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February 25, 2019

VIA ELECTRONIC FILING
Mr. Adam Teitzman
Commission Clerk
Florida Public Service Commission
Betty Easley Conference Center
2540 Shumard Oak Boulevard, Room 110
Tallahassee, FL 32399-0850

Re: Docket No. 20190034-EI
FPL's Responses to Staff's First Data Request

Dear Mr. Teitzman:

Enclosed are Florida Power & Light Company's responses to Staff's First Data Request (Data Request Nos. 1-23 and Document Requests 1-3) in Docket No. 20190034-EI.

Please contact me if you or your Staff has any questions regarding this filing.

Sincerely,

s/ Maria Jose Moncada
Maria Jose Moncada

Enclosures
cc: Walt Trierweiler

:7144333

QUESTION:
Please generally describe the type(s)/operating specifications of generators contemplated and/or planned for use in effectuating Florida Power & Light's (FPL or Company) Optional Supplemental Power Services Pilot Program (OSPS).

RESPONSE:
The operating specifications of generators for use in effectuating FPL's OSPS Program will depend on each customer's needs and premises. FPL also recognizes that generator technology will change over time. Based on information known today, the types of back-up power generators contemplated for use include:

1) "Whole House" residential standby generators – primarily 120/240V single-phase, stationary generators fueled by either natural gas or liquid propane, ranging in size from approximately 10kW to over 50kW. These generators may be either air-cooled or liquid-cooled. They are installed on a concrete pad adjacent to the home and typically connected to the customer's electrical loads through electrical breakers or transfer switches. They are typically mass-produced for lighter-duty operation and built economically to appeal to residential users.

2) Commercial standby generators – either single-phase or three-phase stationary generators, fueled by natural gas, liquid propane or diesel fuel, ranging in size from approximately 20kW to over 60kW. These generators are often water-cooled and are typically used for small-to-medium commercial applications that do not have demanding load requirements. They are installed on a concrete pad adjacent to the business and typically connected to all or a designated portion of the customer's electrical loads through electrical breakers or transfer switches.

3) Large Commercial / Industrial "Heavy Duty" standby generators – three-phase stationary generators typically fueled by diesel or natural gas, ranging in size from approximately 50 kW to over 2MW. These generators are water-cooled and are installed within specially-built enclosures or within dedicated generator rooms. These generators are typically custom-built for the application and designed to meet demanding, critical load uses. They are typically connected to the customer's entire electrical load or to special, dedicated backed-up load circuits, often through multiple electrical breakers or transfer switches.

QUESTION:

Please refer to page 1 of the Petition for Approval of Optional Supplemental Power Services Pilot Program and Rider (Petition) for the following question. Please specify what "power conditioning equipment" is referring to and explain what power conditioning service is (as shown in tariff sheet No. 8.845

RESPONSE:

Power conditioning equipment refers to equipment designed to mitigate shorter-term power quality disturbances, such as voltage swells, sags, transient/lightning surges and momentary interruptions. A common type of power conditioning equipment is an Uninterruptible Power Supply (UPS) battery / energy storage unit, which is designed to ensure that customers' sensitive electronic equipment receives uninterrupted power free from any form of voltage disturbances. Power conditioning service can be provided through FPL-installed, owned and maintained equipment provided under Optional Supplemental Power Services.

QUESTION:
Please refer to page 4, section 7 of the Petition for the following request. Please elaborate on what types of equipment/costs are potentially contemplated by the passage: "[a]ny equipment installed by the Company that is not necessary to support OSPS service to the customer will not be included in the customers' monthly payment."

RESPONSE:
During the pilot, FPL will seek to identify and further understand not only the customer-specific benefits of utility owned, operated and maintained back-up generators and power conditioning equipment, but also any potential to utilize this equipment to benefit the overall operation of the grid. FPL may install additional equipment, such as interconnection, dispatch, control and/or monitoring equipment, which would enable FPL to dispatch the equipment to assist with meeting system emergencies and other conditions for which the equipment may benefit grid operations. This special equipment would also be intended to assist FPL with monitoring results and evaluating opportunities to use OSPS assets to benefit the general operation of FPL's grid. The equipment would only be installed upon the customer's consent that FPL may dispatch the equipment for such uses. The cost of the special equipment would not be included in the costs attributed to the customer for their site-specific need.

Opportunities to use the OSPS assets for additional, beneficial purposes will be evaluated on a project-by-project basis and are anticipated to be limited to a small set of project installations.

QUESTION:

Please refer to page 5, section 12 of the Petition for the following questions.

a. FPL is requesting to record OSPS-related investments in Federal Energy Regulatory Commission Accounts 371 - Installations on Customer Premises, and 372 - Leased Property on Customers' Premises. Given the nature of the equipment is electrical energy generation, why are these investments considered distribution assets and not production assets?

b. Given the nature of the OSPS equipment is electrical energy generation, are there any environmental or safety-related regulatory concerns with the Company owning and operating such equipment? If so, please discuss.

c. Please generally discuss the factors which lead the Company to propose "heavy-duty generators" having double the assumed useful life (20-year) of "light-duty generators" (10-year).

d. Please list all known additional/accessory equipment to the light- and heavy-duty generators which the Company intends to capitalize in effectuating the OSPS Program.

RESPONSE:

a. The type of generator anticipated to be installed under OSPS is a "standby" or "back-up" generator, which is intended to provide back-up power to customers at their premise when a power outage occurs on the utility grid, and for routine testing. This is as opposed to a "main" power generator in a production facility designed to provide primary continuous electrical energy generation to an individual or group of customers.

b. FPL does not foresee any unique environmental or safety-related regulatory concerns with Company-owned / operated back-up generator equipment at customers' premises. FPL expects environmental and safety issues to be consistent with installation and operation of customer-owned / maintained back-up generators currently installed and operating across FPL's service area. Environmental and safety-related considerations are addressed during generator system design, permitting and within standard operating procedures. FPL plans to use internal subject matter experts and qualified, external generator design / installation / service companies with expertise in these areas to ensure that all relevant considerations are met for installations under the OSPS program.

c. Heavy-duty generators are designed and built to meet the more rigorous loads associated with commercial and industrial facilities. Because these loads are typically critical in nature, heavy-duty generators are built as custom, highly-durable units to ensure reliable operation for extended periods of time. These generators are built with rugged engines, heavily-wound alternators, advanced fuel and cooling systems, and strong steel skids. Enclosures are typically custom-built to withstand harsh environmental conditions. All of these factors, along with rigorous preventative maintenance schedules specified by these generator manufacturers, lead to a more durable, longer-lasting generator set compared to light-duty generators.

d. In addition to the generator unit itself and various integral components of the unit such as batteries, chargers, generator controls, cooling and exhaust system components, additional equipment would vary based on customer-specific requirements but would typically include: automatic transfer switches, electrical breakers and panels, electrical cable and connections, surge protection, lightning and grounding systems, conduit, enclosure, fuel tank / system, and concrete pad required to complete a functional generator installation.

QUESTION:
Has the Company installed any OSPS-related equipment to date? If so, please identify the assets installed and dates of installation.

RESPONSE:
No, FPL has not installed any OSPS-related equipment to date.

QUESTION:

Is FPL currently recording any plant depreciation associated with the OSPS Program?
a. If the response to Request No. 6 is affirmative, is the Company requesting any plant in service and accumulated depreciation transfers be performed as part of this docket?
b. If the response to Request No. 6(a.) is affirmative, please specify: amounts to be transferred; accounts in which the property/balances are currently being depreciated; and accounts to which the property/balances are being transferred to.

RESPONSE:

No.

a. N/A
b. N/A

QUESTION:
Has FPL estimated the total three-year capital cost associated with the OSPS Pilot Program? If so, please specify the estimated capital cost of the program by year.

RESPONSE:
Yes, for purposes of initial planning and budgeting, FPL estimated the following capital expenditure ranges:

Annual Capital Expenditure ($ MM) - OSPS Pilot

	Year 1	Year 2	Year 3
Low Range	0.3	1.5	2.9
High Range	0.6	6.0	12.7

In establishing these estimates, FPL considered factors such as: (1) current market interest in back-up generators (gained from discussions with generator manufacturers and installers); (2) building customer awareness of the FPL back-up power service offering; (3) implementation of new processes associated to the pilot program; and (4) estimated lead times to initially assess, then design, construct and commission new installations. Based on the level of customer interest and participation in utility-provided, customer-sited back-up power services, FPL expects that actual capital expenditures during the pilot may vary from these initial estimates.

QUESTION:
Does FPL have any indication/estimation as to the future customer mix (i.e. residential, commercial, etc.) of the OSPS for the three-year duration of the pilot program? If so, please discuss, including what type of commercial customers expects to take service under this tariff.

RESPONSE:
FPL has learned that residential, commercial, industrial and institutional customers have interest in a back-up power service offering; however, there is uncertainty regarding the ultimate mix of customers that may elect to participate in such an offering. A key objective of the Pilot is to gain information about the benefits, costs, and optimal economic implementation of customer-sited, FPL-provided back-up power services for each group. During the three-year pilot program, based on planning assumptions, FPL expects to respond to collectively several hundred OSPS-related back-up power service inquiries from these customer groups, and expects a higher count of the inquiries to come from residential customers due to the overall number of customers within that customer group. At this time – without the benefit of data from the Pilot – FPL expects more non-residential customers will participate in the Program because their interest is driven by economics and operational needs.

From past experience in responding to power outage / disturbance inquiries from customers, FPL knows that some residential customers desire the comfort and security provided by having continuous power, such as provided through whole-home back-up generators, during the periodic power outages that might occur– like Florida's extreme weather. Certain commercial, industrial and institutional customers elect to install back-up power solutions due to the potential for business disruption and financial loss. Based on inquiries made by FPL customers over the years, certain business segments – such as manufacturers, governmental utility and administrative operations, various types of institutional facilities, retail stores, gas stations, media operations, and an increasing range of other small and medium businesses that require continuous power for information technology equipment – often find it advantageous to have on-site back-up power and / or power conditioning equipment to allow continuation of their operations. Electing to participate in an FPL-provided back-up power service offering will allow these businesses to focus their personnel and capital on core business functions, as opposed to having to take responsibility for managing back-up power equipment selection, purchase, design, installation and operation issues.

QUESTION:
Is the Company aware of any other electric utility in the United States that has received regulatory approval for average service life and net salvage values for the purposes of depreciating customer-sited electricity generators/OSPS equipment similar to the type(s) FPL will deploy? Is so, please identify the utility or utilities and specify the approved service life and net salvage values.

RESPONSE:
FPL is not aware of any electric utility receiving the approval for these depreciation rates and service lives.

QUESTION:

Please refer to page 5, section 12 of the Petition. According to the Company: ". . . FPL consulted with its electrical subject matter experts, original generator equipment manufacturers and benchmarked generator industry data to conclude that a ten-year and twenty-year estimated useful life and net salvage of 0% is reasonable and appropriate for residential/small commercial light-duty generators and heavy-duty generators, respectively."

a. Please identify the "subject matter experts" being referenced in this passage.

b. Please identify the "original equipment manufacturers" being referenced in this passage.

c. Please further elaborate on the "benchmarked generator industry data" being referenced in this passage.

d. Will the residential/small commercial light-duty, as well as heavy-duty generators carry a manufacturer's warranty when purchased by FPL? If so, please specify or approximate the typical warranty duration.

RESPONSE:

a. The referenced subject matter experts include FPL's staff of engineering and accounting professionals who, for the purpose of establishing the useful life and net salvage estimations, consulted with multiple electrical construction firms within Florida that have significant, direct experience with and detailed knowledge of installing and servicing residential and commercial / industrial generators.

b. FPL received information from major generator equipment manufacturers including Caterpillar, Cummins and Generac.

c. FPL obtained generator industry data from secondary sources obtained via online searches. Please see response to Staff's First Set of Data Request POD No. 1 for detailed information.

d. Yes. It is FPL's intent to seek the longest warranty available for OSPS installations. For residential/small commercial light-duty generators, the longest warranty is typically 10 years. For heavy-duty generators, warranties and/or extended service plans can extend longer than 10 years assuming that all required preventative maintenance is performed. These large generator longer-term warranties/service plans are typically negotiated with the generator manufacturer.

QUESTION:
Does the OSPS program include such equipment as a battery back-up, rather than diesel or petrol generator for providing uninterrupted energy supply to its customers?

RESPONSE:
Yes. The OSPS Program is designed to accommodate battery back-up, as well as any other technology that constitutes or in the future would constitute power conditioning equipment.

QUESTION:
Please detail how the Company would account for a generator sited on customer premises that is rendered inoperable prior to its assumed useful life.

RESPONSE:
As noted in response to Staff's First Set of Data Request No. 10 d., FPL will pursue long-term warranties and service contracts for the term of the equipment's useful life; or, if not available for the full equipment useful life, then for the longest term offered from the equipment manufacturer. These costs of the warranty will be included in the customer's OSPS monthly service payment and are necessary to ensure the equipment remains operable through its assumed useful life. The OSPS Agreement addresses cases in which the equipment may become inoperable due to situations outside breakdown or normal wear-and-tear, such as situations where the equipment is rendered inoperable due to forces beyond FPL's or the customer's control. Customers would be required to carry insurance that covers property damage. (OSPS Agreement 18(b)). If the customer's insurance does not cover the incident, FPL would be responsible for repairs (OSPS Agreement 12(d)). OSPS pricing accounts for a reserve to repair or replace damaged equipment that is not covered by insurance and to account for insurance deductibles. This reserve is an additional protection to ensure that the OSPS revenues cover all OSPS costs. If damage is due to the actions or negligence of the customer or its contractors, agents or guests, the customer would be financially responsible for repair costs (OSPS Agreement 12(c)).

QUESTION:
Please explain and provide support for the cost of installation included in capital costs for the OSPS.

RESPONSE:
Capital costs under the OSPS Rider will include the cost of the selected equipment and cost of installation. The cost of installation included in capital costs may include, but is not limited to engineering, surveys, construction plans, permits, site preparation, miscellaneous materials such as conduit, wire and concrete pads, construction labor and project management labor. All of these installation-related costs, along with the cost of the equipment, are associated with the initial installation of a functional back-up generation installation.

Please see the table below for indicative cost of installation ranges for various-sized "heavy-duty" generator projects.

	Estimated Engineering / Survey Costs			Estimated Plans / Permitting Costs			Estimated Construction-related site preparation, Misc. Material, Labor, Proj Mgmt Costs			Cost of Installation Examples		
Gen size (kW)	Low Range	Mid Range	High Range	Low Range	Mid Range	High Range	Low Range	Mid Range	High Range	Low Range	Mid Range	High Range
50	$600	$700	$800	$900	$1,000	$1,100	$19,000	$ 23,800	$28,600	$20,500	$25,500	$30,500
100	$1,100	$1,300	$1,500	$1,100	$1,300	$1,500	$33,200	$ 41,500	$49,800	$35,400	$44,100	$52,800
250	$2,800	$3,200	$3,600	$2,100	$2,400	$2,700	$62,800	$ 78,600	$94,400	$67,700	$84,200	$100,700
500	$6,200	$6,900	$7,600	$3,600	$4,100	$4,600	$108,800	$ 136,100	$163,400	$118,600	$147,100	$175,600
750	$10,000	$11,200	$12,400	$6,100	$6,800	$7,500	$178,800	$ 223,600	$268,400	$194,900	$241,600	$288,300
1000	$12,900	$14,400	$15,900	$7,700	$8,600	$9,500	$229,200	$ 286,600	$344,000	$249,800	$309,600	$369,400
1250	$17,800	$19,800	$21,800	$10,700	$11,900	$13,100	$315,800	$ 394,800	$473,800	$344,300	$426,500	$508,700
1500	$22,600	$25,200	$27,800	$13,500	$15,100	$16,700	$402,700	$ 503,400	$604,100	$438,800	$543,700	$648,600
2000	$30,400	$33,800	$37,200	$18,200	$20,300	$22,400	$540,000	$ 675,100	$810,200	$588,600	$729,200	$869,800
2500	$42,100	$46,800	$51,500	$25,200	$28,100	$31,000	$747,600	$ 934,600	$1,121,600	$814,900	$1,009,500	$1,204,100
3000	$50,200	$55,800	$61,400	$30,100	$33,500	$36,900	$892,500	$ 1,115,700	$1,338,900	$972,800	$1,205,000	$1,437,200

NOTES
1) Estimated cost data is for illustrative purposes only; actual, project-specific costs will vary from examples
2) Data is based on general information from electrical contractors that perform generator installations
3) Examples represent commercial / industrial "heavy-duty" generator installation costs

Based on discussions with Florida residential back-up generator installers, the cost of installation for "whole home" stationary back-up generators can range from $5,000 to over $20,000.

The cost of installation, as well as equipment costs, will vary significantly based on the type of equipment installed, the scope of electrical work required for the installation, and numerous customer-site specific conditions and requirements. Before any construction begins, FPL will obtain actual proposals from generator contractors in order to develop the OSPS monthly service payment amount for the customer. FPL will only incur project-specific capital costs after the customer elects to participate and executes an Optional Supplemental Power Services Agreement.

QUESTION:
Please provide the formulas to calculate the participants' monthly fixed charge, including any projected capital, operating, and non-fuel maintenance costs. Please include the variations for customer types and equipment types. Spreadsheets may be appropriate.

RESPONSE:
Please see attached OSPS Pricing spreadsheet and three representative examples: residential (light-duty), commercial business and industrial business (heavy-duty) generator installations. All formulas are intact. The spreadsheet includes an Input sheet into which capital costs and projected expenses are entered (costs to be obtained during the evaluation/engineering study steps of the OSPS process), and contract term length and generator type are selected. The Input sheet also includes the current income tax rates and capital structure values used in performing calculations. The spreadsheet next performs calculations using formulas within the Payment Calculation sheet, which calculates the installation's revenue requirements and levelizes those revenue requirements over the equipment useful life period. The customer's OSPS monthly service payment amount is then presented on the Output sheet.

The three example spreadsheets include illustrative capital and expense costs for variations in customer types and equipment types, resulting in representative output monthly service payment amounts for these variations.

YELLOW CELLS - DATA INPUT REQUIRED

Initial Contract Term	20 yrs
Project Type	Medium / Large (Heavy Duty) Generator
Book Life / Equipment Useful Life (EUL)	20 yrs

Total Capital Cost	

On going Expenses	
Annual O&M Expenses	
Annual Program G&A	

TAX RATES

State Income Tax Rate	5.50%
Federal Income Tax Rate	21.00%
Blended Income Tax Rate	**25.345%**

TABLE 1		**Total Capital Structure**		**Investor Sources**	
Current Capital Structure (Dec 2018 ESR Schedule 4 pg 2of2 Average Midpoint)	**Cost Rate**	**Percent of Capital Structure**	**Pre-Tax Weighted Cost of Capital**	**Percent of Investor Sources**	**After-Tax Weighted Cost of Investor Sources**
Long Term Debt	4.41%	28.19%	1.24%	36.8%	1.21%
Short Term Debt	2.74%	2.75%	0.08%	3.6%	0.07%
Preferred Stock	0.00%	0.00%	0.00%	na	na
Common Equity	10.55%	45.64%	6.45%	59.6%	6.29%
Customer Deposits	2.08%	1.11%	0.02%	na	na
Deferred Income Taxes	0.00%	21.60%	0.00%	na	na
Investment Tax Credits	8.21%	0.71%	0.06%	na	na
Weighted Average Cost of Capital		**100%**	**7.85%**	100.0%	7.57%

Project Type	**Book Life / EUL**
Residential (Light Duty) Generator	10
Small Commercial (Light Duty) Generator	10
Medium / Large (Heavy Duty) Generator	20

REVENUE REQUIREMENT - SUMMARY

Year				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Discount Factor	wacc	7.57%	Escalation	0.93	0.86	0.80	0.75	0.69	0.65	0.60	0.56	0.52	0.48	0.45	0.42	0.39	0.36	0.33	0.31	0.29	0.27	0.25	0.23
Revenue Requirement		**CPVRR**																					
Operations and Maintenance	-	-	2.50%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G&A	-	-	2.50%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Property Tax	1.75%	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Insurance	0.053%	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Depreciation		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Return on Capital		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Revenue Requirement		-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EUL Term	20			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Levelized Tariff - Annual- pre-reserve	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bad Debt / Loss Reserve	6.0%	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Levelized Tariff - Annual	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Levelized Tariff - Monthly	-																						

REVENUE REQUIREMENT - CALCULATION

Book Accounting																							
Book, Beginning				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Investment	-			-																			
Book Depreciation	**20 yr**			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Book, Ending				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rate Base, Average				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pre-Tax Cost of Capital	7.85%			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Optional Supplemental Power Services
Pricing Spreadsheet

Contract Term	20	years
Number of Payments	240	monthly payments
Monthly Service Payment Amount (1)	$ -	

(1) Subject to Applicable Taxes

YELLOW CELLS - DATA INPUT REQUIRED - **RESIDENTIAL LIGHT DUTY WHOLE HOUSE GENERATOR EXAMPLE**

Initial Contract Term	10 yrs
Project Type	Residential (Light Duty) Generator
Book Life / Equipment Useful Life (EUL)	10 yrs

Total Capital Cost	$15,000	(SEE NOTE 1)

On going Expenses		
Annual O&M Expenses	$500	(SEE NOTE 1)
Annual Program G&A	$500	(SEE NOTE 1)

NOTE 1: ESTIMATES FOR ILLUSTRATIVE PURPOSES; ACTUAL COSTS CONTINGENT ON SPECIFIC PROJECT REQUIREMENTS

TAX RATES

State Income Tax Rate	5.50%
Federal Income Tax Rate	21.00%
Blended Income Tax Rate	**25.345%**

TABLE 1		**Total Capital Structure**		**Investor Sources**	
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Customer Deposits	2.08%	1.11%	0.02%	na	na
Deferred Income Taxes	0.00%	21.60%	0.00%	na	na
Investment Tax Credits	8.21%	0.71%	0.06%	na	na
Weighted Average Cost of Capital		**100%**	**7.85%**	100.0%	7.57%

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Residential (Light Duty) Generator	10
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Revenue Requirement		**CPVRR**																					
Operations and Maintenance	500.0	3,776.0	2.50%	500.0	512.5	525.3	538.4	551.9	565.7	579.8	594.3	609.2	624.4	-	-	-	-	-	-	-	-	-	-
G&A	500.0	3,776.0	2.50%	500.0	512.5	525.3	538.4	551.9	565.7	579.8	594.3	609.2	624.4	-	-	-	-	-	-	-	-	-	-
Property Tax	1.75%	1,094.9		262.5	236.3	210.0	183.8	157.5	131.3	105.0	78.8	52.5	26.3	-	-	-	-	-	-	-	-	-	-
Insurance	0.053%	33.2		8.0	7.2	6.4	5.6	4.8	4.0	3.2	2.4	1.6	0.8	-	-	-	-	-	-	-	-	-	-
Depreciation		10,261.9		1,500.0	1,500.0	1,500.0	1,500.0	1,500.0	1,500.0	1,500.0	1,500.0	1,500.0	1,500.0	-	-	-	-	-	-	-	-	-	-
Return on Capital		4,508.4		1,118.6	1,000.8	883.1	765.3	647.6	529.8	412.1	294.4	176.6	58.9	-	-	-	-	-	-	-	-	-	-
Revenue Requirement		**23,450.4**		**3,889.0**	**3,769.2**	**3,650.1**	**3,531.5**	**3,413.7**	**3,296.5**	**3,180.0**	**3,064.2**	**2,949.1**	**2,834.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
EUL Term	10			1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Levelized Tariff - Annual- pre-reserve	3,427.8	23,450.4		3,427.8	3,427.8	3,427.8	3,427.8	3,427.8	3,427.8	3,427.8	3,427.8	3,427.8	3,427.8	-	-	-	-	-	-	-	-	-	-
Bad Debt / Loss Reserve	6.0%	1,407.0		205.67	205.67	205.67	205.67	205.67	205.67	205.67	205.67	205.67	205.67	-	-	-	-	-	-	-	-	-	-
Levelized Tariff - Annual	3,633	24,857.4		3,633	3,633	3,633	3,633	3,633	3,633	3,633	3,633	3,633	3,633	-	-	-	-	-	-	-	-	-	-
Levelized Tariff - Monthly	302.79																						

REVENUE REQUIREMENT - CALCULATION

Book Accounting																							
Book, Beginning				-	13,500.0	12,000.0	10,500.0	9,000.0	7,500.0	6,000.0	4,500.0	3,000.0	1,500.0	-	-	-	-	-	-	-	-	-	-
Investment	15,000			15,000.0																			
Book Depreciation	**10 yr**			(1,500.0)	(1,500.0)	(1,500.0)	(1,500.0)	(1,500.0)	(1,500.0)	(1,500.0)	(1,500.0)	(1,500.0)	(1,500.0)	-	-	-	-	-	-	-	-	-	-
Book, Ending				13,500.0	12,000.0	10,500.0	9,000.0	7,500.0	6,000.0	4,500.0	3,000.0	1,500.0	-	-	-	-	-	-	-	-	-	-	-
Rate Base, Average				14,250	12,750	11,250	9,750	8,250	6,750	5,250	3,750	2,250	750	-	-	-	-	-	-	-	-	-	-
Pre-Tax Cost of Capital	7.85%			1,119	1,001	883	765	648	530	412	294	177	59	-	-	-	-	-	-	-	-	-	-

Optional Supplemental Power Services
Pricing Spreadsheet

Contract Term		10	years
Number of Payments		120	monthly payments
Monthly Service Payment Amount (1)	$	303	

(1) Subject to Applicable Taxes

YELLOW CELLS - DATA INPUT REQUIRED - **100 KW COMMERCIAL / HEAVY DUTY GENERATOR EXAMPLE**

Initial Contract Term	20 yrs
Project Type	Medium / Large (Heavy Duty) Generator
Book Life / Equipment Useful Life (EUL)	20 yrs

Total Capital Cost	$90,000	(SEE NOTE 1)

On going Expenses		
Annual O&M Expenses	$1,250	(SEE NOTE 1)
Annual Program G&A	$1,500	(SEE NOTE 1)

NOTE 1: ESTIMATES FOR ILLUSTRATIVE PURPOSES; ACTUAL COSTS CONTINGENT ON SPECIFIC PROJECT REQUIREMENTS

TAX RATES

State Income Tax Rate	5.50%
Federal Income Tax Rate	21.00%
Blended Income Tax Rate	**25.345%**

TABLE 1		**Total Capital Structure**		**Investor Sources**	
Current Capital Structure (Dec 2018 ESR Schedule 4 pg 2of2 Average Midpoint)	**Cost Rate**	**Percent of Capital Structure**	**Pre-Tax Weighted Cost of Capital**	**Percent of Investor Sources**	**After-Tax Weighted Cost of Investor Sources**
Long Term Debt	4.41%	28.19%	1.24%	36.8%	1.21%
Short Term Debt	2.74%	2.75%	0.08%	3.6%	0.07%
Preferred Stock	0.00%	0.00%	0.00%	na	na
Common Equity	10.55%	45.64%	6.45%	59.6%	6.29%
Customer Deposits	2.08%	1.11%	0.02%	na	na
Deferred Income Taxes	0.00%	21.60%	0.00%	na	na
Investment Tax Credits	8.21%	0.71%	0.06%	na	na
Weighted Average Cost of Capital		**100%**	**7.85%**	100.0%	7.57%

Project Type	**Book Life / EUL**
Residential (Light Duty) Generator	10
Small Commercial (Light Duty) Generator	10
Medium / Large (Heavy Duty) Generator	20

REVENUE REQUIREMENT - SUMMARY

Year				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Discount Factor	wacc	7.57%	Escalation	0.93	0.86	0.80	0.75	0.69	0.65	0.60	0.56	0.52	0.48	0.45	0.42	0.39	0.36	0.33	0.31	0.29	0.27	0.25	0.23
Revenue Requirement		**CPVRR**																					
Operations and Maintenance	1,250.0	15,263.5	2.50%	1,250.0	1,281.3	1,313.3	1,346.1	1,379.8	1,414.3	1,449.6	1,485.9	1,523.0	1,561.1	1,600.1	1,640.1	1,681.1	1,723.1	1,766.2	1,810.4	1,855.6	1,902.0	1,949.6	1,998.3
G&A	1,500.0	18,316.2	2.50%	1,500.0	1,537.5	1,575.9	1,615.3	1,655.7	1,697.1	1,739.5	1,783.0	1,827.6	1,873.3	1,920.1	1,968.1	2,017.3	2,067.8	2,119.5	2,172.4	2,226.8	2,282.4	2,339.5	2,398.0
Property Tax	1.75%	10,255.2		1,575.0	1,496.3	1,417.5	1,338.8	1,260.0	1,181.3	1,102.5	1,023.8	945.0	866.3	787.5	708.8	630.0	551.3	472.5	393.8	315.0	236.3	157.5	78.8
Insurance	0.053%	310.6		47.7	45.3	42.9	40.5	38.2	35.8	33.4	31.0	28.6	26.2	23.9	21.5	19.1	16.7	14.3	11.9	9.5	7.2	4.8	2.4
Depreciation		45,621.8		4,500.0	4,500.0	4,500.0	4,500.0	4,500.0	4,500.0	4,500.0	4,500.0	4,500.0	4,500.0	4,500.0	4,500.0	4,500.0	4,500.0	4,500.0	4,500.0	4,500.0	4,500.0	4,500.0	4,500.0
Return on Capital		44,208.8		6,888.0	6,534.8	6,181.6	5,828.3	5,475.1	5,121.9	4,768.6	4,415.4	4,062.2	3,708.9	3,355.7	3,002.5	2,649.2	2,296.0	1,942.8	1,589.5	1,236.3	883.1	529.8	176.6
Revenue Requirement		**133,976.0**		**15,760.7**	**15,395.1**	**15,031.2**	**14,669.1**	**14,308.7**	**13,950.3**	**13,593.7**	**13,239.0**	**12,886.4**	**12,535.8**	**12,187.3**	**11,840.9**	**11,496.8**	**11,154.9**	**10,815.3**	**10,478.0**	**10,143.2**	**9,810.9**	**9,481.2**	**9,154.0**
EUL Term	20			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Levelized Tariff - Annual- pre-reserve	13,215.0	133,976.0		13,215.0	13,215.0	13,215.0	13,215.0	13,215.0	13,215.0	13,215.0	13,215.0	13,215.0	13,215.0	13,215.0	13,215.0	13,215.0	13,215.0	13,215.0	13,215.0	13,215.0	13,215.0	13,215.0	13,215.0
Bad Debt / Loss Reserve	6.0%	8,038.6		792.90	792.90	792.90	792.90	792.90	792.90	792.90	792.90	792.90	792.90	792.90	792.90	792.90	792.90	792.90	792.90	792.90	792.90	792.90	792.90
Levelized Tariff - Annual	14,008	142,014.6		14,008	14,008	14,008	14,008	14,008	14,008	14,008	14,008	14,008	14,008	14,008	14,008	14,008	14,008	14,008	14,008	14,008	14,008	14,008	14,008
Levelized Tariff - Monthly	1,167.32																						

REVENUE REQUIREMENT - CALCULATION

Book Accounting																							
Book, Beginning				-	85,500.0	81,000.0	76,500.0	72,000.0	67,500.0	63,000.0	58,500.0	54,000.0	49,500.0	45,000.0	40,500.0	36,000.0	31,500.0	27,000.0	22,500.0	18,000.0	13,500.0	9,000.0	4,500.0
Investment	90,000			90,000.0																			
Book Depreciation	20 yr			(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)	(4,500.0)
Book, Ending				85,500.0	81,000.0	76,500.0	72,000.0	67,500.0	63,000.0	58,500.0	54,000.0	49,500.0	45,000.0	40,500.0	36,000.0	31,500.0	27,000.0	22,500.0	18,000.0	13,500.0	9,000.0	4,500.0	-
Rate Base, Average				87,750	83,250	78,750	74,250	69,750	65,250	60,750	56,250	51,750	47,250	42,750	38,250	33,750	29,250	24,750	20,250	15,750	11,250	6,750	2,250
Pre-Tax Cost of Capital	7.85%			6,888	6,535	6,182	5,828	5,475	5,122	4,769	4,415	4,062	3,709	3,356	3,002	2,649	2,296	1,943	1,590	1,236	883	530	177

Optional Supplemental Power Services
Pricing Spreadsheet

Contract Term	20	years
Number of Payments	240	monthly payments
Monthly Service Payment Amount (1)	$ 1,167	

(1) Subject to Applicable Taxes

YELLOW CELLS - DATA INPUT REQUIRED - **1,000 KW INDUSTRIAL / HEAVY DUTY GENERATOR EXAMPLE**

Initial Contract Term	20 yrs
Project Type	Medium / Large (Heavy Duty) Generator
Book Life / Equipment Useful Life (EUL)	20 yrs

Total Capital Cost	$650,000	(SEE NOTE 1)

On going Expenses		
Annual O&M Expenses	$4,500	(SEE NOTE 1)
Annual Program G&A	$4,750	(SEE NOTE 1)

NOTE 1: ESTIMATES FOR ILLUSTRATIVE PURPOSES; ACTUAL COSTS CONTINGENT ON SPECIFIC PROJECT REQUIREMENTS

TAX RATES

State Income Tax Rate	5.50%
Federal Income Tax Rate	21.00%
Blended Income Tax Rate	**25.345%**

TABLE 1

Current Capital Structure (Dec 2018 ESR Schedule 4 pg 2of2 Average Midpoint)	Cost Rate	Total Capital Structure: Percent of Capital Structure	Total Capital Structure: Pre-Tax Weighted Cost of Capital	Investor Sources: Percent of Investor Sources	Investor Sources: After-Tax Weighted Cost of Investor Sources
Long Term Debt	4.41%	28.19%	1.24%	36.8%	1.21%
Short Term Debt	2.74%	2.75%	0.08%	3.6%	0.07%
Preferred Stock	0.00%	0.00%	0.00%	na	na
Common Equity	10.55%	45.64%	6.45%	59.6%	6.29%
Customer Deposits	2.08%	1.11%	0.02%	na	na
Deferred Income Taxes	0.00%	21.60%	0.00%	na	na
Investment Tax Credits	8.21%	0.71%	0.06%	na	na
Weighted Average Cost of Capital		**100%**	**7.85%**	100.0%	7.57%

Project Type	Book Life / EUL
Residential (Light Duty) Generator	10
Small Commercial (Light Duty) Generator	10
Medium / Large (Heavy Duty) Generator	20

REVENUE REQUIREMENT - SUMMARY

Year				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Discount Factor	wacc	7.57%	Escalation	0.93	0.86	0.80	0.75	0.69	0.65	0.60	0.56	0.52	0.48	0.45	0.42	0.39	0.36	0.33	0.31	0.29	0.27	0.25	0.23
Revenue Requirement		**CPVRR**																					
Operations and Maintenance	4,500.0	54,948.5	2.50%	4,500.0	4,612.5	4,727.8	4,846.0	4,967.2	5,091.3	5,218.6	5,349.1	5,482.8	5,619.9	5,760.4	5,904.4	6,052.0	6,203.3	6,358.4	6,517.3	6,680.3	6,847.3	7,018.5	7,193.9
G&A	4,750.0	58,001.2	2.50%	4,750.0	4,868.8	4,990.5	5,115.2	5,243.1	5,374.2	5,508.5	5,646.3	5,787.4	5,932.1	6,080.4	6,232.4	6,388.2	6,547.9	6,711.6	6,879.4	7,051.4	7,227.7	7,408.4	7,593.6
Property Tax	1.75%	74,065.1		11,375.0	10,806.3	10,237.5	9,668.8	9,100.0	8,531.3	7,962.5	7,393.8	6,825.0	6,256.3	5,687.5	5,118.8	4,550.0	3,981.3	3,412.5	2,843.8	2,275.0	1,706.3	1,137.5	568.8
Insurance	0.053%	2,243.1		344.5	327.3	310.1	292.8	275.6	258.4	241.2	223.9	206.7	189.5	172.3	155.0	137.8	120.6	103.4	86.1	68.9	51.7	34.5	17.2
Depreciation		329,490.7		32,500.0	32,500.0	32,500.0	32,500.0	32,500.0	32,500.0	32,500.0	32,500.0	32,500.0	32,500.0	32,500.0	32,500.0	32,500.0	32,500.0	32,500.0	32,500.0	32,500.0	32,500.0	32,500.0	32,500.0
Return on Capital		319,286.0		49,746.9	47,195.7	44,644.6	42,093.5	39,542.4	36,991.3	34,440.1	31,889.0	29,337.9	26,786.8	24,235.7	21,684.5	19,133.4	16,582.3	14,031.2	11,480.0	8,928.9	6,377.8	3,826.7	1,275.6
Revenue Requirement		**838,034.6**		**103,216.4**	**100,310.5**	**97,410.4**	**94,516.3**	**91,628.2**	**88,746.4**	**85,870.9**	**83,002.0**	**80,139.8**	**77,284.5**	**74,436.2**	**71,595.1**	**68,761.4**	**65,935.3**	**63,117.0**	**60,306.7**	**57,504.5**	**54,710.7**	**51,925.5**	**49,149.0**
EUL Term	20			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Levelized Tariff - Annual- pre-reserve	82,661.3	838,034.6		82,661.3	82,661.3	82,661.3	82,661.3	82,661.3	82,661.3	82,661.3	82,661.3	82,661.3	82,661.3	82,661.3	82,661.3	82,661.3	82,661.3	82,661.3	82,661.3	82,661.3	82,661.3	82,661.3	82,661.3
Bad Debt / Loss Reserve	6.0%	50,282.1		4,959.68	4,959.68	4,959.68	4,959.68	4,959.68	4,959.68	4,959.68	4,959.68	4,959.68	4,959.68	4,959.68	4,959.68	4,959.68	4,959.68	4,959.68	4,959.68	4,959.68	4,959.68	4,959.68	4,959.68
Levelized Tariff - Annual	87,621	888,316.6		87,621	87,621	87,621	87,621	87,621	87,621	87,621	87,621	87,621	87,621	87,621	87,621	87,621	87,621	87,621	87,621	87,621	87,621	87,621	87,621
Levelized Tariff - Monthly	7,301.75																						

REVENUE REQUIREMENT - CALCULATION

Book Accounting																							
Book, Beginning				-	617,500.0	585,000.0	552,500.0	520,000.0	487,500.0	455,000.0	422,500.0	390,000.0	357,500.0	325,000.0	292,500.0	260,000.0	227,500.0	195,000.0	162,500.0	130,000.0	97,500.0	65,000.0	32,500.0
Investment	**650,000**			650,000.0																			
Book Depreciation	**20 yr**			(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)	(32,500.0)
Book, Ending				617,500.0	585,000.0	552,500.0	520,000.0	487,500.0	455,000.0	422,500.0	390,000.0	357,500.0	325,000.0	292,500.0	260,000.0	227,500.0	195,000.0	162,500.0	130,000.0	97,500.0	65,000.0	32,500.0	-
Rate Base, Average				633,750	601,250	568,750	536,250	503,750	471,250	438,750	406,250	373,750	341,250	308,750	276,250	243,750	211,250	178,750	146,250	113,750	81,250	48,750	16,250
Pre-Tax Cost of Capital	7.85%			49,747	47,196	44,645	42,093	39,542	36,991	34,440	31,889	29,338	26,787	24,236	21,685	19,133	16,582	14,031	11,480	8,929	6,378	3,827	1,276

Optional Supplemental Power Services
Pricing Spreadsheet

Contract Term	20	years
Number of Payments	240	monthly payments
Monthly Service Payment Amount (1)	$ 7,302	

(1) Subject to Applicable Taxes

QUESTION:
Please detail the process the Company will employ from the customer request to installation and billing for the OSPS program, including estimated timeline.

RESPONSE:
Please see the table below for key process details and representative, estimated timelines. The activities in each step will vary based on project size and scope. The time frames noted may vary considerably based on numerous conditions such as: complexity of project; availability of information provided by the customer; design and engineering requirements; permit reviews and approvals by local authorities; lead time for equipment manufacturing, and site and weather conditions. During the Pilot, FPL expects to gain more knowledge of process steps and timelines.

	Optional Supplemental Power Services (OSPS) Process			
	Step 1: Initial Response	**Step 2: Evaluation**	**Step 3: Engineering Study**	**Step 4: Implementation**
FPL tasks	• Initial analysis of customer issues / needs using minimal information • Phone or in-person meeting/walk-through • Rough understanding of economic or other impact of power disturbances to customer **NOTE: This step builds upon activities currently performed by FPL Customer Service and Power Delivery personnel; FPL currently assists customers seeking help with diagnosing power-related issues and identifying solutions to mitigate effects from power disturbances.**	• Perform Site Survey / data monitoring • Evaluate owner and facility operations needs • Identify potential solutions • Formulate potential location, layout and connection • Estimate equipment type and size • Develop conceptual project design • Prepare an initial budgetary estimate, or firm estimate if detailed engineering is not required	• Validation and prioritization of needs (cost savings, reliability, power quality, etc.) • With third party engineers involved, conduct a detailed site survey, determine location of connection points, major hardware and systems • Conduct system design and engineering to specify major equipment • Develop final plan for supporting critical loads with generator and/or other equipment • Determine fuel supply and procurement details, if applicable • Develop list of all applicable permits, easements and interconnection requirements • Procure quotes and/or engineering estimates for equipment and subcontractor labor • Develop and price maintenance/monitoring plan **NOTE: If detailed engineering is not required, Evaluation step may only be required to produce deliverables above.**	• Complete the design and installation of an operable system • Perform all required testing and commissioning to certify for commercial operations • Initiate monthly billing • Implement maintenance and monitoring **NOTE: Final design, installation and maintenance/service expected to be performed by qualified companies contracted through FPL.**

	Initial Response	**Evaluation**	**Engineering Study**	**Implementation**
What Customer typically provides	• Brief description of needs and problem to be addressed • Brief description of facility layout and operation • Any customer-specific information for initial review: Contact; Project; Financial / Credit; Procurement information	• Site layout drawing • Electrical one-line drawing, if needed • Further detail on facility operation	• Agreement for FPL to perform Engineering Study **(customer typically agrees to pay cost of Engineering Study, which can be incorporated into OSPS installation cost if customer agrees to proceed to enroll in OSPS)** • Additional facilities detail, as required for design	• Executes required Optional Supplemental Power Services Agreement, easements and meets requirements specified by contract terms and conditions.
What FPL typically delivers	• An initial recommendation of potential solutions, including whether the OSPS program could be a good fit, and order of magnitude cost estimates for different options.	• Description of findings and proposed solution, including potential applicability of Optional Supplemental Power Services • Budgetary cost estimate • Recommendation and cost for Engineering Study, if required	Engineering Study Report and Optional Supplemental Power Services Agreement, including: • List of major equipment FPL proposes to install • Review of system components to include generator operations, controls, equipment maintenance schedules/ requirements • Review of all economic calculations • A firm fixed price Monthly Service Payment quote for installation and maintenance of proposed project with timeline for major project milestones **NOTE: If detailed engineering is not required, OSPS Agreement may be provided during Evaluation step.**	Services: • Design • Permitting • Equipment Procurement • Project Administration • System Installation • System Commissioning • System Operation • System Monitoring/Maintenance • Fueling (if applicable) • Repairs
Estimated Timeline – Residential Customer	1-2 weeks	2-3 weeks	N/A	4-6 months
Estimated Timeline – Business / Government Customer	2-3 weeks	4-8 weeks	If required, 3-6 months	6-12 months

QUESTION:
Will the Company file the annual fuel cost recalculations with the Commission referenced in section 9 of the Petition?

RESPONSE:
FPL will file the fuel cost recalculations if the Commission directs FPL to do so.

QUESTION:

If the Company lets the OSPS pilot expire after three years, please explain how any customers taking service under the OSPS would be affected:

a. During the term of their agreement

b. After the term of their agreement.

RESPONSE:

a. FPL proposes that customers taking service under the OSPS Tariff be allowed to continue being served pursuant to and through the term of their Optional Supplemental Power Services Agreements, even if the pilot expires after three years.

b. FPL proposes that, even if the pilot expires after three years, customers taking service under the OSPS Tariff be allowed to select among the options set forth in their Optional Supplemental Power Services Agreements, which would include the options to continue being served, to purchase the equipment and take ownership, or pay for the remaining cost of the equipment and for cost of removal.

QUESTION:
Other than the Company, who can install generation assets on customer premises?

RESPONSE:
Licensed electrical contractors and general contractors may install stationary, back-up generators on customer premises. In the current situation, customers bear the burden of identifying the solution they require, soliciting offers from and selecting a contractor, negotiating the terms of a final contract, paying up-front for or financing the solution, and making arrangements for monitoring, maintenance and repair after the generator is installed. FPL will be responsible for all of those activities under OSPS. FPL will use licensed contractors to perform installation work, and qualified contractors to perform service work.

QUESTION:
Will the back-up generation equipment provided to customers under the OSPS be used exclusively for the customer that requests service or can it provide capacity to the Company's system if needed?

RESPONSE:
The primary purpose of the equipment will be to provide back-up power service to the customer that requests OSPS. However, as noted in FPL's response to Staff's First Set of Data Request No. 3, FPL will evaluate each new project to determine if there are opportunities to operate the equipment to meet system emergencies and other conditions for which the equipment may benefit grid operations.

QUESTION:
Referring to section 11 of the petition, please explain why it is appropriate to include the capital costs of the OSPS rider in rate base. Referring to the third sentence in section 11 of the petition, please clarify whether the OSPS program is designed to have no impact on the general body of ratepayers.

RESPONSE:
The OSPS program is designed to have no impact on the general body of customers over the life of the equipment. FPL believes that offering optional supplemental power services is a natural extension of its commitment to provide reliable electric service and solutions to all of its customers. Like other plant investments that support reliable electric utility service, the capital costs associated with the procurement and installation of the OSPS service are appropriate for inclusion in rate base. Unlike traditional rate base recovery, however, under the OSPS Rider the participating customer bears the full cost of the service. Such treatment will allow FPL to receive a fair and reasonable return on its investment from participating customers during the three-year pilot period while also allowing FPL to expand its capabilities and improve its understanding of its customers' expanding power service needs.

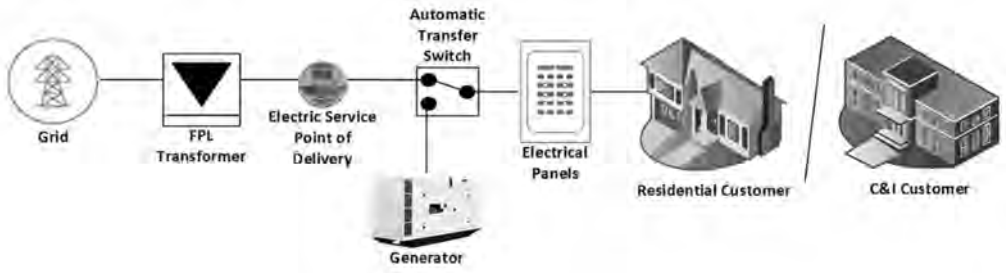
Each participating customer will bear the full cost of installation through a fixed, customer-specific charge that reflects all costs to provide service. The OSPS program is designed to have no impact on the general body of customers over the life of the equipment, and measures are implemented within the program to mitigate risk, including, but not limited to:

- Customer's payment is designed so that each participating customer bears the full cost of the installation and projected expenses over the book life of equipment on a levelized basis
- Capital investment only occurs after customer signs a long-term contract
- Customer's OSPS charge includes a reserve for FPL insurance deductibles and potential default
- Credit screening and credit support may be required
- End-of-contract term options are designed to ensure full asset cost recovery from participating customer
- FPL will enter into long-term warranties and maintenance contracts with Original Equipment Manufacturer/service providers to manage O&M cost risk

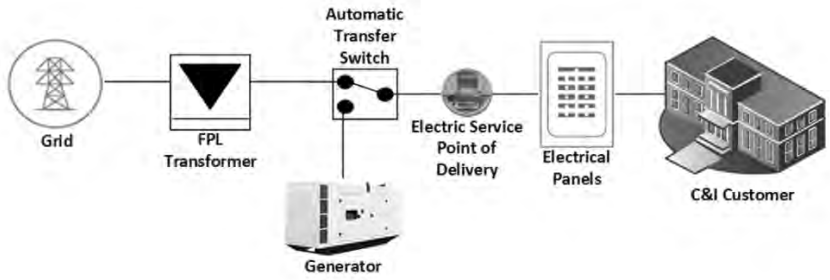
QUESTION:
Referring to the second paragraph under "Limitation of Service" on sheet No. 8.845, please discuss where the generators will be installed in relation to the customer's point of delivery. Please include a simplified diagram of a typical back-up generator setup.

RESPONSE:
FPL may install the generator on either side – utility-side or customer-side – of the electric service point of delivery (POD). Please see the simplified diagram of each configuration below.

Typical Configuration:
Generator installed on customer side of electric service point of delivery



Alternate Configuration:
Generator installed on utility side of electric service point of delivery



One of the Pilot objectives is to gain information and experience about the benefits, costs, and optimal economic implementation of various customer-sited solutions and equipment configurations. FPL anticipates residential / small commercial installations will be primarily on the customer-side of the POD and most large business installations will also be on the customer-side of the POD. However, if a utility-side installation is economically-advantageous for the customer and technically feasible for FPL, that configuration will be evaluated and potentially implemented.

QUESTION:
Referring to section 11 of the petition, please explain why FPL will incur property tax costs if the equipment is on the customers' premises.

RESPONSE:
Florida Statute §196.001, Property Subject to Taxation, provides that all personal property shall be subject to taxation unless expressly exempted. FPL, as the owner of the back-up power equipment, is responsible for property tax on the back-up power equipment.

QUESTION:
Please state and provide the calculation of the current carrying cost as referenced in section 11 of the petition.

RESPONSE:
The carrying cost is derived from the capital structure listed in Schedule 4 of the most recent Earnings Surveillance Report. The Total Ratio column is multiplied by the associated midpoint cost rate for each capital source, and in the case of common equity, adjusts to reflect tax rate effects and obtain a Pre-Tax Weighted Cost of Capital, which serves as the carrying cost factor.

Please see the OSPS Pricing spreadsheet attached in response to Staff's First Set of Data Request No. 14, specifically Table 1 on the Input tab for the calculation.

QUESTION:
Please file with the Florida Public Service Commission (PSC) any documents the Company utilized in developing its proposed residential/small commercial light-duty generators and heavy-duty generators depreciation parameter request.

RESPONSE:
Please see attached responsive documents.

Residential / Light Commercial Light-Duty Generator Life expectancy

Residential and light commercial (RLC) "light-duty" generators are primarily fueled by either liquid propane or natural gas. These generators are often "off-the-shelf" units built economically to serve what is typically a lighter-duty use than medium-to-large commercial / industrial generators. Lifespan of RLC generators in Florida are affected by a number of factors, most importantly: 1) frequency of use – severe storms / hurricanes can cause long runtime, shortening the life of the generator; 2) environmental conditions – can cause corrosion and degradation of various components of the generator & 3) maintenance – routine maintenance is required to help extend the life of the generator.

FPL proposes to use a 10-year depreciation life (10% depreciation rate) for RLC backup generators located at customer premises, to coincide with the expected, reliable, warrantied operating life of a customer-sited backup generator. In establishing the rate for this new class of depreciable assets, FPL consulted with subject matter experts (electrical construction firms that install / maintain/ replace / service this equipment), generator equipment manufacturers (to obtain warranty data) and identified reputable secondary data to conclude that a ten (10) year estimated useful life and net salvage of 0% is reasonable and appropriate for customer-sited residential / light commercial backup generators and ensures recovery in a timeframe that is likely to represent the period when the generator can be used with high-reliability (i.e. prior to any major breakdown concerns, repair costs / major component failures).

FPL will further evaluate the estimated useful life and salvage value for the customer-sited RLC Light-Duty Generator asset as we gain direct experience from operating these assets.

<u>Summary of findings</u>

1. Cummins (OEM) Extended Warranty Program – 10 year maximum warranty
2. Generac (OEM) Extended Warranty Program – 10 year maximum warranty
3. Briggs & Stratton (OEM) Extended Warranty Program – 10 year maximum warranty
4. International Association of Certified Home Inspectors (industry association) – 12 year life expectancy
5. Home Power Systems (generator installer) – cites 15 year life
6. Discussions with several electrical contractors with significant, Florida experience with installing / servicing RLC generators. They indicated that a generator reliable operating lifespan of 10 years is reasonable based on their field experience within Florida.

Our Commitment to You

We stand behind the quality of our products by offering a factory-backed Extended Warranty Program. Your purchase is a long-term investment, and you can count on our Extended Warranty Program to protect your investment.

Extended Warranty at a Glance

- Lower risk of unexpected failure costs beyond factory standard warranty
- Minimized downtime with repairs completed by factory-trained technicians using genuine Cummins parts
- No deductibles or hidden charges
- Up to 10 years extended warranty coverage with fixed-price contract
- Variety of coverage terms and options to meet your needs
- Extended warranty coverage is fully transferable
- Protection against rising parts, labor and travel costs
- Backed by nearly 100 years of experience through Cummins
- Supported by global network of authorized Cummins service providers
- World-class Cummins factory technical assistance

Extended Warranty Overview

When to Buy

- At time of generator purchase

- or -

- Before base warranty expires, during comprehensive coverage period

Where to Buy

- Your local distributor or dealer. Locate a Dealer at homegenerators.cummins.com

What's Included

- Repair of all failures resulting from defects in material, design or workmanship
- Standard base warranty coverage (until extended warranty coverage starts)
- Choice of coverage level
- Immediate benefit of coverage

What's Excluded

- Scheduled maintenance
- Repair of failures that result from customer abuse, neglect or misuse
- Product failures related to improper application, installation, storage or maintenance

These conditions are subject to change. Please contact your distributor or dealer for terms and conditions specific to your product.

Cummins Inc.
1400 73rd Ave. NE
Minneapolis, MN 55432
U.S.A.

Phone: 1-763-574-5000
USA Toll-free: 1-877-769-7669
Fax: 1-763-574-5298
http://homegenerators.cummins.com

Bulletin NASB-6018-EN Printed in U.S.A. 5/18

RLC Extended Warranty Program

North America

Application	Models	Factory Standard Base Coverage	Extended Coverage	Level of Coverage		
				Parts Only	Parts & Labor	Parts, Labor & Travel
Residential Standby	GGMA, GGMC, GGPC, GGHE, GGHF, GGHG, GGHH, GGHJ	2 years / 2000 hours Parts, Labor & Travel	5 years / 2000 hours	✓		✓
	With Grid:GSBA, GSBB, GSBC (Canada Model)	5 years / 2000 hours Years 0-2: Parts, Labor & Travel Years 3-5: Parts Only	5 years / 2000 hours			✓
	Off Grid: GSBA	1 year / 1000 hours Parts, Labor & Travel				
	C13N6H, C17N6H, C20N6H, C20N6HC	5 years / 2000 hours Years 0-2: Parts, Labor & Travel Years 3-5: Parts Only	5 years / 2000 hours			✓
			7 years / 2000 hours			✓
			10 years / 2000 hours			✓
	C20 N6, C22 N6, C25 N6, C36 N6, C40 N6, C45N6, C50 N6, C60 N6, C70 N6, C80 N6, C100 N6, C30 N6H, C36 N6H, C40 N6H, C45 N6H, C50 N6H, C60 N6H	2 years / 1000 hours or 2 years / unlimited hours Parts, Labor & Travel	5 years / 2000 hours			✓
			7 years / 2000 hours			✓
			10 years / 2000 hours			✓
Light Commercial	DSKBA, DSFAA, DSFAD, DSFAE, DSGAA	2 years / 1000 hours Parts, Labor & Travel	3 years / 1500 hours	✓	✓	✓
			4 years / 2000 hours	✓	✓	✓
			5 years / 2500 hours	✓	✓	✓
			6 years / 3000 hours	✓	✓	✓
			7 years / 3500 hours	✓	✓	✓
			8 years / 4000 hours	✓	✓	✓
			9 years / 4500 hours	✓	✓	✓
			10 years / 5000 hours	✓	✓	✓
	C10 D6, C15 D6, C20 D6, C25 D6, C30 D6, C35 D6, C40 D6, C50 D6, C60 D6C50D6C, C60D6C, C80D6C, C100D6C, C125D6C	2 years / 1000 hours Parts, Labor & Travel	3 years / 1500 hours	✓	✓	✓
			4 years / 2000 hours	✓	✓	✓
			5 years / 2500 hours	✓	✓	✓
Light Commerc ial	Configurable Models:C20 N6, C22 N6, C25 N6, C30 N6, C36 N6, C40 N6, C30 N6H, C36 N6H, C40 N6H, C45 N6H, C50 N6H, C60 N6HC45 N6, C50 N6, C60 N6, C70 N6, C80 N6, C100 N6	2 years / 1000 hours Parts, Labor & Travel	3 years / 1500 hours	✓	✓	✓
			4 years / 2000 hours	✓	✓	✓
			5 years / 2500 hours	✓	✓	✓
	Preconfigured Models: C20 N6, C22 N6, C25 N6, C30 N6, C36 N6, C40 N6, C30 N6H, C36 N6H, C40 N6H, C45 N6H, C50 N6H, C60 N6HC50 N6, C60 N6, C80 N6, C100 N6	2 years / unlimited hours Parts, Labor & Travel	EPA-SE 3 years	✓	✓	✓
			EPA-SE 4 years	✓	✓	✓
			EPA-SE 5 years	✓	✓	✓
ATS	RSS, RA	2 years Parts, Labor & Travel	5 years			✓
			7 years			✓
			10 years			✓

RESIDENTIAL/COMMERCIAL

STANDARD and EXTENDED WARRANTY REFERENCE GUIDE

GENERAC

(2)

Model #	Unit Size	Controller	Standard Warranty Coverage	5 Year Extended Warranty Code	5 Year Extended Warranty Coverage	7 Year Extended Warranty Code	7 Year Extended Warranty Coverage	10 Year Extended Warranty Code	10 Year Extended Warranty Coverage
6518 6519 6561 6998	7kW (PowerPact)	Digital LED	Y 1&2 = Parts & Labor Y 3 = Parts only	EXTWRTYAIR2013 DEW-EXWAR100001	Years 1, 2, 3, 4, 5 = Parts and Labor	EXTWRTYAIR7C DEW-EXWAR100002	Years 1 to 7 = Parts and Labor	EXTWRTYAIR10C DEW-EXWAR100003	Years 1 to 10 = Parts and Labor
5870 5882 5871 6051 5883 5872 6052 5884 5873 5885 5874 6053 5886 5875 5887	8kw 10kW 14kW 17kW 17kW 20kW	Nexus	Y 1&2 = Parts & Labor Y3 = Parts only	EXTWRTYAIR (Can no longer be purchased)	Years 1, 2, 3, 4 = Parts and Labor Year 5 = Parts only	Not available	Not available	Not available	Not available
6237 6245 7029 7030 6437 6438 6439 6720 7031 7032 7033 6240 6241 6247 6461 6462 6459 6721 7035 7036 7037 6242 6243 6248 6249 6244 6250 6729 6730 7038 7039 7077 6551 6552 7042 7043	8kw 9kW 11kW 11kW 14kW 16kW 16kW 17kW 20kW 20kW 22kW	Evolution	Y 1&2 = Parts & Labor Y 3 = Parts only Y 4&5 = Engine/Alt Parts ONLY	EXTWRTYAIR2013 DEW-EXWAR 100001	Years 1, 2, 3, 4, 5 = Parts and Labor	EXTWRTYAIR7C DEW-EXWAR 100002	Years 1 to 7 = Parts and Labor	If within first year: EXTWRTYAIR10C DEW-EXWAR 100003 If after first year: (TBD) DEW-EXWAR 100004	Years 1 to 10 = Parts and Labor
6055 6098 7040 7041	20kW Synergy (VSCF)	Evolution	Y 1&2 = Parts & Labor Y 3 = Parts only Y 4&5 = Engine/Alt Parts ONLY	EXTWRTYAIR2013 DEW-EXWAR 100001	Years 1, 2, 3, 4, 5 = Parts and Labor	Not available	Not available	Not available	Not available
QT02224 QT02515 QT02724 QT03015 QT03624 QT04524 QT04854	22kW 25kW 27kW 30kW 36kW 45kW 60kW	Nexus	Years 1 and 2 = Parts and labor	EXTWRTYLCSM2013 DEW-EXWAR 200001	Years 1, 2, 3, 4, 5 = Parts and Labor	EXTWRTYLCSM7C DEW-EXWAR 200002	Years 1 to 7 = Parts and Labor	EXTWRTYLCSM10C DEW-EXWAR 200003	Years 1 to 10 = Parts and Labor
QT06024	60kW	Nexus	Y1 = Parts & Labor Y2 = Parts only	EXTWRTYLCSM2013 DEW-EXWAR 200001	Years 1, 2, 3, 4, 5 = Parts and Labor	EXTWRTYLCSM7C DEW-EXWAR 200002	Years 1 to 7 = Parts and Labor	EXTWRTYLCSM10C DEW-EXWAR 200003	Years 1 to 10 = Parts and Labor
QT07068 QT08054 QT10068 QT13068 QT15068 Last letter = "X" or "C" only	70kW 80kW 100kW 130kW 150kW	Nexus	Y1 = Parts & Labor Y2 = Parts only	EXTWRTYLCLG2013 DEW-EXWAR 200004	Years 1, 2, 3, 4, 5 = Parts and Labor	EXTWRTYLCLG7C DEW-EXWAR 200005	Years 1 to 7 = Parts and Labor	EXTWRTYLCLG10C DEW-EXWAR 200006	Years 1 to 10 = Parts and Labor
RD015 RG027 RD020 RG030 RD030 RG032 RD048 RG036 RD050 RG038 RG022 RG045 RG025 RG048 RG060	RD and RG series 15 - 60 kW	Evolution	Y 1&2 = Parts & Labor Y 3 = Parts only Y 4&5 = Engine/Alt Parts ONLY	EXTWRTYLCSM2013 DEW-EXWAR 200001	Years 1, 2, 3, 4, 5 = Parts and Labor	EXTWRTYLCSM7C DEW-EXWAR 200002	Years 1 to 7 = Parts and Labor	EXTWRTYLCSM10C DEW-EXWAR 200003	Years 1 to 10 = Parts and Labor
Future RG Gaseous 70-150 kW	RG series 70 - 150 kW	Evolution	Y 1&2 = Parts & Labor Y 3 = Parts only Y 4&5 = Engine/Alt Parts ONLY	EXTWRTYLCLG2013 DEW-EXWAR 200004	Years 1, 2, 3, 4, 5 = Parts and Labor	EXTWRTYLCLG7C DEW-EXWAR 200005	Years 1 to 7 = Parts and Labor	EXTWRTYLCLG10C DEW-EXWAR 200006	Years 1 to 10 = Parts and Labor

IMPORTANT NOTES:

1> All warranties (standard and extended) are always retroactive to the startup date of the generator

2> Once an extended warranty is purchased and invoiced it can not be exchanged, refunded, credited, or swapped under any circumstance

3> Extended warranties can not be applied to Honeywell product with a Nexus controller, reconditioned units, EcoGen, Corepower, Siemens, or Eaton branded units

4> Once an extended warranty is applied to a unit, no further (or longer) extended warranties can be applied to the unit

5> Extended warranties can only be applied within the first year of activation date of the generator except where noted (dark green)

(3)

Briggs & Stratton Adds New 12kW, 20kW Fortress Standby Generators With 10-Year Warranty

10-Year Warranty valued at $1,200 now standard on both dealer exclusive model units 040579 and 040592

NEWS PROVIDED BY
Briggs & Stratton Corporation
May 03, 2018, 06:00 ET

MILWAUKEE, May 3, 2018 /PRNewswire/ -- Briggs & Stratton Corporation is pleased to announce the addition of a 10-year warranty** policy to its 12kW* and 20kW* Fortress standby generator units. The warranty policy is the longest in the industry — valued at $1,200 — and offers customers peace of mind through timely repair or replacement of parts on the dealer-exclusive standby generator models 040579 and 040592.

"Our customers rely on our standby generators to keep their homes and businesses powered, and we take that responsibility seriously," said Brian Northway, product manager, Briggs & Stratton. "The new 10-year warranty policy gives our customers confidence that their generator will be ready to provide standby power when they need it most."

The 12kW* and 20kW* Fortress units feature a 175-mph wind rating with third party certification (when installed in accordance with the installation manual) pre-installed oil heaters to save time and money and are housed in corrosion resistant enclosures for added durability. As part of the dealer exclusive Fortress line, the units offer a premium level of protection. As one of the more extensive warranty policies on the market, the new 10-year warranty on both units covers parts and labor, as well as travel, for the full length of the policy.

"We're proud to offer our customers the industry's longest warranty policy on these units," said Northway. "This is just one more way we're working to offer peace of mind through standby power."

*This generator is certified in accordance with UL (Underwriters Laboratories) 2200 (stationary engine generator assemblies) and CSA (Canadian Standards Association) standard C22.2 No. 100-14 (motors and generators).
**Warranty details available at www.briggsandstratton.com.

About Briggs & Stratton Corporation:

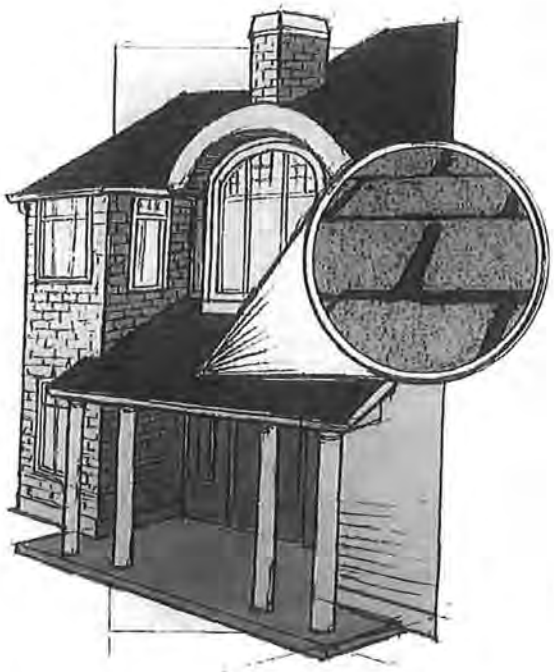
Briggs & Stratton Corporation (NYSE: BGG), headquartered in Milwaukee, Wisconsin, is focused on providing power to get work done and make people's lives better. Briggs & Stratton is the world's largest producer of gasoline engines for outdoor power equipment, and is a leading designer, manufacturer and marketer of power generation, pressure washer, lawn and garden, turf care and job site products through its Briggs & Stratton®, Simplicity®, Snapper®, Ferris®, Vanguard™, Allmand®, Billy Goat®, Murray®, Branco® and Victa® brands. Briggs & Stratton products are designed, manufactured, marketed and serviced in over 100 countries on six continents. For additional information, please visit www.basco.com and www.briggsandstratton.com.

SOURCE Briggs & Stratton Corporation

Related Links

(4)

InterNACHI's Estimated Life Expectancy Chart for Florida Homes



The following chart details the predicted life expectancy of appliances, products, materials, systems and components for homes in the state of Florida. (It may also be applicable to states in the nearby coastal region with similar climate and weather conditions on a typical basis.) While many components and systems in homes located in Florida and the surrounding area have service life expectancies that are comparable to those anywhere else in the U.S., those items that are regularly exposed to the elements, including saltwater, wind, sun and heat, are particularly vulnerable to premature failure compared to items installed in homes located elsewhere. These guidelines attempt to address those differences.

Arc-Fault Circuit Interrupters (AFCIs)	30
Bare Copper	100+
Bulbs (compact fluorescent)	8,000 to 10,000+ hours
Bulbs (halogen)	4,000 to 8,000+ hours
Bulbs (incandescent)	1,000 to 2,000+ hours
Bulbs (LED)	30,000 to 50,000+ hours
Copper-Clad Aluminum	100+
Copper-Plated	100+
Fixtures	40
Ground-Fault Circuit Interrupters (GFCIs)	up to 30
Lighting Controls	30+
Residential Propane Backup Generator	12
Service Panel	60
Solar Panels	20 to 30
Solar System Batteries	3 to 12
Wind Turbine Generator	20

Floor and roof trusses and laminated strand lumber are durable household components, and engineered trim may last 30 years.

ENGINEERED LUMBER	**YEARS**
Engineered Joists	80+
Laminated Strand Lumber	100+
Laminated Veneer Lumber	80+
Trusses	100+

Fastener manufacturers do not give lifespans for their products because they vary too much based on where the fasteners are installed in a home, the materials in which they're installed, and

(5)

Toll Free: (877) 421-0203

HPS Home Power Systems CPS Commercial Power Systems

Generator FAQ's

1) What size generator do I need for my home?

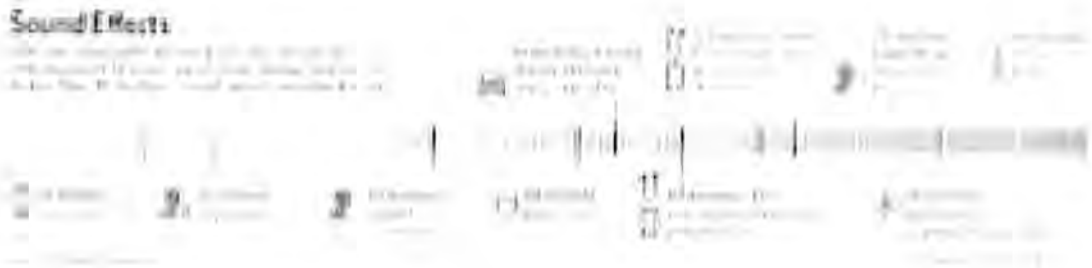
Every home owner's requirement is different. Your generator will be sized based on the electrical load it will be carrying. The size of your house does not matter unless we are sizing for whole house transfer, nor does the size electrical service feeding your home. It all comes down to what you want to run during an outage. The only real answer is to have Home Power Systems provide a complimentary site survey to recommend a proper solution to fit your specific requirements.

2) How much does it cost to install a generator?

See Home Power Systems What It Costs page to answer this question. We are the only company that lists real final costs to properly install your generator. The posted prices represent turn-key installed pricing including a two-year maintenance contract. When you receive competitive pricing, be sure you compare the same scope of work – and always get it in writing!

3) How loud is the generator?

The air-cooled generators are all about 66db's at 20 feet. What does this mean? It means you can have a regular conversation between two people standing next to a running air cooled generator. Remember, Generac has been manufacturing generators for 60 years; they are designed for residential neighborhoods.



4) Do I need to have my gas meter upgraded?

MAYBE! As part of your initial site survey, your Project Manager will complete a Gas Inventory Report. Once the model of your present gas meter is recorded, your Project Manager will take an inventory of all of the gas-fueled appliances. In most cases, if a gas meter upgrade is required by your local gas utility it is a simple process at a minimal cost to the homeowner.

5) Do I need a building permit?

Most likely. As part of a turn-key install, Home Power Systems will coordinate with your local building department to determine how local building code is interpreted in your jurisdiction. In many cases, we have already completed a number of installations in your town or city and are already familiar with what your Building Inspector requires. We will also secure all needed permits, HOA approvals and attend variance meetings on your behalf if needed – truly everything is included in your quote from start to finish.

6) How much service does a generator need once it is installed?

A commitment must be made to properly maintain your generator to ensure reliability and a long service life. This is not an air-conditioning unit or furnace that can go years without service, you are generating electricity! Our recommendation is to have your generator serviced once per year unless you have additional needs such as medical equipment.

7) How long will my new generator last?

The average life expectancy of a standby generator is around 15 years of operation under normal emergency standby conditions. Just like a car, as a machine ages, it may require maintenance towards the end of its lifespan. Keep in mind that the air cooled units are <u>not</u> intended to provide continuous

power (24 hours a day, 365 days a year), however, we can design a solution for your off-grid or prime power application in conjunction with your existing solar PV array and battery bank – call for details.

8) How much does it cost a month to run the generator when it runs for 10 minutes a week?

Depending on the price of natural gas, it shouldn't cost more than $4 or $5 per month to run the unit in exercise mode. During a power outage, under 50% load expect to pay around $20-$30/day for gas usage. A lot cheaper than a hotel room or spoiled food!

9) Why am I getting so many diverse answers on what is needed to install a generator?

It's called a "spectrum of competence". Most "generator guys" are deficient in experience, training, and commitment to the industry. They are looking for the sale and install only. As the old saying goes, "you get what you pay for". This is true for the generator industry as well. If you are looking for the cheapest price, please do not call Home Power Systems. If you are looking for the best value for the money, long-term commitment, trained and certified technicians, and the peace of mind that your generator will start during the most important time for you and your family, HPS is the only authorized dealer for you.

10) Do you have generators and parts in stock?

Yes, Home Power Systems is one of the largest stocking dealers in the Northeast. We do keep stock of most generators and transfer switches. As for part availability, there is no waiting if your generator needs to be repaired – we stock parts at both our Rochester and Syracuse facilities and on each service vehicle. This means if there is an issue with your generator, we can make the repair and there is no lead time for ordering the part you need because we already have it in stock.

11) What fuel supply do I need to run one of your generators?

Generac and Kohler and home standby generators can be fueled by either Natural Gas or Propane vapor. Portable generators are designed to be fueled by gasoline only.

12) Can you install the generator for me?

Yes, if you are in the Upstate and Central New York area we can perform turn-key installation services. Click here for our installation territory. If you are outside this area, please go to http://www.generac.com/dealer-locator.

13) Who will be completing the work?

At Home Power Systems, you are dealing with ONE company. You are working with a team that strictly focuses on only standby power generation. From the initial site survey and design of your standby solution to the review process by our experienced staff to the work complete the day of the

"Heavy-Duty" Generator Life expectancy

"Heavy Duty" generators are typically designed to serve rigorous, three-phase power applications for medium-to-large commercial, industrial and institutional facilities. They are primarily fueled by diesel or natural gas. These generators are built in a heavy-duty manner and are typically customized for the application. Lifespan of industrial generators in Florida are affected by a number of factors, including: 1) frequency of use – severe storms / hurricanes can cause long runtime, shortening the life of the generator; 2) environmental conditions – particularly for generators located outdoors, the environment can cause corrosion and degradation of various components of the generator & 3) maintenance – routine maintenance is required to help extend the life of the generator.

FPL proposes to use a 20-year depreciation life (5% depreciation rate) for heavy-duty backup generators located at customer premises. In establishing the rate for this new class of depreciable assets, FPL consulted with subject matter experts (electrical construction firms that install / maintain / replace / service this equipment), generator equipment manufacturers and identified reputable generator industry information to conclude that a twenty (20) year estimated useful life and net salvage of 0% is reasonable and appropriate. FPL believes the twenty-year life reflects the expected high-reliability useful life of outdoor generators (in enclosures), which is expected to be the typical installation under FPL's program, and ensures recovery in a timeframe that is likely to represent the period when the generator can be used with high-reliability (i.e. prior to any major breakdown concerns, repair costs, or engine / alternator overhauls being required).

FPL will further evaluate the estimated useful life and salvage value for the customer-sited heavy-duty generators as we gain direct experience from operating these assets.

<u>Summary of Findings</u>

1. American Hospital Association Typical Equipment Lifetimes:
    a. Emergency generator set - 20 years
    b. Generator controls – 12 years
2. BOMA – Preventative Maintenance Guidebook, Appendix 7: Building Systems Useful Life
    a. Emergency Engine Generator Set - 20 years
    b. Automatic Transfer Switch – 25 years
3. U.S. Government's Office of Management and Budget, Useful Life and Disposal Value Table
    a. Generators and Generator Sets, Electrical - 19 years / 6.50% disposal value
4. IRS Rev. Proc. 87-56; MACRS Asset Life Table
    a. Asset Class 00.4, electrical generation equipment with a rated total capacity in excess of 500 kilowatts, is assigned a class life of 22 years.
5. Fannie Mae - INSTRUCTIONS FOR PERFORMING A MULTIFAMILY PROPERTY CONDITION ASSESSMENT (Version 2.0) APPENDIX F ESTIMATED USEFUL LIFE TABLES
    a. Emergency Generator – 25 years
6. Life cycle energy assessment of a standby diesel generator set

a. Cites 20 year life

7. Generator industry information
    a. Caterpillar (OEM), Cummins (OEM) and PowerSecure (generator set manufacturer) – indicated that typical maximum extended warranty periods would be 10 years, but extended service coverage could go longer, depending on use of generator. Industrial generators are complex equipment with many different components; therefore comprehensive warranties beyond 10 years are not typical. Caterpillar's Extended Service Coverage plan allows for 15 years or more of service coverage.
    b. http://www.gotpower.com/when-replace-generator/ (generator sales /service) - cites 20-25 years
    c. https://generxgenerators.com/2017/02/09/clearwater-beach-condo-converting-from-a-diesel-generator-to-clean-natural-gas/ (generator sales / service) - cites 15-20 years
    d. https://www.efficientplantmag.com/2012/03/powered-with-preventive-maintenance-longer-standby-generator-life/ (industry magazine)- cites 20-30 years
    e. https://www.facilitiesnet.com/powercommunication/article/Preventing-Power-Emergencies-Facilities-Management-Power-Communication-Feature--7718 (industry magazine)- cites 20-25 years; for high run-time scenarios, 18-20 years
    f. https://duthiepower.com/the-general-life-span-of-a-generator/ (generator sales / service) - cites 15-20 years

ANNEX 3: TYPICAL EQUIPMENT LIFETIMES

Different organizations have tried to estimate typical equipment lifetimes for healthcare technology. This annex contains the results from two different sources – the American Hospital Association, and the GTZ (German Government Technical Aid Agency).

LIST 1: The American Hospital Association (AHA)

Source: American Hospital Asso.ciation, 1998, 'Estimated Useful Lives of Depreciable Hospital Assets', American Hospital Association, Chicago, USA

The AHA's extensive list reflects how equipment lasts within the United States' healthcare system, whether it was manufactured in the US or abroad.

Their list was compiled following:

- discussions with manufacturers of healthcare equipment
- discussions with various hospital department managers
- analysis of actual retirement practices for actual hospital assets.

Their list is made up of a series of tables of different categories of equipment determined by the equipment's role in the health facility.

Part One: Estimated Useful Lives of Land Improvements, Buildings, and Fixed Equipment

Table 1: Land Improvements

Land improvements are assets of an above-ground or below-ground nature, found in the land area contiguous to and designed for serving a health care facility. The asset cost would include a proportionate share of architectural, consulting, and interest expense for newly constructed or renovated facilities.

Item	Years
Bumpers	5
Culverts	18
Fencing	
Brick or stone	25
Chain-link	15
Wire	5
Wood	8
Flagpole	20
Guard rails	15
Heated pavement	10
Landscaping	10
Lawn sprinkler system	15
Parking lot, open-wall	20
Parking lot gate/s	3
Parking lot striping	2
Paving (including roadways, walks,and parking)	
Asphalt	8
Brick	20
Concrete	15
Gravel	5
Retaining wall	20
Shrubs and lawns	5
Signs, metal or electric	10
Snow-melting system	5
Trees	20
Turf, artificial	5
Underground utilities	
Sewer lines	25
Water lines	25
Waste water treatment system	20
Water wells	25
Yard lighting	15

Table 4: Fixed Equipment

Fixed equipment includes assets that are permanently affixed to the building structure and are not subject to movement but have shorter useful lives than that of the building. The asset cost would include a proportionate share of architectural, consulting, and interest expense.

Item	Years	Item	Years
Benches, bins, cabinets, counters, and shelving, built-in	15	Laminar flow system	15
Cabinet, biological safety	15	Lockers, built-in	15
Canopy-ventilating for laundry ironer	15	Mailboxes, built-in	20
Central dictation system	10	Medicine preparation station	15
Coat rack	20	Mirrors, traffic and/or wall mounted	10
Conveyor system, laundry	10	Narcotics safe	20
Cooler, walk-in	15	Nurses' counter, built-in	15
Curtains and drapes	5	Pass-through boxes	15
Emergency generator set	20	Patients' consoles	15
Generator controls	12	Patients' wardrobes and vanities, built-in	15
Hood, fume	15	Projection screens	10
Fire protection in hoods	10	Sink and drainboard	20
ICU and CCU counters	15	Sterilizer, built-in	15
Illuminator		Telephone enclosure	10
Multifilm	10		
Single	10		

Table 5: Building Services Equipment (overleaf)

Building services equipment refers to mechanical components or systems designed for the building(s), including air conditioning, electrical elevators, heating lighting plumbing sprinklers, and ventilating. The asset cost would include a proportionate share of architectural, consulting and interest expense for newly constructed or renovated facilities.

(2)

Preventive Maintenance Guidebook

Best Practices to Maintain Efficient and Sustainable Buildings

Lawrence J. Schoen, P.E., Fellow ASHRAE

BOMA International

SYSTEMS	AVERAGE USEFUL LIFE YEARS
4. Metal	
a. Structural Roof Panels (Prefinished Galvanized Steel)	25
b. Premanufactured Architectural Roof Panels (Prefinished Aluminum or Galvanized Steel)	25
c. Custom Fabricated Standing Seam Roofing (Copper, Lead Coated Copper, Terne Coated Stainless Steel)	75+
d. Custom Fabricated Flat Seam (Copper, Lead Coated Copper, Terne Coated Stainless Steel)	50+
5. Asphalt Shingles	
a. 15 Year	15
b. 20 Year	20
c. 25 Year	25
d. 30 Year	30
6. Slate	
a. S-1	100
b. S-2	75
c. S-3	50
7. Clay/Concrete Tile	50+
8. Spray-On Polyurethane Foam Roofing	10
9. Siding	
a. Wood (Painted 7-10 years)	30
b. Metal	30
c. Vinyl	30
d. Masonry	75
e. Stone	100

E. ELECTRICAL IN DRY, NONCORROSIVE LOCATIONS (EXCEPT FOR EQUIPMENT DESIGNED TO BE OUTDOORS OR IN WET LOCATIONS)

1. Electric Motors	18
2. Electric Transformers	
a. Oil-Filled	30
b. Dry Type	30
3. Motor Control Center	30
4. Automatic Transfer Switch	25
5. Uninterrupted Power Supply	
a. Battery	10
b. Rotary	15
6. Batteries	5
7. Power Panels	
a. Light and Power Distribution Panel Boards	30
b. Switchgear and Service Entrance Equipment	40
8. Circuit Breakers	30
9. Light Fixtures	20
10. Emergency Engine Generator Set	20
11. Ground Fault Circuit Interrupter (GFCI) Switch	25
12. Wire and Cable	
a. 600 V and below	40
b. Above 600 V	30
13. Solar Photovoltaic Collector Panels	20
14. Branch Circuit Wiring and Devices	30
15. Lightning **Protection**	40

F. FIRE/LIFE SAFETY/SECURITY SYSTEM

1. Fire Alarm Systems	
a. Activation Devices (Pull Station, Smoke Detector, etc.)	10
b. Notification Devices (AV Horn/Strobe)	15
c. Control Panels[13]	15
d. Wiring	30
2. Fire Pumps	
a. Electric Motor Driven	25
b. Engine Driven	20
3. Sprinkler Systems	
a. Heads	25
b. Piping Systems	40
c. Equipment and Devices (Flow Switch, Dry Pipe Valve, etc.)	20
4. Security Systems	
a. Activation Devices (Access Entry, Motion Sensor, etc.).	10
b. Notification Devices (Horn, Dialer)	15
c. Control Panels[14]	15
5. Closed Circuit TV System	
a. Monitors	53
b. Pan and Tilt Motors	53
c. Cameras	65
e. Computer Control[15]	10
6. Standby Power Supply: Battery	5

G. INTERIOR FINISHES

1. Flooring (Sealed When Porous, Except For Carpet)	
a. Vinyl	
i. Tile	12
ii. Sheet	12
b. Carpet: Common Area	
i. Broad Loom	5
ii. Carpet Tiles	5
iii. Loop Pile	15
c. Epoxy Coating (Two Part)	10
d. Stone	
i. Granite	75+
ii. Marble	50
e. Terrazzo	50
f. Hardwood	
(i) Finish	10
(ii) Substrate	50
g. Concrete	50

[13] See note at top of this list regarding shortened useful life of central control hardware and software.
[14] See note at top of this list regarding shortened useful life of central control hardware and software.
[15] See note at top of this list regarding shortened useful life of central control hardware and software.

(3)

The attached useful life and disposal values are taken from information published by the U.S. Government's Office of Management and Budget. The disposal value factor, as a percent of acquisition cost, is based upon the rate of return. These values can be used to help agencies calculate depreciation, gain or loss on transfer of assets, and other costs to be considered in evaluating cost of service performance. This listing is not intended to be all-inclusive.

Useful Life and Disposal Value Table

FSC No. (Federal Supply Code, if applicable)	Nomenclature	Expected Useful Life (Years)	Disposal Value as a Percent of Acquisition Cost
1560	Airframe Structural Components	20	2.48
1610	Aircraft Propellers	10	4.58
1615	Helicopter Rotor Blades, Drive Mechanisms and Components	10	3.52
1620	Aircraft Landing Gear Components	10	2.71
1630	Aircraft Wheel and Brake Systems	10	4.92
1650	Aircraft Hydraulic, Vacuum and De-icing System Components	10	2.19
1660	Aircraft Air Conditioning, Heating and Pressurizing Equipment	10	2.23
1670	Parachutes; Aerial Pickup, Delivery, Recovery Systems and Cargo Tie Down Equipment	7	5.52
1680	Misc. Aircraft Accessories and Components	7	1.92
1720	Aircraft Launching Equipment	25	1.91
1730	Aircraft Ground Servicing Equipment	20	3.12
1740	Airfield Specialized Trucks and Trailers	6.37	
1915	Cargo and Tanker Vessels	30	8.54
1925	Special Service Vessels	25	8.54
1930	Barges and Lighters, Cargo	27	11.05
1935	Barges and Lighters, Special Purpose	30	19.83
1940	Small Craft	23	6.35
1945	Pontoons and Floating Docks	30	14.42
1990	Misc. Vessels		8.74
2010	Ship and Boat Propulsion Components	20	10.26
2030	Deck Machinery		3.31
2040	Marine Hardware and Hull Items	20	16.57
2050	Buoys		11.05
2090	Misc. Ship and Marine Equipment		4.81

5831	Intercommunication and Public Address Systems, Airborne	25	0.61
5835	Sound Recording and Reproducing Equipment	22	1.43
5840	Radar Equipment, except Airborne	23	0.92
5841	Radar Equipment, Airborne	24	0.53
5895	Misc. Communications Equipment	23	0.67
5905	Resistors	8	1.02
5910	Capacitors	8	2.32
5915	Filters and Networks	25	0.93
5920	Fuses and Lightning Arrestors	25	3.12
5925	Circuit Breakers	10	7.49
5930	Switches	10	1.55
5935	Connectors, Electrical	22	20.61
5940	Lugs, Terminals and Terminal Strips	8	1.66
5945	Relays and Solenoids	25	1.36
5950	Coils and Transformers	8	1.35
5955	Piezoelectric Crystals	8	0.65
5960	Electron Tubes and Associated Hardware	8	1.00
5961	Semiconductor Devices and Associated Hardware	8	1.04
5962	Microcircuits, Electronic	8	0.54
5963	Electronic Modules	8	
5965	Headsets, Handsets, Microphones and Speakers	24	4.28
5970	Electrical Insulators and Insulating Materials	8	34.93
5975	Electrical Hardware and Supplies	23	3.73
5977	Electrical Contact Brushes and Electrodes	8	2.08
5985	Antennas, Waveguide and Related Equipment	8	2.02
5990	Synchros and Resolvers	14	1.65
5995	Cable, Cord and Wire Assemblies, Communications Equipment	24	4.16
5999	Misc. Electrical and Electronic Components	20	1.01
6105	Motors, Electrical	10	5.31
6110	Electrical Control Equipment	8	2.45
6115	Generators and Generator Sets, Electrical	19	6.50
6116	Fuel Cell Power Units, Components and Accessories	15	22.88
6120	Transformers: Distribution and Power		
6125	Converters, Electrical, Rotating	25	2.88
6130	Converters, Electrical, Nonrotating	22	1.75
6135	Batteries, Primary	15	2.51
6140	Batteries, Secondary	25	6.91

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Rev. Proc. 87-56
1987-2 C.B. 674
Section 168 -- ACRS Depreciation
Statement of Procedural Rules
Modified by Rev. Proc. 88-22
Clarified by Rev. Proc. 88-22

Summary
SERVICE PROVIDES CLASS LIVES FOR DEPRECIATION PURPOSES.
The Service has issued Rev. Proc. 87-56, providing class lives of property that are necessary to compute the depreciation allowances available under section 168, as amended by section 201(a) of the Tax Reform Act of 1986. The guidance applies to both the general depreciation system under section 168(a) and the alternative depreciation system (ACRS) provided in section 168(g).
For further information on Rev. Proc. 87-56, call Rick Robbins at (202) 566-4440. Rev. Proc. 83-35 was made obsolete by Rev. Proc. 87-56.
Full Text
Rev. Proc. 87-56
SECTION 1. PURPOSE
The purpose of this revenue procedure is to set forth the class lives of property that are necessary to compute the depreciation allowances available under section 168 of the Internal Revenue Code, as amended by section 201(a) of the Tax Reform Act of 1986 (Act), 1986-3 (Vol. 1) C.B. 38. Rev. Proc. 87-57, page 17, this Bulletin, describes the applicable depreciation methods, applicable recovery periods, and applicable conventions that must be used in computing depreciation allowances under section 168.
SEC. 2. GENERAL RULES OF APPLICATION
01 IN GENERAL. This revenue procedure specifies class lives and recovery periods for property subject to depreciation under the general depreciation system provided in section 168(a) of the Code or the alternative depreciation system provided in section 168(g).
02 DEFINITION OF CLASS LIFE. Except with respect to certain assigned property described in section 3 of this revenue procedure, for purposes of both the general depreciation system and the alternative depreciation system, the term "class life" means the class life that would be applicable for any property as of January 1, 1986, under section 167(m) of the Code (determined without regard to paragraph 4 thereof and determined as if the taxpayer had made an election under section 167(m)). The class life that would be applicable for any property as of January 1, 1986, under section 167(m), is the asset guideline period (midpoint class life) for the asset guideline class in which such property is classified under Rev. Proc. 83-35, 1983-1 C.B. 745. However, for purposes of the alternative depreciation system, section 168(g)(3)(B) assigns a class life to certain property that is taken into account under section 168 rather than the class life that would be applicable as of January 1, 1986. The class life of property that is either determined as of January 1, 1986, under Rev. Proc. 83-35 or assigned under section 168(g)(3)(B) may be modified by the Secretary pursuant to authority granted under section 168(i)(1). See section 4 of this revenue procedure.
03 REV. PROC. 83-35. Rev. Proc. 83-35 sets out the asset guideline classes, asset guideline periods and ranges, and annual asset guideline repair allowance percentages for the Class Life Asset Depreciation Range System. The asset guideline periods (midpoint class lives) set out in Rev. Proc. 83-35 are also used in defining the classes of recovery property under the Accelerated Cost Recovery System (that is, section 168 of the Code as in effect prior to amendment by section 201 of the Act). Rev. Proc. 83-35 remains effective for property subject to depreciation under those systems. Rev. Proc. 83-35 does not apply to property subject to depreciation under section 168, other than as a basis for determining the class lives of such property under section 2.02 of this revenue procedure.
04 PROPERTY WITH NO CLASS LIFE. Property that is neither described in an asset guideline class listed in section 5 of this revenue procedure nor assigned a class life under section 168(g)(3)(B) of the Code is treated as property having no class life for purposes of section 168 unless and until a class life is prescribed by the Secretary pursuant to the authority granted under section 168(i)(1). See section 4 of this revenue procedure. The general and alternative depreciation systems contain separate rules for classifying property that does not have a class life.
SEC. 3. ASSIGNED PROPERTY WITH ASSIGNED CLASS LIVES, RECOVERY CLASSES, OR RECOVERY PERIODS

included in any other class, and buildings and structural components as defined in section 1.48-1(e) of the regulations. Excludes public utility initial clearing and grading land improvements as specified in Rev. Rul. 72-403, 1972-2 C.B. 102	20	15	20
00.4 INDUSTRIAL STEAM AND ELECTRIC GENERATION AND/OR DISTRIBUTION SYSTEMS:			
Includes assets, whether such assets are section 1245 property or 1250 property, providing such assets are depreciable, used in the production and/or distribution of electricty with rated total capacity in excess of 500 Kilowatts and/or assets used in the production and/or distribution of steam with rated total capacity in excess of 12,500 pounds per hour for use by the taxpayer in its industrial manufacturing process or plant activity and not ordinarily available for sale to others. Does not include buildings and structural components as defined in section 1.48-1(e) of the regulations. Assets used to generate and/or distribute electricity or steam of the type described above but of lesser rated capacity are not included, but are included in the appropriate manufacturing equipment classes elsewhere specified. Also includes electric generating and steam distribution assets, which may utilize steam produced by a waste reduction and resource recovery plan, used by the taxpayer in its industrial manufacturing process or plant activity. Steam and chemical recovery boiler systems used for the recovery and regeneration of chemicals used in manufacturing, with rated capacity in excess of that described above, with			
specifically related distribution and return systems are not			

Asset class	Description of assets included	Class Life (in years)	General Depreciation System	Alternative Depreciation System
	included but are included in appropriate manufacturing equipment classes elsewhere specified. An example of an excluded steam and chemical recovery boiler system is that used in the pulp and paper manufacturing industry	22	15	22
		Recovery Periods (in years)		
	DEPRECIABLE ASSETS USED IN THE FOLLOWING ACTIVITIES:			
01.1	AGRICULTURE:			
	Includes machinery and equipment, grain bins, and fences but no other land improvements, that are used in the production of crops or plants, vines, and trees; livestock; the operation of farm dairies, nurseries, greenhouses, sod farms, mushroom cellars, cranberry bogs, apiaries, and fur farms; the performance of agriculture, animal husbandry, and horticultural services	10	7	10
01.11	COTTON GINNING ASSETS	12	7	12
01.21	CATTLE, BREEDING OR DAIRY	7	5	7
01.22	HORSES, BREEDING OR WORK	10	7	10
01.221	ANY HORSE THAT IS NOT A RACE HORSE AND THAT IS MORE THAN 12 YEARS OLD AT THE TIME IT IS PLACED IN SERVICE	10	3	10
01.222	ANY RACE HORSE THAT IS MORE THAN 2 YEARS OLD AT THE TIME IT IS PLACED IN SERVICE	/2/	3	12
01.23	HOGS, BREEDING	3	3	3
01.24	SHEEP AND GOATS, BREEDING	5	5	5
01.3	FARM BUILDING EXCEPT STRUCTURES INCLUDED IN CLASS 01.4	25	20	25

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FannieMae

INSTRUCTIONS FOR PERFORMING A MULTIFAMILY PROPERTY CONDITION ASSESSMENT (Version 2.0)

APPENDIX F

ESTIMATED USEFUL LIFE TABLES

These Estimated Useful Life Tables for multifamily property systems and components are intended to represent standardized average estimated useful life ("EUL") values and are not intended to replace the professional judgment of the PCA Consultant in determining the Effective Age and Remaining Useful Life of the systems and components at the Property. The PCA Consultant should consider preventive maintenance practices, as well as environment, geographic, resident, and other factors when determining Effective Age and Remaining Useful Life of the systems and components of a multifamily Property. In addition to providing guidance on EUL values typically considered capital expenditure items, the EUL tables may include items that are typically considered general maintenance and repair items to be handled by in-house maintenance staff.

Estimated Useful Life (EUL) Tables

FLATWORK, PARKING AREAS AND WALKWAYS	Multifamily / Coop	Seniors	Students
Asphalt pavement	25	25	25
Asphalt seal coat	5	5	5
Concrete pavement	50	50	50
Curbing, asphalt	25	25	25
Curbing, concrete	50	50	50
Parking, stall striping	5	5	5
Parking, gravel surfaced	15	15	15
Security gate (site ingress/egress) - rolling gate / lift arm	10	10	10
Sidewalk, asphalt	25	25	25
Sidewalk, brick paver	30	30	30
Sidewalk, concrete	50	50	50

BUILDING HEATING WATER TEMPERATURE CONTROLS	Multifamily / Coop	Seniors	Students
Chilled Water Distribution	50+	50+	50+
Chilling Plant	15	15	15
Cooling Tower	25	25	25
Fuel Oil Storage	25	25	25
Fuel Transfer System	25	25	25
Gas Distribution	50+	50+	50+
Heat Sensors	15	15	15
Heat Exchanger	35	35	35
Heating Risers and Distribution	50+	50+	50+

VENTILATION SYSTEMS	Multifamily / Coop	Seniors	Students
Combustion Air, Duct with fixed louvers	30	30	30
Combustion Air, Motor louver and duct	25	25	25
Flue Exhaust	w/boiler	w/boiler	w/boiler
Free Standing Chimney	50+	50+	50+

ELECTRICAL SYSTEMS	Multifamily / Coop	Seniors	Students
Common area	15	15	15
Buzzer/Intercom, central panel	20	20	20
Central Unit Exhaust, roof mounted	15	15	15
Compactors	15	15	15
Dumpsters	10	10	10
Electrical distribution center	40	40	40
Electric main	40	40	40
Emergency Generator	25	25	25
Gas lines	40	40	40
Gas main	40	40	40
Heating supply/ return	40	40	40
Power distribution	40	40	40
Transformer	30	30	30

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Life cycle energy assessment of a standby diesel generator set

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ABSTRACT

The global demand for emergency standby power (ESP) diesel generators continues to grow because of increasing population and urbanization in developing countries. In order to better understand and further reduce the environmental impact of these products, the life cycle assessment (LCA) methodology was applied to an 455 kW ESP diesel generator set to quantify the energy demands of each life cycle stage: materials, manufacturing, transportation, use, and end-of-life disposal. The life cycle inventory (LCI) was completed based on the information acquired from the manufacturing company and its suppliers, and the impact assessment, i.e., energy demand calculation was done using the data from the Ecoinvent and the Inventory of Carbon and Energy (ICE) databases. The results revealed that, similar to on-highway engines, diesel generators consumed most energy (>95% of the entire life cycle) during the use phase, followed by materials, transportation, and then manufacturing. Therefore, increasing fuel efficiency will have the largest energy and potentially environmental benefits. Printed circuit boards (PCBs), although of small mass, accounted for ~35% of energy demands during the materials stage. The materials-related energy demands can be considerably reduced by increasing remanufacturing and recycling rates. Results from this study are expected to help the genset manufacturers to optimize their product design, supply chain, and service so as to minimize the lifetime environmental impact of the product.

1. Introduction

Increased environmental awareness among the public urges industries to proactively evaluate the impact of their operations on the environment. Industries are now moving beyond environmental compliance by incorporating sustainability in the list of company values, which sends a message to the public that their employees are taking actions to protect the environment and conduct business in a sustainable manner. These actions prompt environmental managers and decision makers to look at their products and services from cradle to grave. As a result, the need for Life Cycle Assessment (LCA) continues to grow. LCA is a method for evaluating the cumulative environmental impacts resulting from all stages in the product life cycle (Environmental Protection Agency, 2006). It started as a tool to evaluate individual products but has now developed into a standardized method for providing a scientific basis for environmental sustainability in various industries (Curran, 2013; Kouchaki-Penchah et al., 2016a, 2016b).

This study describes a life cycle assessment (LCA) performed on a standby diesel generator set in cooperation with a large diesel engine manufacturing company in the United States, which also produces power generation products. A standby diesel generator set, hereafter referred to as a genset, is a combination of a diesel engine with an alternator to convert chemical energy in diesel fuels to electricity (Fig. 1). Emergency standby power (ESP) gensets are used to supply power to electrical appliances during the power interruption of the utility source. ESP gensets are essential for applications that require an uninterrupted power supply. Today, nearly every industry needs an ESP genset, as economic loss can be far more expensive than the capital expenditure for the backup power equipment (RNCOS Market Research, 2014).

The genset market is driven by the rapidly expanding global population and urbanization of cities throughout the world (Diesel Service and Supply, 2016). The genset demand will continue to increase as industries such as oil and gas, electronics, semiconductors, textiles, food processing units, automotive, shopping malls, and data centers turn to diesel generators to deal with unexpected power outages (Sverdlik, 2013). This demand is especially

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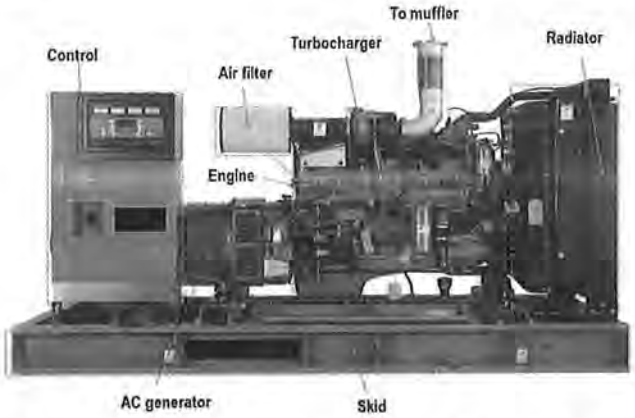

Fig. 1. A typical diesel generator set and its major components. Air filter, turbo charger, and connecting hoses were excluded for assessment due to limited data availability. Note the picture is for demonstration only and may not represent the actual unit investigated in this study.

prevalent in Asia-Pacific, where the data center industry is rapidly expanding, especially in Singapore, Malaysia, Philippines, Thailand, and Australia. Data centers require gensets with a capacity of up to 20 MW (MW) for ESP applications, and therefore, the demand for large diesel gensets with a power output capacity between 1 MW and 3 MW is on the rise (Frost and Sullivan, 2013). It was predicted that the market for 1–3 MW diesel gensets will grow from ~$590 million in 2012 to ~$800 million in 2017 (Sverdlik, 2013). Another study found that the Indian diesel generator market grew 9.5% between 2012 and 2013, and the market would grow at a compound average growth rate of around 11% in value terms during 2014–2018 (RNCOS Market Research, 2014). The global genset market will continue to be driven by the lack of grid infrastructure in remote locations and increasing industrialization in developing countries.

Despite the rapid growth in market demand, only a few LCA studies have been done on diesel gensets. Most of them entailed a comparison of different energy production devices including gensets. Gmünder et al. (2010) compared jatropha oil fueled gensets with diesel gensets, photovoltaic panels, and power grids with respect to greenhouse gases (GHGs) emission and other environmental impacts such as acidification and eutrophication, and concluded that jatropha oil fueled gensets significantly reduced GHGs emission when compared to the other three systems. However, no information was provided regarding the consumption of energy and materials during the manufacturing, transportation, or disposal of the diesel genset. Fleck and Huot (2009) compared a small wind turbine with a diesel genset for residential off-grid use, and reported that although the wind turbine was slightly more expensive than the diesel genset over the entire life cycle, it delivered 93% reduction in GHGs emission. Numerous simplifications and assumptions were made during the assessment of the genset. For example, the material composition of the diesel genset was approximated to be 60% steel, 35% aluminum, and 5% copper. Obviously, this and similar simplifications may cause considerable uncertainties in the final LCA results. Pascale et al. (2011) compared a 3 kW community-scale hydroelectric system with a 7 kW diesel genset in rural Thailand, and found that the hydroelectric system offered better environmental and financial benefits than the genset. However, similar to the study by Gmünder et al. (2010), no information was provided regarding materials and energy consumption during the genset manufacturing or transportation.

LCA studies have also been done on diesel engine and alternator, the two major parts of a diesel genset. Li et al. (2013) investigated the energy consumption and environmental impacts of an on-road diesel engine over its entire life cycle, and reported that the use phase accounted for >99.0% of the total primary energy demand, 97.7% of the total GHGs emission, and 94.2% of the total acidification potential. Cooney et al. (2013) compared mass transit buses driven by diesel engines and electric motors, and concluded that the use phase was dominant in causing global warming, carcinogens and other environmental impacts for both diesel-powered and electric buses. Zhang et al. (2015) compared remanufactured diesel engines with newly built ones, and found that engine remanufacturing reduced the eutrophication potential by 79% and the GHGs emission by 67%. Schau et al. (2012) investigated the economic and environmental benefits from remanufacturing of alternators, and revealed that remanufactured products caused only 12% of the GHGs emission and costs when compared with new ones.

Although efforts have been made to assess the life cycle of diesel gensets and their key components, a detailed systematic investigation is still lacking, especially for large-capacity gensets. To manufacturers, an LCA will allow decision makers to better report, understand, and interpret the environmental impact of their product in a manner that promotes sustainable product and process choices in the future (Curran, 1996). In 2013, the company who manufactured the diesel genset in this study partnered with a master student from the Massachusetts Institute of Technology (MIT) to perform an LCA on a 15 L displacement engine used in the on-highway application (Bolin, 2013). The primary focus of that study was to understand the energy demands of the life cycle stages prior to the use phase because it was well recognized that the use phase was the most energy intensive for on-highway applications. This genset study not only includes the engine information, but extends the analysis to the full life cycle of the engine as a part of the genset.

2. Methodology

2.1. Goal and scope definition

The goal of this study is to perform an LCA on a standby genset in order to quantify the energy demand for each life cycle stage and identify which is the most energy intensive one. The life cycle stages of this analysis include materials, manufacturing, transportation, use, and end of life (EoL), making the study a "cradle-to-grave" analysis. This LCA has been streamlined in order to align the results of the assessment with the goal of the study. A combination of the streamlining techniques described by Keith Weitz at the United States Environmental Protection Agency (USEPA) conference on streamlining LCA was used to perform this streamlined LCA (Weitz and Sharma, 1998, Weitz et al., 1999).

2.1.1. Functional unit

The subject of this study is a standby diesel genset. This particular model is equipped with a heavy-duty 15 L engine with a 455 kW rating. As an emergency standby power supply, the primary function of the genset is to convert chemical energy in diesel fuels to mechanical energy (by a diesel engine) and then to electricity (by an AC alternator) during power grid disruptions. The functional unit of the genset is based on the amount of diesel fuels consumed, which is a function of fuel economy and operation time. Under normal conditions, the genset has a life expectancy of 20 years and an operation time of 50–100 h per year, according to the manufacturer.

2.1.2. Process description and system boundaries

To conduct the LCA, the generator was divided into five main

(7) a)

Cat® Extended Service Coverage (ESC)

4 EASY STEPS TO PROTECT YOUR STANDBY GENERATOR SET

Your operation depends on reliable power. That's why you trust Cat® generator sets. With Cat Financial Insurance Services, you get service coverage that's just as durable and long-lasting. ESC for **new, used and overhauled standby generator sets** protects your investment and your peace of mind. Choosing coverage is as easy as following these four steps.

1 CHOOSE FROM A VARIETY OF COVERAGE OPTIONS

First, extend your protection beyond the original factory warranty by choosing the coverage option that's right for your situation.

NEW ESC

Coverage for electric power standby generator sets is available in 36- to 120- month terms, in 12-month increments, if purchased before the end of your original factory warranty.

ADVANTAGE ESC

Coverage is available after the end of the original factory warranty in 12- to 60-month terms, in 12-month increments, and before the first overhaul. Your standby generator set is eligible if:

- It's less than four years from delivery date and accumulated less than 3,000 hours total use since new, OR
- It's less than 10 years from build date AND currently enrolled in New ESC or Advantage ESC, OR
- It's less than 10 years from build date AND currently covered by an authroized Cat dealer Customer Support Agreement (CSA), OR
- It passes a qualifying inspection performed by an authorized Cat dealer in accordance with the Advantage Certification Inspection Worksheet.

OVERHAUL PROTECTION FOR COMMERCIAL (OPC) ESC

Coverage is available in 12- to 60- month terms, in 12-month increments. Your standby generator set is eligible once a qualifying overhaul has been completed by an authorized Cat dealer in accordance with the OPC Certification Worksheet.

2 IDENTIFY YOUR COVERAGE NEEDS

Next, identify the age and current operating hours of your generator set since delivery or overhaul. Then calculate your annual hours of use to choose the best ESC coverage terms to fit your needs.

(7) b)

1 (866) 468-7697 (tel:18664687697)

Send a quick email

When Should You Replace Your Generator?

Unfortunately, there is no simple rule for when you should replace your diesel generator. There are, however, a few key factors that will help you determine if you should have it evaluated by a generator sales and service professional.

Like any piece of equipment, there will come a time when it will need to be taken out of service. Review the factors below to learn more about how close your generator is to the end of its useful life.

How "Used" is Your Generator?

Opinions vary, but somewhere between 10,000 and 20,000 run hours is considered to be the useful life of a diesel generator. While it depends upon usage, run hours of that amount will often mean the generator is 20 to 25 years old.

Is your generator over 20 years old? Is it nearing or over 10,000 run hours? If so, we recommend having it evaluated.

Are You Complying With Air Quality Regulations?

Diesel generator technology is constantly improving. A generator with a smaller diesel engine may be capable of producing the same amount of power as the one you're currently using.

For example, many 30KW generators today are powered by small engines below 50hp that are not subject to air quality restrictions. If your current generators were manufactured before the year 2000 or your organization is concerned about your air quality footprint, it's time to have your generators evaluated.

Does the Manufacturer Support It?

Your backup generator may be one of the most critical pieces of equipment your company owns. You would only know it, however, when an outage occurs. If your generator needs a replacement part or other support from the manufacturer, would it be available?

(7) c)

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Clearwater beach condo converting from a diesel generator to clean natural gas

by John Macgowan | Feb 9, 2017 | Natural Gas Solutions | 0 comments

All generators have a useful life span. Typically after 15 – 20 years it's time to budget for a replacement. Generators spending their lives in corrosive areas, like those exposed to salt air along Clearwater beach, may need to be replaced even sooner.

December | Power Transmission

Powered With Preventive Maintenance: Longer Standby Generator Life

EP Editorial Staff | March 23, 2012

Availability is priceless when it comes to emergency power.

These tips and techniques can help ensure your generators are there for your operations whenever and wherever duty calls.

By Robert K. Breese II, Generac

Checking the engine oil level is one of several routine maintenance items that should be performed monthly.

While the average life expectancy of a well-maintained service vehicle is approximately 5000 hours (assuming 300,000 miles at 60 mph), a typical standby generator set can last from 10,000 to 30,000 hours. On the other hand, a standby generator might operate as little as 26 hours a year (based on only 30 minutes of weekly exercise and no outages) or as much as several hundred hours a year, depending upon the number and duration of power outages.

In either case, a standby generator set could conceivably last 20 to 30 years. One way to ensure a long, reliable operating life is to implement a preventive maintenance (PM) program.

Preventive maintenance and service are typically done on a schedule based upon engine hours and/or time periods. The maintenance cycle can—*and should*—be adapted to meet specific application needs. The more hours per year a unit operates, the more frequently it will require service. Environment also plays a role: The more severe the environment (dusty, extremely hot or cold, highly humid, etc.), the more frequent the need for service may be.

Most OEM-recommended maintenance schedules for generators—*whether a unit is powered by diesel or gaseous fuels*—are roughly the same. The typical maintenance cycle includes a general inspection followed by scheduled inspection and service of the following critical systems:

- Fuel system (diesel fuel requires more maintenance)
- Coolant system
- Lubrication system
- Air system (combustion and cooling air)
- Starting system (batteries and charger)
- Alternator (a frequently overlooked item)
- Transfer switch (another often-overlooked item)

(7) e)

building operating management

Preventing Power Emergencies

To avoid costly surprises, health care facility executives should build a strong business case for ongoing investments in the power system

By Mike Daugird Power & Communication Article Use Policy

It's easy to put off capital investments in the power infrastructure. But facility executives who find that those expenditures are being delayed year after year should consider what happened at one hospital. There, other priorities cropped up each year that made maintaining the physical plant seem unimportant. For example, replacement of an old generator was put off for three years in a row. Finally, the generator failed during its monthly testing. And the generator was so old that the parts to fix the engine were no longer available.

To maintain a hospital license, the organization rented and temporarily wired in a generator. The hospital was forced to pay a substantial daily rental fee for four weeks before a new generator was delivered. To get the replacement generator delivered quickly, the hospital had to pay a 5 percent premium. Additional cost was required to wire in the new generator and to have the rented unit unwired.

Even more troubling, because deadlines were especially tight, the hospital ordered the same size generator without considering the long-term needs of the facility.

Unfortunately, that's a familiar story. Once the commissioning process and warranty years have come and gone, aggressive building-system maintenance becomes less and less of a priority.

Before long, inconsistent maintenance means building systems only get noticed when an emergency arises. Emergencies cost money — money that doesn't add value to a business' bottom line. Facility executives might be able to get by with a reactive approach to maintenance and upgrades. But

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taking a high-level management philosophy instead is a better approach, one that drives a return on investment for the physical plant.

Proactive management leads to the best financial outcome. Planned upgrades or replacements avoid direct costs, including temporary wiring, rental fees, unwiring, delivery, crane rental and repair of the location where the rental unit had been temporarily set.

The cost of lost opportunity, although difficult to quantify, can be more substantial than direct expenses.

One opportunity that is often lost is the chance to address the long-term goals of the facility master plan, while simultaneously accomplishing the maintenance needs of the current infrastructure. A proactive plan enables an organization to reap important benefits while spending no more than it would have spent by reacting to problems; the difference is that the money spent on the latter leaves the facility with no added value.

As a facility grows, it's not unusual for projects to be based on the least immediate cost. Doing so is shortsighted. Replacing an existing generator or UPS system, for example, is a chance to upgrade to current technology, while implementing the facility master plan.

The key to success is an intelligent strategy. The strategy should be documented carefully because relying on the memories and skills of key people, no matter how well-intentioned, will lead to complications.

Finding the Best Approach

The first step is to undertake a comprehensive study of existing systems in light of the master plan. Often, facility executives can uncover synergies between proactive maintenance that avoids downtime and future needs as laid out in a five- or ten-year facility plan.

The following rules of thumb will prove useful in evaluating the existing infrastructure:

- UPS batteries should be replaced after six to seven years of service
- Generator engine life expectancy is 20 to 25 years
- Transfer switches life expectancy is 20 to 25 years

UPS Batteries: The UPS battery may have been specified as a 10-year unit, but experience shows that waiting that long may cause problems. In addition, filter capacitors used by the UPS will eventually fail. The lifespan on filter capacitors depends greatly on the design and quality of the components.

Consult with the manufacturer of the UPS to determine when these components should be replaced. In many cases, it may be better to replace

the whole unit and upgrade to the most current technology. For example, UPS systems with active IGBT input stages can handle voltage swings in the power supplied by generators much better than older UPS systems; the resulting performance increase alone could be cause to replace the UPS.

Generators: Generators have a long service life. But it's really total runtime, not the total years of service, that counts. If there has been a period during which the generator ran for days on end, expect to replace the generator sooner than normal, perhaps in 18 to 20 years.

Other things to watch include the generator's alternators, which can fail. Alternator brushes also need to be maintained. Permanent magnet alternators require less maintenance because there are no brushes to replace.

While a skilled mechanic may be able to keep old generators running for as long as parts are available, it may not be the wisest option. Advances made with electronic isochronous governors, as well as NFPA 110 alarm and monitoring requirements, may make replacement attractive. Consider this: Spending a lot of money on an engine or alternator rebuild simply won't buy another 20 years of service life.

Transfer Switches: Best practices call for the replacement of transfer switches before they experience full failure. Transfer switches should be closely monitored during monthly generator testing. At the first sign of a failure to transfer or any uncharacteristic noises, schedule a replacement.

Isolation by-pass transfer switches will allow the switch to be replaced without interrupting power to the load. Most large 24-hour facilities can justify the cost increase for these switches. Scheduling replacements during weekend downtime is a cost-effective option for smaller facilities.

The Right Documentation

A business case should be supported with detailed documentation. To complete a gap analysis — a review of what the facility actually has compared to the organization's master plan — consider the audience. Documentation should be laid out in a manner that can be understood by all stakeholders.

As-built drawings are a good place to start. As-built drawings should give a complete plan of the facility, but information is often missing when a set of drawings for one project picks up from a previous project.

Furthermore, as-built drawings depend on the quality of the information red-lined on the drawings during construction. This is where things can be missed, in part because field construction conditions make it harder to keep accurate records.

(7) F)

The General Life Span of a Generator

The General Life Span of a Generator

If you would buy a generator (https://duthiepower.com/new-used-sales/) today, it would generally last you 15 to 20 years depending on the availability of the repair (https://duthiepower.com/service-repair/) components.

The repair is an important part of the life of the generator. If you keep up on the repairs (https://duthiepower.com/service-repair/) you will limit the out of pocket business expenses that are occur in the normal wear and tear in the life of the generator.

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QUESTION:
Please file with the PSC any documents the Company may have in support of its response to Data Request No. 9.

RESPONSE:
FPL has no responsive documents.

QUESTION:
Please file with the PSC any documents the Company may have in support of its response to Data Request No. 10.

RESPONSE:
Please see response to Staff's First Set of Data Requests POD No. 1.