3.0 ALTERNATIVES

We evaluated a number of alternatives to the proposed Project to determine whether any would be reasonable and environmentally preferable to the proposed action. Alternatives described in the following sections include the no action or postponed action alternatives, LNG storage facility site and system alternatives; and pipeline system and route alternatives.

The evaluation criteria for selecting potentially reasonable and environmentally preferable alternatives include whether they would:

- be technically and economically feasible and practical;
- offer significant environmental advantage over the proposed Project or its components; and
- meet the Project purpose as described in Section 1.1.

3.1 NO ACTION OR POSTPONED ACTION ALTERNATIVES

If the Commission selects the no action alternative (i.e., denies the Project), the environmental impacts and benefits of the Project identified in Section 4.0 would not occur and the purpose of the Project would not be met. If the Commission postpones action on the application, the environmental impacts and benefits identified in Section 4.0 would be delayed.

If natural gas supplies are not available when needed, users (including electric generators and industrial users) would likely switch to alternate fuels or face supply shortages. Because the demand for energy in Florida is predicted to continue to increase, natural gas users, particularly those at the end of the supply line, may have fewer and potentially more expensive options for obtaining and managing natural gas supplies in the near future. Failure to provide natural gas during peak demand periods in Florida could cause increased prices or supply shortages for industrial use and electricity generation.

Should the no action alternative be adopted, potential customers could select other available energy alternatives, such as oil, to compensate for the reduced availability of natural gas.[1] Increased use of oil, however, would generally result in higher emission rates of nitrogen oxide and sulfur dioxide than natural gas.

It is possible that energy conservation in the future could lessen the need for additional supplies of natural gas. Florida has an active energy conservation program that has

[1] Since the need for natural gas has increased and the supply has decreased, Florida's utilities had proposed coal generation facilities in their long-range plans to meet the demand for power. Those proposals, however, have either been rejected by the Florida Public Service Commission or cancelled by the sponsoring utilities; it does not appear that any additional coal projects will be constructed in the State in the near future. Thus, new coal plants will not play a major role in meeting the forecasted growth in Florida's electric power demand.

reduced peak demand by approximately 5,000 MW since its inception in 1980. The Florida Public Service Commission (2006) plans to continue to encourage energy conservation in the future; however, energy conservation alone would not eliminate the need for additional generation or additional natural gas sources and infrastructure projects to meet peak demand due to substantial economic and population growth in Florida.

3.2 STORAGE FACILITY ALTERNATIVES

3.2.1 System Alternatives

System alternatives are options to the proposed action that would make use of other existing natural gas facilities to meet the stated objectives of the proposed Project. A system alternative would make it unnecessary to construct all or part of the proposed Project even if some modifications or additions to existing or proposed facilities would still be necessary. These modifications or additions would result in environmental impacts that could be less, similar to, or greater than those associated with construction of the Project. Ultimately, the purpose of identifying and evaluating system alternatives is to determine whether potential environmental impacts associated with the construction and operation of the Project could be avoided or reduced by using another system. Our analysis of system alternatives considers the use of other LNG storage options, other approved or proposed LNG projects in the region, and potential expansion of existing natural gas pipelines to replace all or part of the proposed Project.

Alternative Storage Facilities

There are three major types of "reservoirs" common to the storage of natural gas, all of which are underground:

- Salt dome cavern storage: Salt domes are naturally-occurring underground formations of block salt. These storage facilities are created by drilling a well into a massive salt formation and injecting water to turn the salt into a solution, which is pumped out and disposed of. This "brining" process creates an underground cavern capable of holding natural gas at very high pressures. A typical salt dome storage cavern can hold 4 to 8 Bcf of natural gas. An advantage of salt dome storage is that it can be designed for flexible rates of injection and withdrawal to meet changing market conditions.
- Depleted reservoir storage: Depleted reservoirs reuse existing underground oil- and gas-producing formations that have been commercially developed. By connecting to delivery pipeline networks and installing compression equipment, natural gas can be injected into the old formations and held until needed by the market. There are a limited number of suitable formations, but they are an important resource for the natural gas industry. The injection and withdrawal rates are slower than salt dome projects, but the volumes are usually larger, typically 10 to 80 Bcf.
- Aquifer storage: Aquifer storage is similar to reservoir storage, but uses underground water aquifers instead of depleted oil and gas formations.

Natural gas is taken from the pipeline system, compressed to high pressure, and injected into the underground formation. The water is pumped out or displaced by injecting natural gas into the water formation. This is the least-used method of storing natural gas.

Due to the geology of the state, very few suitable underground storage caverns exist within Florida. The only underground storage in Florida is in the western panhandle section of the state, a considerable distance from southern Florida. Existing caverns in that area would not meet the Project purpose of serving most of Florida via interconnects to the two major interstate pipeline systems. Oil reserves, such as those being rapidly depleted within the Florida Everglades, have been eliminated from further consideration because they do not have the "tight" characteristics desired for natural gas storage. The Everglades are also an environmentally sensitive area where any work could have significant environmental consequences. Aquifer storage is also not a viable alternative. It is not common in Florida due to significant cost and environmental impediments, which make aquifer storage typically the alternative of last resort for storing natural gas in this area. As such, the typical underground storage options are not viable system alternatives to meet the Project's objectives and have been eliminated from further analysis.

Existing, Approved, or Proposed LNG Terminal Projects

There are no existing LNG import terminals in Florida, although there are several proposed projects in various stages of development off the coast of Florida. These include:

- Ocean Cay LNG import terminal by AES Corporation (AES);
- Calypso Freeport LNG import terminal by SUEZ Energy North America;
- Calypso Deepwater Port by SUEZ Energy North America; and
- Port Dolphin Deepwater Port by Port Dolphin Energy, LLC;

SUEZ Energy North America (Suez) submitted an application to build and operate an on-shore LNG import terminal near Freeport in The Bahamas. The terminal would sendout natural gas to Florida via the Calypso pipeline. The government of The Bahamas has not yet acted on the application.

In September 2002, AES submitted an application for approval to build and operate an on-shore LNG import terminal on Ocean Cay in The Bahamas. The terminal would sendout natural gas to Florida via the approximately 54-mile-long Ocean Express pipeline extending from The Bahamas and interconnecting with the FGT pipeline system in Broward County. On February 21, 2002, AES filed an application with the FERC for the Ocean Express pipeline (FERC Docket CP02-90). The FERC issued a certificate authorizing the pipeline on January 22, 2004. The government of The Bahamas has not yet acted on the application.

On July 20, 2001, Suez filed an application with the FERC for the Calypso pipeline (FERC Docket CP01-409). Suez received conditional authorization from the FERC on March 24, 2004 (and subsequently amended) for the 42-mile-long pipeline extending

from The Bahamas Exclusive Economic Zone to an interconnection with the FGT pipeline system in Broward County. Construction of the Calypso pipeline is conditional upon receipt of evidence that all authorizations and approvals have been received, either from the Commonwealth of The Bahamas for the Bahamian portions of the project, or from the USCG for the proposed deepwater port.

On March 1, 2006, Suez submitted an application to the U.S. Coast Guard (USCG) for a deepwater port license to allow the import of natural gas to Florida's east coast. This proposed Calypso deepwater port (USCG Docket No. 26009) would be located approximately 10 miles offshore from Port Everglades. It would send out natural gas to Florida via the Calypso pipeline. The USCG issued a draft EIS in November, 2007 and the project is still undergoing review.

On March 29, 2007, Port Dolphin Energy submitted an application to the USCG for a deepwater port license to allow the import of natural gas to Florida's west coast. The proposed Port Dolphin deepwater port (USCG Docket No. 28532) would be located approximately 28 miles offshore from Tampa Bay. It would sendout natural gas via a new 42-mile-long sub-sea pipeline. This proposal is still under review by the USCG.

The purpose of the FGS Project is to store natural gas so it is available during periods of peak demand or emergencies when supply is shut in. These proposed LNG import terminals could partially meet this goal by providing increased natural gas supply, but these import terminals primarily function as base-load facilities and often have little capability to "peak." In fact, two of the four proposed terminals are offshore deepwater ports that would typically shut down during hurricanes and other major storms and would be unable to deliver gas during some of the very periods the FGS Project is intended to serve. In addition, there is no assurance that the two on-shore terminal proposals in The Bahamas will be approved, as both have been awaiting a government decision for several years. Because of the uncertainty of government approval for the two on-shore terminals, and the inability to meet the Project purpose for the two off-shore deepwater ports, LNG terminals were eliminated as system alternatives to the proposed Project.

Pipeline Expansion, Looping, and Compression

Pipeline expansions involving the construction of large diameter lines, looping of constrained portions of the lines, or additional compression could be used to deliver more gas to the region during normal and peak operating scenarios. We reviewed the possibility that one or both of the existing Florida interstate pipelines (i.e., FGT and Gulfstream) could be expanded as a system alternative to the proposed Project. The Gulfstream Pipeline is already being expanded within Florida to give access to new market areas. The FGT system has had six major expansions to allow for greater deliverability and further increases are limited. Pipeline expansions can have significant environmental impacts depending on the length of pipe and location, and would not satisfy the Project objective of having supply available in Florida to serve the region during weather related shut-ins when pipeline deliveries are curtailed or disrupted. Therefore, expansion of existing interstate pipelines was not considered a viable system alternative.

3.2.2 LNG Storage Facility Site Alternatives

Several other LNG storage facility sites were identified and evaluated as possible alternatives to the proposed storage facility site using the following criteria:

- site area (i.e., must be able to accommodate Project needs);
- extent of wetlands and protected areas;
- compatibility with surrounding land use; (i.e., existing land use and number of residences within 50-feet of proposed facilities);
- compatibility with existing zoning and local future land use plans, and
- proximity to one or both of the Gulfstream and FGT pipelines.

Based on these criteria, five alternative sites were identified in south Florida:

- Site 1 - FPL's Martin Power Plant Property, Martin County;
- Site 1A - Adjacent to FPL's Martin Powerplant Property, Martin County;
- Site 2 - Pratt & Whitney Property, Palm Beach County;
- Site 3 - Adjacent to FPL's West County Energy Center, Palm Beach County; and
- Site 4 - Turkey Point Vicinity, Miami-Dade County.

Figure 3.2-1 shows the location of each alternative site. Table 3.2-1 compares the five alternative sites with the proposed LNG storage facility site using the siting criteria listed above. None of the five alternative sites were located near protected natural or residential areas, so these criteria were not a factor in selecting a preferred site. The five alternative sites were all smaller in area than the proposed site and, depending on site specific conditions, may or may not have sufficient area to satisfy the required thermal radiation and vapor dispersion exclusion zones on site.

Alternative Site 1 - FPL Martin Powerplant Property

Alternative Site 1 is located at the Martin Power Plant in unincorporated Martin County, on land owned by FPL. The primary disadvantages of this site were the presence of a relatively large (65 percent) proportion of natural forest and wetlands and FPL's unwillingness to sell the property. Therefore, we believe that Alternative Site 1 does not offer an environmental advantage over the proposed site.

Alternative Site 1A – Adjacent to the FPL Martin Powerplant

Alternative Site 1A is located adjacent to the FPL Martin Powerplant in unincorporated Martin County. The primary disadvantages of this site were the proximity of residences (several within 0.25 miles of the site) and compatibility with future surrounding land uses as future land use plans propose agricultural ranchettes. Therefore, we believe that Alternative Site 1A is less preferable than the proposed site.

Table 3.2-1

Comparison of Alternative LNG Storage Facility Sites

Criteria		Proposed Site	Alternative Site Locations				
			Site 1	Site 1A	Site 2	Site 3	Site 4
Site Area (acres)		145	~80	~80	~80	~60	~80
Wetlands (percentage)[1]		~10	~15	~1	~75	~1	~50
Protected Areas		0	0	0	0	0	0
Existing Land Use[1]		Industrial	Forest, Open Land	Agriculture	Sparsely Forested	Open Land	Power Generation, Open Land
Residences[2]		0	0	0	0	0	0
Zoning Designation		Industrial	Agricultural	Agricultural	Industrial	Agricultural	Industrial
Future Land Use		Industrial	Power Generation	Agriculture Ranchette	Industrial	Agriculture	Institutional, Utilities, and Communication
Pipeline lateral length (miles)	FGT	~4	<1	<1	<1	19	~5
	Gulfstream	~4	<1	<1	~8	<1	~75

Notes:

[1] Based on 2004 FDEP Land Boundary Information System Aerials

[2] Within 50-feet of proposed site

Sources:

Martin County Growth Management Department Future Land Use and Zoning Map; Palm Beach County Planning, Zoning & Building Department Future Land Use and Zoning Map; Miami-Dade County Planning and Zoning Department Future Land Use and Zoning Map

Alternative Site 2 - Pratt Whitney Property

Alternative Site 2 is located near a major pipeline lateral owned by FPL in unincorporated western Palm Beach County. The existing lateral is a dual fuel pipeline that carries both fuel oil and natural gas approximately 20 miles northeast to the FPL Martin Plant. The primary disadvantages of this site were the relatively large percentage of wetlands (75 percent), the proximity (0.2 miles) of the site to the William P. Gwinn private airport (see Table 2.8-1 for proximity to airport runway siting criteria), and the potential access limitations to the FPL lateral due to the lateral's dual fuel capabilities. Therefore, we believe that Alternative Site 2 does not offer an environmental advantage over the proposed site.

Alternative Site 3 - Adjacent to FPL's West County Energy Center

Alternative Site 3 is located in unincorporated northern Palm Beach County. The primary disadvantages of this site were its proximity to the Loxahatchee National Wildlife Refuge, which provides habitat for a large number of threatened and endangered species; relatively small size (approximately 60 acres); and a relatively long pipeline (approximately 19 miles). Therefore, Alternative Site 3 was eliminated from further consideration.

Figure 3.2-1 Alternative LNG Storage Facility Sites Location Map

Alternative Site 4 - Turkey Point Vicinity

Alternative Site 4 is located in unincorporated Miami-Dade County. The primary disadvantages of this site were the presence of a relatively large (50 percent) proportion of wetlands and the ability to only connect to the FGT pipeline. The Gulfstream interconnection is more than 75 miles north of the site. Therefore, we believe that Alternative Site 4 does not offer an environmental advantage over the proposed site.

Proposed Site

The proposed LNG storage facility would be located in unincorporated Martin County. The site contains a small percentage of wetlands (i.e., about 10 percent) and is close (i.e., approximately four miles) to both the Gulfstream and FGT pipelines. This site, formerly an industrial facility operated by Florida Steel, is zoned industrial, is compatible with surrounding land uses, and is available for sale. This is the largest of the sites evaluated with sufficient area to satisfy all required exclusion zones on site.

3.3 PIPELINE AND ABOVEGROUND FACILITY ALTERNATIVES

3.3.1 Pipeline Route Alternatives

Based on the location of the proposed LNG storage facility site, one proposed and three alternative routes were identified for the two natural gas pipelines. Alternative natural gas pipeline routes were evaluated using the following criteria:

- total pipeline length;
- presence of existing rights-of-way;
- availability of sufficient easement width (at least 50-feet-wide);
- compatibility with existing zoning and future land use plans;
- compatibility with adjacent land use (i.e., number of residences within 50-feet of construction right-of-way);
- extent of wetlands and waterbody crossings;
- presence of federal or state protected areas; and
- presence of public recreation areas.

Based on these criteria, three pipeline route alternatives were identified for connecting the proposed LNG storage facility with the Gulfstream and FGT pipelines:

- Route 1 - Adjacent to or north of SR 710 right-of-way
- Route 2 - Adjacent to or within the CSX railroad right-of-way
- Route 3 - Along the SR 710 right-of-way and FPL transmission line right-of-way

All of the natural gas pipeline alternatives are located in unincorporated western Martin County, Florida. Figure 3.3-1 shows each alternative pipeline route and the proposed route. In addition to the primary alternative routes, three route variations were each evaluated for Alternatives 1 and 2:

Alternative Route 1:

1a - Adjacent to and north of SR 710 right-of-way on private land;

1b - Within the northern SR 710 right-of-way; and

1c - Within the southern SR 710 right-of-way.

Alternative Route 2:

2a - Within the northern CSX railroad right-of-way;

2b - Within the southern CSX railroad right-of-way; and

2c - Adjacent to the CSX railroad on private land.

Table 3.3-1 compares the alternative routes and their variations with the proposed route.

Table 3.3-1

Comparison of Pipeline Route Alternatives

		Natural Gas Pipeline Route Alternatives						
		Alternative Route 1			**Alternative Route 2**			**Alternative Route 3**
Criteria	**Proposed Route**	**Route 1a**	**Route 1b**	**Route 1c**	**Route 2a**	**Route 2b**	**Route 2c**	
Total Pipeline Length (miles)	4.2	6.3	6.3	6.3	6.3	6.3	6.3	4.5
Right-of-Way Type (ROW)	Transmission line	None - Private land	Highway	Highway	Rail Line	Rail Line	None - Private land	Highway
Zoning Designation	Planned unit development-industrial, General industrial, Heavy industrial, Agricultural	Agricultural, Planned unit development, industrial	SR710 ROW	SR 710 ROW	CSX ROW	CSX ROW	General industrial, Heavy industrial, Agricultural	SR 710 ROW Agricultural
Future Land Use Designation	Industrial, Power generation	Industrial, Ranchette, Agricultural, Commercial	SR 710 ROW	SR 710 ROW	CSX ROW	CSX ROW	Industrial, Power generation	SR 710 ROW Power generation
Residences within 50 feet of construction easement	0	0	0	0	0	0	0	0
Waterbody Crossings	0	0	0	0	0	0	0	0
Wetlands	Marshes and prairies	Ditches and ponds	Ditches and ponds	Forest/ scrub-shrub/ wetlands	Forest/ scrub-shrub/ wetlands	Forest/ scrub-shrub/ wetlands	Forest/ scrub-shrub/ wetlands	Marshes and prairies
Federal and State Protected Lands	0	0	0	0	0	0	0	0
Recreation Areas	0	0	0	0	0	0	0	0

Figure 3.3-1 Alternative Pipeline Routes

All of the alternative routes are longer than the proposed route. Alternative Route 1a was eliminated because a large portion of the alignment would be through wetlands or open water. Alternative Routes 1b and 1c were eliminated because the available width within the SR 710 right-of-way would be inadequate (i.e., approximately 18 feet), other utilities (e.g., electric, cable) are already present in the right-of-way, and Florida Department of Transportation plans to widen SR 710 north of County Road 609 would conflict with the pipelines. Alternative Routes 2a and 2b were eliminated because CSX stated that any unused land in its right-of-way was slated for future rail uses, and because a cable utility line and FPL's 18-inch-diameter dual fuel pipeline are already present in the right-of-way. Alternative Route 2c was eliminated because it would affect more wetlands and private property owners than the proposed route. Alternative Route 3 would have similar right-of-way and utility conflicts as Alternative Route 1b and 1c, albeit for a shorter distance.

Proposed Route

The proposed route is the shortest of the alternatives considered and co-located with existing utility rights-of-way. The proposed route would not traverse any protected lands or other designated areas, is not within 50 feet of any residences, and would have minimal effects on wetlands. Of the routes considered, the proposed route would have the least environmental impact. Therefore, we believe the proposed route is environmentally preferable and do not recommend use of any alternative pipeline routes.

3.3.2 Aboveground Facility Alternatives

FGS proposes an aboveground M&R station and interconnections with the Gulfstream and FGT pipelines. Our review of the proposed M&R station and interconnection sites raised no issues (i.e., proximity to residences; impacts to wetlands, threatened and endangered species, or cultural resources). We conclude there are no practical alternative sites offering a clear environmental advantage to the proposed M&R station site.