Memorandum

MIAMI-DADE COUNTY

Agenda Item No. 2(B)(1)
January 22, 2025

Date: December 20, 2024

To: Honorable Chairman Anthony Rodriguez
and Members, Board of County Commissioners

From: Daniella Levine Cava
Mayor

Daniella Levine Cava

Subject: Report regarding Feasibility Reports completed pursuant to the Master Services Agreement with Florida Power & Light Services, LLC – Directive No. 241760

Executive Summary

This report is being presented in response to Resolution No. R-1090-23 (Directive No. 241760), sponsored by Commissioner Raquel A. Regalado, and adopted as amended by the Board of County Commissioners (Board) on December 12, 2023. Pursuant to the Board's directive, this initial Feasibility Study report is being presented to the County Infrastructure, Operations, and Innovations Committee (CIOIC) and the Board detailing the results of the Feasibility Reports completed to date in connection with the Master Services Agreement (MSA) with Florida Power & Light (FPL) Services, LLC. The costs associated with the undermentioned projects and the delegated authority to enter into the agreements with FPL to implement these projects were approved by the Board and no further Board action is required. To date the County has not incurred any costs in connection with the attached Feasibility Report.

Resolution No. R-1090-23 further directs the Administration to provide annual written reports to the Board throughout the term of the MSA of all work projects authorized under the MSA, which shall identify implemented projects, monies spent on such projects, and the utilization of small business participation goals on projects authorized under the MSA. Such annual reports will be submitted to the Board accordingly as this and forthcoming Feasibility Reports and connected work advances.

Background

Resolution No. R-1090-23 approved the MSA with FPL Services, LLC for a resilient infrastructure, electrical hardening, sustainability, and electric vehicle (EV) services feasibility study and implementation services thereunder through FPL under the tariff programs. The MSA is for a 20-year term with automatic renewal periods of 12 months in an amount not to exceed $912,000,000.00. The Resolution authorized the County Mayor or County Mayor's designee to execute the MSA and exercise all provisions therein, including the execution of Statements of Work (SOW) and tariff agreements with FPL for implementation of the approved projects. Section 9 of the directive R-1090-23 "Directs the County Mayor or County Mayor's designee to disclose to the Board all the projects identified in the initial Feasibility Study before implementation. Thereafter, during the 20-year term of the MSA, the County Mayor or County Mayor's designee is directed to seek prior Board approval before procuring any projects arising under the MSA not identified in the initial Feasibility Study valued at $5,000,000.00 or more."

The implementation of the MSA by FPL will assist the County in the modernization of aging systems and help to make these systems more economical, resilient, and energy efficient. The work FPL will implement under the MSA includes all aspects of operating and maintaining the electrical infrastructure system at the sites identified for normal and emergency power, as well as EV charging stations.

For the purposes of expediting project delivery and not exhausting County resources all at once, County staff and FPL collectively decided to segment the Feasibility Report and subsequent implementation projects into several packages. As the MSA includes a wide range of projects varying in size and cost, the phasing of the Feasibility Reports and connected project implementation provides for the prioritization of projects and allocation of staff time and resources over time. This report includes a Feasibility Report for the first project to be constructed through the MSA. There will be additional Feasibility Reports submitted to the Board and CIOIC for additional projects to be completed under the MSA as these Feasibility Reports are completed.

The document attached as Exhibit 1 is the Feasibility Report for FPL Electrical Sustainability and Resiliency, Miami International Airport – 3090 Building.

The backup power services to provide an alternative source of electrical power and electrical distribution upgrades to the MDAD 3090 Building were prioritized to address needed life cycle replacement of MDAD equipment and backup power. The backup power services and electrical distributions upgrades will be implemented through the Non-Residential Optional Supplemental Power Services Agreement, Supplemental Power Services Rider Pilot, and the Non-Residential Optional Supplemental Power Services Tariff Program SOW. The monthly service payments are estimated to be in the range of $64,737.42 to $77,684.90 over the 20-year term of the tariff and include operations and maintenance.

The SOW connected with the attached Feasibility Report is available upon request.

Resolution R-1090-23 directs the County Mayor or County Mayor's designee to provide annual written reports to the Board throughout the term of the MSA of all work projects authorized under the MSA, including identification of implemented projects, along with monies spent. Such reports will be forthcoming as this work proceeds.

Pursuant to rule 5.06(j) of the Board's Rules of Procedure, this report will be placed on the next available Board of County Commissioner's meeting agenda. Forthcoming Feasibility Reports conducted pursuant to the MSA will be reported to the CIOIC and Board of County Commissioners as such Feasibility Reports become available. Should you require additional information, please contact Patricia Gomez, Interim Chief Resilience Officer at 305-375-4775 or Ralph Cutie, Director & CEO, MDAD at 305-876-7066.

Attachment:
Exhibit 1 – Feasibility Report

c: Geri Bonzon-Keenan, County Attorney
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FPL Services™

Feasibility Report #1

FPL Electrical Sustainability and Resiliency
Miami International Airport – 3090 Building

December 9, 2024

FPL Services™

Contents

Executive Summary

In accordance with the Master Services Agreement "MSA" - Master Agreement for Energy Related Products and Services by and between FPL Services, LLC and Miami-Dade County (MDC) entered on January 24, 2024 and a Feasibility Study Authorization form dated February 14, 2024, this first Feasibility Study for Electric Energy Sustainment and Resiliency was conducted at Miami International Airport (MIA).

This is the first feasibility report for MIA by FPLS, as it prioritizes the needs of MDAD, to replace and upgrade end-of-life emergency generator and switchgear at MIA 3090 Building. This report also introduces the technical concepts and methodology that are applied throughout the primary electrical distribution circuit at MIA, enabling standardization of the system design. Future feasibility reports will be submitted for other electrical spaces in-scope at MIA, based on technical methodology established.

The core objective of the feasibility report for electrical resiliency and sustainability is to evaluate the electrical distribution system at MIA to identify electrical risks that could impact operations, identify gaps in electrical resiliency, and develop electrical infrastructure solutions that increase overall resiliency and sustainability in-line with MDC's environmental objectives. There are fifty-two (52) electrical rooms to be evaluated as part of the FPLS scope, each with varying levels of complexity and needs, with a total airport peak demand of around 62MW.

There are two types of projects that will be submitted to MDC for review:

1) Maintenance Projects – Legally required backup generation systems for life/safety applications
2) Optional backup generation systems for operational resiliency and sustainability

This first report is for Level 1 system at 3090 Building. This space is recommended to go first due to the poor condition of the existing electrical equipment, major risk to airport operations, and to help MDAD eliminate the costs associated with the large rental generator currently in-place.

The scope is 480V switchgear and emergency generator replacement. The scope incorporates modern technology and FPL's recommendations for design upgrades to increase resiliency, such as main-tie-main switchgear configuration, multiple smaller engines in parallel (instead of a single big block), and cellular based remote monitoring. In addition, the scope includes removal of all decommissioned equipment that will free up space for future operational needs.

The 24/7 operational nature of MIA and criticality of airport operational area (AOA) space is considered with this project work. The objective for all work is to reduce/minimize new space occupied by new permanent electrical equipment. The temporary power plan will require temporary equipment to be connected to downstream panels that will be coordinated with all stakeholders, including planned power shutdowns.

The commercial mechanism for performing this work is through the FPL regulated tariff program called Optional Supplemental Power Services (OSPS). The tariff is resiliency-as-a-service where FPL owns, installs, and maintains the equipment for twenty (20) years, including warranty and break/fix. The cost is a fixed monthly service payment over the 20-year term, determined by actual cost incurred during construction and covering operations and maintenance by FPL throughout the contract duration. The monthly payment starts once the equipment is operational and providing the resiliency service.

The construction and implementation timeframe for 3090 Building is approximately two years from a signed agreement, subject to change based on permitting, sourcing process, and other external market factors.

Organizational Capabilities.

FPL is well-positioned to support Miami-Dade County's investments in electrical infrastructure that is both hardened for resiliency and environmentally sustainable.

The company is an industry leader in resilient electrical infrastructure since introducing our FPL OSPS program in 2019, delivering large backup power solutions to major institutions throughout the state. Including hurricane tested systems that have successfully provided full electrical resiliency during multi-day electric utility outages caused by recent hurricanes.

FPL is the industry leader in storm response. Florida is impacted by hurricanes or other severe weather nearly every year, it's not a question of if, but when a major weather event will occur. The internal capabilities and external vendor network are fully leveraged to deliver value to OSPS customers. We design hardened systems, but we know things will happen and our network will help ensure there is no delay in the restoration process.

In addition to Storm response and weather-related outages, FPL is developing solutions against momentary outages caused by faults downstream in MIA owned infrastructure and considering that these momentary outages can be severely disruptive to airport operations. FPL is an industry leader in maintaining its infrastructure as evidenced by its low SAIDI numbers, despite having some of the most severe weather in the county.

FPL, along with its parent company NextEra Energy, is the world's largest owner and operator of solar generation systems. FPL also owns and operates several utility scale battery storage systems throughout the state. The nuances and lessons learned from past projects are included in how FPL develops solutions for MIA for energy sustainability and reduction in environmental impact.

We look forward to being your partner in Florida. FPL has extensive experience in deploying resilient electrical infrastructure solutions designed to meet our customers' needs, and we are happy to serve as an advisor as you navigate this process, leveraging our experience deploying robust, reliable electric infrastructure around the state.

Together, as two of Florida's largest organizations, we can help meet a growing need for resilient electrical infrastructure and position MIA for continued economic prosperity.

Evaluation Methodology

The project team has taken a wholistic approach to the evaluation of MIA, with the clear focus on improving resiliency and sustainability in the electrical distribution circuit. MIA is appropriately considered a city-within-a-city with a very large electrical distribution system that supports 24x7 operations that is a major economic engine with impact globally. The airport complex has grown with the greater Miami-Dade County region over the past nearly 100-years to what it is today. The airport complex will continue to change with major expansion projects, in various stages of development, throughout the MIA geographic footprint.

Given the magnitude and complexity of the electrical system at MIA, the evaluation process starts in documenting the existing state electrical conditions to define the problem statement. The evaluation then considers the county's long-term capital improvement plan (CIP) to ensure all work supports the long-term vision of MIA. This electrical work is heavily driven by codes and standards that must be adhered too for solution development. Basically, the evaluation process considers where we are today and where we need to be in the future.

The scope of electrical evaluation for existing state conditions focuses on the main electrical distribution panels throughout MIA for energy resiliency and sustainability. This is the head-end switchgear and first point of disconnect from utility power. The scope does not include evaluation of secondary panels and secondary distribution.

Several factors are documented to define existing state conditions:

- Peak electrical demand, in terms of kilowatt demand (KWD) – this is obtained by performing utility meter analysis, going back several years, where available. Peak demand is the most important information needed to properly size electrical distribution equipment and alternative sources of energy.
- Single-line diagram (SLD) – the SLD defines how the circuit is configured. How the circuit is designed directly influences system resiliency, maintenance, and connected loads, among other factors. OSHA requires an accurate SLD, or equivalent (such as a panel elevation drawing), in all main electrical spaces.
- Floor Plan Layout – the floor plan layout defines physically where equipment is and isn't, it defines the space. Electrical equipment supports revenue generating operations and does not generate revenue itself, thus space used by electrical infrastructure must be minimized where possible.
    - Space is the #1 design constraint at MIA for new work and construction planning.
- Condition assessment – the existing equipment is visually inspected for type of equipment, manufacturer, age, signs of corrosion, air-conditioning/humidity control, availability of spare parts, and other factors that contribute to the perceived level of useful life remaining and respective risk profile.

Several factors are documented to define future state electrical needs:

- CIP Projects – The future capital projects for terminal expansion, EV infrastructure, new cargo processing facilities, major facility modifications, etc. all contribute to changes in (a) space and (b) electrical demand. All work is performed in consideration of these future separately planned projects.
- Electric Vehicles – the impact of electrical vehicle charging is going to drive huge (>20MW) of new load increases at MIA over the next 10yrs. The existing infrastructure is not ready for mass adoption. In addition, increased adoption of electrified fleet vehicles will drive future requirements to increase resiliency for EV systems. The feasibility study is considering the Counties plans to electrify fleet vehicles of around 10% per year.
- Today, the general opinion of most facility operators is not to backup electric vehicle chargers, however there is a county code that requires gas stations to have some means of readily connecting backup power to pump gas in-case of a major grid outage event, such as a hurricane. If there is a prolonged electrical outage event, then operations will still need a means of resiliency for electric vehicles. Put differently, backup power systems for EV chargers will help eliminate operational risk concerns and help promote EV adoption. This further helps MDC meet its various climate goals.

All work must adhere to applicable codes. In addition, the environmental factors that will influence any system design:

- All solutions will adhere to all applicable codes required by the AHJ, including the wind loading requirements for genitor systems in Miami-Dade County.
- Flooding and sea-level rise – All design work considers code requirements for existing base-flood elevation plus 1-foot, as well as MDC requirements for future FEMA flood projections to ensure long term resiliency.

- All projects consider salt-spray, jet wash, and other environmental factors. An example of this is the selection of aluminum enclosures instead of steel enclosures.
- The corrosion considerations of electrical systems in South Florida is significant, which contributes to strong bias to install equipment in air-conditioned spaces to prevent unplanned downtime, ensure longevity of equipment, and keep costs under control.
- Underground conduit – In South Florida, ruptured conduit is not uncommon, especially in systems over 30yrs old, which is a major construction risk for nearly every system at MIA. Because all loads are currently connected, there is no way to have assurance that new cable can be pulled through old conduit until the task is complete. As a result, the contingency planning for project work will be extensive, including plans for temporary power while permanent resolutions can be implemented.

The operational needs of MIA and impact during construction activities also must be considered in development of the problem statement and final proposed solutions. After several meetings and conversations with MDAD Officials, FPL has captured the following operational considerations:

- MIA operates 24/7 – the new equipment must be integrated with a detailed and resilient temporary power plan that minimizes total impact and risk to operations. Including planning details around locations of temporary power equipment, timing of power transfer events, testing processes, and other details to minimize risk of unplanned outages.
- Space must be optimized for airport operations, not electrical equipment. The general goal is to work within the existing footprint of electrical equipment without taking up any new space or minimize new space taken up.
- Construction impact shall be minimized and closely coordinated. An example is underground work to trench and install new conductors within the AOA. This process would require shutting down 1-2 gates for an extended duration as the underground works down the line. This example represents risky construction processes that will be avoided wherever possible and coordinated with MDAD prior to starting construction activities.
- Underground work is risky, especially within the AOA. Underground equipment, while robust, may cause bigger risk overall than the benefit of going underground. All underground work will be evaluated for alternatives and resulting risk to operations.

The evaluation for each electrical space will include commentary for what is there currently, what is needed end-state, and how to get there.

Design Concepts and Solution Development

The electrical resiliency and sustainability solutions developed by FPL to support MIA incorporate best practices from utility operations and industry benchmarking. The system will be robust and secure, both physically hardened and for cyber security. The intent of this feasibility report is to utilize commercially available and proven technologies.

FPL is proposing the following design standard concepts to be incorporated into all electrical project work at MIA. The goal is to reduce total costs for spare parts via less inventory of spares, reduced training costs for having similar equipment, and ensure operational resiliency for future design-build projects by 3rd party contractors.

The concepts and technical standards are presented by equipment class:

- Switchgear (low-voltage and medium-voltage)
    - All switches shall be fully rated vacuum circuit breakers, equal or better.

- No more fused disconnect switches for critical loads.
- Breakers are typically more expensive upfront in comparison to fused disconnects. However, the cost is in operational risk and impact. A real event occurred when a 4160V fused disconnect switch blew in June 2022 in the central chiller plant resulted in over 24hrs of downtime making chilled water and resulted in the passenger area getting very hot. This scenario was exacerbated by lacking electrical monitoring and not having a specialized 4160V fuse readily available. A breaker could have been reset and system back online in minutes, or instantly with system automation.

- Main-tie-main configuration for all critical panels
  - MIA is full of radial fed switchgear (only one source). Opening this one source will cut power to all downstream loads. This makes maintenance of the main-service-disconnect switch nearly impossible due to complex outage coordination.
  - A main-tie-main helps mitigate risk from breaker failure and ensure maintainability of equipment. For example, if a main breaker fails, then a technician can close the tie-breaker to restore power to connected loads while the main breaker is repaired.
  - Additionally, a tie-breaker can be closed to facilitate maintenance of the main-service disconnect while downstream loads are not impacted.
- Main-Main configuration switchgear instead of Automatic Transfer Switches (ATS, where possible).
  - A main-main configuration consists of a utility source and backup generator source. The breaker of either source can be maintained while downstream loads remain online.
  - ATS' are effective for loads that can take periodic outages, and sometimes code requirements will force the use of ATS's over M-M schemes. However, the mechanism of an ATS represents a single point of failure. This is mitigated by having two breakers, one for utility power and one for emergency backup generation.
- Remote monitoring
  - Cyber security measures will be implemented for all project work to ensure a private controlled network.
  - All equipment shall have digital controllers with some output for monitoring electrical conditions that ties into a cellular based remote monitoring system.
  - FPL will tie-in all installed electrical equipment to a common platform.

- Generator's
  - Multiple smaller engines in parallel is more resilient than a single big block. Generators, like car engines, have many individual parts that can fail and cause the engine to trip offline. Multiple engines mitigate this risk.
  - Wet stacking is also avoided when load is low. Industry rule of thumb is that a diesel generator should have load greater than 30% of nameplate capacity to prevent wet-stacking of diesel and prevent risk of fire. Having multiple engines allows under-utilized engines to drop offline while load is maintained with fewer engines operating at loads above target 30% or more.
- Level 1 vs Optional Backup systems
  - The National Electric Code, Florida Building Code, and other local/state laws require certain electrical configurations and reserve capacity.
  - Level 1 loads are legally required to have backup generation and governed by NEC 700 and 701. Typical examples of level 1 loads include emergency lighting, elevators, door access, and fire-pumps.

- Operational loads are typically not legally required to have backup generation. Optional loads are governed by NEC 702. Examples of optional loads are most mechanical equipment (air-conditioning), convenience outlets, baggage handling, retail, etc.
- The Code allows for a generator system to backup Level 1 and optional loads, but with certain circuit configuration and controls.
- This benefit of backing up optional loads by the same generator system is be considered when performing Level 1 generator projects.

With design concepts created, solutions will be more tightly controlled to promote a robust system design and uniformity for all new project work.

Fuel Source Evaluation

The fuel source for electrical power is essential to system design. At MIA, certain fuel sources are better than others and it depends on the application. This section will explore different technologies for power generation (generators, solar, battery storage, etc) that are commercially available and provide context as to why one technology is a better fit than other technologies.

Engine Classification	Fuel Type	Considerations
Diesel Tier 2	Diesel Only	EPA qualified for emergency response only. Industry standard for Level 1 generator systems.
Diesel Tier 4 Final	Diesel with diesel exhaust fluid (DEF)	DEF injected into the exhaust. EPA rules require system controller to shutdown system if issue with DEF supply. Qualified for continuous duty / load control.
Natural Gas (NG)	Piped natural gas	EPA qualified for continuous duty. Dependent on natural gas infrastructure.
Liquid Propane (LP)	Stored on-site LP	Not common in large systems due to fuel limitations, high volatility and low energy density (large tanks). Can be stored long-term. Good for small systems (<100KW).
Turbine Engines	Multiple	Turbine engines are not common for backup power applications due to cost compared to alternatives and it's slow response times.

Traditional generators for emergency backup power in *large industrial applications* are typically one of three types:

1) Tier 2 Diesel
    a. Pro's
        i. Established infrastructure and availability.
        ii. Reliable performance in severe weather conditions.
        iii. High energy density, providing longer run times with smaller tanks.
        iv. Typically least expensive in terms of cost per KW for backup power.

   b. Con's
      i. Tier 2 has higher emissions compared to other fuels.
      ii. Requires regular maintenance to prevent
   c. Downside is that this is a diesel generator, burning diesel fuel. The EPA has limits on annual runtime that allows for routine testing, but prevents this type of generator from participating in a demand-response program or other type of continuous duty base-load generator due to emissions. The EPA allows for this generator to run in extended emergency power outage scenarios only.
   d. Diesel as a fuel source is proven to be reliable long-term storage with routine fuel polishing and fuel treatments. Diesel is readily available, easy to transport, and less volatile compared to other fuel options.
   e. Due to high resiliency, lower cost, but with emissions that must be considered, this generator type is recommended for Level 1 legally required life/safety applications.
   f. Diesel burn rates are not perfectly linear and some engines are more efficient than others, however rough order of magnitude is 70gallons per hour per 1000KW.
      i. For example, a 2MW load is expected to consume around 140g per hour.
      ii. Peak demand of MIA is 62MW, which rounds to roughly 4500g per hour.
      iii. 3090 building, at a peak demand of under 1MW, the fuel consumption rate at full load is 70gallons per hour. Half load of 500kw is roughly 40gallons per hour in the same engine (higher efficiency at higher loads).

2) Tier 4 Final Diesel
   a. Rough order of magnitude, DEF is consumed at around 8-9% the rate of diesel consumption.
      i. 70 gallons of diesel consumed would also require roughly 6g of DEF
   b. The type of generator burns diesel, but often has diesel exhaust fluid (DEF) aftertreatment, much larger catalytic converters, and may incorporate other methods (such as lean burning engines) to reduce certain types of emissions to make it more environmental friendly.
   c. The EPA allows for T4F generators to run continuously in demand-response and baseload applications.
   d. However, the addition of DEF requires two fluids (diesel and DEF) to be stored and maintained for the system to operate. Loss of either fluid, or component failure in any part of the respective system, will result in the generator system not operating.
   e. Due to increased risk, this type of generator is not recommended for any Level 1 system, but would be a good fit for Level 2 optional backup systems, especially with multiple engines in parallel.

3) Natural Gas
   a. The fuel consumption rough order of magnitude is 12,000scfh per 1MW of generation.
      i. MIA is 62MW of peak demand, this would be roughly 750,000scfh without any safety factor for pipeline sizing.
   b. NG is the cleanest burning backup generator system from an emissions standpoint. The EPA also allows for NG generators to run continuously and in demand response applications.
   c. The downside to NG is that onsite fuel storage is not practical and thus it relies on the availability of natural gas piping. There are methods of storing natural gas onsite such as compressed natural gas or liquified natural gas (LNG), but these systems are physically large, very high in maintenance, and only provides a few hours of autonomy in-case of a loss of pressure in NG pipelines. Compressed NG systems or LNG systems are rare for backup power systems due to relatively high costs compared to alternatives.
   d. For MIA, NG systems are further limited due to the natural gas infrastructure in South Florida that can support generation.

e. Code allows for natural gas in Level 1 systems. However, major utility systems, including FPL, have emergency plans in place to generate electricity with liquid fuel in-case of a natural gas pipeline disruption, thus it is hard to recommend a resiliency system that relies solely on natural gas. Due to debatable resiliency risk, this evaluation and feasibility study is taking a conservative stance on NG.

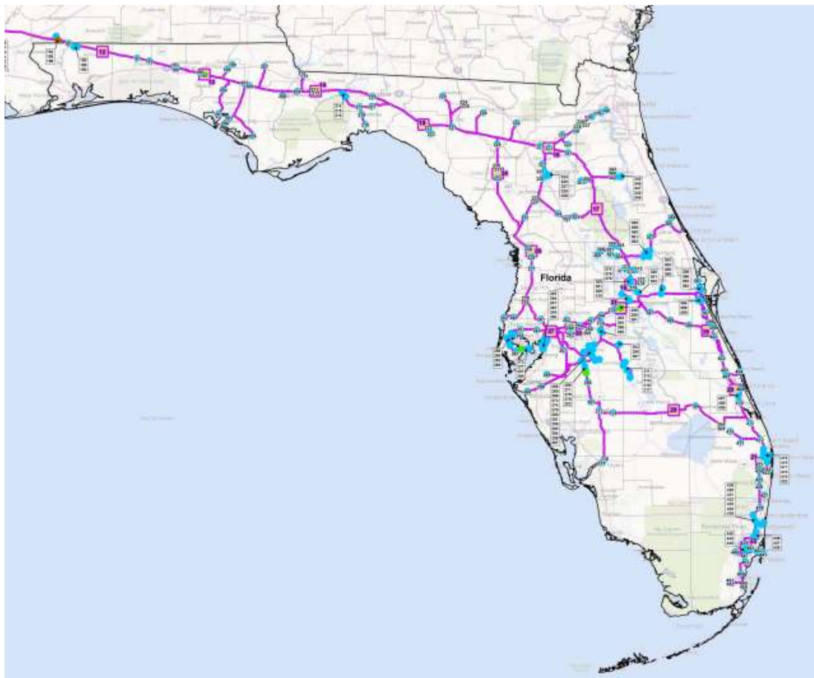


Figure 1 - Map of Natural Gas Transmission Line from Florida Gas Transmission Company, LLC

Diesel Alternatives

Generators that utilize internal combustion (ICE) engines can be powered off other fuel sources than diesel and natural gas and are discussed for viability as it relates to MIA:

Fuel Type	Pro's	Con's
Biodiesel	Renewable, biodegradable, liquid fuel alternative to diesel.	Issue with long-term storage that could cause engine malfunction, cannot be polished. Requires extensive fuel management plan.
Hydro-treated vegetable oil (HVO)	Renewable, biodegradable. Significant reduction in greenhouse gas (GHG) lifecycle emissions. Better storage than Biodiesel. Similar energy density and combustion characteristics as ultra-low sulfur diesel.	More costly than diesel (~30-50%), limited infrastructure and availability (but growing). Not enough public data on long term storage and reliability (>1yr).
Hydrogen	No carbon emissions in combustion.	Technology is not commercially available (yet). Expensive infrastructure for production, storage, and distribution. Fuel volatility and

		metallurgy issues must be overcome before mass adoption.
Ethanol	Renewable, often blended with gasoline.	Corrodes fuel lines and clogs fuel injectors.
Biogas	Renewable, common byproduct of land-fills.	Limited supply

The takeaway for diesel alternatives is that these technologies are advancing in the market. Biodiesel and HVO are both drop-in fuel replacements for traditional off-road diesel used in generator systems, meaning it can be mixed with diesel without system modifications, simplifying its adoption. However, both biodiesel and HVO require extensive fuel management plans. The known operational risk of Biodiesel makes it unattractive in legally required systems due to life-safety application of the system. In optional backup power systems, biodiesel and HVO represent a viable alternative that will be considered, along with a comprehensive fuel management plan.

Renewable Energy Sources and Battery Storage

In addition to traditional internal combustion engines for a generation source, this feasibility study considers commercially available alternatives to ICE systems.

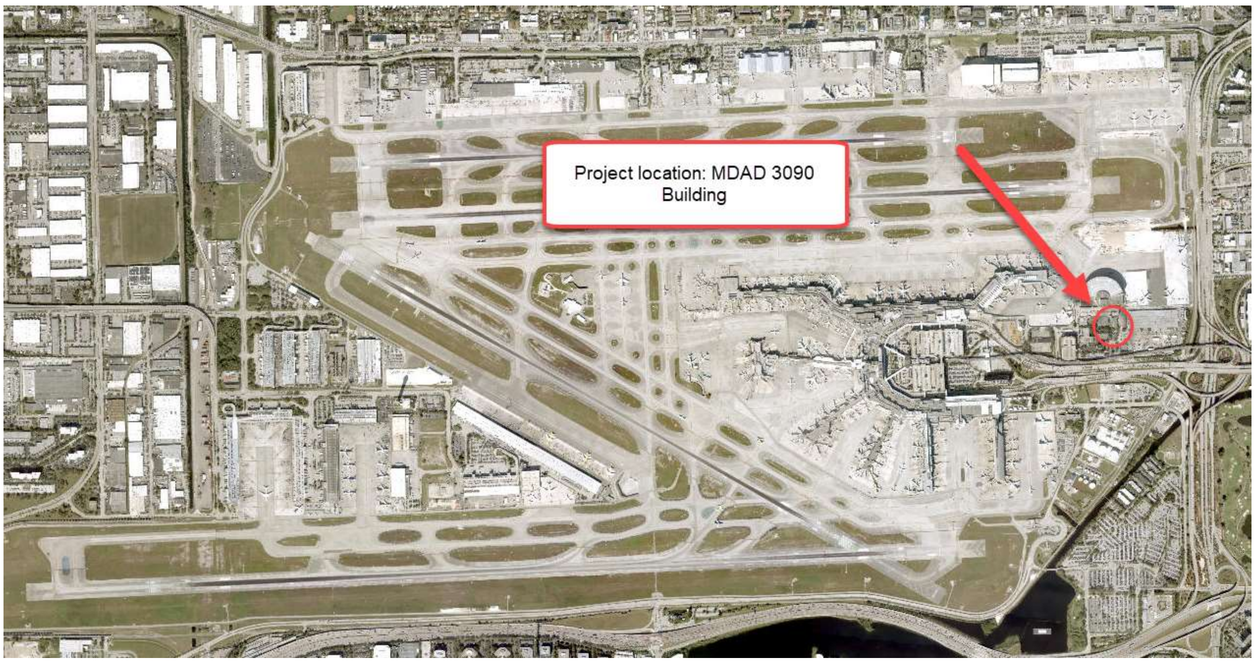
Fuel Type	Pro's	Con's
Solar	No emissions powered by the sun. Very low maintenance. Established technology with clear interconnection guidelines. Excellent sustainability play.	Solar glare must be considered for airline safety. No generation at night and issue with small clouds. No reduction in demand charges. System turns off during utility outage (grid-following).
Battery Energy Storage Systems (BESS)	Grid-forming inverters can be used in backup power applications. New battery types emerging to reduce fire-risk. Can be used for peak demand shaving.	Continuous energy losses charging, discharging, and maintaining the battery system. Difficult to maintain demand response benefits long term. Safety codes influencing design are getting much tougher.
Wind Turbine	Clean and established technology. Excellent in windy, but not too windy areas.	Not economical or reliable in Florida due to intermittent winds and sudden strong thunderstorms. Difficult to install in urban areas due to size.
Small Modular Reactors (SMR's) (discussion only)	Emerging nuclear technology that is potentially clean, hardened, and reliable. Base load considerations.	Not publicly available. Major risks and uncertainty remains on the topic. Not considered for this project work.

The takeaway for renewable energy systems is that solar is an excellent system for base-load and sustainability. Batteries are themselves not clean, but certainly have a place in certain system applications.

Project Solution Development – 3090 Building

All project work will be executed in a design-bid-build turnkey project, based on estimates and design guidance established in this feasibility report. This feasibility report is concept level based on design guidance previously established, and not permit level drawings or detail.

The project description for 3090 building is the end-of-life equipment replacement and upgrade of the 480V 3MW emergency generator system, main distribution switchgear replacement, and addition of air-conditioning to the space for environmental control, including sealing the old exterior louvers.



Condition Assessment – 3090 Building

The condition of the existing equipment is *extremely poor.*

- 2yr peak electrical demand, based on meter analysis, is 900KW.
- Connected system – this system feeds several buildings nearby, including space that has been unoccupied for several years, decreases the recent peak demand.
- Generator – the existing emergency generator has already failed and permanently removed by MDAD, several years ago. A rental generator on a semi-trailer has been in place for many years. Satellite photos online show the rental generator.
- Switchgear – GE Type AKD-5 switchgear, discontinued in the 1970's
    - Existing gear is over 50yrs old
    - Current equipment has retrofits and repairs that present safety issues – some equipment doors do not close, exposing energized components.
    - Aux DC battery system – failed, evidence of prior thermal runaway. Battery cases have burst and the battery electrolyte is dried on the floor.

- Spare parts are not available (OEM doesn't exist anymore) and retrofitted or used equipment is the only repair options, at best.

- Space – the building itself has issues that need to be addressed with the project work.
  - Asbestos – FPL is aware of existing asbestos in the space. This is excluded from FPL's project scope, but noted to ensure safety and ensure asbestos remediation efforts by MDC are completed before electrical work can begin.
  - The switchgear on the mezzanine helps simplify construction (top entry and bottom entry equipment is relatively easy) and ensure operations during flood events.
  - The roof – FPL understands that the roof has previously been replaced for this building and should not impact electrical work.
  - The building used to have the generator inside, which is why the louvers are there. The louvers themselves are non-structural to the building enclosure. The intent of the work is to seal the open spaces of the building for air-conditioning purposes.
  - Air-conditioning can be added with the building being closes. It houses MEP equipment and is the main distribution building that feeds adjacent properties.

Figure 2 - Exterior of 3090 Building

Figure 3 - Mezzanine level of MDAD 3090

Figure 4 - Safety Issue with retofitted breaker

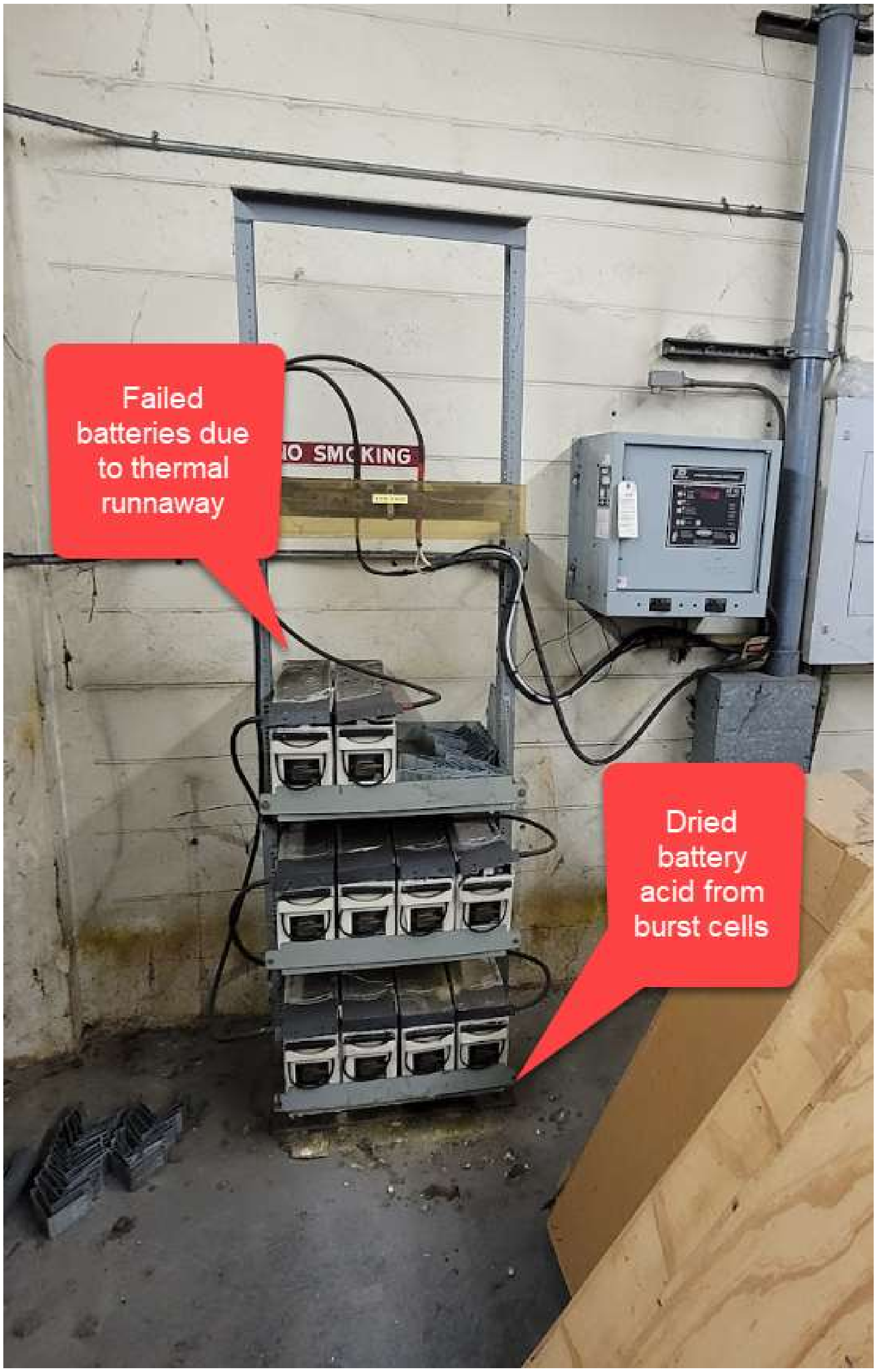


Figure 5 - Existing DC Battery System

Figure 6 - Lower level, location or previously removed generator

CIP Considerations

The capital improvement plan for MIA has been considered to ensure this project does not conflict with other planned work at MIA. FPL's understanding is that 3090 building will largely remain as a main local mechanical plant and electrical distribution hub for greater than 20yrs.

The area is expected to have electrical load growth greater than 25% during the life of the equipment with additional resiliency needed from this generator system. The two primary drivers of load growth are:

1) Some space served by this electrical distribution has been temporarily vacant, this space will likely be occupied well before the end-of-useful life of new equipment, or the structure may change, but electrically still fed off this new equipment. New load attributed to occupied space is difficult to estimate, but reasonably 250-500KW or more is assumed for the purpose to ensure operational resiliency.
2) Electric Vehicles – the generator system today will not be connected to EV chargers, however provisions will be put in-place to enable EV resiliency later at a saving to MDC.

Project Plan – 3090 Building

To address the operational risk identified in the condition assessment and incorporating the design concepts for FPL backup generation systems at MIA, the following concept solution is proposed. This solution will be executed in a design-bid-build project plan.

Project Description

Backup power service to provide an alternative source of electrical power and electrical distribution equipment to Building 3090. Based on site installation conditions and electrical load data, Company expects to utilize two (2) 1500kW diesel Tier 2 generators, controls, and new main distribution switchgear to provide service to the electrical loads, based on the historical 24-month metering data, associated with FPL Account Number 35908-77514.

Scope of Work

See appendix for system drawings. The scope includes all construction and permitting by licensed contractors, per applicable codes.

Electrical System

- (2) 1.5MW Tier 2 Generators
    - Outdoor aluminum enclosure high-velocity hurricane-zone rated.
    - 48hr sub-base fuel tank
    - OSHA compliant stairs
- Generator Paralleling Switchgear
    - Main-Main configuration, fully rated
    - Indoor equipment
- Main Distribution Switchgear
    - Main-Tie-Main system
    - PLC controls
- Remote monitoring
    - Generator system and switchgear
    - Cellular based

Building Upgrades

- Close exterior louvers and seal the building where the equipment is housed.
- Add air-conditioning via air-handlers. The existing space has chillers and chilled water supply that can be tapped into. Only air-handlers are added to the space and sized to accommodate all mechanical equipment within the space to ensure corrosion control.

Temporary Power Plan

- A robust temporary power plan is intended and will be evaluated with MDAD during the detailed construction phase of the project.
- At a minimum, all loads are assumed that brief outages can be planned/coordinated with stakeholders to tie-in temporary equipment. This enables continuous operations while electrical work takes place.

Schedule

A project timeline is included below. This timeline reflects estimated date ranges of work to be performed. Actual dates may vary, are non-binding, and are subject to change. The below critical items are required from MDC to move forward in each phase of the project construction timeline.

Milestone	**Week(s)**
Signed Agreement / PO Issued	1
Procurement - Public Notice	2 - 6
Procurement - Engineering Services	6 - 8
Selection - Engineering Services	9 - 10
Engineering Phase	10 - 18
Start Procurement - Equipment & Services	16 - 22
Selection - Equipment & Services	22 - 23
Permit Submittal	22
Long Lead Sourcing / Planning / Permit Acceptance	23 - 75
Start Construction	78
Ground work / close up 3090, Add A/C	78 - 88
Generator Delivery & Gen Switchgear	89 - 92
Critical Event - Cutover #1 - A Side	93
Critical Event - Cutover #2 - B Side	94
Final System Commissioning / Closeout	95 - 96
Contingency	97 - 104

Performance Bonds

Single instrument Payment and Performance Bonds will be obtained for each construction project. These bonds will remain in effect for six months following construction operation date. Fees related to bond costs will be determined based on specific project requirements and risks and will be passed on to MDC at FPL cost in each applicable statement of work as part of the service fees thereunder.

Responsibility Matrix

FPL is responsible for design and proposal of backup power solutions and distribution-related service upgrades. Various departments within FPL will be involved throughout the project. Similarly, MDC has identified departments to be involved in certain key processes. A listing of the departments involved is included below.

	FPL	**Miami-Dade**
Technical Feasibility		
Charging designs	Engineering & Construction (E&C)	MDAD
Service upgrades	Power Delivery (PD)	MDAD
Installation Analysis		
Agreement & SOW	Development, Legal	RER, MDAD
Procurement	E&C, Sourcing	MDAD, RER
Permitting	E&C	RER, MDAD, City of Miami
Inspections	E&C	RER, MDAD, City of Miami

Flood Zones	E&C	MDAD, RER
Sea Level Rising	E&C	MDAD, RER
Tree Removal Impacts	E&C	RER, MDAD
System designs	E&C	MDAD, RER
Service upgrades	PD	MDAD
Account set-up	Development, Customer Service	MDAD

Technical and Construction Feasibility

The 3090 Building represents a typical level 1 system with clear codes, design guidelines, and space available for construction. The flood elevation issues, and space issues are significantly lower at 3090 Building compared to other congested spaces at MIA. The key benefit of this project going first is that the technical feasibility is clear, this will help promote smooth execution and lessons learned will be applied to future projects to reduce total program risk.

All underground work is immediately within the footprint of the 3090 building perimeter. There will be no directional boring or other work that crosses public rights-of-ways.

The type of equipment contemplated are considered fixtures within a building, and the scope does not trigger additional requirements for other building upgrades to adhere to LEED Silver Certification. LEED certification is not in-scope for 3090 Building.

Permit Applications and Inspections

Permits are required for all electrical work per Florida Building Code, Miami-Dade County Code, and City of Miami code enforcement. All applicable codes will be adhered too and formalized in the design stage of the project by the Engineer of Record.

Financial Feasibility

The OSPS Backup Generator Monthly Service Payment for 3090 Building is estimated based on pre-survey design and prior to equipment purchase and installation. As stated in the statement of work (SOW), actual costs are estimated as a range for rough-order-of-magnitude planning and approval. The actual cost will be based on 100% permit approved design and competitive bidding, based on concept developed in this feasibility report. The monthly service payment is for 20yrs, fixed, and includes all maintenance, break/fix, and emergency support costs per the SOW. The monthly payment goes on the utility bill and starts after the system is fully commissioned, helping MDC delay capital expenditures.

OSPS Monthly Service Payment

3090 Building	Monthly Service Payment
High Estimate	$77,684.90
Low Estimate	$64,737.42

No net change to fuel usage is expected as part of this project work.

- The new generator system will test and operate similarly as the rental emergency generator currently in place.
- Fuel costs are the only variable cost that will continue to be paid by MDC.

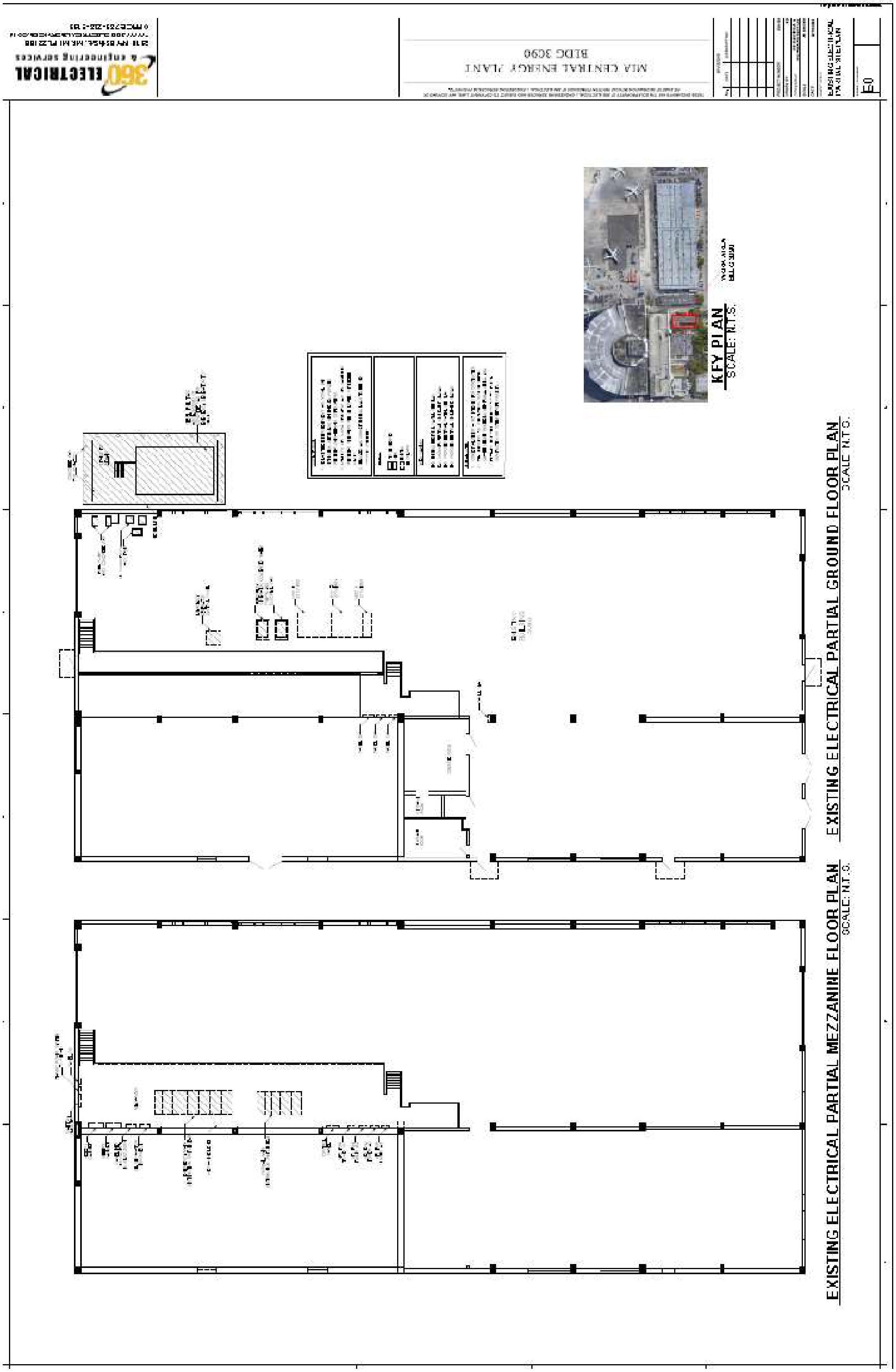
No net change to electrical consumption is expected as part of this project work.

- The new generator system is emergency backup only. It does not provide baseload support.

Conclusion and Recommendations

FPL recommends immediate replacement and modernization of the obsolete electrical infrastructure at MIA Building 3090. Should the County proceed with a Non-Residential Backup Power Services Agreement and corresponding Statement of Work with FPL for the identified work by December 2024, FPL is prepared to support construction and installation of the equipment to be operational in 2026.

Appendix – System Drawings


MIA CENTRAL ENERGY PLANT
BLDG 3090
KEY PLAN
SCALE: N.T.S.
EXISTING ELECTRICAL PARTIAL GROUND FLOOR PLAN
SCALE: N.T.S.
EXISTING ELECTRICAL PARTIAL MEZZANINE FLOOR PLAN
SCALE: N.T.S.
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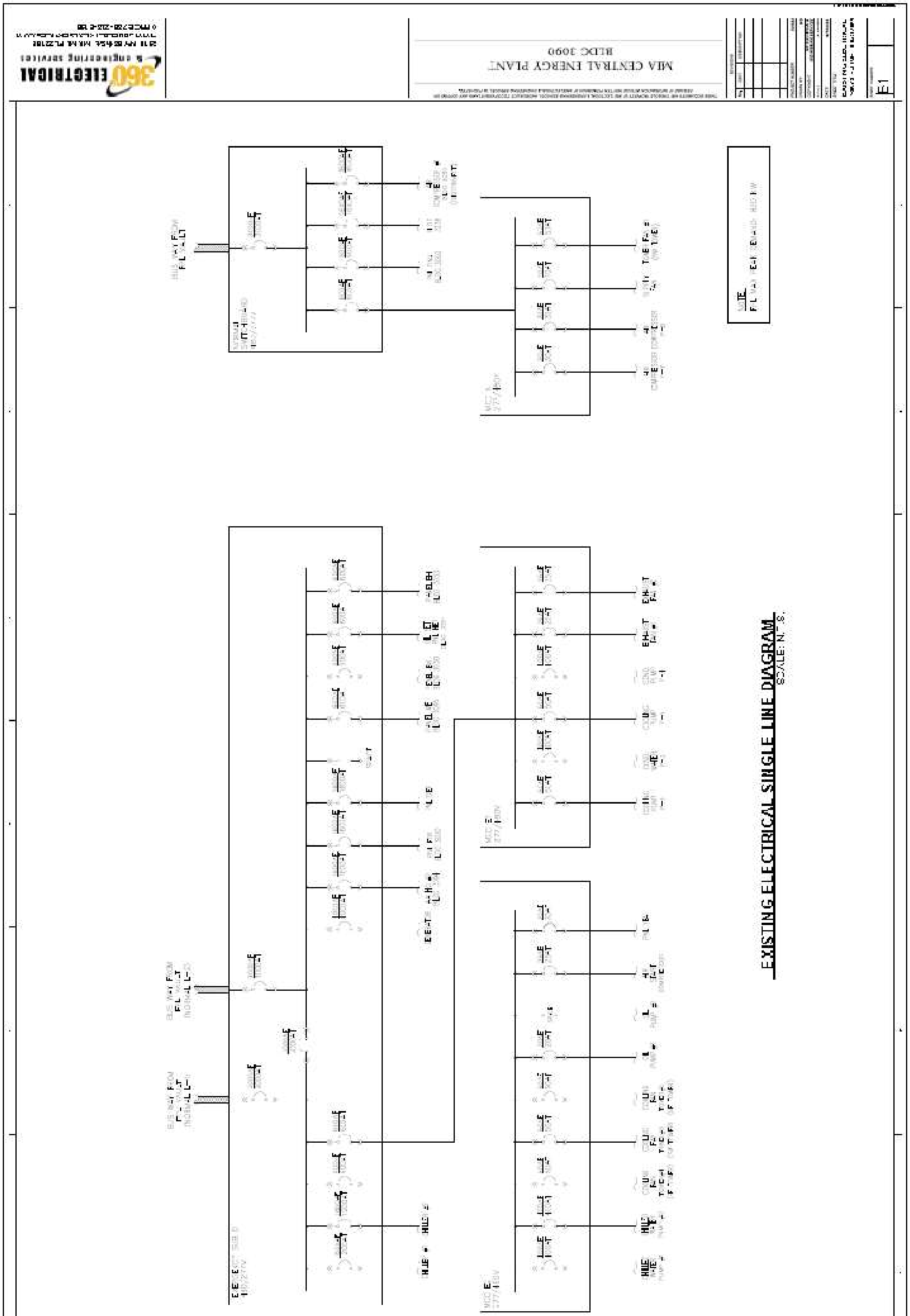

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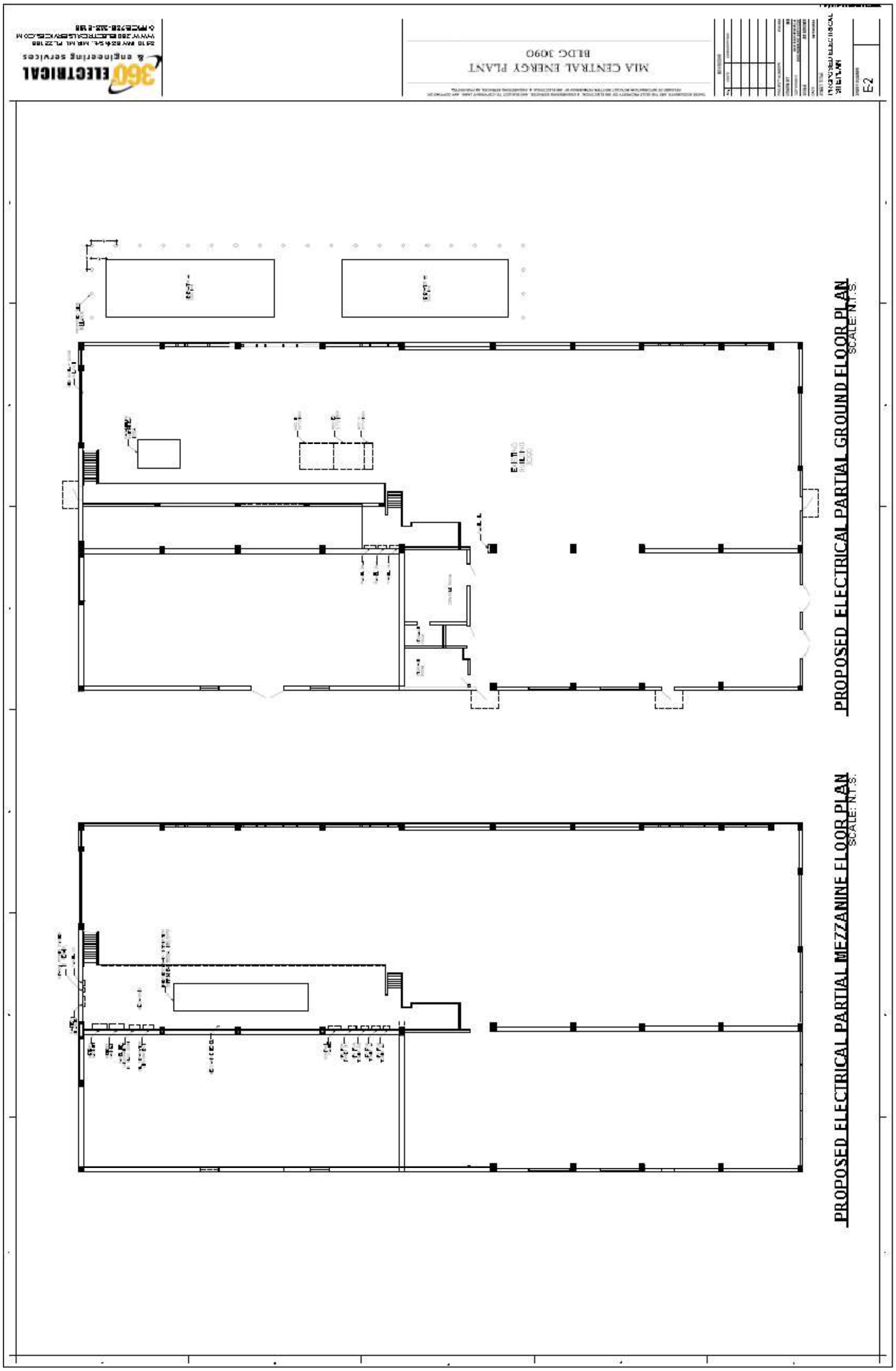

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