APPENDIX B

Permissible Uses of Energy Allocation Initiative Funding

The State intends for the Energy Allocation Initiative to offer municipalities, counties, and other qualified government units the opportunity to pursue energy resilience through a broad range of available technologies. Below is a list of permissible uses for Energy Allocation Initiative funding.

The permissible use(s) ultimately pursued using Energy Allocation Initiative funding must comply with FEMA regulations and would need to meet FEMA minimum standards for HMGP awards, including a benefit-cost analysis.

Permissible Use	Description of Permissible Use
Permanent back-up or stand-by generator to be operated as an emergency generator (powered by *natural gas*)	A small capacity natural gas generator, typically in the 100 kW or smaller range but could be larger. The generator is installed permanently on-site and operates automatically when the distribution grid power is down. This includes a transfer switch and wiring of critical loads with a lock box. The generator must be operated as an emergency generator only as defined by the New Jersey Department of Environmental Protection (NJDEP). Engines powering generators that comply with all applicable regulations (including installation of air pollution control equipment) can be permitted as regular generators allowing them to operate during periods other than defined emergencies. The approximate cost for the installation of a permanent emergency generator is in the $450 per kW to $650 per kW range.
Permanent back-up or stand-by generator to be operated as an emergency generator (powered by *propane*)	A small propane capacity generator, typically in the 100 kW or smaller range but could be larger. The generator is installed permanently on-site and operates automatically when the distribution grid power is down. This includes a transfer switch and wiring of critical loads with a lock box. The generator must be operated as an emergency generator only as defined by NJDEP. Engines powering generators that comply with all applicable regulations (including installation of air pollution control equipment) can be permitted as regular generators allowing them to operate during periods other than defined emergencies. The approximate cost for the installation of a permanent emergency generator is in the $450 per kW to $650 per kW range.
Permanent back-up or stand-by generator to be operated as an emergency generator (powered by *diesel*)	A small diesel capacity generator, typically in the 100 kW or smaller range but could be larger. The generator is installed permanently on-site and operates automatically when the distribution grid power is down. This includes a transfer switch and wiring of critical loads with a lock box. The generator must be operated as an emergency generator only as defined by NJDEP. Engines powering generators that comply with all applicable regulations (including installation of air pollution control equipment) can be permitted as regular generators allowing them to operate during periods other than defined emergencies. The approximate cost for the installation of a permanent emergency generator is in the $450 per kW to $650 per kW range.
Permanent back-up or stand-by generator to be operated as an emergency generator (powered by *combination of sources or dual/trifuels*)	A small capacity generator, typically in the 100 kW or smaller range but could be larger. These generators can use a combination of fuels including diesel and natural gas. The generator is installed permanently on-site and operates automatically when the distribution grid power is down. This includes a transfer switch and wiring of critical loads with a lock box. The generator must be operated as an emergency generator only as defined by NJDEP. Engines powering generators that comply with all applicable regulations (including installation of air pollution control equipment) can be permitted as regular generators allowing them to operate during periods other than defined emergencies. The approximate cost for the installation of a permanent emergency generator is in the $450 per kW to $650 per kW range.

Permissible Use	Description of Permissible Use
Portable standby or back-up emergency generator (powered by *diesel*)	A small capacity diesel generator that is typically in the 5 kW to 10 kW range. The portable generator is brought to a site for use when the grid power is down. This could include a quick connect set up (aka a tap box and lockout unit). The generator must be operated as an emergency generator only as defined by NJDEP. Engines powering generators that comply with all applicable regulations (including installation of air pollution control equipment) can be permitted as regular generators allowing them to operate during periods other than defined emergencies. The approximate cost is in the $200 per kW to $450 per kW range.
Portable standby or back-up emergency generator (powered by *propane*)	A small capacity propane generator that is typically in the 5 kW to 10 kW range. The portable generator is brought to a site for use when the grid power is down. This could include a quick connect set up (aka a tap box and lockout unit). The generator must be operated as an emergency generator only as defined by NJDEP. Engines powering generators that comply with all applicable regulations (including installation of air pollution control equipment) can be permitted as regular generators allowing them to operate during periods other than defined emergencies. The approximate cost is in the $200 per kW to $450 per kW range.
Portable standby or back-up emergency generator (powered by *natural gas*)	A small capacity natural gas generator that is typically in the 5 kW to 10 kW range. The portable generator is brought to a site for use when the grid power is down. This could include a quick connect set up (aka a tap box and lockout unit). The generator must be operated as an emergency generator only as defined by NJDEP. Engines powering generators that comply with all applicable regulations (including installation of air pollution control equipment) can be permitted as regular generators allowing them to operate during periods other than defined emergencies. The approximate cost is in the $200 per kW to $450 per kW range.
Portable standby or back-up emergency generator (powered by *combination of sources or dual/trifuels*)	A small capacity dual/tri fuel generator that is typically in the 5 kW to 10 kW range. The portable generator is brought to a site for use when the grid power is down. This could include a quick connect set up (aka a tap box and lockout unit). The generator must be operated as an emergency generator only as defined by NJDEP. Engines powering generators that comply with all applicable regulations (including installation of air pollution control equipment) can be permitted as regular generators allowing them to operate during periods other than defined emergencies. The approximate cost is in the $200 per kW to $450 per kW range.
Solar generator	A small capacity solar generator that is typically in the 2 kW to 10 kW range. The portable generator is brought to a site for use when the grid power is down. This could include a quick connect set up (aka a tap box and lockout unit). No NJDEP air permit is required for this generator. This is a new technology and prices are provided on request.
Solar and diesel/gas hybrid generator	A small to mid-size capacity solar and diesel/gas hybrid generator that is typically in the 2 kW to 20 kW range. The portable generator is brought to a site for use when grid power is down. This could include a quick connect set up (i.e., a tap box and lockout unit). The generator must be operated as an emergency generator only as defined by NJDEP.
Quick Connect or Tap Box	Quick connects or tap boxes are devices that are installed in a building that allow for the installation of an emergency portable generator. These are permanent units that are installed outside the building and pass through the building. They connect to the building electric panel and ultimately the building electrical system. These devices readily allow a building to be powered by an emergency generator. The approximate cost is in the $100 per kW range.

Permissible Use	Description of Permissible Use
Off-grid inverter and backup battery storage for a facility with existing solar	There are currently 776 solar photovoltaic (PV) systems on public facilities including state, county, and municipal buildings in New Jersey. This is over 170 MW of installed solar PV capacity that produces over 204,000,000 kWh of electricity per year. Solar PV converts sunlight into electricity through solar panels. The direct current (DC) electricity generated must be converted to alternating current (AC) by an inverter to be used in plugs and lighting in buildings. Inverters typically shut down when a grid power outage is detected. This is a safety feature that is required by code to prevent electricity from feeding onto the grid during an outage, to allow work to be conducted on the grid. However, with the right equipment, including the appropriate transfer switches for critical loads, solar PV with backup battery storage can be disconnected from the grid, and supply power locally when there is a grid power outage. This system, which is a quieter and cleaner form of energy generation, could be an alternative to supplement or replace an emergency generator. A hybrid option is possible to link the existing PV solar system with the permanent or portable generator. This can extend the fuel liquid availability of the permanent or portable generator. This will require a transfer switch and wiring for all critical loads and a lock box. The approximate cost for the off grid inverter and backup batteries is in the range or $1,500 to $2,500 per kW depending on the cycle time to recharge and discharge the batteries and the overall time to provide stored electricity. The longer the timeframe to provide storage the higher the cost. This technology would require a detailed engineering study and design.
Feasibility Study –Distributed Energy Resources	This option is an energy study of a facility to determine the feasibility of designing, installing, and operating a distributed energy resource (DER) system at the facility as opposed to (or in addition to) just installing an emergency backup generator. DERs are any energy systems, equipment, or processes that are small, modular, and decentralized to provide onsite power as opposed to the customer obtaining power from the grid from larger, centralized power plants. DER systems are on-site energy systems connected on the customer's side of the meter as opposed to the utility's side of the meter. DER can include a complete energy package that includes demand response (DR), energy efficiency (EE), and distributive generation (DG). DER can be either grid-connected or off-grid energy systems located in or near the place where customers require energy. . A component of DER is distributive generation (DG) or on-site generation. DG is only the generation portion of DER without the DR and EE. DG generates power onsite at the point-of-use of the power as opposed to at large centralized facilities. The DG facility can generate both electricity and useful thermal energy for heating and cooling. Some typical DG systems are combined heat and power (CHP), fuel cells, microturbines, wind, solar photovoltaics (PV), and wind/solar with backup storage. The typical CHP system is powered by an engine or a turbine but can include any DG energy system. The NJBPU provides a no-cost energy audit through the New Jersey Clean Energy Program (NJCEP) in the Local Government Energy Audit program. This energy audit could provide a high level assessment of the applicability of a DER option for the local government facility. The typical cost for an energy audit at a municipal facility is in the $5,000 range. However, an engineering design evaluation would be required to determine the feasibility of the facility for any DER option. The approximate cost for a DER feasibility study is in the $10,000 to $60,000 range, and varies widely depending on the size of the facility and other factors.

Combined Heat and Power (CHP)	The NJBPU has provided rebates to 23 combined heat and power (CHP) natural-gas-fired facilities for over 85 MW and to 11 renewable biogas-fired energy CHP facilities for over 5.3 MW. CHP generates both electricity and useful thermal energy. Useful thermal energy can heat or contribute to process loads within a facility. The fuel used to power a CHP system is typically natural gas, but can also be a renewable fuel such as biogas from landfills or wastewater treatment facilities. In order for CHP to be cost effective the facility must have a use for heating processes throughout the year. Installing a CHP system instead of a back-up generator may reduce operating costs year-round and improve resiliency during disaster events. Typical sizes for CHP units range from 10 kW to 20 MW. The approximate cost for a natural gas fired CHP system is in the range of $2,000 to $3,000 per kW. A NJDEP permit is required, but systems under 3 MW using conventional fuels can obtain a general air permit. This technology would require a detailed engineering study and design. Adding islanding capabilities in order to operate as a microgrid could add 10% to 30% to the overall cost. Additional incentives may be available to pursue this type of technology.
Fuel Cells	The NJBPU has provided rebates to 8 fuel cell facilities powered by natural-gas-fired facilities for 1.5 MW. A fuel cell is a device that converts the chemical energy from a fuel into electricity through a chemical reaction with oxygen or another oxidizing agent. Hydrogen powers the fuel cell and a common source of hydrogen is natural gas or renewable biogases. Fuel cells are different from batteries in that they require a constant source of fuel and oxygen from the air to sustain the chemical reaction. However, fuel cells can produce electricity continually for as long as the fuel and oxygen are supplied. They are extremely quiet sources of energy and have almost zero air emissions. The approximate cost for a natural-gas-fired fuel cell is in the range of $4,000 to $7,000 per kW. Systems under 500 kW and powered by natural gas can receive an air permit by rule. This technology would require a detailed engineering study and design. Adding islanding capabilities in order to operate as a microgrid could add $200 to $1,000 per kW to the overall cost. Additional incentives may be available to pursue this type of technology.
Retrofitting existing construction to connect building to "microgrid"	A microgrid is a group of interconnected electrical loads and distributed energy resources (DER) with clearly defined electrical boundaries that acts as a single controllable entity with respect to the electric distribution or transmission grid. A microgrid can connect and disconnect from the grid to enable it to operate in either "grid connected" or "island mode." Island mode means that a site can operate independent of the larger grid system. DER systems can be designed and constructed to operate independent of and isolated from the distribution grid (island mode). Examples are an emergency backup generator with a transfer switch; a solar PV system equipped with a dynamic inverter and transfer switch; a CHP system; and/or a fuel cell. If designed to be islanded, these energy systems can power the facility during and after a storm or other event if there is a grid outage for any period of time. The cost to have a distributed generator such as CHP, or a fuel cell, operating isolated from and independent from the grid in island mode as a microgrid, is relatively small if included in the new design of a new facility. Retrofitting an existing building and existing generator system could approximately cost in the $1,000 per kW range.
Connecting to an existing on-site solar, fuel cell, or CHP generator for emergency or continuous power	A local government customer may connect to an existing on-site solar, fuel cell or CHP generator as an end-use customer of the existing solar, fuel cell or CHP generator provided they are located on the same property or contiguous to the existing generator. The additional end use customer would be contiguous if they were geographically located next to each other or are separated by a street, road, or right of way. The additional end use customer, in this case, would be considered part of the site and not a public utility. The onsite generator and additional end-use customer must maintain the one-call notification and reporting system requirements. This technology would require a detailed engineering study and design. The cost would depend on the overall power needs of the end use customer and the availability of additional power from the on-site generator.
Other Innovative Uses to Support Energy Resilience	Other available technologies may be appropriate for consideration and should be identified to the NJ Office of Emergency Management for consideration by the State.

Special note regarding energy technologies and solutions: Before purchasing any equipment powered by natural gas, the applicant is advised to contact the local gas utility to determine if there is access to natural gas at the appropriate

pressure. Before purchasing any electric generating equipment, the applicant should contact the local electric utility to determine if any interconnection review is required. Before purchasing any equipment, the applicant should contact their local code officials to determine the appropriate building code requirements. Other permitting and FEMA/State restrictions may also apply.