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7.1 ALTERNATIVES CONSIDERED

IID used the following evaluation criteria as a means of evaluating and ranking alternatives:

- **Commercial availability/feasibility** – the selected alternative must currently be in use and proven as an accepted industry standard for technology; it must be operational within a reasonable timeframe where permits and approvals are required.
- **Maximize thermal conversion efficiency** – The selected alternative must convert fuel resources to electrical energy at the lowest cost and highest thermal efficiency.
- **Maximize use of existing assets** – The selective alternatives must use assets (facilities, operating and administrative staff, etc.) to their fullest potential.

As part of the Project development process, IID considered a number of project alternatives. The alternatives selection process is discussed in more detail below, and included the following:

- 7.2 – No Project Alternative
- 7.3 – Site Alternatives and Linear Facilities
- 7.4 – Alternative Generating Technologies
- 7.5 – Configuration Alternative
- 7.6 – Alternative Interconnection Options
- 7.7 – Alternative Emission Controls

7.2 NO PROJECT ALTERNATIVE

If there were no Project, and with customer electrical load in the IID service territory growing at 7 percent per year, IID would be required to purchase peaking power from the open market regardless of price, or continue to use older peaking generation facilities with higher heat rates. The continued increase in imported power to meet local demand is of concern to IID energy management; in fact, a target has been set by IID management to keep imported power to 50 percent or less of IID's annual energy needs. Therefore the No Project Alternative does not meet the reliability-based business objectives to promote the development of internal generation resources to meet the current and growing customer load and provide ancillary services to the electrical system. Any new internal power generation resources are required to favorably compete market alternatives in a competitive bid process.

7.3 SITE ALTERNATIVES AND LINEAR FACILITIES

As discussed in the sections below, the Project was driven by the needs identified by IID Supply and Trading, which is responsible for 10-year resource planning and the procurement of sufficient energy resources for IID's customers.

To obtain the required power supplies, IID Supply and Trading issued an RFP seeking qualified projects or market products to serve peak loads (Product 2, RFP #484). Current IID policy requires procurement of new generation resources be subject to a competitive bid process. Although bids were received from outside organizations, they did not meet the established credit

criteria in RFP #484, or the projects offered were located outside of the IID service territory, and therefore increased energy imports**.**

In response to this RFP, IID Generation identified two viable sites for a natural gas-fired combustion turbine project within the specified 50-MW to 100-MW capacity range for Product 2. IID Generation offered proposals for a new generation facility at (1) the existing ECGS in El Centro, California ("El Centro Site"), and (2) on Property owned by IID next to the existing Niland Substation in Niland ("Niland Site").

These site alternatives were selected based on the existing natural gas transportation, electric transmission, and water supply infrastructure that could support up to 100 MW of peaking generation without infrastructure improvements and new linear facilities. The absence of new linear facilities such as new transmission lines or natural gas pipelines outside of the property boundary reduced any environmental impacts associated with the Project.

Both sites were proposed to be located on property owned by IID and therefore site control was not of concern. In addition, from an electrical interconnection perspective, the El Centro Site and the Niland site offered benefits to the IID transmission system and access to the primary load centers in the IID service territory.

The Coachella Valley was also evaluated to locate a feasible site for a power project of this size and characteristics. However, no site was identified in the Coachella Valley that was equal to or superior to the Niland site and El Centro site, given the criteria and site characteristics identified.

IID Generation proposed several natural gas turbine technology alternatives on each of the Niland and the El Centro sites. Based on the pricing structure and the site characteristics, IID Supply and Trading awarded the proposal to IID Generation, offering two LM6000s at the Niland Site. Key selection drivers were (1) the economic value offered, (2) the natural gas transportation capacity available at the Niland site, and (3) the 161/92-kV delivery system to both the Coachella Valley and El Centro load centers.

7.4 ALTERNATIVE GENERATING TECHNOLOGIES

Generation technologies such as coal, biomass, and oil were considered but these fuels would not provide the same environmental benefits of natural gas. Alternative technologies such as solar, wind, fuel cells, or water-based technologies were not considered as IID maintains a separate RFP process for the acquisition of renewable power. In fact, IID has voluntarily committed to the establishment of a Renewable Portfolio Standard (RPS) of 20 percent, consistent with state-level RPS applicable to investor-owned utilities, as outlined in SB1078.

Combined cycle projects did not meet the requirement RFP #484, Product 2, as peaking power was required during the peak power demand during the summer months due to the extreme heat in IID's service territory. Natural gas-fired simple-cycle operation of CTGs was therefore considered as the only technology that met the needs of IID customers.

IID did not consider the General Electric LMS100 Combustion Turbine because the CTG as currently designed requires water injection, and uses an intercooler, both of which require significant amounts of water. In addition, as of the SPPE filing date there were no LMS100 CTGs in commercial operation.

IID considered the following simple cycle configuration alternatives:

- One General Electric 7EA combustion turbine
- Two General Electric LM6000 combustion turbines
- Ten Wartsila reciprocating engines

The LM6000 and Wartsila technology alternatives were short-listed based on the economic value offered and the need for quick start capability and load management.

In April 2005, IID Supply and Trading recommended the award of the Project for two LM6000s at Niland, and the IID Board of Directors approved the Project as part of the Load/Resource Plan for IID. In June 2005, the IID Board of Directors authorized the development of the Project.

7.5 CONFIGURATION ALTERNATIVES

Given the extreme peak loads experienced in the IID service territory, it was critical to maximize the generation capacity and the reliability from the Project. After the award of the Project, IID Generation worked with IID Supply and Trading and other IID stakeholders to develop a preliminary design that would provide the most cost-effective, reliable capacity while balancing environmental impacts.

In this balancing of resource needs and environmental impacts, water use was the factor that was closely evaluated as various technology options were considered. The configuration alternatives shown in Table 7.5-1, Configuration Alternatives (@ 110ºF), were evaluated for the Project.

TABLE 7.5-1
CONFIGURATION ALTERNATIVES (@ 110°F)

Technology Alternative	Technology Description	Raw Water Use (gpm)	Demin. Water Use (gpm)	Total Annual Water Use (acre-feet)	MW Production
A	PC SPRINT with water-cooled chiller	147.6	110.3	152	96.5
B	PC SPRINT with air-cooled chiller	0	110.3	65	93.1
C	PD with evaporative cooling	28.2	0	17	69.3
D	PD with air-cooled chiller	0	0	0	81.4
E	PD SPRINT with air-cooled chiller	0	35.2	21	88.2

Notes:
ºF = degrees Fahrenheit
gpm = gallons per minute
MW = megawatt
PD = General Electric LM6000 dry low NO_x model designation

Although the generation capacity requirement initially advanced the PC SPRINT with a wet cooling tower technology (Alternative A), Alternative E was the selected Technology Alternative for the Project because the use of the dry low NO_x engine and the air-cooled chiller greatly reduces annual water use while highly leveraging the small amount of water that is used for power augmentation. At the proposed permit limits, annual water consumption decreased 93 percent, from approximately 152 acre-feet per year to less than 25 acre-feet per year. The

modification to the technology and associated reduction in water consumption decreased the Project output in severe summer ambient conditions by more than 7 MW.

Another factor in the decision to limit water use was the limited viable alternatives for water supply. Colorado River water was very accessible from the Highline Canal located just northeast of IID's Niland property. IID has significant Colorado River water rights that could be utilized for the Project.

A potential alternative wastewater supply from the Niland Sanitary District was identified approximately 5 miles (based on viable right-of-way) from the Project Site. However, the available wastewater supply from the Niland Sanitary District was deemed inadequate to support 100 percent of the water needs of Alternative A; therefore, it would have to be supplemented with Colorado River water. In addition, the cost of the required infrastructure to transport this water source was very costly, given the distance of water pipeline, a crossing of Highway 111, and two crossings of the Union Pacific rail system to reach the Project Site. In addition, given the elevation difference from the wastewater treatment plant, a pump station would have been required to lift the water an elevation of approximately 100 feet, which would add to both capital costs and ongoing operating costs. These costs factors, combined with the maximum allowable annual production of only 540,000 megawatt-hours (MWh) (based on proposed permit limits) from the Project, resulted in the determination that this water supply alternative was uneconomic and not feasible.

More information on water supply options is presented in Section 2.6, Water Supply and Use, and Section 6.13, Water Resources, of this application.

7.6 ALTERNATIVE INTERCONNECTION OPTIONS

In addition to water supply and transportation options, one additional interconnection alternative was evaluated. The interconnection application and the draft system impact study for the Project considered an electrical interconnection at both 161 kV and 92 kV. The transmission system impacts and benefits were studied at both interconnection voltages. The 92-kV interconnection was clearly better in that it avoided transformer losses and potential overloads on the 161/92-kV transformer while still providing load serving capability in both key load centers. Based on the draft SIS results, the decision was made to abandon the 161-kV interconnection alternative.

7.7 ALTERNATIVE EMISSION CONTROLS

IID's objective in selecting equipment and vendors is to ensure continuous compliance with air quality regulations and ongoing operating efficiency through a history of demonstrated performance in similar installations.

One emissions control strategy has been repeatedly used and demonstrated to meet BACT requirements for simple-cycle natural gas turbines. This strategy includes the use of selective catalytic reduction to reduce NO_x emissions to 2.5 ppm by volume (ppmv), combined with an oxidization catalyst to reduce CO emissions to 6.0 ppmv. The SCR/CO oxidization strategy has been utilized in numerous natural gas turbine projects and has been demonstrated to be safe, reliable, and cost-effective through significant accumulated hours of operation. SCR/CO oxidization is understandably recognized by natural gas turbine manufacturers and by environmental regulators as the standard for BACT determinations.

One emerging technology warrants discussion as an alternative emission control strategy, but has not been adequately shown to be consistently effective and cost-feasible as the proposed SCR/CO oxidization system—SCONOx™. SCONOx™ is a NO_x reduction system produced by Goal Line Environmental Technologies (now distributed by EmeraChem) for natural gas turbine applications within an exhaust temperature range significantly below the design operating parameters of the simple-cycle LM6000 employed at Niland. This system uses a coated catalyst to oxidize both NO_x and CO and thereby reduce plant emissions. As demonstrated by an initial installation on several natural gas turbines where energy is recovered from the exhaust gas to produce steam, SCONOx™ is capable of achieving NO_x emission concentrations of 2 ppm based on a maximum inlet concentration of 25 ppm, and 90 percent CO reduction based on a maximum inlet concentration of 50 ppm. However, the SCONOx™ technology has not been sufficiently demonstrated on higher exhaust temperature simple-cycle peaker natural gas turbines such as those proposed for the Project.

The SCONOx™ system consists of a catalyst that is installed in the flue natural gas at a point where the temperature is between 280°F and 650°F. The Niland CTGs operate between 820°F to 870°F; therefore, the SCONOx™ application is not appropriate for this high-temperature technology.

Therefore, in conclusion, it does not appear that SCONOx™ is a viable alternative for reducing emissions from this Project.