2.7.7 Marine Mammals

The likelihood of impacts to marine mammals or sea turtles is limited because project permit and certificate requirements typically prohibit construction during periods when such species would be present in Long Island Sound, or may require marine mammal monitoring during construction, and contingency plans in the event of a marine mammal sighting. For those individual marine mammals or sea turtles that are present during construction, however, there are several ways by which they could be affected, including:

Noise associated with blasting and vessel engines;

Collisions with vessels and/or anchor lines;

Loss of feeding habitat because of disruption of the substrate and resulting turbidity plumes;

Loss of prey items impacted by the trenching; and

Impacts of surface oils from fuel spills and releases from construction activities.

Noise and Blasting

Response of whales to noise such as vessel operation is generally related to the behavior of the whale at the time of the noise. Feeding and courting whales tend to be unresponsive to the approach of boats while cows with calves and single long-diving whales appear to be more sensitive and are more apt to avoid boats. Intense sounds in either air or water likely produce discomfort in marine mammals, but individuals would be expected to avoid a "zone of discomfort" surrounding the noise source. Marine mammals in the area will be startled and will likely swim out of the area. It is likely that those individuals that remain in the vicinity of a lay barge would become acclimated to the steady noise of the barge engines. Pacific harbor seals have been found to become somewhat acclimated to powerboats, delaying their departure from the haulout areas.[233] Minke whales, Atlantic white-sided dolphins and harbor porpoises are not likely to reside in the vicinity of a construction project unless schools of fish are present there. Seals are likely to react similarly.

Blasting would present the greatest potential risk to marine mammals and should not be performed if marine mammals are observed in the blasting area. Injury and response depends on several factors, including size of the charge, depth of the water, and size of the animal. Methods to direct the force of the blast into the bedrock, rather than into the water column, have been developed and can minimize impact. These include stemming (placement of rock into the top of the borehole) and delays (multiple small charges that are set off sequentially rather than simultaneously). In addition, if there is a concern that

[233] Suryan, R.M. and J.T. Harvey. 1999. Variability in reactions of Pacific harbor seals, *Phoca vitulina richardsi*, to disturbance. *Fish. Bull.* 97:332-339.

2.7.8 Sea Turtles

Trenching, particularly by jetting, would temporarily remove potential prey items from the immediate area and suspend large volumes of sediment in the water. This could temporarily deplete the down current area of sea turtle prey items. This impact is likely to be short-term and minimal.

There is a slight risk of collision between sea turtles and fast-moving vessels. Sea turtles have been reported to dive as an avoidance behavior in response to on-coming vessels, potentially exposing themselves to contact with the vessel's propellers or in the undertow. It is unlikely that the turtles will collide with the slow moving lay barge and its support tugs because the movements of these vessels will be slow and sporadic. In addition, most turtles found in Long Island Sound are absent during the winter months, and would not be affected by winter construction.

Sea turtles are susceptible to the effects of oil or fuel spills either by direct encounter or ingestion of oiled prey.

2.7.9 Impacts of Infrastructure Operation on Marine Resources

Potential impacts on the marine and coastal environment from the operation of a natural gas pipeline, electric cable, and/or telecommunications line crossing include interference to navigation, impediments to commercial and recreational fishing, alterations to the ambient electric and magnetic field, and contaminant release either through fuel spills or from damaged fluid-filled cables. Modifications to the seabed caused by the installation of energy and telecommunications infrastructure may cause long-term changes in benthic habitat that can affect invertebrates, shellfish, finfish, birds, and other resources.

Navigation Concerns

Navigational concerns are related to interference with anchoring and trawling as a result of exposed cables or pipelines. Burial of cables and pipelines reduces the risk of entanglement. However, burial may increase the area affected by the project and habitat disturbance.

A second concern arises from the changes in magnetic field that result from subsea electric cable operation. Concerns have been raised that changes in the magnetic field would affect vessel navigational equipment. For example, energy cables were initially implicated as the cause of the collision between the Baltic Carrier and Tern in the Baltic Sea. Further investigations indicate that the overlying magnetic fields did not contribute to the accident.[239] Studies for the Cross-Sound Cable suggest that changes in the

[239] Division for Investigation of Maritime Accidents, Udrag af soulyhkkesrapport af 18.juli 2001 fra Sofartsstyrelsens Opklaringsenhed om kollisionen mellem "tern" og "Baltic Carrier". http://www.stubbekobing.dk/nyheder/sidste_nyyt

magnetic field from operation of the cable system would result in maximum magnetic compass deflection of less than 0.05 degrees in 35 feet of water, which would not affect navigation. There is no other evidence of interference with navigation.

EMF

Electric and magnetic fields (EMF) are produced by electric transmission cables and lines. While both electric and magnetic fields are produced by submarine electric cables, electric fields are shielded by the submarine cable materials. The intensity and frequency of the magnetic field depends on the type of transmission (AC or DC) and current levels.

Many phyla of marine organisms have been studied for their ability to detect electric or magnetic fields in the natural environment. The principal focus of research has been to determine whether the earth's geomagnetic field can be detected and used in orientation and migration. What is known is that some species use the earth's magnetic field for orientation and navigation and that other species, e.g., sharks, appear capable of detecting low frequency electric fields. This electrical sensing may be related to orientation and the detection of prey. EMF effects on marine organisms are largely known from laboratory experiments, which have limited applicability to field conditions. Effects of magnetic fields from undersea transmission lines would depend on the field levels in combination with the species and life stages that would be exposed.

A review was conducted of the potential environmental impacts of the Cross-Sound Cable project on marine species in Long Island Sound. This study reached a conclusion that the DC magnetic field that could be generated by the 330 MW HVDC cable would cause the ambient DC magnetic field one meter above the ground over the cable to increase or decrease within a range of about 31 percent, the change depending upon the orientation of the cable with respect to the earth's magnetic field. At the surface of the seabed, the maximum magnetic field produced by the cables would be approximately 0.16 Gauss. This level can be compared to the earth's natural magnetic field of 0.5 Gauss.[240]

Calculations performed to estimate the AC magnetic field expected to be generated by the cables replacing the 1385 Line indicate that the AC magnetic field level would be 0.021 Gauss at the seabed six feet directly above the proposed cables, and less than 0.020 Gauss at an elevation of three feet above grade. This is less than the estimated AC magnetic field level of the existing 1385 Line which is 0.45 Gauss at six feet above the seabed and 1.39 Gauss at three feet above grade directly over the cables under the heaviest expected power flow.[241]

[240] Exponent. Electric and Magnetic Field Assessment: Cross-Sound Cable Project, July 19, 2001. submitted as an Exhibit to Cross-Sound Cable, LLC filing with the Siting Council.

[241] Zaffanella, L. E. 2001. EMF Study of LIPA-NUSCO Submarine Cable. Enertech Consultants. (July 3, 2001) submitted as Attachment 8a to CL&P's filing with the CSC.

EMF effects on marine resources continue to be a subject of debate and research.[242]

Thermal Effects

Electrical cable operation will generate heat, which will vary depending on the cable load, water depth, ambient temperature, burial depth, and ability of sediment to dissipate temperature changes (resistivity). Thus any thermal changes in overlying water or sediments and any associated impact on benthic communities will be project dependent. For example, the 480 MW HVDC Basslink project in Tasmania estimated that surface sediment temperatures would have negligible heat dissipation around the cable; surface sediments temperature differences would be less than 1° C from ambient.[243] Natural gas pipelines typically do not result in thermal effects; the temperature of the natural gas will depend on the proximity to compressor stations.

Dielectric Fluid Releases

High pressure fluid filled and self-contained fluid filled cables most commonly utilize an insulating fluid. This fluid can be inadvertently released into the marine environment through leaks in pipe joints, from corrosion or damage from external sources such as a vessel's anchor. Common types of dielectric fluid are alkylbenzene, polybutene, or a combination thereof. The 1385 Line utilizes an alkylbenzene insulating fluid. Although the fluids are non-toxic and relatively inert, they are slow to degrade in the environment. There are a number of sources of alkylbenzenes entering the coastal areas other than from dielectric fluid in transmission cables. Alkylbenzenes are used in the manufacturing or processing of products such as detergents, cutting fluids, wetting agents, textile scrubbing agents, fuel oil additives, and printing inks and they are naturally occurring components of petroleum products.[244,245,246] As discussed in Section 2.5.2, areas that were subject to dielectric fluid leaks from the 1385 Line after the mid-1990s were extensively monitored for impacts to shellfish and sediments, and results indicated that alkylbenzene levels in sediment and shellfish near the cables were consistent with background levels for Long Island Sound. In one instance, as a precaution, the State required a shellfish bed area to be closed as a result of a 1994 fluid release. The area was subsequently reopened.

[242] For example, Basslink Project. 2002. Environmental Impact Statement and Supplement to the Draft Integrated Impact Assessment Statement.

[243] NSR Environmental Consultants. 2002. Basslink Pty. Ltd. Final Environmental Impact Statement and Supplement to the Draft Integrated Impact Assessment Statement.

[244] Eganhouse R.P., Blumfield, and I.R. Kaplan. 1983. Long-chain alkylbenzenes as molecular tracers of domestic wastes in the marine environment. Environ. Sci. Technol. 17:523-530.

[245] Ishiwatari R.T., H. Takada and S. Yun. 1983. Alkylbenzene pollution of Tokyo Bay sediments. Nature 301:599-600.

[246] Murray, A.P., C.F. Gibbs, and P.E. Kavanagh. 1987. Linear alkylbenzenes (LABS) in sediments of Port Phillip Bay (Australia). Mar. Environ. Res. 23:65-76.

Cumulative Impacts

NEPA is generally viewed as the legislative catalyst that first raised interest in the assessment of cumulative impact analysis. NEPA introduced a national environmental policy into the normal business practices of the Federal government.

While NEPA established the basic framework for integrating environmental considerations into federal decision making, it did not provide the details of a process for federal agencies to follow. Federal implementation of NEPA was the charge of the Council on Environmental Quality (CEQ), which interpreted the law and promulgated regulations and guidance, the bulk of which are focused on the preparation of EISs.

NEPA requires the preparation of an EIS for any major federal action that significantly affects the quality of the human environment. Because federal actions as defined include the approval of private proposals by a federal agency, the NEPA process extends to any private action that requires a federal permit or other form of approval. The EIS must contain an analysis of the cumulative impact of that one proposal when taken together with other reasonably foreseeable actions. The regulations promulgated under NEPA define cumulative impacts as:

> "...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." (See 40 CFR Section 1508.7.)

Like NEPA, the Connecticut Environmental Protection Act (CEPA) requires state agencies to draft an Environmental Impact Evaluation before approving or undertaking a state action that may "significantly affect the environment." Conn. Gen. Stat. § 22a-1b(c). CEPA applies to activities being undertaken by the State or funded in whole or in part by the State. Section 22a-1a-3 of the Regulations of Connecticut State Agencies (RCSA) requires that a state agency consider "Cumulative Impacts" when determining whether a state action will have a significant effect. The regulation defines "Cumulative Impacts" as:

> "...the impacts on the environment which result from the incremental impact of the action when added to other past, present or reasonably foreseeable future actions to be undertaken by the sponsoring agency. For the purposes of these regulations, cumulative impacts include the incremental effects of similar actions with similar environmental impacts and the incremental effects of a sequence of actions undertaken pursuant to an ongoing agency program which may have a significant environmental impact, whereas the individual component actions would not. (RCSA § 22a-1a-3(b).)

In Connecticut, the legislature has enacted a number of statutes expressly requiring agency analysis of cumulative effects when considering certain proposed projects or

programs that do not fall under CEPA. For example, before the Siting Council may grant a Certificate of Environmental Compatibility and Public Need for an underwater transmission cable it must find and determine "the nature of the probable environmental impact, including a specification of every single adverse and beneficial effect that, whether alone or cumulatively with other effects, conflict with the policies of the state concerning the natural environment, ecological balance, public health and safety, scenic, historic and recreational values, forests and parks, air and purity and fish and wildlife" and "why the adverse effects or conflicts referred to [above] are not sufficient reason to deny the application..." CGS Section 16-50p(c)(2). In another instance, before the Commissioner of Environmental Protection may issue a general permit for minor activities involving dredging and erection of structures and placement of fill in tidal, coastal or navigable waters, he must first determine, among other factors, that the permitted activities will " cause only minimal environmental effects when conducted separately...and cause only minimal cumulative environmental effects..." CGS Section 22a-361(d)(1).

Also, any applicant for a federal ACOE permit for work which would result in the discharge of dredged or fill material into the waters of the United States, including wetlands, may also be required to obtain a state Water Quality Certificate from DEP pursuant to Section 401 of the federal Clean Water Act. Such work or discharge must be consistent with the provisions of the federal Act and with the Connecticut Water Quality Standards. Generally, certification is made in conjunction with issuance of a state permit under the structures, dredging and fill statutes. Under Connecticut's Anti-Degradation Implementation Policy, which is incorporated as part of the Water Quality Standards, before the DEP may issue a certificate or permit for a "non-point discharge to Class AA, A, or SA waters" consisting "of a dredging activity or discharge of dredged or fill material" it must find "that the resulting change in water quality will not be significant..." *See* Conn. Water Quality Standards, App. E, Connecticut Anti-Degradation Implementation Policy, paragraph III.2. To establish whether a change in water quality is significant, DEP must consider, among other factors, the "cumulative impact of the proposed discharge or activity on water quality of the proposed receiving surface water, taking into account all other existing regulated discharges and activities therein..." Conn. Water Quality Standards, App. E, paragraph IV.1. Additionally, "high quality Class B or SB water resources, which support designated uses, will be maintained at their existing high quality unless..." the DEP finds that "the resulting change in water quality would not be significant" in accordance with, among other factors, the cumulative impact considerations quoted above. Connecticut Water Quality Standards, App. E, paragraph III.3.

Under both the federal and Connecticut definitions, only impacts from current or reasonably foreseeable actions that are collectively significant must be considered. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Cumulative impacts may result when the environmental effects of a single project combine with either temporary (construction related) or permanent (operation related) impacts associated with past, present, or reasonably foreseeable future projects. Cumulative impacts need to be considered in light of the baseline conditions,

which may include some degree of pre-existing environmental impairment. However, this does not mean that a potential adverse impact of a project is insignificant if it incrementally contributes to a broader trend of environmental degradation.

Although a cumulative impacts analysis requires an assessment of the impacts of past, present, and reasonably foreseeable developments that may contribute to the impact of the proposed project, a "crystal ball inquiry"[247] is not required. Cumulative impact analysis does not require consideration of the cumulative effects of projects which are speculative and/or contingent.

Any evaluation of potential impacts of energy and telecommunications infrastructure that may be cumulatively significant should include:

1) water quality;
2) submerged vegetation;
3) shellfish;
4) threatened and endangered species; and
5) air quality.

Other cummulative impacts may be considered on a project-specific basis. Some cumulative impacts may be avoided, minimized, or mitigated. Avoidance may be either spatial (avoidance of critical habitats, such as piping plover nesting areas) or temporal (time of year restrictions to avoid winter flounder spawning, or avoid concurrent construction of multiple projects). Impacts may be minimized or mitigated with the construction method selected.

2.8 Alternatives to Long Island Sound Crossings

The Task Force evaluated a broad range of alternatives to electric cable, gas pipeline, and telecommunications line crossings of Long Island Sound. This section is intended to provide an inventory of alternatives that could serve to reduce the number of Long Island Sound crossings, including those measures that have already been successfully implemented, as well as projects that have been proposed but appear to lack market support. Alternatives can be organized into the following categories:

Alternative routes for natural gas pipelines that do not cross Long Island Sound;
Alternative routes for electric cables that do not cross Long Island Sound;
Measures to expand, reinforce, or upgrade existing generation and transmission assets in Connecticut and Long Island that do not require cables crossing Long Island Sound;
Alternative fuels and energy sources that do not require Long Island Sound crossings;

[247] Natural Resource Defense Council vs. Morton, 458 F. 2d 827, 837 (D.C. Cir. 1972).

Measures that reduce the demand for natural gas and electricity through conservation, load management, and demand response programs; and
Alternatives to telecommunications line crossings Long Island Sound.

2.8.1 Alternative Routes for Natural Gas Pipelines That Do Not Cross Long Island Sound

In recent years, two projects to construct or expand gas pipelines to the southern shore of Long Island have been proposed: Blue Atlantic and Cross Bay. Neither of these routes would cross Long Island Sound. Neither project is being actively pursued at this time, nor are there prospects for pipeline expansions to the south shore of Long Island for the foreseeable future.[248]

Blue Atlantic

The Eastern Pipeline Group of El Paso Corporation proposed an ambitious 1,000-mile submarine pipeline to transport gas supplies from Sable Island, Nova Scotia, to markets in eastern Canada and the northeastern U.S. The project would also serve as a gathering system for the multiple production fields off the coast of Nova Scotia. The pipeline would start from a natural gas processing facility on Nova Scotia, cross the Gulf of Maine, and be diverted around George's Bank to a delivery point in Linden, New Jersey. A potential off-shore maintenance platform south of Long Island may afford an opportunity for a connection directly to Long Island or New York City. The pipeline is envisioned to consist of a 36- or 42-inch diameter pipe, accommodating 1.0 Bcf/day of natural gas. The Blue Atlantic project completed an initial sub-sea survey, commenced environmental, geotechnical, and engineering studies, and began outreach to public officials in Canada and the United States, including U.S. and Canadian regulatory agencies. El Paso had anticipated that construction would begin in 2006-2007 with pipeline operations commencing in late 2007. However, Blue Atlantic was put on hold in April 2003, pending more favorable discoveries of deep gas reserves off Nova Scotia.

Cross Bay Pipeline

In July 2000, Cross Bay Pipeline Company and Transco jointly filed an application with the FERC to increase the capacity on approximately 3.3 miles of Transco's existing onshore pipeline in Middlesex County, New Jersey, and approximately 33.7 miles of the existing marine segment under the Lower New York Bay, terminating at Long Beach on the south shore of Long Island. The proposed project included an additional compressor station, modifications to meter stations, and replacement of several sections of pipe. The project would have added 0.122 Bcf/d (125,000 Dth/d) of incremental capacity available to new shippers for service to Long Island and to New York City by displacement. At the time the project was proposed, Cross Bay anticipated up to 6% growth in the Long

[248] Iroquois' ELIE project was withdrawn from consideration for market reasons on February 7, 2003. The ELIE project would have minimized, but not completely avoided, new pipeline construction in Long Island Sound. The ELIE project is discussed in Section 2.6.2.

Island area and approximately 0.49 to 0.58 Bcf/d (500,000 to 600,000 Dth/d) of additional gas needed by 2005 to supply new generation facilities on Long Island and New York City. [249] The FERC approved the project in November 2001. The following month, Cross Bay requested that the FERC vacate the order approving the certificate citing "significant tariff and rate provisions that will carry long-term economic uncertainty." In addition, Cross Bay stated that "the market targeted by the Cross Bay project has not materialized in the time frame anticipated, resulting in additional economic risk."[250]

2.8.2 Alternative Routes for Electric Cables That Do Not Cross Long Island Sound

Overland Route

A land-based transmission route connecting Connecticut and Long Island would give rise to many of the issues that the Working Group has addressed. Such a route could traverse SWCT and Westchester County, and would intertie with the line Y-49 or Y-50 interconnections between Westchester and Long Island. Land acquisition in these highly developed areas, aesthetic and environmental impacts, environmental justice concerns, and the additional distances involved do not portend well for this overland route. Furthermore, an overland route would not remedy the problems regarding SWCT, Y-49 or Y-50, and the LIPA transmission system in western Long Island, and may worsen congestion in SWCT.

South Shore Route

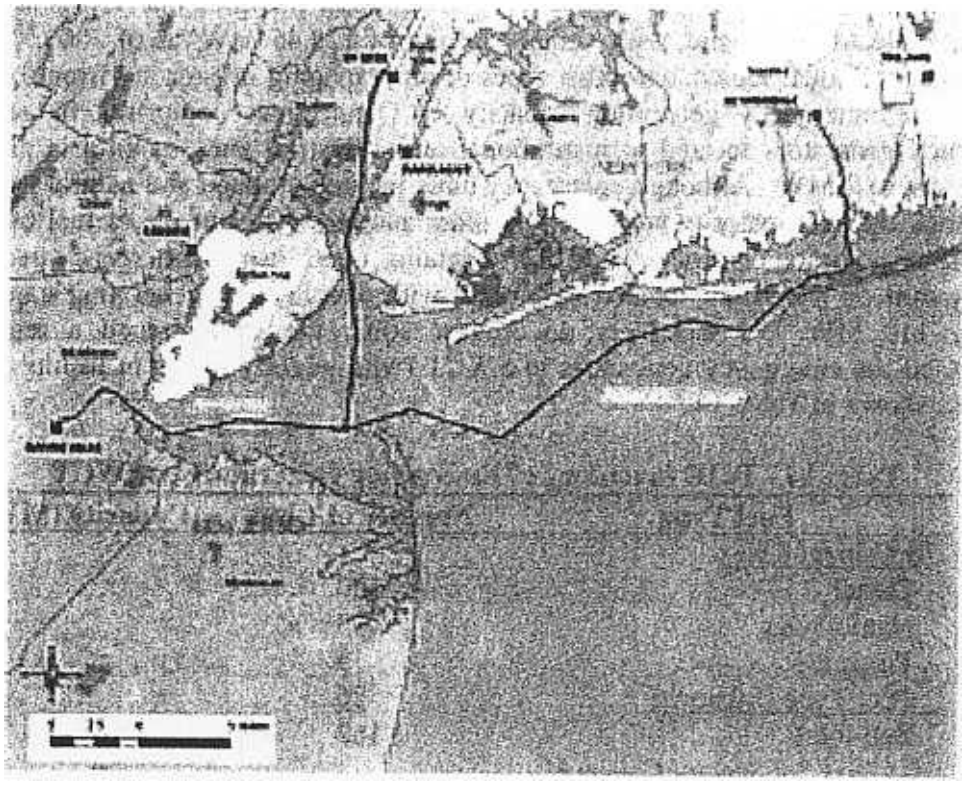
The NeptuneRTS Phase I project envisioned the installation of two 600 MW HVDC submarine electric transmission cables that would connect load centers in New York City and Long Island with transmission and generation resources in New Jersey (Figure 9). The Sayreville, New Jersey to Newbridge substation in Levittown, Long Island route will extend a distance of 54.5 miles, including 47 miles of solid-state cable beneath New York Harbor and the Atlantic Ocean. According to the project proponent, NeptuneRTS would increase the available capacity and energy in a more flexible and reliable manner than siting new generating facilities in New York City or Long Island because NeptuneRTS Phase I is a transmission connection to the Pennsylvania, New Jersey, Maryland (PJM) system.[251]

In addition to the FERC project approval in July 2001, NeptuneRTS has prepared and filed all required major state and federal environmental permit applications. These permit applications include filings with the ACOE, and an Article VII application to the NY

[249] FERC Order Issuing Certificates and Authorizing Abandonments, Cross Bay Pipeline Company, LLC, Docket No. CP00-412-00, November 8, 2001.
[250] Cross Bay Pipeline Company letter to FERC December 7, 2001, Docket CP00-412-000.
[251] www.neptunerts.com.

PSC. The project expects to file for a Waterfront Development Permit shortly with the New Jersey Department of Environmental Protection. NeptuneRTS Phase I has an expected in-service date of 2004 to 2005.

Figure 9 – Proposed NeptuneRTS Phase I



2.8.3 Measures to Expand, Reinforce, or Upgrade Generation and Transmission Assets

Expand Generation Capacity in SWCT

Relatively new central station generating projects in SWCT include Bridgeport Energy (520 MW) and Milford Power (536 MW operation pending). However, owners of other facilities have submitted requests to deactivate some of their units in SWCT. The resolution of the deactivation of these units is ongoing.

A January 2003 ISO-NE technical assessment of the generating resources required to operate Connecticut's bulk electric system reliably concluded that all existing generation in Connecticut is required unless new resources are added or transmission improvements are made. Furthermore, the assessment concluded that additional generation resources are needed in SWCT to ensure reliability.[252]

[252] ISO-NE *Technical Assessment of the Generating Resources Required to Reliably Operate Connecticut's Bulk Electric System 2003 and 2006.* Final Report. System Planning, January 29, 2003.

Expand Distributed Generation (DG) in Connecticut

DG resources in Connecticut can be grouped into two categories: self-generation units, typically installed at large commercial or industrial facilities that displace some portion of the facility's outside electric purchases on a regular basis; and emergency generators. According to the Siting Council, there were 71 different facilities that self-generate and utilize the electricity on-site, with a total capacity of 128.45 MW, as of 2001.[253] These include gas, oil, dual-fueled, and other types of units ranging in capacity from 0.01 to 25 MW. The emergency generation capacity in Connecticut comprises thousands of emergency generators located at institutional and industrial sites ranging in size from several kW to 2 MW. Although emergency units include propane and natural gas-fueled generators, the vast majority are generally older and less efficient diesel fuel units with minimal air pollution controls. The DEP maintains a database of emergency generators, roughly 400 of which are located in SWCT with a collective generating capacity of roughly 110 MW.[254] Separately, in August 2002, the DOE issued a report that inventoried the emergency generators in SWCT (with slightly different results than the DEP), as shown in Table 14.

Table 14 – DOE Inventory of Emergency Generators in SWCT

Fuel Type	Number of Units	Capacity (MW)
16 Critical Cities		
Diesel	120	
Natural Gas	13	
Propane	3	
Fuel Type Unknown	26	
Sub-total	162	62.29
36 Cities "of Special Concern"		
Diesel	164	
Natural Gas	23	
Propane	1	
Fuel Type Unknown	81	
Sub-total	269	61.24
Total	431	123.53

The DOE Report, *Improving Transmission Reliability: The Role of Emergency Generation in Southwest Connecticut*, also concluded that, "...emergency generators can considerably support the [SWCT transmission] system by allowing consumers to disconnect themselves from the grid and produce power locally during times of peak demand." The DOE Report also agreed with other analyses that, in a competitive electric market, emergency generators can mitigate price spikes during times of peak demand.

Acknowledging the potential role of DG in improving reliability for SWCT, but also recognizing the potential air quality impact of emergency generators, the DEP initiated a

[253] Connecticut Siting Council, Review of the Connecticut Electric Utilities' Twenty-Year Forecasts of Loads and Resources, October 2001, Appendix A.
[254] See DPUC Order in Docket No. 02-04-12, at 33.

new General Permit program in April 2002. This program is intended to allow DG units of equal to or greater than 50 hp (roughly 37.3 kW) in SWCT to operate when called upon by ISO-NE under the demand response program provided the unit complies with specified general permit conditions. Specifically, when ISO-NE declares there is a certain need (Operating Procedure No. 4 Step 12 or higher), the permitted DG unit can operate for up to 300 hours in a rolling 12-month period. These hours are in addition to the hours of operation allowed for the facility's own emergency or backup use. Further, the General Permit requires use of ultra-low sulfur fuel, and imposes strict emission limits for NO_x, SO_2, and particulate matter. The Waterside Power Project, in Stamford, was permitted under this general permit program. However, an analysis submitted in the DPUC's investigation of possible shortages in SWCT (Docket 02-04-12) concluded that the vast majority of diesel units in Connecticut cannot meet the DEP's NO_x standard.

The DPUC supports DG as a potential means to address reliability concerns in SWCT and across the state, but recognized that "there was little factual evidence of the potential for DG in SWCT."[255] The DPUC also noted that the lack of transmission capacity in the region may be a hindrance to DG development. Additional critical barriers to the more widespread use of DG resources include lack of technology maturation, lack of manufacturing economies of scale, regulatory barriers such as high stand-by rates,[256] inconsistent interconnection requirements, and other permitting and siting hurdles[257]. These issues have been explored in a parallel study by Xenergy commissioned by the ISE and released on January 10, 2003. This study found that the technical potential for DG use among commercial/institutional and industrial customers in southwest Connecticut is over 650 MW. However, only 20.70 MW of new DG is projected to be installed by 2013, based on use of current DG technologies and a "Base Case" for market penetration. An "Accelerated Case" (business and regulatory climate more supportive of DG) using advanced DG (products/improvements expected to be commercial in the near- to mid-term) would allow the development of up to 186 MW by 2013.[258]

Expand Generation Capacity on Long Island

Additional on-island capacity would reduce Long Island's reliance on interconnections with Connecticut and New York City. LIPA's Draft Energy Plan incorporates multiple initiatives to bring additional generating projects to Long Island. As referenced in Section 2.3.2, ANP is developing a 480 MW merchant combined-cycle facility in Brookhaven. KeySpan is also developing a 250 MW combined-cycle project at its Spagnoli Road site. Both projects will be fired primarily by natural gas and are expected to achieve commercial operation by 2005. Increasing the amount of on-island gas-fired generation would also increase the demand for natural gas on Long Island.

[255] Decision in Docket No. 02-04-12.

[256] The Connecticut DPUC has recently released a decision on Stand-by Rates in Docket 02-02-06 that require the customer to pay a standby rate of $60/kW-yr to act as backup to the cogeneration capacity.

[257] FERC is currently evaluating standardized interconnection procedures for small generators. See FERC RM02-12.

[258] An Assessment and Report of Distributed Generation Opportunities in Southwest Connecticut, Institute for Sustainable Energy at Eastern Connecticut State University, January 10, 2003.

LIPA has also initiated development of smaller combined-cycle and peaking facilities, similar to the fast track units developed prior to the summer of 2002. These units, including Calpine's cogeneration facility at SUNY Stony Brook and projects developed by Global Common (Village of Greenport) and FPL Energy (the Rockaways), are expected to bring roughly 189 MW on-line by the summer of 2003.

LIPA has also identified for future consideration the utilization of LIPA-owned property for the development of a combined cycle facility. LIPA's Draft Energy Plan envisions a 300 MW generating plant on-line by 2007 at one of the sites, however no merchant developers have yet been identified.[259]

Repowering of Existing Generation on Long Island

Repowering represents a wide range of infrastructure improvements at existing generation facilities. Repowering often refers to the replacement of a traditional boiler, which is fairly inefficient, with a modern and more efficient combustion turbine and heat recovery steam generator (HRSG). Steam from the HRSG is then utilized in the existing steam turbine and electric generator, improving the overall plant efficiency by 20 to 30% and significantly expanding the plant's capacity. It should be noted that repowering has been considered at many plant sites and rejected because of the difficulties in matching steam conditions between a new HRSG and the existing steam turbine, the inability to optimize cycle efficiency, the difficulty of fitting in new equipment at an existing site, or the inability to obtain a performance guarantee for the entire plant. In addition, repowering can double a plant's daily fuel requirements, thereby placing new demands on the gas delivery infrastructure, and triple the plant's output, requiring an expansion of the electric transmission link. For example, a 100 MW traditional boiler power plant might require about 26,400 MMcf/d (assuming a 10,000 BTU/kWh heat rate) of gas. Replacing the boiler with a 180 MW gas turbine would require about 51,700 MMcf/d (assuming a 7,000 BTU/kWh heat rate) of gas, about twice the previous amount. The power output would almost triple, to 280 MW. If the original facility was oil-fired, a new gas pipeline to the plant would be required.

A stated goal in LIPA's Draft Energy Plan is to work with KeySpan to repower old power plants prior to siting new generation on Long Island. LIPA and KeySpan are both actively evaluating repowering options. In the Draft Energy Plan, LIPA indicated that a Phase 1 "initial screening study" was conducted by KeySpan on all five units operated by KES on behalf of LIPA.[260] LIPA also indicated that a Phase 2 detailed analysis of Wading River Units 1-3 and EF Barrett Unit 2 is about to proceed, and has including the additional capacity of these plants in its resource plan.[261] Should those four units proceed with repowering, an incremental 395 MW could be brought on-line by 2006.

[259] LIPA Draft Energy Plan, Executive Summary, at 5.
[260] LIPA Draft Energy Plan, Executive Summary, at 5.
[261] At the writing of this report, we believe the Phase 2 analysis is currently ongoing.

Expand Distributed Generation on Long Island

NYSERDA is nationally recognized for its innovative technology development and cost-sharing programs to promote DG throughout New York. NYSERDA's DG and combined heat and power (CHP, also referred to as cogeneration) program is funded at $15 million per year. This program supports the development and demonstration of DG systems, components, and related power systems technologies, and CHP application in industrial, municipal, commercial, and residential sectors. As of 2002, New York had approximately 5,000 MW of installed CHP capacity.[262] According to a recent NYSERDA study, there is a technical potential for approximately 8,500 MW of new CHP over the next decade, although the economic potential is estimated at 764 MW.

DG on Long Island

Long Island has several new generation facilities, including traditional technologies (e.g., combined cycle and combustion turbine units) and alternative technologies (e.g., wind, solar, fuel cell). Alternative technology facilities are discussed in Section 2.8.4. The traditional technology facilities that have been recently developed (or are in the development process) are relatively large in electric output, and thus, often excluded from the list of DG developments. These facilities are, however, in close proximity to the load requirements, and therefore, require less transmission infrastructure to deliver the power than more distant generation units. Such facilities include the 79.9 MW cogeneration facility being developed at SUNY Stonybrook, as well as the 55 MW Greenport and Jamaica Bay simple cycle facilities; all of these facilities are expected to be operational by summer 2003.

Long Island has only modest opportunities for the development of cost-effective, small-scale cogeneration facilities. Small-scale cogeneration is generally developed in industrial and large commercial facilities, where steam requirements are relatively consistent year-round. However, Long Island comprises primarily residential and small-to-medium commercial loads. Therefore, even in situations where air conditioning can be met through steam-based chillers, such customers generally do not have a sufficient need for steam output to justify the commitment of capital for the development of a cogeneration system.

Reinforce and Upgrade of Electric Transmission

The principal east-west electric transmission corridor across Long Island was designed to operate at 345 kV, but is currently operated at 138 kV. If operated at 345 kV, the line could bring more power east from its interconnection with Con Edison, or west from plants developed in Suffolk County, such as the ANP Brookhaven project. However, the line is missing a five to ten mile segment that would allow interconnection with the 345 kV system operated by Con Edison in New York City. Multiple transformer stations would need to be developed in at least six locations where the 345 kV line interconnects

[262] See http://www.nyserda.org/dgchp.html.

with the remaining 138 kV transmission infrastructure.[263] Therefore, operating the Long Island system at 345 kV would require tens of millions of dollars in improvements.

LIPA has identified dozens of committed and planned upgrades to its transmission and distribution system. In total, LIPA projects that it has spent or committed over $200 million to improve its transmission and distribution system and interconnect new generation facilities.

For information on the transmission system in Connecticut and New England, refer to Section 2.3.1 of this report. For more detailed information regarding SWCT, refer to Comprehensive Assessment and Report, Part I.

In general, there are several different ways to raise the capacity of a transmission line to accommodate increased power deliveries as given below:

Reconductoring. The capacity of existing transmission lines can be increased by reconductoring – removing the existing cable (i.e., conductor) from the transmission towers and replacing it with a conductor of greater capacity. Reconductoring can be done using a new single larger conductor, or by using new twin conductors of the same size in parallel ("twinning" the existing conductors) to provide a nominal double capacity provided the remaining life of the existing conductor is acceptable and the towers can accept the added load.

Increase Operating Temperature. HVAC transmission lines are rated to a maximum operating temperature based on line sag and corridor clearances. Increasing this maximum operating temperature may allow the cable to carry more current, but increases the risk of line failure due to overheating or breaching ground clearances as conductor sags increases. The sagging problem can sometimes be resolved by re-stringing the conductor, which requires re-tensioning the line, rearranging insulator configurations, and increasing structural heights as required. The benefits of increasing the maximum operating temperature are relatively modest, but the costs are not as high as reconductoring or replacement.

Implement Dynamic Line Rating. Transmission line capacities can change based on weather conditions, such as wind and temperatures (both ambient and net radiation). Dynamic Line Rating (DLR) systems monitor conductor sag in real time or estimate conductor sag by continually monitoring the weather conditions and re-rating the line capacity accordingly. This allows transmission operators to operate a transmission line closer to its ultimate rating when temperature and wind conditions allow, while maintaining the necessary ground clearances.[264]

[263] To change voltages, power needs to "step-up" to a higher voltage or "step-down" to a lower voltage through the use of transformers.

[264] A Connecticut-based firm, The Valley Group, develops conductor tension monitors.

Reinforce Gas Pipelines

A gas pipeline is typically designed to allow its delivery capacity to be expanded over time in response to customer demands. Capacity can be expanded, provided that the pipeline's maximum allowable operating pressure (MAOP) is not exceeded, by either adding compression along the route or looping segments of the line. Compression is added by installing additional compressors (also referred to as adding horsepower), typically small gas turbine units, at existing or new compressor stations along the pipeline route. Looping requires adding parallel pipe segments along specific portions of the pipeline to increase the entire pipeline's overall capacity.

For example, the Iroquois pipeline, which crosses the Long Island Sound to Northport, Long Island, has been certified by the FERC to add 10,000 horsepower of additional compression at the Brookfield, Connecticut compressor site. This additional compression is required to transport 85 MDth/d of incremental gas supplies for the new Astoria combined cycle plant in Queens, New York and for PP&L Energy on Long Island. The Iroquois pipeline is also being physically extended (Eastchester Extension) from Northport to the New York Facilities System at Hunts Point in the south Bronx. When the Eastchester Extension is completed, Iroquois will be capable of delivering 284 MDth/d to Long Island and 241 MDth/d to Hunts Point, for a total of 525 MDth/d

2.8.4 Alternative Fuels and Energy Sources That Do Not Require Long Island Sound Crossings

Renewable Energy - Connecticut

Through the Connecticut Clean Energy Fund (CCEF), Connecticut invests in technologies and initiatives for renewable energy. The fund will provide mechanisms to achieve the Renewable Portfolio Standards for the State.

Wind. Regulators have acknowledged that wind turbines would require siting in windy areas including hilltops and in or adjacent to Long Island Sound. An issue associated with the placement of wind turbines is the potential impact on scenic protected areas. After completion of a wind power study, CCEF invested in a start-up wind energy company that could develop wind turbines in a remote area outside of Connecticut.

Photovoltaics. CCEF is an active member of the Northeast Sustainable Energy Association and has invested in Solar Dynamics, a start-up company that produces solar power units. In addition, CCEF has promoted the application of solar technology through a formal request for proposals.

Fuel Cells. CCEF has made the development and deployment of fuel cells a priority. Initiatives have included a formal request for proposals that have led to the award of funding for fuel cell deployment; investment in a company that designs and installs high reliability applications for fuel cells; and investment in the University of Connecticut

Global Fuel Cell Center. The installed capacity of fuels cells in Connecticut is approximately two MW.[265]

Renewable Energy - New York

New York Governor Pataki recently announced the state's intention to implement an aggressive Renewable Portfolio Standard, which would require all electricity suppliers to provide 25% of their portfolio from renewable supplies by 2012. Most of the increase is expected to result from wind and biomass energy development. Renewables, including hydro-electric power, currently supply about 17% of electricity sold in New York.

On Long Island, LIPA currently has long-term agreements with resource recovery (i.e., waste-to-energy) and landfill gas generating facilities. At present, LIPA has long-term contracts with seven such facilities (four resource recovery and three landfill gas). These contracts provide LIPA 111 MW of summer capacity through at least 2008,[266] almost all (106 MW) from the four resource recovery facilities.

Wind. LIPA is currently pursuing several wind energy projects. On January 21, 2003, LIPA issued a Phase II Siting Assessment in support of a large-scale off-shore Wind Energy Facility.[267] On January 22, 2003, LIPA issued a Request for Proposals for a 100 MW to 140 MW off-shore wind energy project.[268] Proposals were due on May 1, 2003 and proposal acceptance is expected by September 30, 2003. Commercial operation of the wind power facility is currently expected for December 2007.

LIPA is working with the Long Island Farm Bureau to site five 50 kilowatt (kW) electric generating wind turbines on Long Island farms.[269] LIPA is also co-sponsoring the installation of a 10 kW wind turbine at Long Island University's Southampton College campus.

The wind resource is seldom a steady, consistent flow. It varies with the time of day, season, height above ground, and type of terrain. Wind turbine output depends on wind resource intermittency, the wind farm site's wind speed distribution, turbine design, and turbine reliability. The degree of wind resource intermittency may vary both daily and seasonally. Therefore, wind resources are not always available at all hours of the year to serve electric load.

Photovoltaics. NYSERDA and LIPA each have several initiatives to promote solar energy. NYSERDA has provided over $1 million to install and maintain a 92 kW PV

[265] Review of Siting Council information including Docket 171, Petitions 376, 482, 553, and 598.

[266] One Landfill Gas contract, with the Smithtown Landfill, provides no capacity to LIPA, but sells energy to LIPA when available.

[267] The Phase II Assessment was the follow-up document to a preliminary assessment of wind energy potential issued in April 2002.

[268] The request for proposal can be found at www.lipower.org/pdfs/projects/wind/offshore_wind_RFP.pdf.

[269] See LIPA web site at http://www.lipower.org/projects/wind.html.

system at SUNY Farmingdale on Long Island. NYSERDA has also awarded grants to firms that develop technologies related to solar- or wind-powered generation, and offers a Residential PV Program to stimulate residential implementation of PV systems.
LIPA is a member of DOE's Million Solar Roofs Initiative and Solar Pioneer Program to encourage PV technology in residences and businesses. As part of LIPA's involvement with the Million Solar Roofs Initiative, LIPA has pledged to install 10,000 PV systems on Long Island roofs by 2010.[270] LIPA is offering a rebate of $5,000 /kW on installed grid-tied photovoltaic systems, representing approximately 50% of the installed cost through the LI Solar Roofs Initiative.[271] Once 500 kW of systems are installed, the rebate will be reduced to $4,000 /kW.[272]

LIPA was also directly involved in two installations: a 20 kW system and a geothermal heat pump at the New York Nature Center located at Jones Beach State Park, and a 15.5 kW system at the New York Institute of Technology.

While PV can help ameliorate Long Island's energy situation, it is doubtful that it could economically provide a sufficient quantity of electricity to avoid the need for a major new generating source (either located on Long Island or located off-island with a high voltage electrical connection to Long Island). PV facilities generate relatively small amounts of electrical power when receiving sunshine, and the capital cost must include the PV arrays, as well as the electronic control and safety modules to connect the PV output to the electrical system, i.e., either direct interconnection with the electric grid or as a behind-the-meter installation on a customer's premises.

Fuel Cells. NYSERDA and LIPA are each implementing initiatives to promote fuel cells in various location around the state. At present, the net impact of these alternative generation technology initiatives is small in relation to LIPA's current energy needs. In 2002, LIPA deployed 17 five-MW fuel cell systems at commercial and academic institutions across Long Island. LIPA is currently considering proposals for a ten MW fuel cell substation deployment program.

While fuel cells have great potential to generate power across a region, there are practical questions concerning their siting and the economics of fuel cell facilities. Fuel cells are extremely capital intensive, much more so than competing standard technologies, such as combined cycle or simple cycle gas turbines. Furthermore, fuel cells operate on hydrogen, which is typically "stripped" away from natural gas through a reforming process, thus continuing the dependence on fossil fuels. Any significant development of fuel cells on Long Island would require a considerable amount of natural gas.

[270] See http://www.lipower.org/solar/.
[271] In addition to LIPA's rebate, homeowners can take advantage of New York's 25% tax credit towards the total cost of a PV system, with a maximum credit of $3,750.
[272] On December 10, 2002, LIPA auctioned two photovoltaic systems (one residential, one commercial) to Long Island ratepayers. The proceeds of which will go to Citizens Advisory Panel's (a primary member of SEA) Clean Energy Campaign.

LNG

Gas utilities throughout the Northeast rely on LNG imported from overseas to supplement pipeline supplies during the heating season. LNG is created by chilling natural gas to about minus 260 degrees Fahrenheit so that it can be converted to liquid form. LNG requires approximately 1/600th of the volume that natural gas vapor requires, thus making storage and transoceanic tanker transport economically feasible. LNG has been transported into the United States for more than three decades and in 2001 represented about 6% of total U.S. gas imports.[273]

There are four marine LNG terminals in the U.S.: Everett, Massachusetts; Cove Point, Maryland; Elba Island, Georgia; and Lake Charles, Louisiana. The Everett terminal, serving most of the Northeast, receives LNG cargoes primarily from Algeria and Trinidad. Up to 1 billion cubic feet per day can be vaporized at Everett, injected into pipeline interconnections, and transported to end-users through the Tennessee and Algonquin pipelines and through the local Boston Gas system. Up to 100 million cubic feet per day can also be delivered by truck to satellite LNG storage facilities at regional LDCs throughout the Northeast. The Cove Point terminal currently provides only LNG storage services, but expansion of this terminal is underway. By July 2003, Cove Point will be able to receive ocean-going tanker deliveries and will have a peak sendout capacity of over 1.2 billion cubic feet per day.

More than a dozen proposals for new import facilities have been announced since the beginning of 2001, primarily in California, the Gulf Coast, and the Bahamas. None of the proposals would directly impact LNG deliverability to Long Island or Connecticut. Truck deliveries of LNG are used to refill satellite storage tanks that the LDCs rely on to maintain gas pressures on the coldest winter days, but truck transported LNG is not sufficient or economically feasible for year-round deliveries. LDCs and merchant generators who utilize LNG that is injected into pipelines at the Everett or Cove Point terminals will continue to rely on existing interstate pipelines to ship gas to Long Island and Connecticut, either by direct forward haul or by displacement. Therefore, LNG as an alternate fuel will not obviate the need for cross-Sound pipeline capacity.

Yankee Gas Services Company (Yankee) has proposed to build a 2 Bcf LNG storage and production facility in Waterbury. The project, currently being reviewed by the DPUC, would provide a secure, reliable natural gas supply to meet the growing energy demands of customers well into the future. This project will provide greater control over managing natural gas supply, while helping to keep prices lower and more stable for customers. Yankee is in the process of obtaining required regulatory approvals; for example, Yankee has obtained approvals for the project from the Waterbury Inland Wetlands Commission, Zoning Commission, City Plan Commission, and Zoning Board of Appeals. Pending receipt of all required pre-construction regulatory approvals, groundbreaking is projected to occur in early 2004 with an estimated in-service date of 2007.

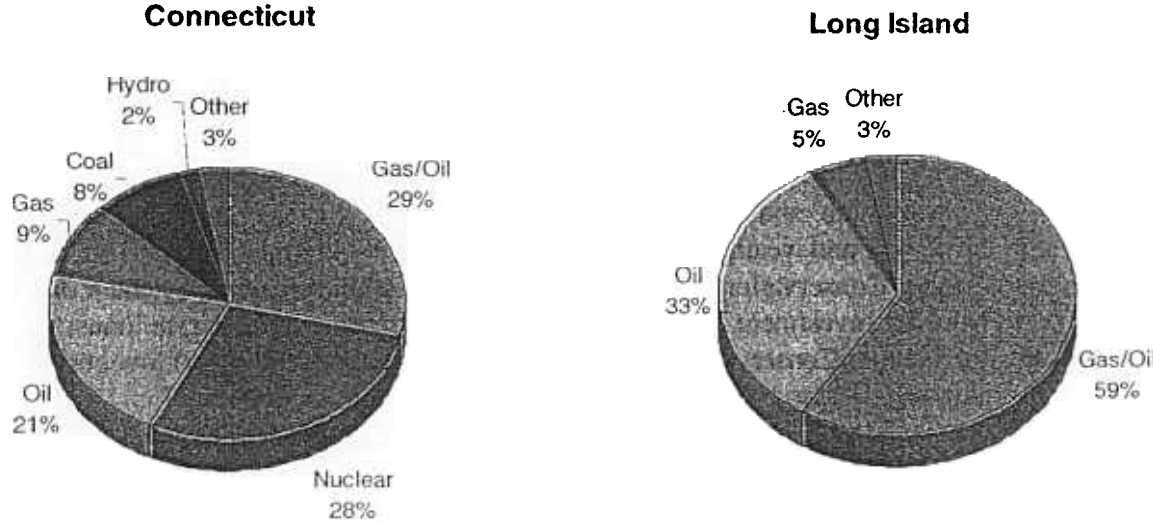
[273] Energy Information Administration, Office of Oil and Gas, January 2003.

Fuel Oil

Fuel oil includes a number of different liquid petroleum products. Distillate fuel oil (DFO), which includes No. 2 fuel oil, jet fuel, and kerosene, are critical energy sources. In Connecticut, 52.4% of households rely on No. 2 fuel oil for home heating.[274] On Long Island, nearly 70% of households use oil heat.[275] DFO, residual fuel oil (RFO), and other petroleum products are commonly used in industrial boilers and for other manufacturing purposes.

RFO and, to a lesser extent, various types of DFO are currently utilized throughout Connecticut and Long Island for electric power production. As indicated in Figure 10, almost 60% of generating facilities on Long Island and almost 30% in Connecticut are dual fuel, i.e., they are capable of firing both gas and oil. The option to burn gas or RFO has economic and reliability value. The flexibility to fuel switch based on price lowers the cost of electrical production. The ability to burn oil also allows gas-fired plants with non-firm transportation entitlements to be dispatched on cold days when gas service is otherwise curtailed. However, relative to natural gas, fuel oil generally has higher emissions of NO_x, SO_2, and particulate matter. Importantly, the amount of oil burned, particularly during the summer ozone season (May to September), is limited by each facility's air permit and applicable state regulations. Most of the new gas-fired combined cycle plants constructed in the last few years are permitted to burn oil for up to about 720 hours per year. Air quality regulations promulgated in both Connecticut and New York require the use of low-sulfur oil and impose more stringent emissions limits. These regulations will increase compliance costs for burning oil in the more vintage plants.

Figure 10 – Connecticut and Long Island Electric Capacity by Fuel Type



One advantage of fuel oil is that it can be stored in aboveground or underground tanks. Oil can therefore be purchased and stored as a backup fuel when prices are favorable.

[274] Northeast Gas Association, based on U.S. Census data for year 2000.
[275] Oil Heat Institute of Long Island. http://www.ohili.org/index.shtml.

However, facilities that rely on oil may face difficulties to refill storage tanks that are depleted during periods of prolonged cold. Oil storage capacity is, increasingly, a limited asset. Permits for new oil storage tanks are difficult to obtain. Accidental release of oil, either from overfilling or from tank leakage, may cause contamination of soil, surface water, or groundwater. Potential groundwater contamination is a particular concern on Long Island. Virtually all of Long Island's water supply is derived from groundwater, which is vulnerable to contamination due to the highly permeable nature of the soils. Long Island's groundwater aquifer has been designated a "sole source aquifer" by EPA and is subject to enhanced environmental protections.

Fuel oil is delivered by barge to the major ports in Connecticut (e.g., Bridgeport, New Haven, and New London), as well as to locations on Long Island. According to the U.S. Coast Guard Vessel Traffic Division, in 2000, 11,968 barges passed under the Throgs Neck Bridge going into or out of Long Island Sound. Oil spills from grounded barges, most recently last February in Norwalk, remain an ecological threat to Long Island Sound.

2.8.5 Measures That Reduce the Demand for Natural Gas and Electricity Through Conservation, Load Management, and Demand Response Programs

Gas Conservation - Connecticut

Three Connecticut natural gas local distribution companies (LDCs) fund energy efficiency programs within their service territories through either the Conservation Adjustment Mechanism or through base rates. Most of the programs below have been developed in conjunction with the Conservation Collaborative Group.

Connecticut Natural Gas (CNG) has three residential conservation programs plus one state program. The total budget for 2002 is $569,000 for the following:

- Conservation and Retrofit Energy Services (CARES) program provided 182 insulation and weatherization installations for low-income customers in 2001;
  Energy Conservation Loan Program (ECLP) is administered by the Connecticut Housing Investment Fund and provides below-market interest rate loans;
- Residential Conservation Services (RCS) program provided 130 low cost and free (for qualified and hardship customers) energy audits in 2001; and
  Conservation Program for State Facilities per P.A. No. 93-417 has completed 9 projects, and one project is in process.

Southern Connecticut Gas (SCG) has two residential conservation programs and one state program. The total budget for 2002 is $400,000 for the following:

SCG funds a low income weatherization program approved by the Conservation Collaborative Group and a Limit the Gap program administered by the

Community Action Agency - New Haven; 147 customers received such services in 2001;
ECLP provides below-market interest rate loans for energy conservation improvements;
The RCS program provided 144 low cost and free (for qualified and hardship customers) energy audits in 2001; and
Conservation Program for State Facilities (P.A. No. 93-417) has undertaken several projects; all work is expected to be completed by 2003.

Yankee Gas Services Company (Yankee) has three residential conservation programs that are administered by Northeast Utilities' Community Relations Department. The total budget for 2002 is $282,000:

- Insulation Program (formerly the Attic Insulation program) for low-income customers;
  The RCS program provided 153 free energy audits in 2002 (for qualified and hardship customers); and
- ECLP provides below-market interest rate loans for energy conservation improvements.

In the Comprehensive Assessment and Report, Part I, the Working Group recommended that the scope of the LDC's energy efficiency programs be expanded and consolidated under an Energy Efficiency Collaborative Group (EECG) that would develop, implement, and evaluate the cost-effectiveness of these programs. DPUC approval would be required before the final EECG program could be implemented. It was anticipated that the annual program funding would be approximately $1.5 million.

Electric C&LM Programs and Initiatives – Connecticut

C&LM initiatives in Connecticut are primarily implemented via the state's electric utilities, CL&P and UI. The two electric utilities develop their programs with input from the Connecticut Energy Conservation Management Board (ECMB); funding and program design approval is authorized by the DPUC.

State funding for C&LM programs in Connecticut is being considered for transfer to the General Fund. The programs discussed below reflect historical efforts and may not be funded and continued beginning July 2003.

CL&P offers a wide variety of C&LM programs aimed at the residential sector[276] and for commercial, industrial, government, and institutional entities.[277] UI offers a similar slate of programs, targeted towards all primary customer sectors.

[276] The residential programs include: residential retail lighting; "Smartliving Catalog'; EnergyStar appliances; EnergyStar homes; and low income and residential HVAC.

In May 2002, the DPUC approved an $86.5 million budget in Docket No. 02-01-22 for DSM initiatives in the state, $69.5 million for CL&P customers and $17.0 for UI customers. These values are based on the projected investments into the C&LM Fund established by the legislature pursuant to PA 98-28. The C&LM Fund receives an assessment of three mills per kWh on electricity sold to each customer of an investor-owned electric utility. After discussions with the DPUC, UI reassessed their C&LM budget, and focused the implementation of measures in SWCT. The DPUC also required CL&P to alter their program investments, and to apply greater effort and budget dollars towards SWCT initiatives. For example, CL&P was required to increase the incentives for participants in the ISO-NE LRP.

The utilities develop their programs and budget with the advice and assistance of the ECMB, created by the Connecticut Legislature pursuant to Section 33 of PA 98-28. The ECMB, an eleven-member Board made up of representatives from business groups, consumer organizations, environmental groups, government agencies and distribution utilities, provides oversight and recommendations on utilities' C&LM program and budgets before they are submitted to the DPUC. The ECMB monitors energy efficiency and LRPs, with particular emphasis on SWCT.

C&LM initiatives are projected to have large paybacks on the investments made. In 2001, CL&P and UI invested roughly $86 million of ratepayer funds acquired through the C&LM Fund. All programs must be cost-effective with a benefit-cost ratio of at least 1.0. According to an ECMB report of 2001 DSM implementation, the $86 million investment is projected to produce a lifetime savings for customers over of $473 million.[278] More than 400,000 customers participated in 2001, including industrial, commercial, and residential customers. At this time, the potential cumulative savings from all current and previous C&LM sources are forecast to reduce the 2006 summer peak demand by approximately 700 MW from levels otherwise expected. The most successful C&LM programs in 2001, measured in terms of participation and benefit/cost ratio, were retail lighting, advanced design for new residential, commercial, and industrial construction, energy efficient residential washing machine sales, and custom on-site energy audits for commercial and industrial customers. The programs with the lowest benefit/cost ratios were residential audits, heat pump water heater sales, and express services targeted to small load commercial and industrial customers for upgrading lighting, motors, and heating/cooling units.

Within the C&LM Fund, a research development and demonstration (RD&D) program was established to identify and manage projects that would advance the development of reliable and efficient use of electricity. RD&D projects seek to deliver sustainable energy savings benefits to Connecticut businesses and residents. RD&D seeks to complement

[277] The non-residential programs include: new construction; customer services; express services; small business energy advantage; RFP for energy efficiency program; operation and maintenance RFP program; and state and municipal buildings program.

[278] Report of the Energy Conservation Management Board Year 2001 as represented by UI in Connecticut's Conservation and Load Management Fund, Year 2001 Accomplishments.

the DSM portfolio of energy-efficient measures for all customers by uncovering new products and services that save energy, benefit the state's environment and economy, and enhance power system reliability. CL&P and UI separately administer their RD&D programs, also referred to as Market Transformation Programs.

The RD&D Program solicits innovative technology or technical service proposals in the categories of Energy Efficiency and Distributed Resources. Energy Efficiency technologies are defined as technologies that offer large electric energy savings whether from one improvement or from a series of smaller ones. Innovative technologies sought for consideration include lighting, energy management/load control, computer/ electronics, refrigeration, water heating, electro-technologies, and space conditioning/ HVAC. Distributed Resource technologies are defined as the combined or individual use of DG, energy storage, and load management on the customer side of the meter with complementary energy efficiency benefit, and to address specific customer reliability and power quality needs. Innovative Distributed Resource technologies sought for consideration include photovoltaic (PV), fuel cells, and distributed resources and fuel cell cost analysis.

SWCT C&LM Activities

The DPUC has indicated its belief that "an increased focus on C&LM activities in SWCT, particularly in the NOR area" should be part of a balanced approach to solve the transmission congestion issues facing the region. In Docket No. 02-01-22, the DPUC approved $5.633 million for CL&P's 2002 load management programs in SWCT.[279] CL&P established a goal of 28.85 MW of local reduction in SWCT. As of November 2002, CL&P was able to enroll only 0.7 MW in the NOR sub-area and 6.88 MW in the remainder of the CL&P's towns in SWCT. The DPUC also approved $660,000 in uncommitted funds for UI to reallocate to the NOR sub-area.

The DPUC expected total conservation program savings of 65.6 MW throughout the state and 36.9 MW in SWCT due to 2001 expenditures (Table 15). Savings values for the 2002 implementation are expected to be slightly higher (67.2 MW) with most of the savings in SWCT (40 to 45 MW). According to the DPUC Investigation in Docket 02-04-12, load management savings were projected to reduce load by an additional 44 MW, all in SWCT, but there is some overlap between CL&P's and UI's load reduction values and ISO-NE's LRP program, as outlined in Table 15.

[279] CL&P originally proposed a $2.46 million budget, expected to save roughly 10 MW of peak demand. The DPUC subsequently identified $0.93 million of C&LM funds to be reallocated to SWCT load management and CL&P proposed an additional $2.25 million for such endeavors.

Table 15 – Peak Load Reduction from CL&P and UI C&LM Programs[280]

	2002 Peak Load Reduction (MW)	
	State-Wide	SWCT only
Energy Efficiency Programs		
Original Program Filing	67	40
Incremental SWCT Initiatives	5	5
Total Energy Efficiency	72	45
Load Response Programs		
C&LP	28	28
UI	12	12
ISO-NE SWCT RFP	4	4
Total Load Response	44	44
Total C&LM	116	89
% of SWCT Peak	*n/a*	*2.7%*

Electric C&LM Programs and Initiatives – New York

The New York Energy Research and Development Agency (NYSERDA) is a public benefit corporation created in 1975 by the New York Legislature. NYSERDA is nationally recognized for its innovative research and technology development, energy efficiency and conservation, and environmental protection programs. NYSERDA derives its revenues from a system benefits charge (SBC) on in-state gas and electric utility sales, voluntary annual contributions by the New York Power Authority and LIPA, and corporate funding.

NYSERDA is authorized by the NY PSC to administer and implement a range of C&LM programs through its Energy $mart initiative intended to improve the economics of conservation measures or efficiency activities, and to support research and development of renewable energy technologies and fuels. The Energy $mart initiative is an 8-year program (1998 through 2006) with a total budget of $932.1 million. Approximately $372.2 million has been committed, and $115.6 million invoiced, as of March 31, 2002. Solicitations for the implementation and marketing of ongoing programs continue on a regular basis. Energy $mart contains ten unique C&LM programs targeted to commercial and industrial customers and eight unique programs targeted to residential customers, including low-income programs. Unlike customers of investor-owned utilities, LIPA and NYPA customers are not charged a SBC, and thus, are not eligible to participate in NYSERDA's C&LM programs.

LIPA directly administers its own C&LM programs in its service territory and coordinates certain aspects of its DSM programs, as well as alternative generation

[280] DPUC Docket 02-04-12.

initiatives, with NYSERDA. In 1999, LIPA committed $170 million over five years to its Clean Energy Initiative targeting energy efficiency, load management, and renewable energy resources.[281] According to LIPA, these programs have yielded over 122 GWh of energy savings, roughly 40 MW of installed peak load reduction, and more than 200 MW of curtailable load reduction capability as of October 2002. LIPA expects that its efficiency programs with committed funding will produce a total of 290 GWh of energy savings and over 110 MW of installed load reduction (excluding curtailable load) by the end of 2004.

ISO-NE Demand Response Program[282]

ISO-NE is responsible for administering the Demand Response Program (DRP) for the New England Power Pool (NEPOOL). There are approximately 254 commercial and industrial customers throughout New England enrolled in the DRP that could provide a total of 343 MW of demand response to help manage peak demand for electricity in New England.

Customers can receive incentive payments if they reduce their electricity consumption or operate generation in response to high real-time wholesale electricity prices or when the reliability of the region's electricity grid is stressed. Customers can contribute load reduction in a variety of ways:

- Turning off non-essential lights and office equipment
  Adjusting HVAC, refrigeration and water heater temperatures
  Delaying or reducing manufacturing processes
- Operating on-site generators
- Using energy management system (EMS)

Demand response participants provide an important resource for New England. They help ensure the power grid's reliability, reduce wholesale price volatility that drives up the cost of power for everyone, and reduce air pollution by enabling older, less efficient power plants to run less often.

Real Time Demand Response. The Real Time Demand Response Program is designed for customers who can make a commitment to reduce electricity demand within either 30-minutes or 2-hours advance notice. By making a commitment, customers will receive a guaranteed minimum payment of $0.50 per kilowatt hour (kWh) in the 30-minute program and $0.35 per kWh in the 2-hour program. Payments may be higher (up to a maximum of $1.00 per kWh) based on the actual hourly wholesale prices. In addition, customers may receive additional credit for Installed Capacity (ICAP) and reserve margin.

[281] LIPA Draft Energy Plan, October 17, 2002, at 7-3.
[282] Information obtained from ISO-NE on May 30, 2003.

Real-Time Profiled Response. The Real Time Profile Response program is designed for groups of customers who can reduce their loads within 30-minute notice from ISO-NE. This program is intended for:

Businesses with similar facilities in multiple locations such as retail stores, office buildings, etc.
Companies installing direct load control technologies in residential homes or commercial buildings (e.g., super-thermostat programs, water heater and pool pump controls, etc.)
Distributed generation installed in multiple locations

A minimum of 1 MW of load reduction for this program is required to provide a statistical response factor for the group. For example, an aggregated 10 MW demand resource having a 50 percent response rate would be credited for 5 MW of response. In addition, customers may receive additional credit for Installed Capacity (ICAP) and reserve margin.

Real Time Price Response. The Real Time Price Response Program is designed for customers who can reduce electricity demand when wholesale prices are projected to be greater than $0.10 per kWh. This is a voluntary program. Customers are not required but can choose to reduce demand on a case-by-case basis. These customers are paid the actual hourly wholesale prices (up to a maximum of $1.00 per kWh) with a guaranteed minimum price of $0.10 per kWh. Customers in this program do not qualify for Installed Capacity (ICAP) credit.

Most customers pay about $0.05 per kWh for retail electricity supply; however, wholesale electricity prices can reach as high as $1.00 per kWh during peak demand periods. For example, in the summer of 2002 wholesale electricity prices exceeded $0.10 per kWh for over 40 hours on 12 different days. Each hour over $0.10 per kWh represents an opportunity for customers to reduce their consumption and receive incentive payments.

Hourly Metering and Data Reporting. With the exception of the Real Time Profile Response Program, an advanced meter capable of recording energy consumption every 5 to 15 minutes is required to participate in these programs. Interval meter data must be reported to ISO New England to determine the customer's load reductions. ISO-NE offers internet based communications system (IBCS) and low tech data reporting options.

A detailed description of ISO New England's Demand Response Program is available on the web at www.iso-ne.com.

NYISO Load Response Program

During the summer of 2001, NYISO tested two price-responsive load pilot programs: the Emergency Demand Response Program (EDRP) and the Day-Ahead Demand Response Program (DADRP).

- Participants in the EDRP are provided at least two hours advance notice of a curtailment need. Customers who do curtail are paid the higher of the location based marginal price (LBMP) or $500 / MWh. During the summer of 2001, the EDRP program provided 418 MW of load reduction in critical peak periods.

  Participants in the DADRP submit reduction bids comparable to supply bids from generators, and receive market prices for load reductions scheduled for the next day. Over a dozen customers subscribed to the DADRP program in 2001, supplying over 25 MW of load reduction coincident with summer peaks.[283]

Customers with at least 100 kW of curtailable load were allowed to participate in these programs. Forty percent of subscribers chose to participate in an existing NYISO load management program, which allows load serving entities to claim certain curtailable loads to fulfill their installed capacity requirements. Industrial customers, located primarily in Western New York, represent the bulk of the curtailable load, so only about 43 MW was curtailed in the New York City and Long Island, as shown in Table 16.

Table 16 – New York EDRP Loads by Zone

Zone	Average Hourly Event Value		Total EDRP Load (MWh)
	EDRP Load (MWh)	% Change in RT Load due to EDRP	
Capital	63	3.1%	1,446
New York City	37	0.4%	860
Long Island	6	0.1%	128
Western NY	293	3.3%	5,276
Hudson Region	19	0.5%	430
Grand Total	**418**		**8,159**

As indicated in Table 16, curtailable load on Long Island is small compared to other regions of New York. This reflects Long Island's relatively small proportion of industrial load compared to commercial and residential load, which have less flexibility to modify daily operations and energy use. LIPA intends to establish a new energy conservation rate as a further incentive to its customers.

2.8.6 Alternatives to Telecommunications Lines Crossing Long Island Sound

The existing telecommunications network has sufficient capacity due to the redundancy built into the network and techniques to improve equipment utilization. The major service providers have no near-term plans to install additional lines across Long Island Sound, and the relative ease of expanding wireless systems may reduce any long-term plans as well.

[283] See NYISO PRL Program Evaluation: Executive Summary.

2.9 Ocean Management and Planning

Planning tools such as common utility corridors, ocean zoning, and marine protected areas were considered as potential options for the management of energy and telecommunications infrastructure in Long Island Sound.

2.9.1 Utility Corridors[284]

On land, linear infrastructure such as roadways, gas and electric transmission lines, telecommunications lines, and railroad rights-of-way (ROW) are often clustered in common corridors. The use of common corridors is sometimes preferred by regulators.[285] However, use of common corridors often pose engineering and design considerations. The main design issue for co-locating a gas pipeline and a high voltage alternating current (HVAC) electric transmission line is the induced current that can be transferred from the HVAC line to the steel gas pipe. Induced currents can lead to accelerated corrosion of the pipe. Proper pipeline design may mitigate this problem. Cathodic protection, including placement of sacrificial anodes or rectifiers along the pipeline, may prevent electric corrosion from stray currents.

Co-locating multiple transmission infrastructure along a common ROW may raise significant security concerns, particularly if there is a gas and electric line or multiple electric lines serving the same load. Such contingencies could conceivably include accidents or intentional subversive acts.

Because common infrastructure corridors have been used on land, the Task Force considered whether a similar concept would be adaptable to infrastructure across Long Island Sound. However, construction and maintenance of marine infrastructure is significantly different from terrestrial ROWs. Because of these differences, many of the benefits of terrestrial ROW corridors are not applicable to the marine environment. For example, several lines (gas, electric, cable) could potentially be constructed within a single on land corridor approximately 100 to 200 feet wide, whereas deepwater marine construction methods could require separation distances of approximately 2,000 to 4,000 feet between lines for lay barge anchoring. Near shore construction methods may require a separation distance between lines of 75 to 300 feet. Substrate type and water depth also affect infrastructure installation techniques and the separation distances required to provide protection from construction and excavation equipment (

[284] The discussion relates to the potential for the placement of multiple and varied energy and telecommunications infrastructure within common linear routes or "corridors". This discussion is generic and does not pertain to the replacement, repair or maintenance of existing facilities in Long Island Sound.

[285] FERC citation regarding preference for giving consideration to utilizing, enlarging, or extending existing right-of-ways:18 CFR 2.69(1).

Table 12.). As a consequence, multiple pipelines or cables cannot be compactly located within a single designated marine corridor, unless that corridor is thousands of feet wide.

In conclusion, marine corridors raise the following unique issues:

The inherent difficulty in delineating the area of any such corridor;

National security concerns with placing multiple utility infrastructures in a common area;

Operational concerns associated with utility facilities in proximity to each other, i.e., increased likelihood of electrolytic corrosion and an increased potential for third party damage;

- Substrate types and water depth can affect construction techniques and corridor width;

Repair, inspection and maintenance considerations;
- Minimum separation distances required for safety;
- Distance affords protection from construction/excavation equipment;
- Avoid as much as possible crossing of cables/pipes to assure adequate access;

Impacts on utility infrastructure insurance requirements;

Liability considerations in connection with construction and post-construction activity relating to utility infrastructure;

May minimize right-of-way needs if assume finite number of utility infrastructures and/or no significant change in technology for installation and repair;

Could benefit efficiency of siting process if the corridor is identified;

May or may not facilitate avoidance or minimization of impact on discrete sensitive resources;

May increase cumulative environmental impacts, albeit within an identified area;

Use of a Long Island Sound corridor may increase adverse terrestrial environmental impacts in connection with the concentration of related utility infrastructure;

May require infrastructure in Long Island Sound to be longer in total length thereby impacting, among other things, the infrastructure cost and the extent of needed right of way;

- Any corridor proposed for Long Island Sound would require the concurrence of New York;

  Current lack of data adversely impacts a conclusive decision on location; and

  Establishing a common corridor will result in repeated impacts in the same areas and will likely result in long-term effects.

Marine Protected Areas and Marine Zoning

A number of proposals have been reviewed in recent years for the construction or installation of electrical cables and gas pipelines in and through Long Island Sound. In the course of evaluating alternative management processes for such activities, the question has been asked, "How do or might states use marine protected areas and marine zoning for the purpose of reviewing and/or regulating subtidal energy and telecommunications infrastructure?"

Marine protected areas (MPAs) have been established in various locations nationwide, including areas designated in response to federal Executive Order 13158. The Executive Order, issued in May, 2000, defines a MPA as "any area of the marine environment that has been reserved by Federal, State, territorial, tribal or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein." As described on The National MPA Center's website, www.mpa.gov, MPAs have been designated to conserve biodiversity, manage natural resources, protect endangered species, reduce user conflicts, provide educational and research opportunities, and enhance commercial and recreational activities.

The MPA Center website further describes the varying levels of resource protection provided and uses allowed in MPAs, ranging from areas closed to public access to multiple-use areas. Existing MPAs also range in size (from 14 acres to 5,300 square miles) and shape. Some MPAs are located entirely within federal waters and are managed under federal laws by federal agencies. Others are found in state waters where both state and federal laws may apply. Some MPAs, such as the Cape Cod National Seashore, include both marine and terrestrial components.

Marine protected areas generally create a level of management over and above the existing authorities that apply outside of MPAs, and can provide a focused, ecosystem-based approach to resource management. Activities that are permitted or regulated by law outside an MPA may be prohibited or severely curtailed within an MPA in order to achieve the benefits for which the MPA was established. Oil exploration and production, dredging, dredged material disposal, certain types of vessel traffic, fishing, and placement of structures on the seabed are examples of activities that have been restricted in certain MPAs.

Nevertheless, while MPA program objectives, as described above, are intended to provide necessary and effective resource protection, outstanding management issues remain. The Ocean Conservancy (formerly known as the Center for Marine Conservation) evaluated 95 MPAs of widely divergent jurisdiction and scope within the U.S. Gulf of Maine. Given the variety of sites reviewed, the study's reported observations may be indicative of MPAs in a broader geographic context, including Long Island Sound.

The Ocean Conservancy study found that the resource areas most frequently lacking fully or permanently needed protection are subtidal habitats. In ranking the degree of resource protection provided, the Conservancy found that while the majority of MPAs prohibit certain activities year-round, such as non-renewable resource development (sand and gravel mining, oil and gas extraction, dredging), many still allow activities causing high and widespread impacts to such benthic habitats, primarily bottom trawling and scallop dredging. Of relevant concern to Long Island Sound, these prohibitions do not generally include energy and telecommunications infrastructure.

The following analysis describes a number of existing MPAs that have been established at the national and state levels in this country, as well as in Australia. It also describes the concept of marine zoning as it has been applied in the United States and Australia. The examples that are cited provide insight into the applicability of these mechanisms for resolving the potential impacts of the installation of energy and telecommunications infrastructure on resources in Long Island Sound, including but not limited to shellfish and eelgrass beds, as well as water quality. The content of this document reflects information gathered by the Connecticut Department of Environmental Protection (DEP) and Save Long Island Sound from listed resources, including telephone conversations with state and federal agency staff.

National Programs

The primary initiative through which MPAs have been established at the federal level is the National Marine Sanctuaries (NMS) Program. The review of any activity in a National Marine Sanctuary is dependent on the purpose for which the area was designated. At the inception of the MPA program, the impacts of energy and telecommunications infrastructure were not considered specifically. Consequently, NMS administrators find that they must address these issues in the context of a non-existent legal framework. However, while such infrastructure is not specifically prohibited in Sanctuaries, disturbance of the seabed is disallowed.

National Marine Sanctuaries on the U. S. west coast, as well as Stellwagen Bank NMS in Massachusetts, have developed a system of Special Use policies and permits, in consultation with the oil industry and the White House, for dealing with the particular issue of the installation of oil pipelines. These policies and permits address, among other things, grandfathering of such uses, and the assessment of user fees. Subject activities must be compatible with the purposes for which the sanctuary was designated and must be protective of sanctuary resources.

State Programs

The four New England coastal states other than Connecticut, as well as New York, New Jersey and Florida, were surveyed to determine the existence of marine protected areas, and whether those MPAs have been used to review or regulate subtidal energy and telecommunications infrastructure. All of the surveyed states review proposals for activities such as energy infrastructure through conventional regulatory authorities. For example, Rhode Island, like Connecticut, enforces seasonal restrictions on such activities to avoid impacts to shellfish resources.

To date, neither Maine, New Hampshire, Rhode Island nor New York have established under state authority MPAs in which any or all development activities, including utility construction, are prohibited. Maine's staff speculated, however, that any proposed offshore activity expected to adversely affect an onshore special resource area, such as the Rachel Carson National Wildlife Refuge, part of the Wells Estuarine Research Reserve, would focus the review of that activity on the impacts to area-specific sensitive resources. Nevertheless, Maine also indicated that energy infrastructure would likely be reviewed as a special exception to other regulated activities.

Massachusetts, New Jersey and Florida have established MPAs, all of which offer examples pertinent to the management of energy and telecommunications infrastructure in Long Island Sound. Massachusetts has designated a series of five Ocean Sanctuaries spanning most of the state's coastline. The sanctuaries extend from mean low water seaward to the three-mile limit of the state's jurisdiction. The primary incentive for their designation was the protection of water quality for fisheries and tourism. Working harbors and developed shoreline are excluded from the sanctuaries. The sanctuary that is contiguous with the Cape Cod National Seashore contains the most use restrictions, reflecting the sensitive nature of the marine resources at that location.

Under the relevant enabling legislation, the Ocean Sanctuaries are to be "protected from any exploitation, development, or activity that would seriously alter or otherwise endanger the ecology or appearance of the ocean, the seabed, or the subsoil thereof." The state Department of Environmental Management (MADEM) acts as trustee of the sanctuaries, ensuring that any activity proposed within a sanctuary is consistent with the Massachusetts Ocean Sanctuaries Act, while the Department of Environmental Protection (MADEP) evaluates and regulates activities proposed within sanctuaries.

Activities prohibited in Massachusetts' Ocean Sanctuaries include the building of any structure on the seabed or under the subsoil thereof. However, exceptions are made for "activities, uses and facilities associated with the generation, transmission, and distribution of electric power, and laying cables," and projects deemed to be "necessary to the public interest." Determination of such necessity is based on the evaluation of, among other things, the importance of the project to public safety and welfare; the impact of the activity on the ecology or appearance of the ocean, seabed or subsoil thereof; the effect of the activity on existing uses; and the financial and technical ability of the

applicant to build and properly maintain the project. In the state's North Shore sanctuaries, infrastructure is allowed if it is the only feasible alternative.

Among those projects that have been reviewed by the Ocean Sanctuaries program is the Hubline, a gas pipeline traversing Massachusetts Bay. Review of the pipeline, which was proposed to be buried in the seabed and which is presently under construction, was bundled with the state's coastal regulatory process. The project was approved by MADEP, however due to the Ocean Sanctuaries program's concerns about potentially serious environmental impacts, a variety of mitigative requirements were imposed on the sponsors of project. Such measures included long-term monitoring of the pipeline and funding of projects intended to provide insight into better management of the Hubline itself and other activities which would potentially impact Sanctuary resources, e.g., mapping of the Sanctuary seafloor.

Massachusetts also has designated a system of Areas of Critical Environmental Concern (ACEC). While ACECs address protection of both terrestrial and aquatic resources, proposed work within area boundaries is reviewed by DEM in accordance with existing policies and regulations.

Florida has established a system of aquatic preserves to protect extensive seagrass beds and mangroves, and the accompanying fish and wildlife habitat, in addition to significant cultural resources. Certain activities are restricted within the preserves depending on the resources at risk, and the nature of the activity of concern. Any proposal for work within a preserve must meet a "public interest" test. Prohibited activities include new dredging and shoreline armoring. Public energy and telecommunications infrastructure is not prohibited in aquatic preserves, however, otherwise unregulated or privately funded and constructed utility facilities which do not pass the public interest test would be prohibited.

International Programs

New South Wales, Australia has established two types of MPAs:

Aquatic reserves. These are areas designated under the *Fisheries Management Act of 1994* to conserve the biodiversity of fish and marine vegetation. Aquatic reserves protect fish habitats, and can also be used specifically for fisheries management purposes, to protect threatened species, facilitate educational activities, or scientific research.

National parks and nature reserves. These are areas established under the *National Parks and Wildlife Act of 1974*. All land (including submerged land) and all native plants and animals (except fish and marine vegetation) are protected within parks and reserves. Coastal parks and reserves often extend to low water and beyond, and sometimes include the beds of adjoining lakes or estuaries.

The principles upon which the qualifications of an area for protection are based can be found at http://www.mpa.nsw.gov.au/pages/overview/6_goals.htm. The process for

identifying and designating such areas may be found at http://www.mpa.nsw.gov.au/pages/overview/7_identifying.htm.

2.9.2 Marine Zoning

State Programs

Marine protected areas have been established in the United States, including in New Jersey and Florida, through a mechanism known as marine zoning, also referred to as ocean zoning and ocean management areas. Marine zoning is the temporal and geographic division of a waterbody by legislative regulation into districts to reduce user conflicts and lessen the concentrated impact to marine resources.

The focus of marine zoning is the protection of critical portions of sensitive habitats, while not restricting activities within the zone any more than necessary. It has the following potential benefits, and is achieved through the management procedures indicated parenthetically:

- reduction of impacts on sensitive species or communities (i.e., buffer zones);
- protection of biodiversity and habitats (i.e., MPAs or areas of critical concern);
- protection of marine ecosystem from pollution (i.e., no discharge zones);
- protection from over-fishing or restoration of stock (i.e., "no take" areas);
  restoration of degraded habitats through self-healing (i.e., non-consumptive zones, in extreme cases "no access" zones for all uses other than scientific assessment of the recovery);
  reduction of gear conflicts (i.e., "no bottom trawl" zones); and
  protection of sensitive life stages (i.e., seasonal window zones).

Similar to terrestrial zoning, marine zoning is legally enforceable and penalties apply for breaches. However, because marine resources are held in trust for the public, any intrusion or limits of that public's use must be in the public interest and not be an unreasonable interference of that use. Boundary disputes, enforcement difficulties and frequent user conflict are just some of the marine zoning trials that do not generally afflict terrestrial zoning. Examples of the use of marine zoning in the United States are:

New Jersey

In March of 2001, the Tidelands Resource Council set forth a plan creating the Sedge Islands Marine Conservation Zone (MCZ). It was designed to reduce environmental effects of personal watercraft and to better manage wildlife, recreation and traditional uses of the area. The Sedge Islands support New Jersey's largest osprey colony and contain the state's first peregrine hacking tower. The Islands also include 715 acres of tidal wetland that serve as spawning, nursery, forage and refuge habitat for many estuarine and offshore species.

The Council authorized New Jersey's Department of Environmental Protection to manage the tidelands, thus giving the agency's Park Service and Division of Fish and Wildlife jurisdictional authority to control activities in the inter-tidal zone. This affords a more holistic approach by providing for conservation areas, "soundscapes" and "user experience" areas, which are not currently contemplated by the state's boating regulations. Use restrictions are site-specific and do not affect watercraft activities in adjacent areas.

Stakeholders were involved in the designation process, and the public has been supportive of the initiative. The designation was a joint effort by state's resource agencies, and required approval of state's Natural Resources Council in addition to that of the Tidelands Resource Council. While the review of proposed activities in the MCZ, including energy and telecommunications infrastructure, is conducted through existing regulatory authorities, MCZ staff regard marine conservation zoning as an additional effective tool for management of such infrastructure.

Florida

A more extensive marine zoning initiative is found in Florida. The goal of the state's program is to protect resources while allowing the pursuit of activities compatible with such protection. Within a limited area of the Florida Keys National Marine Sanctuary, marine zones have been designated to protect resources, conserve biodiversity, and disperse uses. Several types of "no-take" zones have been established, including small sanctuary preservation areas, wildlife management areas, special use areas and an ecological reserve. These zones comprise only 2% of the Sanctuary. Florida's marine zoning regulations complement those in existing non-zoned management areas, including the Aquatic Preserves described above.

Florida's marine zoning program has the following objectives:

- reduce stresses from human activities by establishing areas that restrict access to especially sensitive wildlife populations and habitats;
- protect biological diversity and the quality of resources by protecting large, contiguous diverse habitats that are intended to provide natural spawning, nursery, and permanent residence areas for the replenishment and genetic protection of marine life and to protect and preserve all habitats and species;
- minimize conflicting uses;
- protect Sanctuary resources and separate conflicting uses by establishing a number of non-consumptive zones in areas that are experiencing conflict between consumptive and non-consumptive uses and in areas that are experiencing significant population or habitat declines;
- eliminate injury to critical/sensitive habitats; disperse concentrated harvests of marine organisms;
- prevent heavy concentrations of uses that degrade Sanctuary resources; provide undisturbed monitoring sites for research activities by setting areas aside for scientific research, monitoring, and restoration; and

provide control sites to help determine the effects of human activities on resources.

- Specific activities restricted in the various no-take zones include: spearfishing, shell collecting, tropical fish collecting, fishing and other activities that result in the harvest of marine life by divers, snorkelers, and fishermen and direct physical impact to corals. Measures instituted to manage public access in wildlife management areas include idle speed only/no wake zones, elimination of access buffers, no-motor zones, and limited area closures.

International Programs

At least one other nation, Australia, has undertaken a marine zoning initiative similar in scope to that in Florida. Marine parks have been established in the states of Queensland and New South Wales which are divided into zones, most of which allow a wide range of uses. Zoning and operational plans are used to guide the protection of conservation values and to manage activities that occur within marine parks. Four zones are used in marine parks:

sanctuary zones: highest in biological diversity, key sites for threatened or other significant species, important natural or cultural features. Examples: estuarine systems; sandy beach habitat; intertidal rocky shore; subtidal soft sediment habitats (muddy, sandy or gravely seafloor); subtidal reefs and fringe reefs.

- habitat protection zones: high in biological diversity, key sites for threatened or other significant species, important natural or cultural features. Examples: all above mentioned examples, particularly inshore areas.

special purpose zones: special management requirements; Examples: oyster leases and scientific study sites.

general use zones: all areas within park not subject to other zoning. Examples: deeper offshore areas.

Applicability To Long Island Sound

A wide variety of Marine Protected Areas have been established in the United States and internationally to address identified resource concerns. Within these MPAs, various uses are restricted to protect sensitive species and habitats. In many of the individual MPAs described above, energy and telecommunications infrastructure are or would be regarded as "in the public interest" and thus an exception to other restricted activities, or as a "special use" subject to review and approval in accordance with policies specific to that use and to the goals of the respective MPA. These mechanisms, while allowing the construction of energy and telecommunications infrastructure, prescribe appropriate management measures, within the context of existing regulatory policies.

Massachusetts' criteria for the determination of "public necessity" allow for more critical review of such energy infrastructure construction. In addition to the evaluation of resource impacts, the effect of the activity on existing uses and the financial and technical ability of the applicant to build and properly maintain the project are also assessed.

Similarly, Florida's "public interest" test might preclude the construction of energy and telecommunications infrastructure that does not provide a demonstrated public benefit.

There may be less imperative in Connecticut than in other states for the establishment of new MPAs. The resources of Long Island Sound are not as concentrated as the osprey colony which is protected by New Jersey's Sedge Islands Marine Conservation Zone, or as extensive as the mangroves and seagrass beds that characterize Florida's aquatic preserves. Neither do the waters of Long Island Sound constitute a resource area as sensitive as that encompassed by the Massachusetts Ocean Sanctuary contiguous with the Cape Cod National Seashore.

The state and federal programs described above offer the following additional specific mechanisms, which may be applicable to resource management, including the review of energy and telecommunications infrastructure proposals in Long Island Sound:

Special Use policies. The Connecticut Coastal Management Act and existing state and federal coastal regulatory programs contain policies and provisions pertinent to the potential disturbance of subtidal habitats resulting from, among other activities, the construction of energy and telecommunications infrastructure. However, if such activities are shown to generate unforeseen conflicts or adverse resource impacts, it may become prudent to consider the development by resource management agencies of additional management procedures such as the National Marine Sanctuaries program's Special Use policies.

User fees. This mechanism has been employed in National Marine Sanctuaries to manage the installation of oil pipelines.

- ***Public interest review***. Consideration of the consistency of private, for-profit energy and telecommunications infrastructure with the public interest, may be appropriate in Long Island Sound. In particular, public interest review might consider benefits to public safety and welfare, potential for resolution of resource and use conflicts, and the demonstration of the financial and technical ability of the applicant to build and properly maintain a proposed infrastructure project.

Marine zoning has also been used in the United States and other countries to protect sensitive resources. New Jersey's Marine Conservation Zone is the most restrictive resource management designation presently in place in nearby states. The zone enables the identification of specific sites or areas where activities such as utility infrastructure would not be allowed due to identified impacts, and where such uses would be acceptable.

The establishment of marine zoning is likely to be a long and complicated process, requiring the involvement of a wide group of stakeholders. Potential steps which may be appropriate in the consideration of such a zoning or spatial resource management system in Long Island Sound include:

1) Identify and assess existing habitats and coastal resources;
2) Identify and assess existing uses;

3) Document and map such uses and consider: a) how habitats are impacted; b) current protection methods; and c) priorities, including exceptions to prohibitions and restrictions for utility infrastructure and/or projects "necessary to the public interest";
4) Determine the spatial scale requirement for protection (i.e., how much acreage must be included to provide the necessary resource protection);
5) Determine the relative spatial percentage protection (i.e., is partial protection of a zone sufficient or is full protection of the zone required);
6) Determine the tools, technologies and human resources necessary to effectuate a zoning plan;
7) Determine interagency involvement (i.e., who gets involved where?); and
8) Identify stakeholders and solicit their input to the proposed zoning through appropriate public forums.

In summary, this analysis summarizes information regarding the use of designated Marine Protected Areas and marine zoning on the state, national and international levels for the management of activities which could potentially impact the presence and viability of natural coastal resources and existing water-dependent uses. Clearly, additional research is needed before it can be determined whether either of these mechanisms is suitable for the management of proposed energy and telecommunications infrastructure in Long Island Sound. Similarly, all stakeholders would need to be involved in the development of such initiatives, since both MPAs and marine zoning would have implications beyond the utility industry.

2.9.3 Marine Zoning - Additional Resources

Ocean Zoning for the Gulf of Maine: A Background Paper; Prepared for the Gulf of Maine Council for the Marine Environment

Bibliography related to MPAs and Zoning:
http://life.bio.sunysb.edu/marinebio/reserve.ref.html

Marine Protected Areas: http://www.nap.edu/books/0309072867/html/257.html

Improving Marine Stewardship: http://bob.nap.edu/html/striking/

Marine Fish Conservation Network:
http://www.surfrider.org/specialplaces/ocean_zoning.htm

Other Examples: Monterey Bay (CA), Marine Life Conservation Districts in Hawaii, Galapagos Island (under consideration), Cayman Islands, Philippines, Socotra, and South Africa.

Other contacts: waiting for return calls from Ocean Conservancy, Environmental Defense Fund, and Project Manager of the Florida Project.

Marine Protected Areas – Contacts:

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