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March 4, 2021

VIA: ELECTRONIC FILING

Mr. Adam J. Teitzman
Commission Clerk
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399-0850

In re: Petition of Tampa Electric Company for approval of Direct Current Microgrid
Pilot Program; Docket No. 20200234-EI;

Dear Mr. Teitzman:

Attached for filing on behalf of Tampa Electric Company is an Amended Petition for
Approval of Direct Current Microgrid Pilot Program.

Thank you for your assistance in connection with this matter.

Sincerely,



Malcolm N. Means

MNM/bmp
Attachment

cc: All Parties of Record

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition of Tampa Electric Company)
for Approval of Direct Current Microgrid)
Pilot Program and for Variance or Waiver)
of Rule 25-6.065 of the Florida)
Administrative Code)
_____)

DOCKET NO. 20200234

FILED: March 4, 2021

**AMENDED PETITION OF TAMPA ELECTRIC COMPANY
FOR APPROVAL OF DIRECT CURRENT MICROGRID PILOT PROGRAM**

Tampa Electric Company ("Tampa Electric" or "the Company"), pursuant to Section 366.04, Florida Statutes, petitions the Florida Public Service Commission ("the Commission") for approval of a direct current microgrid pilot program, and as grounds therefore, states:

I. Preliminary Information

1. The Petitioner's name and address are:

Tampa Electric Company
702 North Franklin Street
Tampa, Florida 33602

2. Tampa Electric is an investor-owned electric utility subject to the Commission's jurisdiction pursuant to Chapter 366, Florida Statutes. Tampa Electric serves retail customers in Hillsborough and portions of Polk, Pinellas and Pasco Counties in Florida. The company's principal offices are located at 702 N. Franklin Street, Tampa, FL 33602.

3. This Amended Petition represents an original pleading and is not in response to any proposed action by the Commission. Accordingly, the Petitioner is not responding to any proposed agency action.

4. The persons to whom all notices and other documents should be sent in connection with this docket are:

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II. Statement on Disputed Issues of Material Fact

5. In compliance with paragraph (2)(d) of Rule 28-106.201, F.A.C., Tampa Electric states that it is not aware of any disputed issues of material fact at this time, and does not believe any disputed issues of material fact will arise in this docket, but acknowledges the possibility that other parties could assert disputed issues of material fact during this proceeding.

III. Overview of Request

6. Tampa Electric, working with its affiliate Emera Technologies Florida, Inc. (“ETFI”) and two unaffiliated companies, seeks authorization for an innovative new pilot program (the “Direct Current Microgrid Pilot Program” or “Pilot”). The Pilot involves installation of new direct current (“DC”) electric microgrid technology and associated generating equipment,¹ known as the Block Energy System, to provide power to approximately 37 home lots (“Project Site”) developed by Dune FB Debt LLC, an affiliate of Metro Development Group (“Metro”). These lots will accommodate homes built by Lennar Homes Inc. (“Lennar”) as a part of a housing development within Tampa Electric’s service area in southern Hillsborough County.

7. This Pilot will test the capability of the Block Energy System to provide power to residential homes in Florida with a high level of renewable energy as well as superior reliability

¹ The generating equipment consists of Tampa Electric owned and operated rooftop photovoltaic (PV) arrays and natural gas fueled distributed generating units.

and resiliency. More specifically, the goals of the Pilot will test the ability of the Block Energy System to: (1) ride through all upstream AC system disturbances with no interruption to the customer; (2) integrate high levels of renewable energy targeted to be at least 60% of the total energy used by the homes participating in the Pilot; and (3) reduce impacts on the transmission and distribution system during times of peak demand. Additionally, the Block Energy System equipment will be monitored and expected to maintain high levels of reliability on the DC system. Should the Block Energy System meet these objectives, a resulting set of benefits attributable to such system may be quantified, including increased renewable penetration, reduced system losses, reduced generation capacity costs, reduced system transmission and distribution capacity costs, reduced energy costs, and significant customer reliability benefits.

8. Standard distribution infrastructure throughout Florida and the rest of the United States typically operates using alternating current (“AC”). While the Block Energy System distributes power on DC infrastructure rather than AC infrastructure, homeowners will not need to purchase special appliances or equipment. Immediately before power is delivered to the home, an inverter changes the power supplied from the Block Energy System to AC. This means that AC power will flow into the meter attached to the home. To provide a secure power supply to the homes in the Pilot, all the homes will also be served by a redundant AC distribution system, which Tampa Electric would normally install for such a subdivision. In the event of any outages or failures on the Block Energy System during the Pilot, either unexpected or planned, Tampa Electric will be able to automatically connect one or all of the homes to the standard AC system and power supply will be preserved. As a secondary control, each home will also have a manual transfer switch to allow Tampa Electric to manually switch the AC power supply between the Block Energy System and the standard AC system if required.

9. Customers participating in the Pilot will be charged standard Tampa Electric tariff rates with no additional charges associated with the Block equipment or the local generation. In addition, the solar energy – delivered without fuel cost and any energy supplied by the local natural gas generation – will be factored into the overall Tampa Electric fuel adjustment and the Pilot customers will pay the tariff fuel adjustment rates identical to those for all other customers.

10. Tampa Electric plans for the Pilot to last four years, beginning when the first home is occupied, the installed Block Energy System (the “System”) is ready to be energized, and the Commission has granted approval for the Pilot to begin. While the Pilot is intended to be temporally limited, Tampa Electric intends for the Block Energy System equipment to be the permanent electric supply for these homes and to remain in service long past the Pilot, even for decades, unless some reason to abandon or remove the Block Energy System arises during, or after, the Pilot. Potential home buyers will be informed of the uniqueness of the Block Energy System and will purchase these homes with an understanding and written acknowledgement at time of home purchase of all the elements of this commitment, including the installation of Tampa Electric owned PV arrays on their roofs.

11. Through this Petition, Tampa Electric seeks Commission findings that: (1) it is reasonable and prudent to proceed with the Pilot; (2) the assets installed for both systems are eligible for rate base treatment; and (3) O&M expenses incurred by Tampa Electric associated with both systems may be recoverable as base rate revenue requirements. Tampa Electric seeks recovery of the capital and O&M costs associated with this Pilot through base rates, assuming that the company demonstrates that the costs were prudently incurred in a future base rate proceeding.

IV. Statement of Ultimate Facts Alleged and Providing the Basis for Relief

A. Block Energy System

12. The DC Microgrid Pilot Program will utilize the Block Energy System, which integrates local distributed energy resources, primarily renewable, and loads into a DC microgrid. The Block Energy System is designed to provide more reliable, resilient, renewable and efficient power to an interconnected community than can be achieved with standard AC distribution delivery architecture.

13. In the Block Energy System, each home is equipped with a “Block Box” containing battery storage and other necessary components, including communications and control equipment. The Block Box battery delivers all necessary power to the home. Given that current panels and home appliances are AC based, the Block Box includes inverters that convert the DC power delivered by the battery to AC before it enters the home. The Block Energy System also interconnects the Block Box at each home into a network of neighborhood Block Boxes and a central shared resource pool (“Community Energy Park” or “CEP”). Each home is also equipped with rooftop photovoltaic solar panels. The solar panels are directly connected to the Block Box and do not only serve that home. When the sun shines, the solar panels generate DC power which is used to charge the battery in the Block Box or deliver the energy to the DC Microgrid to use elsewhere in the System. Each home, with its utility-owned and operated rooftop solar and Block Box with batteries, is referred to as a “Nanogrid.”

14. Each Nanogrid is interconnected to the other Nanogrids in the System through underground DC lines and fiber optic cables. This allows the Block Energy System to instantly and seamlessly deliver power where it is needed within the community.

15. The Block Energy System also includes a “Community Energy Park.” This is a designated area within the community that houses a larger battery, power generation equipment, and an interconnection to Tampa Electric’s standard AC distribution grid. The Community Energy Park at the Pilot location includes small gas-fired generators that provide the System with access to additional local generation when necessary. The Community Energy Park is interconnected with the Nanogrids through underground DC lines and fiber optic cables. The interconnected Nanogrids and Community Energy Park are collectively referred to as a Microgrid.

16. The Block Energy System is sized to meet the needs of the community. The quantity of rooftop solar panels will vary from home to home depending on the size and orientation of the square footage on the roof that is suited for solar generation. Collectively, however, the System is designed such that the community will have enough rooftop solar, along with the Community Energy Park resources, to meet the needs of the entire community.

17. Because the Block Boxes and the Community Energy Park are interconnected, all components of the System communicate in real time. The System seeks to optimize power generation and delivery within the Microgrid using this continuous stream of information. For example, if one home’s Block Box battery reaches a low state of charge, the interconnected system can deliver excess power from other Nanogrids or the Community Energy Park to the depleted Block Box. Similarly, if the Block Box batteries all become depleted at night when the solar panels are not generating power, the System can dispatch the gas-fired generation at the Community Energy Park or import power from Tampa Electric’s grid to recharge those batteries. These adjustments happen in real time without the need for continuous management by a human operator.

18. The control algorithm used to manage power flow throughout the Microgrid also has many potential benefits. The System can dynamically respond and intelligently prioritize the

various Block Energy System flexibilities under varying operating system conditions. For example, the System could be set to prioritize exporting power outside of the micro-grid whenever it is necessary to support reliable operation of Tampa Electric's larger grid. Conversely, it could be programmed to isolate the micro-grid from Tampa Electric's overall grid in the case of widespread outages due to AC system grid outages. These features will be studied as part of the Pilot.

19. The Block Energy System could also provide benefits to Tampa Electric's grid. The System could export excess power from its batteries or generators on an early winter morning to assist with meeting peak load. The System could also import power from the grid to charge its batteries when Tampa Electric's utility-scale solar facilities are at their peak generation. These are some of the potential uses that will be studied as part of this Pilot.

20. The Block Energy System provides multiple layers of redundancy. The System is designed to function as a true microgrid during normal operation. The System incorporates a connection to Tampa Electric's AC distribution grid as an additional resource. In the unlikely event that an individual Nanogrid is disconnected from the Microgrid, the Nanogrid can still function for some period of time depending on its own load, dedicated battery storage and rooftop solar. The System is also designed where multiple community Microgrids can be interconnected to provide additional redundancy. The reliability benefits of the System will be studied as part of the Pilot.

21. The utilization of the Block Energy System provides several potential benefits, including:

- The System is designed to deliver at least 60% of the energy provided to the homes from renewable resources (calculated on a quarterly basis).

- The System is designed to aggregate renewable and natural gas generation sources and utilizes distributed storage in the Block Boxes and CEP to meet the anticipated needs of the homes in a resilient, efficient and cost-effective manner.
- The System should provide better power quality at the home as the inverter is designed to provide a low harmonic distortion sine wave with finer voltage control than can be accomplished on the AC system. The community as a whole and the individual homes are not subjected to abnormal conditions experienced elsewhere on the AC or DC systems including momentary interruptions.
- The System should provide enhanced reliability and immunity to disturbances from the main AC distribution network since it is designed to operate as an independent power system with the ability to operate autonomously from the AC grid. The use of DC technology allows the microgrid to have truly seamless connection and disconnection from the AC grid.
- The System is designed to ensure that no power is imported from the AC grid during peak load hours. The System could even export power to the AC grid during peak load hours if local conditions permit.
- The System is designed to be more resilient during storms since all power requirements for full load servicing are contained locally within the microgrid and all distribution is located underground.

These expected benefits of the Block Energy System will be studied as part of this Pilot.

22. Emera Technologies LLC, ETFI's parent company ("ETL") constructed and deployed a demonstration of the Block Energy System at Kirtland Air Force Base in Albuquerque, New Mexico. This system currently provides all power to several homes and a community

gathering space within the base. The Kirtland Air Force Base system has been in continuous operation since December of 2019.

B. Safety Features and Testing

23. Section 366.04(6) of the Florida Statutes requires the Commission to adopt the current edition of the National Electric Safety Code (“NESC”) as the minimum safety standards for public electric utilities. As a result, Rule 25-6.0345, F.A.C. states that the Commission “adopts and incorporates by reference the 2017 National Electric Safety Code (NESC) C2-2017, as the applicable safety standards for transmission and distribution facilities subject to the Commission’s safety jurisdiction.” The Rule also requires each investor-owned electric utility to, at a minimum, comply with those standards.

24. The NESC does not contemplate the use of DC infrastructure to deliver power to homes. Section 012.C of the NESC, however, states: “For all particulars not specified, but within the scope of these rules...construction and maintenance should be done in accordance with accepted good practice for the given local conditions...”.

25. The Block Energy System is designed to comply with the NESC through incorporation of multiple dedicated safety features that are considered “accepted good practice” in the industry.

- a. The DC network incorporates conventional safety protections as well as an innovative center – point resistance grounded design that will limit the fault energy in the event of a single pole-ground fault. In addition, such design will be supplemented with a proprietary protection system which will monitor for ground and pole to pole faults to make the safest and most effective decisions on isolation

of the fault; such system is under development by ETL and will be installed into the Tampa Electric system after completion of satisfactory testing.

- b. Each Block Box will include sensitive Volatile Organic Compound (VOC) detection that is indicative of signs of early battery thermal stress. This detection will be continuously monitored by the proprietary control system that will make real time decisions on changes to operating parameters or isolation to remove the risk of thermal runaway.
- c. The Community Energy Park will employ UL 1741 approved AC-DC inverter technology to allow the Microgrid to detect loss or disturbance of AC supply and immediately isolate the Microgrid from the AC network. The Community Energy Park will also monitor the AC system for power quality or other system disturbance indicators and take immediate, real time action to protect the Microgrid.

26. Because the Block Energy System is designed to incorporate these accepted good practices, the System complies with Section 012.C of the NESC and Rule 25-6.0345, F.A.C.

27. Comprehensive testing continues to be performed on the Kirtland Air Force Base Block Energy System. ETL will test the system at the Microgrid level to see how the system responds to events such as a sudden AC grid disconnection, an AC grid fault, or a fiber network failure. ETL will also test the system at the Nanogrid level for events such as high and low resistance ground faults and will assess power quality during normal and system disturbance conditions. Finally, ETL will test the individual components of the system, for example by testing battery degradation in different conditions.

C. DC Microgrid Pilot Program

28. Medley at Southshore Bay is a planned subdivision currently under development in Hillsborough County, Florida by Metro.

29. Tampa Electric plans to conduct the DC Microgrid Pilot Program in Active Adult Phase 3 development of the subdivision (“Phase AA3”) utilizing the Block Energy System. The terms of the Pilot are set out in a series of written agreements.

i. EPC Agreement – Block Energy System

30. Tampa Electric and ETFI entered into an engineering, procurement, and construction agreement (“EPC Agreement”) whereby ETFI will design, engineer, supply, install, test, and commission the Block Energy System in the Phase AA3 of the subdivision. Tampa Electric’s obligations under the EPC are subject to certain conditions precedent, including approval of the DC Microgrid Pilot Program by the Commission.

31. Pursuant to the EPC Agreement, Tampa Electric and ETFI will initially operate the System under a one-year test period. Tampa Electric will retain the exclusive right to suspend the use of the System and switch to use of the AC distribution system at any time.

32. Tampa Electric can unwind the project in whole or in part based on certain performance criteria. If Tampa Electric elects to unwind the Block Energy System based on system performance, ETFI is obligated at its sole expense to remove all components of the system for which use is discontinued (except for the Community Energy Park and installed solar panels), restore the development property to its prior condition, and refund the corresponding portion of the purchase price back to Tampa Electric. Tampa Electric will keep the Community Energy Park as a generation resource. If it is in a partial state of completion, ETFI will either complete the Community Energy Park or remove the equipment and restore the site, whichever is in the best

interest of customers. In the event of unwinding, the solar panels that are already installed on homes within the development will be offered to individual homeowners to be integrated to serve their homes directly through the appropriate Tariff at their respective AC service meters.

ii. Developer Agreement

33. Tampa Electric also entered into an agreement with Metro (the “Developer Agreement”). A provision in the Developer Agreement states that Tampa Electric and Metro are freed from any obligations under that Agreement if the Commission denies approval of the DC Microgrid Pilot Program.

34. Pursuant to the Developer Agreement, Metro will provide access to Tampa Electric and ETFI to install, operate, and maintain the Block Energy System in parallel with the traditional AC distribution system, and will include Tampa Electric and ETFI in the scheduling, construction, and development of the project. Metro also agreed to grant Tampa Electric an exclusive easement within the project for a Community Energy Park which will contain small gas fired generators, gas supply for those generators, a central battery and the interconnection between the Block Energy System and Tampa Electric’s AC distribution grid.

iii. Builder Agreement

35. Tampa Electric also entered into an agreement with Lennar (the “Builder Agreement”). A provision in the Builder Agreement states that Tampa Electric and Lennar are freed from any obligations under that Agreement if the Commission denies approval of the DC Microgrid Pilot Program.

36. Pursuant to the Builder Agreement, Lennar will provide Tampa Electric and its contractors access to install, operate, and maintain the Block Energy System in parallel with the traditional AC distribution system, and will allow Tampa Electric to participate in the scheduling,

construction, and development of the project. Lennar also agreed that solar panels will be installed on the roof of the homes in the Project Site. These panels will be owned, operated, and maintained by Tampa Electric. Block Boxes will be installed at every home, and the Community Energy Park will supplement the solar energy generated at each home.

iv. Easement

37. Pursuant to these Agreements, Tampa Electric will obtain an easement for each of the subject properties. The easement will permit Tampa Electric to enter onto each subject property to install, expand, access, inspect, maintain, operate, modify, update, repair, replace, and remove: (1) a solar photovoltaic system on the roof of the primary residence; (2) battery and control units (Block Boxes); and (3) ancillary electrical devices. The easement restricts the homeowner from tampering with, damaging, obstructing, maintaining, relocating, repairing, or modifying the Company's equipment.

38. The easement also provides that Tampa Electric has the right to use information obtained from the Block Energy System to operate and maintain the System, to provide service to its customers, and for other internal business purposes. The homeowner also agrees that Tampa Electric and its affiliates may share such information with consultants and third parties to evaluate the performance of ETL's technology and to market it to other prospective developers and customers, provided that the information is anonymized or deidentified.

39. Tampa Electric has the right to terminate the easement at any time. In the event that the company terminates the easement, Tampa Electric will give the homeowner the choice to either request removal of the rooftop solar panels or take ownership of those panels. If the customer elects to take ownership of the panels, Tampa Electric will transfer ownership of the installed rooftop solar panels to the homeowner and perform the necessary modifications to allow for

interconnection of those panels to the company's standard AC grid. The customer may then execute an interconnection agreement and net meter. If the customer elects to have the panels removed, Tampa Electric will remove the panels and restore the roof to a functional and weather tight condition.

v. Information Provided to Homebuyers

40. Tampa Electric informs potential homebuyers about the nature and scope of the Pilot Program through several channels.

41. ETFI and Tampa Electric developed marketing materials that describe the Block Energy System and provided them to Lennar for use in marketing homes included in the Pilot Program.

42. Tampa Electric also prepared a concise information sheet that provides potential homebuyers with information about the Block Energy System and this proposed Pilot Program. Tampa Electric provided this sheet to Lennar for distribution to potential homebuyers. The information sheet includes contact information for Tampa Electric where potential homebuyers can direct questions about the Pilot Program. Among other things, the sheet also explains that:

- a. Homeowners in the Pilot will pay the same rate for electricity as other residential customers.
- b. Tampa Electric will obtain a permanent easement allowing the company to install solar panels on the roof of the home and a Block Box next to the home.
- c. The solar panels and Block Box will remain on the property unless and until use of the microgrid is terminated.
- d. Tampa Electric will maintain this equipment.

- e. Homeowners may install their own rooftop solar, but in the event that they do, their home would be disconnected from the Block Energy System.

43. When a potential homebuyer decides they would like to purchase a home from Lennar, Lennar provides them a purchase and sale agreement for the home. This purchase and sale agreement includes a “Block Energy System Addendum.” The Addendum, which was drafted by Tampa Electric and Lennar, includes a description and explanation of the Block Energy System and plainly states that: (1) Tampa Electric will own, operate, and maintain the system; (2) portions of the Block Energy System are located on the homebuyer’s lot pursuant to a utility easement; (3) the power generated by the panels and stored in the System will be owned by Tampa Electric and may be used to serve not only the homebuyer’s home, but also other homes in the System or the conventional AC grid; (4) the homebuyer will pay the standard tariff rate for electrical service without any additional charges; and (5) Tampa Electric may use the homebuyer’s anonymized energy consumption data. A copy of the Grant of Easement is included with the Addendum. The potential homebuyer must initial the Addendum on each page and sign at the end of the document when they execute the home purchase agreement.

44. The Addendum also informs homebuyers that, pursuant to Rule 25-6.065 of the Florida Administrative Code, they have the right to install their own rooftop solar, interconnect it to the Tampa Electric AC distribution grid, and net meter their generation. The Addendum explains that any homebuyer who does so will be removed from the Pilot Program, meaning they will no longer receive power from the Block Energy System but will instead be served exclusively by Tampa Electric’s AC distribution grid. Finally, the Addendum explains that, in this scenario, Tampa Electric will retain its easement allowing the company to own, operate, and maintain the Block Energy System on their property.

45. Some homebuyers received a previous version of the Addendum that included a reference to a restriction on customer-owned rooftop solar during the term of the Pilot Program. Since Tampa Electric removed this restriction from the Pilot Program, these homebuyers will receive a letter directly from Tampa Electric that explains that customers are free to install their own rooftop solar, but if they do so they must enter into an interconnection agreement, that they will be disconnected from the Block Energy System, and that Tampa Electric will retain its easement allowing the company to own, operate, and maintain the Block Energy System on their property.

D. Regulatory Treatment of Assets and Costs

46. Under this Pilot Program, Tampa Electric will install two parallel distribution systems to provide electric service to the participants in the Pilot Program, one AC and the other the DC microgrid. Tampa Electric requests that the Commission find that: (1) it is reasonable and prudent to proceed with the Pilot; (2) that the assets installed for both systems are eligible for rate base treatment; and (3) O&M expenses incurred by Tampa Electric associated with both systems are eligible for recovery as base rate revenue requirements.

47. Through the Block Energy System, Tampa Electric will generate power from the rooftop PV arrays and from the gas fired local generators in the Community Energy Park. Tampa Electric requests that these two cost streams, zero cost for the solar and gas cost for the local generators, be included for cost recovery through the normal fuel adjustment clause.

48. Customers served under the Pilot will take service under the standard RS electric service tariff and pay standard clause rates associated with that tariff, with no additional charge added for service from the DC microgrid.

E. Parameters of Pilot Program

49. As mentioned earlier in this Petition, the DC Microgrid Pilot Program is designed to study the benefits which could accrue to participants, as compared to service under the standard AC system. The Pilot Program is planned for a four-year period beginning when the first home is occupied, the Block Energy System is ready to be energized, and the Commission has granted approval for the Pilot to begin.

50. The Builder has commenced construction of homes in the Project Site. As of March 1, 2021, one home is complete and occupied, with construction underway on 19 other homes in the Project Site.

51. Tampa Electric will produce annual reports during the Pilot. Tampa Electric will also produce a final report. Each of these reports will be provided to the Commission. The Company intends to make a quantitative and qualitative analysis to: (1) compare the cost of providing local distribution service from a DC microgrid to the cost of a standard AC system; (2) describe whether the System performs as expected; (3) describe whether any incremental O&M costs may arise; and (4) describe what benefits the microgrid provided with respect to reliability and resiliency. Input from the participating customers will also be included.

52. If Tampa Electric determines at the end of the Pilot that the DC microgrid is not effective and there is no further desire to redesign or fix it, then the DC infrastructure will be removed. As explained above, the homeowner will be offered a choice to either retain the panels and enter into an interconnection agreement or have the Tampa Electric owned PV system removed.

53. The expectation is that the Block Energy System will be effective and that Tampa Electric may evaluate providing a tariff to provide such service on a similar or revised design as

an option to serve customers rather than standard AC infrastructure, including any necessary charges to equalize cost recovery with rates set to recover costs of typical AC grid service.

V. Relief Requested

54. Tampa Electric requests authority to implement the DC Microgrid Pilot Program, as described herein, for a period of four years. During the Pilot, Tampa Electric will produce reports describing the results of the Pilot, success and or failure of the Pilot to produce the expected benefits and in the final report an assessment of the overall Pilot and whether a more permanent program to provide DC microgrid service as an alternative to standard AC service to residential subdivisions or other communities merits a tariff revision request to the PSC.

WHEREFORE, Tampa Electric requests that the Commission approve the company's proposed pilot program as requested herein.

DATED this 4th day of March, 2021.

Respectfully submitted,



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