 43.

the sufficiency of these standards and the adequacy of inspection of these ships are open to question.

LNG tankers are double-hulled. Some LNG tanks on ships are double-strength, with air space between the outer and inner bulkheads. Other tanks are directly attached to the inner hull; or in some cases, independent of the ship's structure but supported by it. The cargo is frequently used as fuel for the tanker itself.[52]

Among the ever-present dangers inherent in tanker operations are marine collisions, where sparks from friction could ignite the cargo or cause damage to the tanks from the motion and vibration of the ship. Escaping LNG could fracture the ship's deck. In addition, overpressurization of LNG could cause the tank to crack or even rupture. Two other serious dangers are fire at sea and the failure of the ship's cryogenic temperature system.

B. Tanker Safety and Harbor Safety

Because of the lack of effective international safeguards for ship construction and crew training, tankers, like all ocean vessels, are only as safe as the laws of their country of registry require. "Flags of convenience" have led to much of the world's oil tonnage being carried on Liberian and Panamanian vessels—a pattern which LNG tankers continue to follow. In 1970 one-quarter of the entire world's tanker tonnage and an even greater proportion of tankers under construction[53] were of Liberian registry.

Both the *Torrey Canyon*, which ran aground in the English Channel in 1967 with a loss of enormous quantities of oil,[54] and the *Arrow*, which caused a similar oil spill in Canadian waters,[55] were of Liberian registry.[56] After the *Arrow* spill a Canadian government commission reported:[57]

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52. For a discussion of the characteristics of LNG tankers, see COMPTROLLER GENERAL REP. 24-25. For a more rigorous analysis of the specifications of LNG tankers, see Soesan & Ffooks, *LNG Carriers—the New Liners*, in OUTLOOK FOR NATURAL GAS—A QUALITY FUEL 99 (P. Hepple ed. 1973).

53. Hunter, *Possibilities and Problems of Preventing Oil Pollution of the Oceans*, 4 TRANSP. L.J. 21, 46-47 (1972).

54. *Id.* at 33 n.45.

55. *Compare id.* at 29 *with id.* at 48 n.155.

56. *Id.* at 48 & n.155.

57. *Id.* at 48.

> We are well aware of the fact that no form of transportation can be 100 percent safe but from the record available to us the standard of operation of the world's tanker fleets, particularly those under flags of convenience, is so appalling and so far from the kind of safety which science, engineering and technology can bring to those who care, that the people of the world should demand immediate action.

Of course, nothing of the sort has occurred. There is still no effective international body of law to regulate the construction of tankers, their maintenance, their routes, or the competence of their officers and crews. The recent Caracas and Geneva conferences of the Intergovernmental Maritime Consultative Organization (IMCO) have produced some well-reasoned ideas, but as far as effective international agreement is concerned in this area, we are still in the pre-League of Nations era.

The IMCO conferences did result in approved routes in a few heavily-trafficked sea lanes such as the English Channel where the *Torrey Canyon* disaster had highlighted the need for traffic lanes to even the most stubbornly resistant "Lord Jims" of the world. But these lanes are only "suggested," not mandatory, as are their counterparts on land and in the air.[58] The time-honored right of the master of a ship to choose his own course has not yet been restricted by any enforcible international law. Yet seven percent of the world's fleet—one out of every fourteen ships—is involved in a collision every year. Moreover, these collisions most often occur, as one might expect, in crowded water—fully half of them between the English Channel and the Elbe, for example.[59]

"Human error" has been repeatedly singled out as the principal cause of tanker accidents.[60] Yet IMCO, for lack of an international consensus, has failed to mandate the use of navigational aids even when those aids are available. And the world's tankers still largely fly flags of convenience, despite the unenforced rule of the 1958 Geneva Convention on the Law of the Sea that "[t]here must exist a *genuine link* between the State [of registry] and the ship" such as "jurisdiction and control" effectively exercised.[61]

In the utter absence of meaningful international controls, the

58. *Id.* at 35.
59. *Id.* at 34 n.50.
60. *Id.* at 36.
61. *Id.* at 46.

United States and some other coastal countries have begun to enforce their own standards. For example, the 1971 Vessel Bridge-to-Bridge Radiotelephone Act[62] requires vessels in American waters to have a radiotelephone on their bridge.

Tanker construction in the United States is regulated by the Ports and Waterways Safety Act,[63] which amended the earlier Tanker Vessel Act[64] and now requires environmental safety to be considered in the design of tankers of United States registry. Tankers of foreign registry carrying hazardous cargoes must possess a Coast Guard letter of compliance with American standards in order to enter United States waterways. The Coast Guard's regulations[65] under this act require new tankers carrying liquefied flammable gases to meet safety standards with regard to container design and construction and to be periodically inspected. Foreign vessels are only subject to inspection the first time they enter United States waters, and not afterwards. Although some LNG tankers are of French registry and therefore subject to strict safety standards in construction and inspection, many fly flags of convenience, such as Liberia's, which provide less occasion for confidence.

Tanker traffic in ports is regulated by the Ports and Waterways Safety Act[66] which authorizes the Secretary of Transportation to establish traffic controls in harbors and other congested waterways and enact procedures for the handling of dangerous cargoes. Pursuant to this mandate, the Coast Guard has begun to modernize its regulations, but safety requirements have not fully adapted to new conditions.

Except in emergency situations, Coast Guard regulations require the master of a ship carrying dangerous cargo to furnish 24 hours' notice to the Captain of the Port before entering a harbor and to provide specific information as to the flammable cargo.[67] In addition, the regulations impose requirements on the transfer of hazardous cargoes.[68] But present Coast Guard policy and regulations are

62. 33 U.S.C. §§ 1201-08 (Supp. IV, 1974). Coast Guard Regulations implementing this act are in 33 C.F.R. §§ 26.01-.10 (1975).
63. 33 U.S.C. §§ 1221-27 (Supp. IV, 1974).
64. 46 U.S.C. § 391a (Supp. IV, 1974).
65. 46 C.F.R. §§ 38.01-1 to .25-10 (1975).
66. 33 U.S.C. §§ 1221-27 (Supp. IV, 1974).
67. 33 C.F.R. §§ 124.10, .14 (1975).
68. *Id.* §§ 126.01 -.37.

nevertheless inadequate to deal with frequent shipments of LNG in a harbor as congested as that of New York. The broad discretion of the Coast Guard's Captain of the Port is intended to provide an adequate safeguard. This, however, is no substitute for thorough inspection of tankers before they enter harbors or for effective legislation placing storage tanks and transfer operations far from densely-populated urban areas.

Under current Coast Guard policy each LNG tanker must notify the Captain of the Port 72 hours before docking, and must stand offshore for boarding and inspection on its first voyage.[69] This inspection is unlikely to reveal flaws in tank bulkheads, pipes, or cooling systems which may prove disastrous. Recently, the failure to require inspection after the first arrival of a vessel resulted in the entry of an LNG tanker into Boston's harbor with a leak known to its captain but not to the Coast Guard.[70] Despite the skill and dedication of the personnel of the Coast Guard, there is no substitute for more effective legislative regulation of port traffic.

IV. Regulating the Storage of LNG

Onshore regulatory jurisdiction is fragmented. For example, in New York, the Public Service Commission (PSC) must approve the construction of gas storage tanks,[71] but it lacks jurisdiction over the unloading of LNG tankers and the interstate transmission of LNG. At first, after the PSC approved the construction of Staten Island storage tanks, the FPC disclaimed jurisdiction over Distrigas' application.[72] One year later, however, the FPC reversed itself and held that certification was required since it was empowered to regulate imports. In affirming the FPC's determination, the Court of Appeals for the District of Columbia held that the FPC could regulate terminals receiving LNG from a foreign country and any sales therefrom although such importation did not constitute foreign commerce.[73]

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69. U.S. COAST GUARD, GENERAL AND SPECIFIC REQUIREMENTS FOR LNG/LPG OPERATIONS in IMPACT STATEMENT, vol. 2, app. C, at 2.

70. For a discussion of this incident, see Ingram, *Peril of the Month: Gas Supertankers*, WASHINGTON MONTHLY, Feb., 1973, at 7, 11-12.

71. *Compare* N.Y. PUB. SERV. LAW § 68 (McKinney 1955) *with id.* § 2(10). The PSC also regulates transmission lines. *Id.* §§ 120-30 (McKinney Supp. 1975).

72. Distrigas Corp. v. FPC, 495 F. 2d 1057, 1058-62 (D.C. Cir.), *cert. denied*, 419 U.S. 834 (1974).

73. *Id. But see* Border Pipe Line Co. v. FPC, 171 F.2d 149 (D.C. Cir. 1948).

The National Environmental Policy Act of 1969[74] requires every federal agency, before taking or licensing any action which might substantially affect the environment, to consider th environmental consequences of its decision,[75] and to prepare an impact statement analyzing the risks involved. The FPC's final environmental impact statement on the Distrigas LNG proceeding was prepared in July of 1974, while its hearings were still taking place. But this statement glosses over the risks which have been examined here, and fails to deal as thoroughly as it should with alternatives such as remote siting and the use of pipelines rather than barges. Fortunately, Distrigas' plans to transport LNG by barge have terminated as a result of its financial difficulties. But the dangerous location of the tanks themselves, and the hazards of traversing New York Harbor and the narrow Arthur Kill with LNG tankers are still present. It remains to be seen whether the FPC will give those dangers the respect they deserve.

V. Legal Liability and Insurance in Marine LNG Disasters

Fortunately, there have not been any marine accidents involving LNG tankers. This is probably due to the novelty of such shipments. If, as we must assume, the ordinary rules of maritime and other tort liability apply, LNG's unusual hazards present some difficult problems. An uncontrolled fire caused by LNG would be likely to wreak extraordinary damage over such a wide area that fire insurance claims would be astronomical. Following any LNG accident, even if contained, premiums would probably climb steeply throughout the surrounding area.

Questions of liability might be difficult to unravel where a holocaust destroys evidence as to whether the accident was caused by a tanker, barge operator, or storage-tank owner. In addition there is the problem of adequate insurance coverage. At present no insurance is required, and one guess as to what constitutes adequate coverage is as good as another.

LNG accidents also lie at the border between admiralty and ordi-

74. 42 U.S.C. §§ 4321-47 (1970), *as amended*, 42 U.S.C.A. §§ 4321-47 (Supp. 1976). New York adopted parallel legislation in 1975. N.Y. ENVIRONMENTAL CONSERVATION LAW §§ 8-0101 to -0115 (McKinney Supp. 1975).

75. 42 U.S.C. § 4332 (1970), *as amended* 43-32 (1970), *as amended* 42 U.S.C.A. § 4332 (Supp. 1976).

nary tort law. When admiralty concepts apply, some of them are troublesome. For example, the Federal Limitation of Liability Act of 1851[76] still limits a shipowner's liability to the value of the ship and its cargo in cases where the damage occurred without his knowledge. This is true whether the vessel is American or foreign. Apparently, this obsolete statute was, the courts tell us, enacted to encourage investment in shipping and shipbuilding, and it is to be construed broadly.[77]

Although federal policy with respect to penalties for oil spills has grown stricter over the years,[78] it has done little in preventing oil spills, let alone marine accidents. Moreover, it is totally ineffective in dealing with LNG, which does not spill as does oil, but vaporizes with even more devastating consequences. Furthermore, these laws do not alter the anachronistic statutes limiting the shipowner's liability.[79]

VI. Conclusion

Federal and state legislation is desperately needed. The New York Senate has proposed legislation which would impose strict liability in cases involving oil and gas spills, fires, and other accidents.[80] The validity of such state laws was upheld by the Supreme Court in *Askew v. American Waterways Operators, Inc.*,[81] on the basis that federal admiralty jurisdiction and legislation had not preempted the field. It is now clear that whatever obstacles to such legislation exist in the statehouses of the coastal states, such obstacles are not federal constitutional ones.

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76. 46 U.S.C. § 183 (1970).

77. *See, e.g.*, Coryell v. Phipps, 317 U.S. 406, 411 (1943). An owner of a ship includes one who charters it. 46 U.S.C. § 186 (1970). *See* The Severance, 152 F.2d 916, 921 (4th Cir. 1945), *cert. denied*, 328 U.S. 853 (1946).

78. For an historical development of federal policy in this area, see Note, *Liability for Oil Pollution Cleanup and Water Quality Improvement Act of 1970*, 55 CORNELL L. REV. 973 (1970).

79. In contrast, Canada's Arctic Water Pollution Prevention Act, CAN. REV. STAT. C.2 (1st Supp. 1970), imposes absolute liability for damage and cleanup costs for depositing waste in Arctic waters and mandates financial security requirements and safety standards. This exemplary act is described in Kalsi, *Oil in Neptune's Kingdom: Problems and Responses to Contain Environmental Degradation of the Oceans by Oil Pollution*, 3 ENVIRONMENTAL AFFAIRS 79 (1974). *See also* Wood, *An Integrated International and Domestic Approach to Civil Liability for Vessel-Source Oil Pollution*, 7 J. OF MARITIME L. & COMMERCE 1 (1975).

80. N.Y. Sen. 2833 (1975).

81. 411 U.S. 325, 343-44 (1973).

In addition to legislation imposing strict liability for this ultrahazardous activity and subjecting vessels and equipment to vigorous state inspection and safety requirements, there is a need for a mandatory liability insurance program, federally subsidized as in the case of the Price-Anderson Act[82] covering nuclear reactors, but without the anachronistic and much criticized ceiling on coverage contained therein.[83] The need for such an insurance program is heightened by the fact that many individual tankers are separate corporations, so that the corporation's entire assets might easily be consumed by one blaze.

Finally, there is a need for federal and state legislation with respect to the siting of LNG storage tanks. After a comprehensive examination of the entire subject, legislation should be passed setting specific statutory criteria, such as distance from heavily-populated areas and congested harbors.[84] Legislation has been introduced as part of the New York State Attorney General's program to authorize PSC regulation of the siting of LNG storage tanks and terminals. This proposed legislation would require the PSC to consider proximity to densely-populated areas, ship traffic lanes, and transportation routes in approving sites.[85]

The concerns voiced by New Yorkers over the Staten Island tanks and the risks of LNG importation in the absence of effective regulation underscore the need for vigilance to insure that regulatory agencies meet their responsibility of protecting the public. Those who gloss over the risks of marine collision and fire and oppose stricter regulation of New York City's harbor traffic should consider the disaster which struck another Atlantic seaport in 1917.[86] On the morning of December 6 of that year the *Mont Blanc*, a French freighter laden with munitions, was struck by the *Imo*, a large Belgian relief ship carrying wheat, in the entrance to Halifax harbor. Both ships were piloted by experienced pilots, and each plainly saw the other approaching well before the collision. Yet the *Imo*, heading outward, crossed mid-channel and cut across the path of

82. 42 U.S.C. § 2210 (1970).

83. *See id.* § 2210(d).

84. *CF.* 10 C.F.R. §§ 100.1-.11 (1975) (dealing with the distances which nuclear reactors must be separated from population centers).

85. N.Y. Ass. 9916 (1976).

86. For an exhaustive discussion of this disaster, see M. BIRD, THE TOWN THAT DIED (1962).

the *Mont Blanc* and the two collided. The smaller freighter burned for twenty minutes until, inevitably, its cargo of lyddite and TNT exploded, wrecking much of the city of Halifax and neighboring Dartmouth, across the harbor. Between 1900 and 3200 persons died in the explosion and ensuing fire; 9000 were injured and thousands more left homeless.[87] The Halifax disaster proves beyond dispute that human fallibility can cause the most frightening consequences despite what appears to be a surfeit of precautions.

The only certain means of avoiding similar catastrophes would be for explosives not to enter the harbor. Perhaps wartime exigencies required the cargo to enter Halifax; but it is difficult to justify running the risk of the holocaust an LNG accident might cause when there are alternatives, such as remote siting of storage tanks and pipeline transportation of gas to cities.

The public has been subjected to much discussion of the economic need to import LNG, but the economic catastrophies and the enormous dislocations which would result from a serious fire in New York and other major harbors deserve equal consideration. Too many in the nineteenth-century shrugged off all too readily the risks imposed on the lungs of coal miners and the limbs of railroad brakemen until safety measures were belatedly required by government. No thinking person today wants to repeat those lessons. Nor should we wager the lives of thousands of port and maritime employees and residents of urban areas, such as Staten Island as long as available alternatives and safeguards exist. We must strike a balance between valid energy and maximum safety, and a government which fails to strike the balance is remiss.

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87. *Id.* at 186.