would be so required; provided further that as a condition to the Trustee voting or giving such consent, the Trustee shall have received a certificate of a Company representative or an opinion of counsel, at its election, stating that such voting or consent is authorized or permitted by the Indenture.

Supplemental Indentures

The Issuer and the Trustee may enter into indentures supplemental to the Indenture as shall not be inconsistent with the terms and provisions of the Indenture, without the consent of or notice to the Bondholders, in order (i) to cure any ambiguity or formal defect or omission in the Indenture, (ii) to grant to or confer upon the Trustee, as may lawfully be granted, additional rights, remedies, powers or authorities for the benefit of the Bondholders, (iii) to subject to the Indenture additional revenues, properties or collateral, (iv) to permit qualification of the Indenture under any federal statute or state blue sky law, (v) to add additional covenants and agreements of the Issuer for the protection of the Bondholders or to surrender or limit any rights, powers or authorities reserved to or conferred upon the Issuer, (vi) to make any other modification or change to the Indenture which, in the sole judgment of the Trustee, does not adversely affect the Trustee or any Bondholder, (vii) to make other amendments not otherwise permitted by (i), (ii), (iii), (iv) or (v) of this paragraph to provisions relating to federal income tax matters under the Code or other relevant provisions if, in the opinion of Bond Counsel, those amendments would not adversely affect the exclusion of the interest on the Bonds from gross income for federal income tax purposes, (viii) to make any modification or change to the Indenture necessary to provide liquidity or credit support for the Bonds, including any modifications necessary to upgrade or maintain the then applicable ratings on the Bonds or (ix) to permit the issuance of the Bonds in other than book-entry-only form or to provide changes to or for the book-entry system.

Notwithstanding the foregoing, the Company, with the consent of the Trustee, may at any time further secure the Bonds by means of a letter of credit, other credit facility or other guarantee or collateral.

Exclusive of supplemental indentures for the purposes set forth in the preceding two paragraphs, the consent of registered owners holding a majority in aggregate principal amount of all Bonds then outstanding is required to approve any supplemental indenture, except no such supplemental indenture may permit, without the consent of all of the registered owners of the Bonds then outstanding, (i) an extension of the maturity of the principal of or the interest on any Bond issued under the Indenture or a reduction in the principal amount of any Bond or the rate of interest or time of redemption or redemption premium thereon, (ii) a privilege or priority of any Bond or Bonds over any other Bond or Bonds, (iii) a reduction in the aggregate principal amount of the Bonds required for consent to such supplemental indenture or (iv) the deprivation of any registered owners of the lien of the Indenture.

If at any time the Issuer requests the Trustee to enter into any supplemental indenture requiring the consent of the registered owners of the Bonds, the Trustee, upon being satisfactorily indemnified with respect to expenses, must notify all such registered owners. Such notice must set forth the nature of the proposed supplemental indenture and must state that copies thereof are on file at the designated office of the Trustee for inspection. If, within sixty days (or such longer period as prescribed by the Issuer or the Company) following the giving of such notice, the registered owners holding the requisite amount of the Bonds outstanding have consented to the execution thereof, no Bondholder will have any right to object or question the execution thereof.

No supplemental indenture will become effective unless the Company consents to the execution and delivery of such supplemental indenture. The Company will be deemed to have consented to the execution and delivery of any supplemental indenture if the Trustee does not receive a notice of protest or objection signed by the Company on or before 4:30 p.m., local time in the city in which the designated

office of the Trustee is located, on the fifteenth day after the mailing to the Company of a notice of the proposed changes and a copy of the proposed supplemental indenture.

Enforceability of Remedies

The remedies available to the Trustee, the Issuer and the owners upon an Event of Default under the Loan Agreement, the Indenture or the First Mortgage Indenture are in many respects dependent upon judicial actions which are often subject to discretion and delay. Under existing constitutional and statutory law and judicial decisions, the remedies specified by the Loan Agreement, the Indenture and the First Mortgage Indenture may not be readily available or may be limited. The various legal opinions to be delivered concurrently with the delivery of the Bonds will be qualified as to the enforceability of the various legal instruments by limitations imposed by principles of equity, bankruptcy, reorganization, insolvency, moratorium or other similar laws affecting the rights of creditors generally.

Tax Treatment

In the opinion of Bond Counsel, under existing law, including current statutes, regulations, administrative rulings and official interpretations, subject to the qualifications and exceptions set forth below, interest on the Bonds will be excluded from the gross income of the recipients thereof for federal income tax purposes, except that no opinion will be expressed regarding such exclusion from gross income with respect to any Bond during any period in which it is held by a "substantial user" of the Project or a "related person" as such terms are used in Section 147(a) of the Code. It is Bond Counsel's further opinion that, subject to the assumptions stated in the preceding sentence, (i) interest on the Bonds will be excluded from gross income of the owners thereof for Kentucky income tax purposes and (ii) the Bonds will be exempt from all ad valorem taxes in Kentucky. Interest on the Bonds will be an item of tax preference in determining alternative minimum taxable income for individuals and corporations under the Code. The alternative minimum tax has been repealed with respect to corporations for taxable years beginning after December 31, 2017.

The opinion of Bond Counsel assumes and is conditioned on the payment and discharge of all of the 2007 Bonds on or before the 90th day following the date of issuance of the Bonds. The Company has agreed (i) to apply all of the proceeds of the bonds to the payment and discharge of the 2007 Bonds within 90 days following the date of issuance of the Bonds, (ii) to provide additional funds necessary, on or prior to a day within 90 days following the date of issuance of the Bonds, to defease and discharge the 2007 Bonds on such day and (iii) to give irrevocable instructions on the date of issuance of the Bonds to the trustee in respect of the 2007 Bonds directing the redemption of the 2007 Bonds.

The opinion of Bond Counsel as to the excludability of interest from gross income for federal income tax purposes will be based upon and will assume the accuracy of certain representations of facts and circumstances, including with respect to the Project, which are within the knowledge of the Company and compliance by the Company with certain covenants and undertakings set forth in the proceedings authorizing the Bonds which are intended to assure that the Bonds are and will remain obligations the interest on which is not includable in gross income of the recipients thereof under the law in effect on the date of such opinion. Bond Counsel will not independently verify the accuracy of the certifications and representations made by the Company and the Issuer. On the date of the opinion and subsequent to the original delivery of the Bonds, such representations of facts and circumstances must be accurate and such covenants and undertakings must continue to be complied with in order that interest on the Bonds be and remain excludable from gross income of the recipients thereof for federal income tax purposes under existing law. Bond Counsel will express no opinion (i) regarding the exclusion of interest on any Bond from gross income for federal income tax purposes on or after the date on which any change, including any interest rate conversion, permitted by the documents other than with the approval of Bond Counsel is

taken which adversely affects the tax treatment of the Bonds or (ii) as to the treatment for purposes of federal income taxation of interest on the Bonds upon a Determination of Taxability.

The Code prescribes a number of qualifications and conditions for the interest on state and local government obligations to be and to remain excluded from gross income for federal income tax purposes, some of which, including provisions for potential payments by the Issuer to the federal government, require future or continued compliance after issuance of the Bonds in order for the interest to be and to continue to be so excluded from the date of issuance. Noncompliance with certain of these requirements by the Company or the Issuer with respect to the Bonds could cause the interest on the Bonds to be included in gross income for federal income tax purposes and to be subject to federal income taxation retroactively to the date of their issuance. The Company and the Issuer will each covenant to take all actions required of each to assure that the interest on the Bonds will be and remain excluded from gross income for federal income tax purposes, and not to take any actions that would adversely affect that exclusion.

The opinion of Bond Counsel as to the exclusion of interest on the Bonds from gross income for federal income tax purposes and federal tax treatment of interest on the Bonds will be subject to the following exceptions and qualifications:

(i) The Code also provides for a "branch profits tax" which subjects to tax, at a rate of 30%, the effectively connected earnings and profits of a foreign corporation which engages in a United States trade or business. Interest on the Bonds would be includable in the amount of effectively connected earnings and profits and thus would increase the branch profits tax liability.

(ii) The Code also provides that passive investment income, including interest on the Bonds, may be subject to taxation for any S corporation with Subchapter C earnings and profits at the close of its taxable year if greater than 25% of its gross receipts is passive investment income.

Except as stated above, Bond Counsel will express no opinion as to any federal or Kentucky tax consequences resulting from the receipt of interest on the Bonds.

Owners of the Bonds should be aware that the ownership of the Bonds may result in collateral federal income tax consequences to certain taxpayers, including without limitation, financial institutions, certain insurance companies, individual recipients of Social Security or Railroad Retirement benefits, and taxpayers who may be deemed to have incurred (or continued) indebtedness to purchase or carry tax-exempt obligations. Prospective purchasers of the Bonds should consult their own tax advisors regarding such matters and any other tax consequences of holding the Bonds.

From time to time, there are legislative proposals in Congress which, if enacted, could alter or amend one or more of the federal tax matters referred to above or could adversely affect the market value of the Bonds. It cannot be predicted whether or in what form any such proposal might be enacted or whether, if enacted, it would apply to obligations (such as the Bonds) issued prior to enactment.

A draft of the opinion of Bond Counsel relating to the Bonds in substantially the form in which it is expected to be delivered on the date of issuance of the Bonds is attached as Appendix B to this Official Statement.

Legal Matters

Certain legal matters incident to the authorization, issuance and sale by the Issuer of the Bonds are subject to the approving opinion of Bond Counsel. Bond Counsel has in the past, and may in the future, act as counsel to the Company with respect to certain matters. Certain legal matters will be passed upon for the Issuer by its County Attorney. Certain legal matters will be passed upon for the Company by Jones Day, Chicago, Illinois, and John R. Crockett III, General Counsel, Chief Compliance Officer and Corporate Secretary for the Company. Certain legal matters will be passed upon for the Underwriter by its counsel, McGuireWoods LLP, Chicago, Illinois.

Underwriting

"US Bancorp" is the marketing name of U.S. Bancorp and its subsidiaries, including U.S. Bancorp Investments, Inc., which is serving as the underwriter for the Bonds (the "Underwriter"), and U.S. Bank National Association, which is serving as Trustee, Paying Agent, Tender Agent and Registrar for the Bonds.

The Underwriter has agreed, subject to the terms of the bond purchase agreement between the Issuer and the Underwriter, to purchase the Bonds from the Issuer at the public offering price set forth on the cover page of this Official Statement. The Underwriter is committed to purchase all the Bonds if any Bonds are purchased. In connection with the underwriting of the Bonds, the Underwriter will be paid by the Company a fee in the amount of $89,375, which excludes reimbursement for certain reasonable out-of-pocket expenses.

The Underwriter may offer and sell the Bonds to certain dealers and others at prices lower than the public offering price set forth on the cover page of this Official Statement. After the Bonds are released for sale to the public, the public offering price and other selling terms may from time to time be varied by the Underwriter.

In connection with the offering of the Bonds, the Underwriter may over-allot or effect transactions that stabilize or maintain the market prices of such Bonds at levels above those that might otherwise prevail in the open market. Such stabilizing, if commenced, may be discontinued at any time.

Pursuant to an Inducement Letter, the Company has agreed to indemnify the Underwriter and the Issuer against certain civil liabilities, including liabilities under the federal securities laws, or contribute to payments that the Underwriter or the Issuer may be required to make in respect thereof.

In the ordinary course of its business, the Underwriter and certain of its affiliates have in the past and may in the future engage in investment and commercial banking transactions with the Company, including the provision of certain advisory services to the Company.

Continuing Disclosure

Because the Bonds will be special and limited obligations of the Issuer, the Issuer is not an "obligated person" for purposes of Rule 15c2-12 (the "Rule") promulgated by the SEC under the Exchange Act, and does not have any continuing obligations thereunder. Accordingly, the Issuer will not provide any continuing disclosure information with respect to the Bonds or the Issuer.

In order to enable the Underwriter to comply with the requirements of the Rule, the Company will covenant in a continuing disclosure undertaking agreement to be delivered to the Trustee for the benefit of the holders of the Bonds (the "Continuing Disclosure Agreement") to provide certain continuing disclosure for the benefit of the holders of the Bonds. Under its Continuing Disclosure Agreement, the Company will covenant to take the following actions:

(i) The Company will provide to the Municipal Securities Rulemaking Board ("MSRB") (in electronic format) (a) annual financial information of the type set forth in Appendix A to this Official Statement (including any information incorporated by reference in Appendix A) and (b) audited financial statements prepared in accordance with generally accepted accounting principles, in each case not later than 120 days after the end of the Company's fiscal year.

(ii) The Company will file in a timely manner not in excess of 10 business days after the occurrence of the event with the MSRB notice of the occurrence of any of the following events (if applicable) with respect to the Bonds: (a) principal and interest payment delinquencies; (b) non-payment related defaults, if material; (c) any unscheduled draws on debt service reserves reflecting financial difficulties; (d) unscheduled draws on credit enhancement facilities reflecting financial difficulties; (e) substitution of credit or liquidity providers, or their failure to perform; (f) adverse tax opinions, the issuance by the Internal Revenue Service of proposed or final determinations of taxability, Notices of Proposed Issue (IRS Form 5701-TEB) or other material notices or determinations with respect to the tax status of the Bonds, or other material events affecting the tax status of the Bonds; (g) modifications to rights of the holders of the Bonds, if material; (h) the giving of notice of optional or unscheduled redemption of any Bonds, if material, and tender offers; (i) defeasance of the Bonds or any portion thereof; (j) release, substitution, or sale of property securing repayment of the Bonds, if material; (k) rating changes; (l) bankruptcy, insolvency, receivership or similar event of the Company; (m) the consummation of a merger, consolidation or acquisition involving the Company, or the sale of all or substantially all of the assets of the Company, other than in the ordinary course of business, the entry into a definitive agreement to undertake such an action or the termination of a definitive agreement relating to any such actions, other than pursuant to its terms, if material; and (n) appointment of a successor or additional trustee or a change of name of a trustee, if material.

(iii) The Company will file in a timely manner with the MSRB notice of a failure by the Company to file any of the information referred to in paragraph (i) above by the due date.

The Company may amend its Continuing Disclosure Agreement (and the Trustee shall agree to any amendment so requested by the Company that does not change the duties of the Trustee thereunder) or waive any provision thereof, but only with a change in circumstances that arises from a change in legal requirements, change in law, or change in the nature or status of the Company with respect to the Bonds or the type of business conducted by the Company; provided that the undertaking, as amended or following such waiver, would have complied with the requirements of the Rule on the date of issuance of the Bonds, after taking into account any amendments to the Rule as well as any change in circumstances, and the amendment or waiver does not materially impair the interests of the holders of the Bonds to which

such undertaking relates, in the opinion of the Trustee or counsel expert in federal securities laws acceptable to both the Company and the Trustee, or is approved by the Beneficial Owners of a majority in aggregate principal amount of the outstanding Bonds. The Company acknowledges that its undertakings pursuant to the Rule described under this heading are intended to be for the benefit of the holders of the Bonds and shall be enforceable by the holders of those Bonds or by the Trustee on behalf of such holders. Any breach by the Company of these undertakings pursuant to the Rule will not constitute an event of default under the Indenture, the Loan Agreement or the Bonds.

The Company is a party to continuing disclosure agreements with respect to 5 series of pollution control bonds. The MSRB's Electronic Municipal Market Access website reflects that within the past five years the Company did not timely file certain information in connection with December 2014 and June 2016 downgrades of credit ratings for four series of Company pollution control bonds resulting from the downgrade of the bank providing the letters of credit supporting such bonds. Moody's Investors Service, Inc. downgraded the long-term rating of the four Company pollution control bonds on December 2, 2014. The Company was not aware of the downgrade until February 10, 2015 and filed the required disclosures on February 11, 2015. On May 23, 2016, S&P Global Ratings updated its methodology and assumptions for rating jointly supported financial obligations. As a result, S&P Global Ratings downgraded the long-term rating on the four Company pollution control bonds as of June 3, 2016. The Company was not aware of the downgrade until July 24, 2017 and filed the required disclosures on July 24, 2017. The Company has had, and continues to have, procedures in place in order to make material event notices and financial statement filings on an ongoing basis.

This Official Statement has been duly approved, executed and delivered by the County Judge/Executive of the Issuer, on behalf of the Issuer. However, the Issuer has not and does not assume any responsibility as to the accuracy or completeness of any of the information in this Official Statement except for information furnished by the Issuer under the heading "The Issuer."

COUNTY OF CARROLL, KENTUCKY

By: /s/ Bobby Lee Westrick
County Judge/Executive

Appendix A

Kentucky Utilities Company

Kentucky Utilities Company ("KU"), incorporated in Kentucky in 1912 and in Virginia in 1991, is a regulated public utility engaged in the generation, transmission, distribution and sale of electric energy in Kentucky, Virginia and Tennessee. As of December 31, 2017, KU provided electricity to approximately 525,000 customers in 77 counties in central, southeastern and western Kentucky, approximately 28,000 customers in five counties in southwestern Virginia and three customers in Tennessee. KU's service area covers approximately 4,800 non-contiguous square miles. KU's coal-fired electric generating stations produce most of KU's electricity. The remainder is generated by natural gas fueled combined cycle combustion turbines, a hydroelectric power plant and natural gas and oil fueled combustion turbines. In Virginia, KU operates under the name Old Dominion Power Company. KU also sells wholesale electric energy to 10 municipalities.

KU is a wholly-owned subsidiary of LG&E and KU Energy LLC and an indirect wholly-owned subsidiary of PPL Corporation. KU's affiliate, Louisville Gas and Electric Company ("LG&E"), is a regulated public utility engaged in the generation, transmission, distribution and sale of electric energy and natural gas in Kentucky. KU's obligations under the Loan Agreement are solely its own, and not those of any of its affiliates. None of LG&E, PPL Corporation or KU's other affiliates will be obligated to make any payment on the Loan Agreement or the Bonds.

The information above concerning KU is only a summary and does not purport to be comprehensive. Additional information regarding KU, including audited financial statements, is available in the documents listed under the heading "Documents Incorporated by Reference," which documents are incorporated by reference herein.

Selected Financial Data
(Dollars in millions)

	Six Months Ended June 30, 2018	Six Months Ended June 30, 2017	Year Ended December 31, 2017	Year Ended December 31, 2016	Year Ended December 31, 2015
Operating revenues	$ 885	$ 843	$ 1,744	$ 1,749	$ 1,728
Operating income[1]	$ 236	$ 244	$ 518	$ 531	$ 457
Net income	$ 148	$ 119	$ 259	$ 265	$ 234
Total assets	$ 8,353	$ 8,086	$ 8,254	$ 8,085	$ 8,011
Long-term debt obligations (including amounts due within one year)[1]	$2,329	$2,237	$ 2,328	$ 2,327	$ 2,326
Ratio of earnings to fixed charges[2]	4.6	4.9	5.2	5.3	5.3

Capitalization:

	June 30, 2018	% of Capitalization
Long-term debt and notes payable	$ 2,462	41.9%
Common equity	3,414	58.1%
Total capitalization	$ 5,876	100.0%

(1) Effective January 1, 2018, KU adopted accounting guidance that changes the income statement presentation of net periodic benefit cost. Retrospectively, this guidance requires the service cost component to be disaggregated from other components of net benefit cost and presented in the same income statement line items as other employee compensation costs arising from services rendered during the period. The other components of net periodic benefits are presented separately from the line items that include the service cost and outside of any subtotal of operating income. As a result, all periods reported in the June 30, 2018 Form 10-Q reflected the retrospective adoption of this guidance. Amounts reported in the table above for December 31, 2017, December 31, 2016 and December 31, 2015, also reflect retrospective reclassifications from other operation and maintenance expense to other income (expense) of $1 million, $2 million, and $2 million, respectively.

(2) For purposes of this ratio, "Earnings" consist of earnings (as defined below) from continuing operations plus fixed charges. Fixed charges consist of all interest on indebtedness, amortization of debt discount and expense and the portion of rental expense that represents an imputed interest component. Earnings from continuing operations consist of income before taxes and the mark-to-market impact of derivative instruments.

The selected financial data presented above for the three fiscal years ended December 31, 2017, and as of December 31 for each of those years, have been derived from the Company's audited financial statements. The selected financial data presented above for the six months ended June 30, 2018 and 2017 have been derived from the Company's unaudited financial statements for the six months ended June 30, 2018 and 2017. The Company's audited financial statements for the three fiscal years ended December 31, 2017, and as of December 31 for each of those years, are included in the Company's Form 10-K for

the year ended December 31, 2017 incorporated by reference herein. The Company's unaudited financial statements for the six months ended June 30, 2018 are included in the Company's Form 10-Q for the quarter ended June 30, 2018 incorporated by reference herein. "Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations" in the Company's Form 10-K for the year ended December 31, 2017 and "Item 2. Management's Discussion and Analysis of Financial Condition and Results of Operations" in the Company's Form 10-Q for the quarter ended June 30, 2018, as well as the Combined Notes to Financial Statements as of December 31, 2017, 2016 and 2015 and the Combined Notes to Condensed Financial Statements (Unaudited) as of June 30, 2018 and December 31, 2017 and for the six-month periods ended June 30, 2018 and 2017, should be read in conjunction with the above information. Deloitte & Touche LLP audited the Company's financial statements for the fiscal years ended December 31, 2017 and December 31, 2016. Ernst & Young LLP audited the Company's financial statements for the fiscal year ended December 31, 2015.

Risk Factors

Investing in the Bonds involves risk. Please see the risk factors in KU's Annual Report on Form 10-K for the year ended December 31, 2017, which is incorporated by reference in this Appendix A. Before making an investment decision, you should carefully consider these risks as well as the other information contained or incorporated by reference in this Appendix A. Risks and uncertainties not presently known to KU or that KU currently deems immaterial may also impair its business operations, its financial results and the value of the Bonds.

Available Information

KU is subject to the information requirements of the Securities Exchange Act of 1934, as amended, and, accordingly, files reports and other information with the Securities and Exchange Commission (the "SEC"). Such reports and other information on file can be inspected and copied at the public reference facilities of the SEC, currently at 100 F Street, N.E., Room 1580, Washington, DC 20549; or from the SEC's Web Site (http://www.sec.gov). Please call the SEC at 1-800-SEC-0330 for further information on the public reference room.

Documents Incorporated by Reference

The following documents, as filed by KU with the SEC, are incorporated herein by reference:

1. Form 10-K Annual Report of KU for the year ended December 31, 2017;

2. Form 10-Q Quarterly Reports of KU for the quarters ended March 31, 2018 and June 30, 2018; and

3. Form 8-K Current Reports of KU filed with the SEC on January 16, 2018 and March 26, 2018.

All documents filed by KU with the SEC pursuant to Section 13(a), 13(c), 14 or 15(d) of the Securities Exchange Act of 1934 subsequent to the date of this Official Statement and prior to the termination of the offering of the Bonds shall be deemed to be incorporated by reference in this Appendix and to be made a part hereof from their respective dates of filing. Any statement contained in a document incorporated or deemed to be incorporated by reference in this Official Statement shall be deemed to be modified or superseded for purposes of this Official Statement to the extent that a statement contained in this Official Statement or in any other subsequently filed document which also is or is deemed to be incorporated by reference in this Official Statement modifies or supersedes such statement. Any

statement so modified or superseded shall not be deemed, except as so modified or superseded, to constitute a part of this Official Statement.

KU hereby undertakes to provide without charge to each person (including any beneficial owner) to whom a copy of this Official Statement has been delivered, on the written or oral request of any such person, a copy of any or all of the documents referred to above which have been or may be incorporated in this Official Statement by reference, other than certain exhibits to such documents. Requests for such copies should be directed to Treasurer, Kentucky Utilities Company, One Quality Street, Lexington, Kentucky 40507, telephone: (859) 255-2100.

Appendix B

(FORM OF OPINION OF BOND COUNSEL)

September 5, 2018

Re: $17,875,000 County of Carroll, Kentucky, Environmental Facilities Revenue Refunding Bonds, 2018 Series A (Kentucky Utilities Company Project)

We hereby certify that we have examined certified copies of the proceedings of record of the County of Carroll, Kentucky (the "**County**"), acting by and through its Fiscal Court as its duly authorized governing body, preliminary to and in connection with the issuance by the County of its Environmental Facilities Revenue Refunding Bonds, 2018 Series A (Kentucky Utilities Company Project), dated their date of issuance, in the aggregate principal amount of $17,875,000 (the "**2018 Series A Bonds**"). The 2018 Series A Bonds are issued under the provisions of Sections 103.200 to 103.285, inclusive, of the Kentucky Revised Statutes (the "**Act**"), for the purpose of providing funds which will be used, with other funds provided by Kentucky Utilities Company (the "**Company**") for the current refunding of $17,875,000 aggregate principal amount of the County's Environmental Facilities Revenue Bonds, 2007 Series A (Kentucky Utilities Company Project), dated May 24, 2007 (the "**Refunded 2007 Series A Bonds**"), which were issued for the purpose of financing a portion of the costs of the acquisition, construction, installation, and equipping of certain solid waste disposal facilities to serve the Ghent Generating Station in Carroll County, Kentucky (the "**Project**"), as provided by the Act.

The 2018 Series A Bonds mature on February 1, 2026 and bear interest initially at the Long Term Rate, as defined in the Indenture, hereinafter described, subject to change as provided in such Indenture. The 2018 Series A Bonds will be subject to optional and mandatory redemption before maturity at the times, in the manner, and upon the terms set forth in the 2018 Series A Bonds. From such examination of the proceedings of the Fiscal Court of the County referred to above and from an examination of the Act, we are of the opinion that the County is duly authorized and empowered to issue the 2018 Series A Bonds under the laws of the Commonwealth of Kentucky now in force.

We have examined an executed counterpart of a certain Loan Agreement, dated as of August 1, 2018 (the "**Loan Agreement**"), by and between the County and the Company and a certified copy of the proceedings of record of the Fiscal Court of the County preliminary to and in connection with the execution and delivery of the Loan Agreement, pursuant to which the County has agreed to issue the 2018 Series A Bonds and to lend the proceeds thereof to the Company to provide funds to pay and discharge, with other funds provided by the Company, the Refunded 2007 Series A Bonds. The Company has agreed to make loan payments to the Trustee at times and in amounts fully adequate to pay maturing principal of, interest on, and redemption premium, if any, on the 2018 Series A Bonds as they become due and payable. From such examination, we are of the opinion that such proceedings of the Fiscal Court of the County show lawful authority for the execution and delivery of the Loan Agreement; that the Loan Agreement has been duly authorized, executed, and delivered by the County; and that the Loan Agreement is a legal, valid, and binding obligation of the County, enforceable in accordance with its terms, subject to the qualification that the enforcement thereof may be limited by laws relating to bankruptcy, insolvency, or other similar laws affecting creditors' rights generally, including equitable provisions where equitable remedies are sought.

We have also examined an executed counterpart of a certain Indenture of Trust, dated as of August 1, 2018 (the "**Indenture**"), by and between the County and U.S. Bank National Association, as trustee (the "**Trustee**"), securing the 2018 Series A Bonds and setting forth the covenants and undertakings of the County in connection with the 2018 Series A Bonds and a certified copy of the

proceedings of record of the Fiscal Court of the County preliminary to and in connection with the execution and delivery of the Indenture. Pursuant to the Indenture, certain of the County's rights under the Loan Agreement, including the right to receive payments thereunder, and all moneys and securities held by the Trustee in accordance with the Indenture (except moneys and securities in the Rebate Fund created thereby) have been assigned to the Trustee, as security for the holders of the 2018 Series A Bonds. From such examination, we are of the opinion that such proceedings of the Fiscal Court of the County show lawful authority for the execution and delivery of the Indenture; that the Indenture has been duly authorized, executed, and delivered by the County; and that the Indenture is a legal, valid, and binding obligation upon the parties thereto according to its terms, subject to the qualification that the enforcement thereof may be limited by laws relating to bankruptcy, insolvency, or other similar laws affecting creditors' rights generally, including equitable provisions where equitable remedies are sought.

In our opinion the 2018 Series A Bonds have been validly authorized, executed, and issued in accordance with the laws of the Commonwealth of Kentucky now in full force and effect, and constitute legal, valid, and binding special and limited obligations of the County entitled to the benefit of the security provided by the Indenture and enforceable in accordance with their terms, subject to the qualification that the enforcement thereof may be limited by laws relating to bankruptcy, insolvency, or other similar laws affecting creditors' rights generally, including equitable provisions where equitable remedies are sought. The 2018 Series A Bonds are payable by the County solely and only from payments and other amounts derived from the Loan Agreement and as provided in the Indenture.

In our opinion, under existing laws, including current statutes, regulations, administrative rulings, and official interpretations by the Internal Revenue Service, subject to the exceptions and qualifications contained in the succeeding paragraphs, (i) interest on the 2018 Series A Bonds is excluded from the gross income of the recipients thereof for federal income tax purposes, except that no opinion is expressed regarding such exclusion from gross income with respect to any 2018 Series A Bond during any period in which it is held by a "substantial user" of the Project or a "related person," as such terms are used in Section 147(a) of the Internal Revenue Code of 1986, as amended (the "**Code**"); and (ii) interest on the 2018 Series A Bonds is a separate item of tax preference in determining alternative minimum taxable income for individuals and corporations under the Code. The alternative minimum tax has been repealed with respect to corporations for taxable years beginning after December 31, 2017. In arriving at the opinion set forth in this paragraph as to the exclusion from gross income of interest on the 2018 Series A Bonds, we have assumed and this opinion is conditioned on, the accuracy of and continuing compliance by the Company and the County with representations and covenants set forth in the Loan Agreement and the Indenture which are intended to assure compliance with certain tax-exempt interest provisions of the Code. Such representations and covenants must be accurate and must be complied with after the issuance of the 2018 Series A Bonds in order that interest on the 2018 Series A Bonds be excluded from gross income for federal income tax purposes. Failure to comply with certain of such representations and covenants in respect of the 2018 Series A Bonds after the issuance of the 2018 Series A Bonds could cause the interest thereon to be included in gross income for federal income tax purposes retroactively to the date of issuance of the 2018 Series A Bonds. We express no opinion (i) regarding the exclusion of interest on any 2018 Series A Bond from gross income for federal income tax purposes on or after the date on which any change, including any interest rate conversion, permitted by the documents (other than with approval of this firm) is taken which adversely affects the tax treatment of the 2018 Series A Bonds; or (ii) as to the treatment for purposes of federal income taxation of interest on the 2018 Series A Bonds upon a Determination of Taxability. We are further of the opinion that interest on the 2018 Series A Bonds is excluded from gross income of the recipients thereof for Kentucky income tax purposes and that the 2018 Series A Bonds are exempt from ad valorem taxation by the Commonwealth of Kentucky and all political subdivisions thereof.

Our opinion as to the exclusion of interest on the 2018 Series A Bonds from gross income for federal income tax purposes and federal tax treatment of interest on the 2018 Series A Bonds is further subject to the following exceptions and qualifications:

(a) The Code provides for a "branch profits tax" which subjects to tax, at a rate of 30%, the effectively connected earnings and profits of a foreign corporation which engages in a United States trade or business. Interest on the 2018 Series A Bonds would be includable in the amount of effectively connected earnings and profits and thus would increase the branch profits tax liability.

(b) The Code also provides that passive investment income, including interest on the 2018 Series A Bonds, may be subject to taxation for any S corporation with Subchapter C earnings and profits at the close of its taxable year if greater than 25% of its gross receipts is passive investment income.

Except as stated above, we express no opinion as to any federal or Kentucky tax consequences resulting from the receipt of interest on the 2018 Series A Bonds. Ownership of the 2018 Series A Bonds may result in other federal tax consequences to certain taxpayers, and we express no opinion regarding any such collateral consequences arising with respect to the 2018 Series A Bonds.

We have received opinions of John R. Crockett III, General Counsel, Chief Compliance Officer, and Corporate Secretary of the Company and Jones Day, Chicago, Illinois, counsel to the Company, of even date herewith. In rendering this opinion, we have relied upon said opinions with respect to the matters therein. We have also received an opinion of even date herewith of Hon. Nicholas Marsh, County Attorney of Carroll County, Kentucky, and relied upon said opinion with respect to the matters therein. The opinions are in forms satisfactory to us as to both scope and content.

We express no opinion as to the title to, the description of, or the existence or priority of any liens, charges, or encumbrances on the Project.

In rendering the foregoing opinions, we are passing upon only those matters specifically set forth in such opinions and are not passing upon the investment quality of the 2018 Series A Bonds or the accuracy or completeness of any statements made in connection with any offer or sale thereof. The opinions herein are expressed as of the date hereof and we assume no obligation to supplement or update such opinions to reflect any facts or circumstances that may hereafter come to our attention or any changes in law that may hereafter occur.

We are members of the Bar of the Commonwealth of Kentucky and do not purport to be experts on the laws of any jurisdiction other than the Commonwealth of Kentucky and the United States of America, and we express no opinion as to the laws of any jurisdiction other than those specified.

Respectfully submitted,

STOLL KEENON OGDEN PLLC

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LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 84

Responding Witness: Daniel K. Arbough

Q-84. Provide copies of credit reports for PPL, Louisville Gas & Electric, and Kentucky Utilities between January 1, 2017 and the present from the major credit rating agencies (Moody's, S&P, and Fitch).

A-84. See attachments 1 through 11 for copies of the credit rating agency reports. Note that Fitch does not rate any of the companies.

INFRASTRUCTURE AND PROJECT FINANCE

MOODY'S
INVESTORS SERVICE

ISSUER IN-DEPTH
5 November 2018

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RATINGS

PPL Corporation

Domicile	Allentown, Pennsylvania, United States
Long Term Rating	Baa2
Type	LT Issuer Rating - Dom Curr
Outlook	Stable

Source: Moody's Investors Service

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PPL Corporation

Frequently asked questions about recent regulatory and legislative developments

In 2018, several regulatory and legislative developments have the potential to impact PPL's credit quality, including the UK regulator's published framework for the next control period and new legislation for alternative rate-making in Pennsylvania. This report addresses recent investor questions about the implications of these developments for PPL.

» **PPL has a lower overall business risk than its US peers.** PPL's UK and Pennsylvania electric transmission and distribution (T&D) utilities account for a combined 63% of its rate base, operate in supportive regulatory environments and are shielded from direct commodity or carbon transition risks because they don't own any generation. PPL's remaining operations, vertically integrated regulated utilities in Kentucky that own a lot of coal-fired generation, are more exposed to carbon transition risks.

» **UK operations provide a steady stream of dividends to the parent, supporting overall credit quality.** Through 2023, we expect continued strong operating performance from Western Power Distribution Plc (WPD, Baa3 stable), PPL's UK subsidiary. WPD operates under the UK's transparent regulatory environment, and is expected to dividend annual cash distributions to PPL between $300 million and $500 million. However, earnings from the start of the next regulatory period, in 2023, will be subject to decisions following the regulators' recently published framework, including on allowed returns. The risk of renationalizing British energy networks also lingers, potentially deepening subordination of holding companies.

» **Alternative ratemaking in Pennsylvania will be credit positive.** A new Pennsylvania law allowing for alternative ratemaking mechanisms will benefit PPL Electric Utilities Corporation (PPL Electric, A3 stable). Once implemented, we think the new mechanisms will provide greater transparency and stability to their cash flow and earnings.

» **Kentucky's heavy reliance on coal-fired generation exposes PPL to long-term carbon transition risk.** About 33 TWh, or 85%, of the electricity produced by PPL's Kentucky utilities are from coal-fired power plants and we expect coal to continue to be the primary fuel. The dispatch of the power plants is based on the lowest generating cost and we believe the political and regulatory support for coal in Kentucky will provide some pathway to mitigate PPL's carbon transition risk.

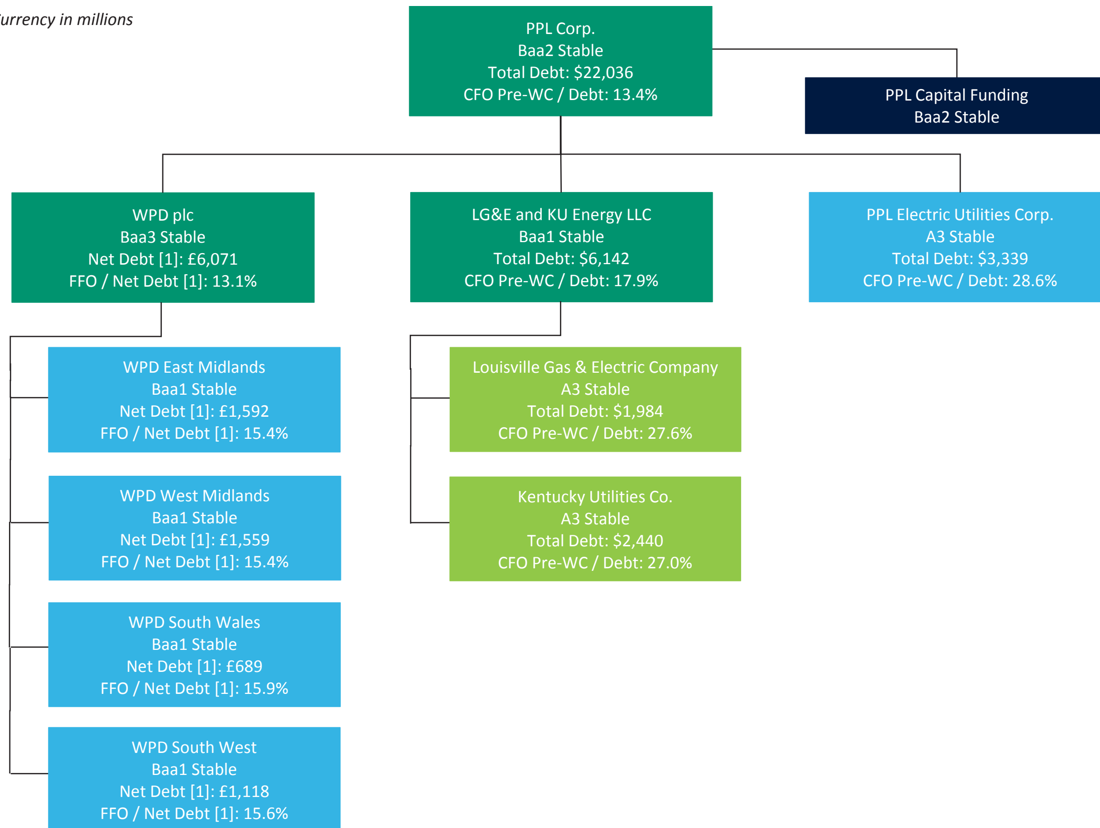
» **US tax reform is credit negative for PPL.** The US Tax Cuts and Jobs Act reduced the cash flows of PPL's US regulated utilities by roughly $150 to $250 million. However, PPL largely mitigated this impact with a $1.7 billion equity issuance in early 2018.

Why do we view PPL's business risk as being lower than that of its US peers?

Because it owns a large, low risk network in the UK. Compared to its US utility holding company peers, PPL's unique mix of businesses reduces its overall business risk. PPL is one of the few US-based utility holding company with regulated utility operations in the UK, where the regulatory environment, administered by the Office of Gas and Electricity Markets (Ofgem), is more transparent and predictable than in the US. Under the current RIIO (revenue = incentive + innovation + outputs) model, PPL retains a predetermined share of any cost savings and has significant scope to earn formulaic incentives for superior operating performance.

Exhibit

PPL Corporation's organizational structure [2]
As of 12/31/2017
Currency in millions

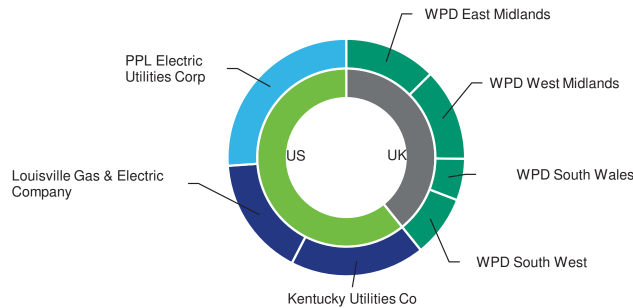


[1] As of 3/31/2018; CFO Pre-WC to Debt is not a key metric we use for WPD and subsidiaries. WPD and subsidiaries are assessed under the Regulated Electric and Gas Networks Industry Grid
[2] Metrics are based on adjusted financial data and incorporate Moody's Global Standard Adjustments for non-financial corporations.
Source: Moody's Financial Metrics, Company reports

Based on PPL's 2018 estimates, WPD accounts for about $10.3 billion, or 38%, of the company's total rate base. PPL's US utility operations are comprised of PPL Electric, Kentucky Utilities Co. (KU, A3 stable) and Louisville Gas & Electric Company (LG&E, A3 stable). PPL Electric's rate base is about $7.1 billion, or roughly 26% of the total rate base, while PPL's Kentucky utilities KU and LG&E represent about 36%, or $9.9 billion, of the total rate base.

This publication does not announce a credit rating action. For any credit ratings referenced in this publication, please see the ratings tab on the issuer/entity page on www.moodys.com for the most updated credit rating action information and rating history.

Exhibit 2
Unique mix of businesses which includes utility operations in the UK



Source: Company reports

PPL Electric has no direct exposure to commodity or power plant operational risks because it does not own any generation assets. Instead, it owns and operates only transmission and distribution assets, which are regulated by the Federal Energy Regulatory Commission (FERC) and the Pennsylvania Public Utility Commission (PAPUC), respectively. The regulatory framework under FERC is formulaic, providing greater transparency and certainty than state regulations in ratemaking. We view the regulatory environment in Pennsylvania as credit supportive, owing to the various rider mechanisms used to shorten the regulatory lag between general rate cases. Pennsylvania recently enacted a new law for the alternative ratemaking mechanism, including revenue decoupling for electric utilities, which will be credit positive once the new mechanisms are implemented.

By contrast, KU and LG&E own and operate power plants, exposing them to operations and commodity risk. About 85% of their power output is generated from coal-fired generating capacity, adding greater carbon transition risk to PPL's overall business risk profile. However, the state of Kentucky and its utility regulations as enforced by the Kentucky Public Service Commission (KPSC) are supportive of using coal as the primary fuel source for electricity generation. The KPSC applies a “lowest reasonable cost” analysis to the recovery of costs related to coal usage and other environmental expenses through such mechanisms as its fuel adjustment clause and environmental cost recovery surcharge.

Exhibit 3
Overall regulatory environment for PPL is supportive

	Mechanisms	Allowed ROE
Pennsylvania	Distribution System Improvement Charge, Smart Meter Rider, Storm Cost Recovery, Alternative Ratemaking, Forward Test Year for distribution rate cases	11.68%
Kentucky	Environmental Cost Recovery, Fuel Adjustment Clause, Gas Line Tracker, Forward Test Year for base rate cases, Gas Supply Clause, Demand Side Management	9.70%
United Kingdom	Real-time recovery of capex, Incentive revenues available for strong performance and innovation, Mechanism to retain 70% of cost efficiencies	6.4%[1]

[1] Approximately 9.4% including inflation of regulatory asset value
Source: Company reports

How do PPL's UK operations contribute to its overall credit quality?

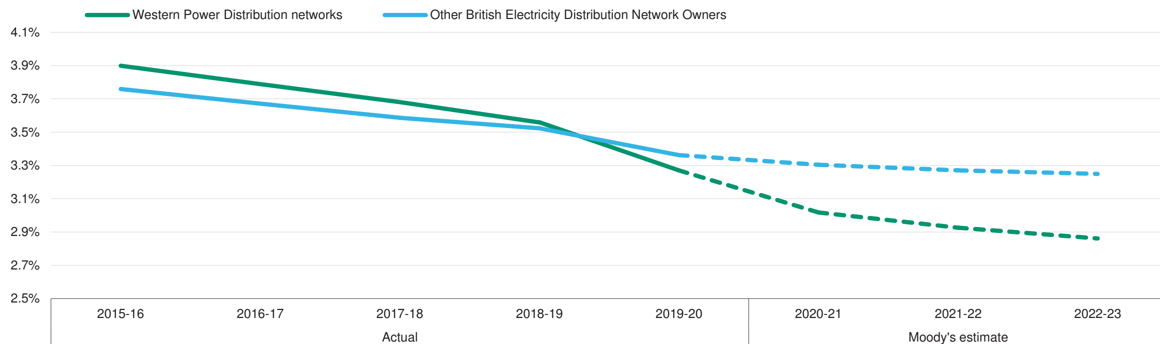
WPD owns four electricity distribution networks with a track record of excellent operational performance, as well as a first-tier efficiency ranking relative to their peers, according to the metrics established by Ofgem. UK regulation of power networks is more transparent than the state regulatory environments of Pennsylvania and Kentucky. The current RIIO-ED1 framework, which runs until

March 2023, provides greater certainty for how a distribution network operator can earn and generate cash flow compared to the regulatory framework in PPL's other operating areas. The UK operations also provide regulatory and operational diversity to PPL's overall portfolio and dilute higher risk associated with its Kentucky generation portfolio.

Unlike the US regulatory framework, the cost of debt is not a pure pass-through for energy networks in Britain. Instead, it is, as part of allowance, set based on an index that is updated annually. WPD's allowed real returns will fall over the remaining years of RIIO-ED1 as the long-term decline in market yields is reflected in the annual update. As an unintended consequence of WPD's "fast track" award in the last price review, this decline in allowed returns will be more acute than for other British electricity networks. Although WPD's financing costs are lower than most other groups, we expect it to underperform cost-of-debt allowances over the remainder of RIIO-ED1.

However, the credit profile of WPD and its subsidiaries are constrained by the group's high leverage at around 80% of regulatory asset value (RAV).

Exhibit 4
Western Power Distribution's allowed return will fall over the rest of the current price control period
Allowed return on regulatory asset value for WPD and other UK distribution network owners



Sources: Ofgem, Moody's estimates

WPD expects to achieve a real (pre-inflation) return on regulatory equity – a measure of returns excluding over- or under-spend on financing costs – of 9.9% over the 2015-23 period, above the 6.4% base allowed return. Unlike other British networks groups, which generally expect to achieve significant outperformance on operating costs, WPD's additional returns come largely from incentive income as a result of its success in reducing the frequency and duration of power supply interruptions.

Based on the current RIIO framework and operations, we expect PPL's UK operations to contribute annual cash distributions ranging between $300 million and $500 million based on their 80% overall leverage target. Because of the current RIIO framework, which is fixed over the remainder of the current pricing control period through 2023, and, despite declining allowed returns, continuing strong operational performance by WPD will support the expected cash distribution to PPL.

What will happen to WPD's returns and cash flows after 2023?

We expect WPD's returns and cash flows after 2023 to decline from the current levels. Ofgem has recently published its framework for the next price control period (RIIO-2), which begins in April 2023 for electricity distribution (see Regulated Electric & Gas Networks: British energy regulator's proposals would reduce returns for network owners, 12 March 2018). Although the electricity distribution price controls still have four years to run, Ofgem needs to settle key aspects of the framework earlier because the next pricing controls for transmission and gas distribution networks begin in April 2021.

Although the framework itself continues to be transparent, we expect RIIO-ED2 framework to limit the ability of networks to outperform and earn financial incentives. In particular, the framework consultation proposed that allowed returns should be based on a cost of equity in the 3%-5% range, if set in March 2018, before inflation using the retail prices index (RPI) as the inflation index, below

the 6.4% used in setting WPD's current returns. Ofgem has also set out proposals to make systematic outperformance less likely, in our view. The reduction in expected returns is credit negative for all UK networks.

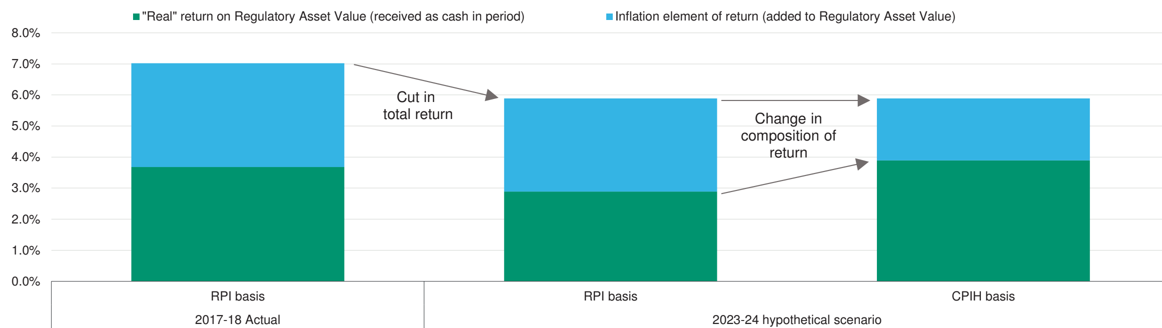
However, two other changes in RIIO-2 are likely to somewhat mitigate the immediate impact of lower returns on WPD's cash flows:

» **Higher cost of debt allowance.** WPD will likely move to the same cost-of-debt allowance as other electricity distribution network groups, ending the anomaly that has caused it to receive a lower allowance than peers in RIIO-ED1. We estimate that this will boost allowed returns by around 0.3 percentage point in the first year of RIIO-ED2.

» **Larger part of return received in cash.** Regulated utilities in Britain receive a large part of their total return through the inflation of their RAV. In RIIO-ED2, Ofgem has confirmed that it will switch to using the consumer prices index including owner occupiers' housing costs (CPIH), in place of the RPI. Because CPIH is typically around 1 percentage point lower than RPI, a larger part of the total return will be received in cash and less through additions to the RAV.

Taken together, we estimate that WPD's real allowed return will be slightly lower than today, even though total returns are likely to be sharply lower. However, the change to CPIH increases near-term cash flows at the expense of asset growth, and, therefore, debt capacity and future cash flows (see Transition to CPI creates risks for water and energy networks, 13 January 2016).

Exhibit 5
Move to CPIH inflation index will support cash flows in the short term
Estimated changes in total (nominal) return and composition of return during the first year of RIIO-ED2*



*Scenario for 2023-24 (first year of RIIO-ED2) estimated based on midpoint of 3-5% return range, cost of debt based on extended trailing average methodology, and Moody's estimate of market interest rates and inflation
Source: Ofgem, Moody's estimates

What else could affect PPL's access to WPD's cash flows?

As part of RIIO-2, Ofgem is considering measures to support the credit quality of regulated operating companies that could result in greater subordination for holding companies. In particular, a proposed "revenue floor" mechanism in discussion could allow operating companies to raise additional revenue from customers if needed to meet debt repayments, but would then block dividend distributions until this amount was repaid. This would be a major change, as there are currently few limitations on moving cash and debt between operating and holding companies, unless an operating company has the lowest investment grade credit rating with any major rating agency and is placed on a negative outlook. A revenue floor mechanism, while likely improving the credit quality of the operating companies, would significantly deepen the subordination of holding company creditors and raise questions around the stability and predictability of the regulatory framework.

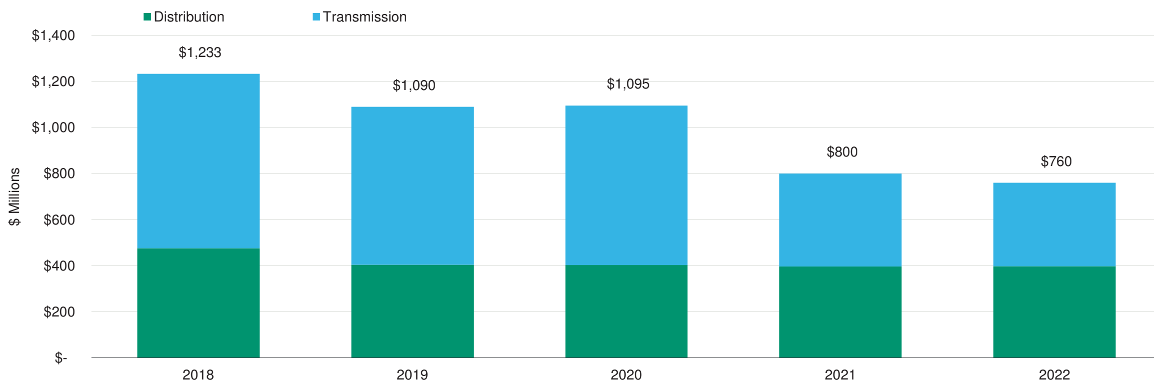
Potential renationalization of the networks could affect PPL's future access to WPD's cash flows. The UK's opposition Labour Party has proposed to take the country's energy networks, as well as water and rail companies, into public ownership (see FAQ on Labour's proposed renationalisation, 16 October 2017). For electricity distribution networks, the party has suggested that new "regional energy boards" would manage system operation, later acquiring the operating companies' assets in exchange for government bonds. Although this is a very longer-term potential development, it would pose a significant risk for holding companies like WPD and PPL if the networks are renationalized.

How will alternative ratemaking mechanisms in Pennsylvania affect PPL?

The new legislation authorizing alternative ratemaking mechanisms in Pennsylvania is credit positive for both PPL Electric and PPL because it will provide greater transparency and stability to their cash flow and earnings.

In early July, Gov. Tom Wolf signed a new utility alternative regulation bill authorizing the PAPUC to approve innovative ratemaking mechanisms for electric and water utilities in the state. Such mechanisms include revenue decoupling, performance-based rate plans, formula rates and multi-year rate plans, which are similar to the ratemaking framework in the UK. The PAPUC will establish the new rules within six months of enactment, and all Pennsylvania investor-owned utilities, including PPL Electric, will be allowed to pursue alternative ratemaking frameworks, including decoupling. However, it is unlikely that PPL Electric will request any changes to its ratemaking framework until its next general rate case, which it doesn't expect to be filed before 2020.

Exhibit 6
Transmission capital investment to decline, while distribution investment holds steady for PPL Electric



Source: Company Reports

Over the next five years, PPL Electric plans to invest about $5 billion, about 42% of which it has earmarked for its distribution system, as shown in Exhibit 6. High capital investments are likely to pressure certain credit metrics slightly for PPL Electric due to the delayed timing of the investment and its recovery. However, the new alternative ratemaking mechanisms will improve transparency in ratemaking and potentially allow faster recovery of investment costs, a credit positive.

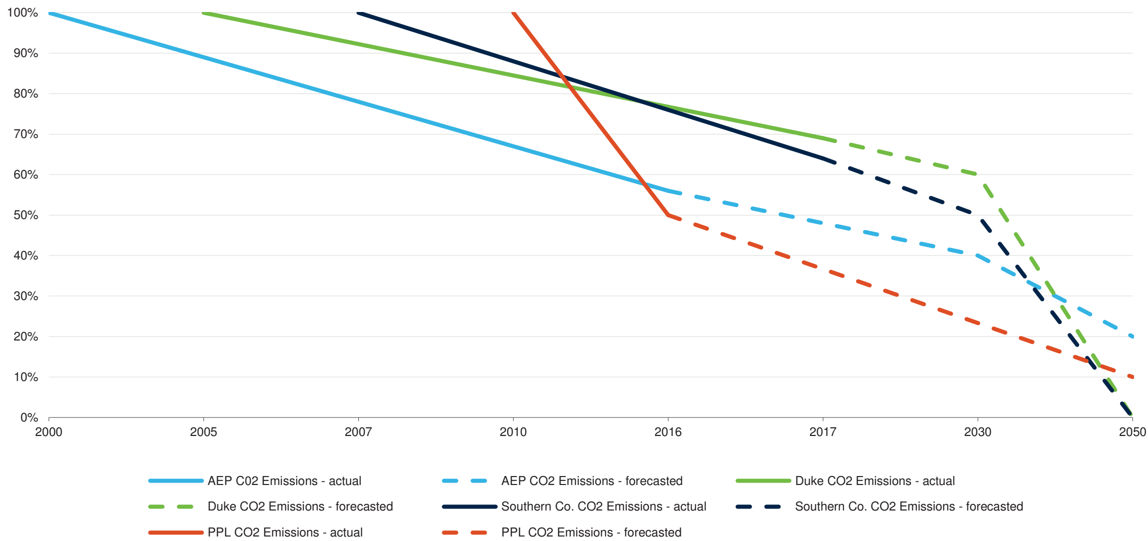
We expect PPL Electric's ratio of cash flow from operations excluding changes in working capital (CFO pre-WC) to debt to range between 19% and 23% over the next couple of years. Our forecast does not reflect any potential impact from the new legislation. We expect the new legislation's positive impact to be included after its next general rate case.

Does PPL's coal-dependent generation portfolio in Kentucky face significant carbon-transition risks?

Yes. Due to their heavy reliance on coal-fired power plants in Kentucky, PPL's carbon-transition risk is focused in Kentucky. PPL's utility subsidiaries KU and LG&E face greater carbon-transition risks relative to their utility peers. Overall, carbon-transition risks are lower for PPL compared to its utility holding company peers because the majority of its utility operations are transmission and distribution with no direct CO_2 emissions. These long-term risks include the potential for higher operating costs and increased stranded asset exposure. However, there is a strong political support for coal in Kentucky and the state's regulatory framework provides mechanisms to recover environmental investments related to their coal-fired power plants.

PPL divested in 2015 its competitive generation business which consisted of approximately 15 GW of generating capacity, significantly reducing its future carbon transition risk. With this divestiture, PPL reduced its CO_2 emissions by 50% in 2016 from its 2010 emission levels. In January 2018, PPL announced a goal to reduce the company's CO_2 emission levels by 70% by 2050 from 2010 levels. In its two-degree scenario analysis included in PPL's 2017 climate assessment report, it showed its CO_2 emissions could be reduced further based on retiring its Kentucky power plants at the end of their useful lives.

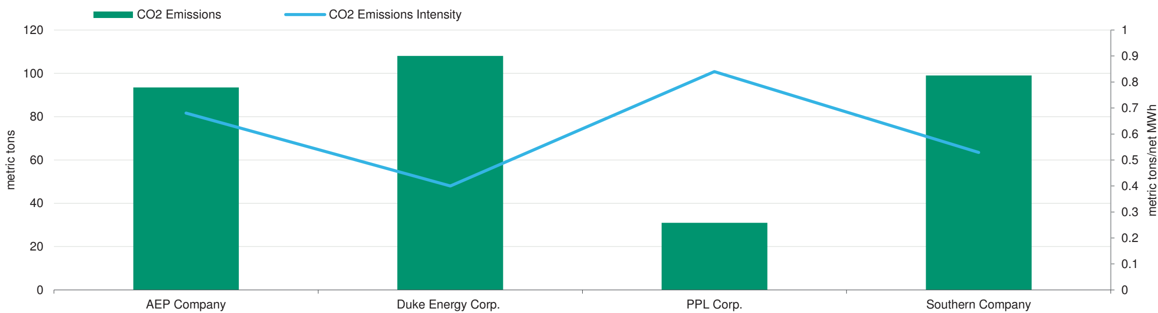
Exhibit 7
PPL's CO2 emission reduction was a result of competitive generation assets divestiture and coal plant retirement in Kentucky



Source: Companies' reports; Moody's Investors Service

However, its carbon intensity, CO2 emissions per MWh produced, remains high because of its heavy reliance on coal as its primary fuel for power generation.

Exhibit 8
Despite emitting much less CO2 compared to its peers, every MWh of power generated from PPL's portfolio emits more CO2



[1] The CO2 emissions intensity for Duke Energy represents Moody's calculation. Our calculation uses total energy produced, which includes owned generation and purchased power.
Source: Companies' reports; Moody's Investors Service

Currently there is no federal mandate to reduce CO2 emissions from US electricity production given that the Clean Power Plan was stayed by the US Supreme Court in 2016. Coal-fired power plants account for about 33 TWh, or 85%, of the electricity produced by PPL's Kentucky utilities. These utilities dispatch their power plants based on the lowest generating cost to serve their customers. Historically, the KPSC's decisions to approve cost recovery and rate increases were based on the lowest cost option deemed to be reasonable and prudent. Thus, we expect coal to continue to be the primary fuel source for these utilities' power generation in the foreseeable future.

PPL's Kentucky utilities have retired about 800 MW of coal-fired generating capacity in 2015 and expect to retire an additional 272 MW by the end of 2019. In addition, KU and LG&E completed a multi-year $2.8 billion investments to add environmental controls

to four of their coal-fired power plants to reduce emissions. KU and LG&E plan to make additional investments over the next five years totaling about $828 million. PPL expect to recover these environmental investments through an environmental cost recovery surcharge, shortening the regulatory lag.

Based on the retirement of about 908 MW of coal-fired generating capacity, KU and LG&E reduced their CO2 emission by over 16% over the past five years. However, we do not expect a further reduction in their CO2 emissions based on KU and LG&E's current investment plan beyond 2019.

Exhibit 9
Coal plant retirements helped PPL's Kentucky utilities reduce CO2 emissions
KU and LG&E's carbon-dioxide emissions, 2013-2017

	Capacity (MW)	CO2 Emission (MMT)	Average Capacity Factor	Change in CO2 Emission
2013	6,209	32.2	65.2%	
2014	6,132	31.6	64.9%	*-1.9%*
2015	6,114	28.1	57.9%	*-11.1%*
2016	5,379	26.4	63.0%	*-6.0%*
2017	5,379	26.9	63.0%	*1.9%*

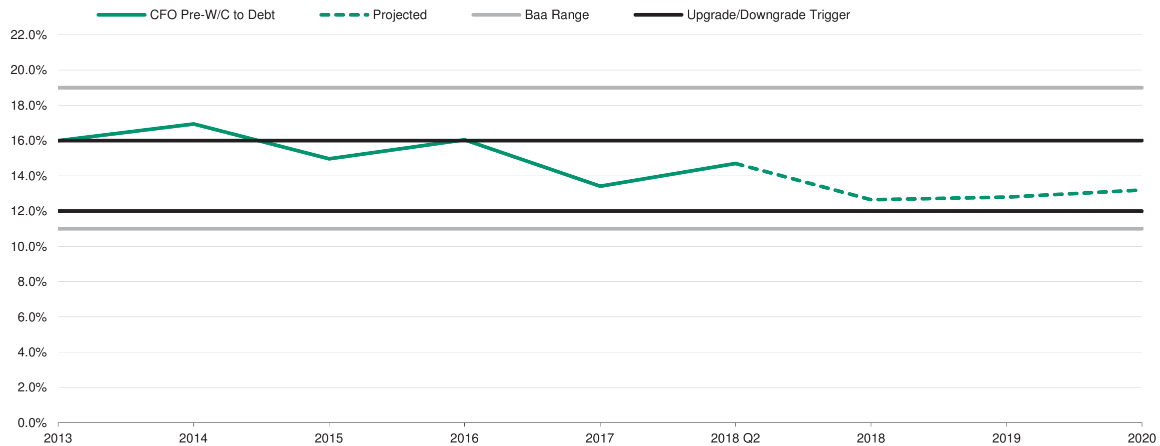
Sources: SPGMI, Moody's Investors Service

How has US tax reform affected PPL's credit metrics?

It reduced cash flow, as expected. The US Tax Cuts and Jobs Act lowered the US corporate tax rate to 21% from 35% and eliminated the acceleration of depreciation for the tax purpose. This reduced the cash flows of PPL's regulated utilities and led to what we estimate was about a 100 basis-point decrease in PPL's consolidated CFO pre-WC to debt ratio. However, PPL largely mitigated this impact with a $1.7 billion equity issuance in early 2018.

With this equity issuance and some benefits from foreign currency hedge gains, PPL will be able to maintain its CFO pre-WC to debt in the 12%-14% range over the next three years. Also, we believe the regulated operating subsidiaries will continue to be supported by credit-supportive regulation and the financing of their large capital investments with a balanced mix of debt and equity. Because of the PPL parent company's overall lower business risk profile, we believe a lower downgrade threshold is appropriate. A rating downgrade could be considered for PPL if its consolidated CFO pre-WC to debt falls below 12% on a sustained basis.

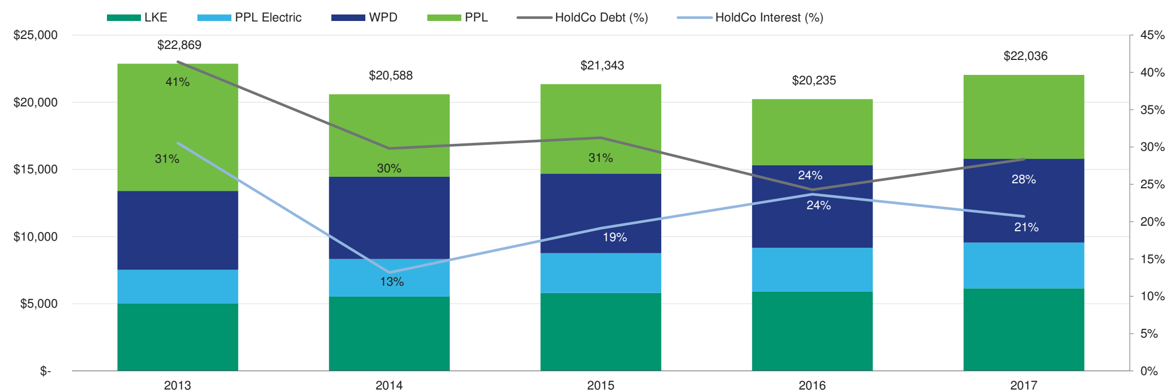
Exhibit 10
CFO pre-WC to debt to decline from historical levels but still appropriate for its credit profile
PPL's CFO pre-WC to debt ratio, with our projections through 2020



Source: Moody's Financial Metrics

Another negative impact from the tax reform was related to the parent-level debt at the PPL parent, which had about $6.3 billion of holding company debt at the end of 2017. It is a combination of debt issued at the PPL parent level and intermediate holding companies' level in the US and UK. It accounts for approximately 28% of total consolidated debt of $22 billion at the end of 2017. At the parent level, PPL records a net loss due to having operating expenses as well as interest expense. These net losses were used to slightly offset PPL's consolidated tax obligations. However, the tax benefit created by the interest expenses paid at the parent level was reduced when the corporate tax rate was reduced to 21% from 35%.

Exhibit 11
PPL maintains a relatively high parent debt level
Composition of PPL debt, 2013-2017



Source: Moody's Financial Metrics

Appendix

Exhibit 12
Peer Comparison of US Holding Companies [1]
($MM)

	PPL Corporation [2]	Berkshire Hathaway Energy Company	American Electric Power Company	Duke Energy Corporation
	Baa2 Stable	A3 Stable	Baa1 Stable	Baa1 Stable
Total Rate Base	$ 27,300	$ 42,200	$ 38,000	$ 58,840
Total Revenue	$ 7,745	$ 19,327	$ 15,977	$ 24,059
Total interest expense	$ 965	$ 1,864	$ 1,016	$ 2,229
Total Net Income	$ 1,253	$ 3,119	$ 1,928	$ 3,044
Net PP&E	$ 34,003	$ 68,265	$ 53,530	$ 89,861
Total Equity	$ 11,473	$ 28,175	$ 18,637	$ 42,269
Total Debt	$ 23,045	$ 42,417	$ 25,947	$ 55,771
CFO	$ 3,455	$ 6,636	$ 4,708	$ 7,750
Total Dividend	$ 1,111	$ -	$ 1,221	$ 2,455
Earned ROE	11.3%	11.6%	10.6%	7.3%
Dividend Payout	89%	0%	63%	81%
CFO Pre-WC to Debt	14.7%	16.2%	19.3%	14.6%
CFO Pre-WC - Div to Debt	9.9%	16.2%	14.6%	10.2%
Total Debt to Rate Base	84%	101%	68%	95%

[1] As of LTM 6/30/2018
[2] PPL rate base reflects company's 2018 estimated figures
Source: Moody's Investors Service

Exhibit 13
Peer Comparison of Pennsylvania Utilities [1]
($MM)

	PPL Electric Utilities Corporation [2]	PECO Energy Company	Pennsylvania Electric Company	Duquesne Light Company
	A3 Stable	**A2 Stable**	**Baa1 Stable**	**A3 Stable**
Total Rate Base	$ 7,100	$ 6,600	$ 1,614	$ 2,260
Total Revenue	$ 2,278	$ 2,963	$ 894	$ 947
Total interest expense	$ 151	$ 129	$ 66	$ 59
Total Net Income	$ 425	$ 431	$ 106	$ 142
Net PP&E	$ 8,911	$ 8,343	$ 2,109	$ 3,066
Total Equity	$ 4,377	$ 3,587	$ 1,307	$ 1,211
Total Debt	$ 3,734	$ 3,072	$ 1,325	$ 1,391
CFO	$ 965	$ 654	$ 280	$ 371
Total Dividend	$ 404	$ 442	$ 85	$ 70
Earned ROE	10.2%	12.1%	8.2%	12.0%
Dividend Payout	95%	103%	80%	49%
CFO Pre-WC to Debt	26.9%	24.4%	17.7%	25.4%
CFO Pre-WC - Div to Debt	16.0%	10.0%	11.3%	20.4%
Total Debt to Rate Base	53%	47%	82%	62%

[1] As of LTM 6/30/2018
[2] PPL rate base reflects company's 2018 estimated figures
Source: Moody's Investors Service

Exhibit 4
Peer Comparison of Kentucky Utilities [1]
($MM)

	Kentucky Utilities [2]	Louisville Gas & Electric Company [2]	Kentucky Power Company	Duke Energy Kentucky, Inc.
	A3 Stable	A3 Stable	Baa2 Negative	Baa1 Stable
Total Rate Base	$ 5,500	$ 4,400	$ 1,600	$ 850
Total Revenue	$ 1,786	$ 1,492	$ 659	$ 455
Total interest expense	$ 99	$ 74	$ 41	$ 18
Total Net Income	$ 288	$ 242	$ 60	$ 64
Net PP&E	$ 6,876	$ 5,490	$ 1,836	$ 1,444
Total Equity	$ 3,405	$ 2,596	$ 706	$ 568
Total Debt	$ 2,515	$ 2,067	$ 940	$ 585
CFO	$ 661	$ 516	$ 125	$ 91
Total Dividend	$ 252	$ 151	$ 18	$ -
Earned ROE	8.6%	9.6%	8.7%	12.6%
Dividend Payout	88%	62%	29%	0%
CFO Pre-WC to Debt	25.3%	23.2%	14.5%	17.2%
CFO Pre-WC - Div to Debt	15.3%	15.9%	12.6%	17.2%
Total Debt to Rate Base	46%	47%	59%	69%

[1] As of LTM 6/30/2018
[2] PPL rate base reflects company's 2018 estimated figures
Source: Moody's Investors Service

Exhibit 15
Peer Comparison of UK Holding Companies
(£MM)

	Western Power Distribution Plc [1]		Northern Powergrid Holdings Company [2]	
	Baa3 Stable		Baa1 Stable	
Total RAV	£	7,578	£	3,139
Total Revenue	£	1,621	£	781
Total interest expense	£	273	£	106
Total Net Income	£	587	£	190
Net PP&E	£	12,025	£	5,854
Total Equity	£	4,304	£	2,388
Net Debt	£	6,021	£	2,119
FFO	£	741	£	341
Total Dividend	£	93	£	51
Earned ROE		14.4%		8.3%
Dividend Payout		16%		27%
FFO to Net Debt		12.3%		16.1%
RCF to Net Debt		10.8%		13.7%
Net Debt to RAV		79%		67%

[1] As of FY 3/31/2018
[2] As of FY 12/31/2017
Source: Moody's Investors Service

Exhibit 16
Peer Comparison of UK Utilities [1]
(£MM)

	Western Power Distrib (East Midlands) Plc		Western Power Distrib (West Midlands) Plc		Western Power Distrib (South Wales) Plc		Western Power Distrib (South West) Plc		South Eastern Power Networks Plc		Southern Gas Networks Plc	
	Baa1 Stable		Baa1 Stable		Baa1 Stable		Baa1 Stable		Baa1 Stable		Baa1 Stable	
Total RAV	£	2,411	£	2,423	£	1,129	£	1,682	£	1,826	£	3,802
Total Revenue	£	491	£	497	£	246	£	364	£	421	£	746
Total interest expense	£	63	£	80	£	38	£	38	£	43	£	102
Total Net Income	£	182	£	181	£	88	£	139	£	99	£	184
Net PP&E	£	4,048	£	3,806	£	1,822	£	2,596	£	2,832	£	4,249
Total Equity	£	1,304	£	1,319	£	666	£	895	£	907	£	897
Net Debt	£	1,592	£	1,559	£	689	£	1,118	£	1,202	£	2,792
FFO	£	256	£	239	£	107	£	183	£	176	£	282
Total Dividend	£	113	£	165	£	47	£	95	£	105	£	1,047
Earned ROE		14.8%		14.1%		13.6%		15.9%		11.3%		14.2%
Dividend Payout		62.2%		91.3%		53.3%		68.3%		106.0%		568.8%
FFO to Net Debt		16.1%		15.3%		15.6%		16.4%		14.7%		10.1%
RCF to Net Debt		9.0%		4.7%		8.8%		7.9%		5.9%		-27.4%
Net Debt to RAV		66.0%		64.3%		61.1%		66.5%		65.8%		73.4%

[1] As of FY 3/31/2018
Source: Moody's Investors Service

Moody's related publications

Sector Comments

» Regulated Electric and Gas Networks - UK: Risks are rising, but regulatory fundamentals still intact, May 2018

» Regulated Electric & Gas Networks: British energy regulator's proposals would reduce returns for network owners, March 2018

Credit Opinions

» PPL Corporation: Update to credit analysis, June 2018

» LG&E and KU Energy LLC: Update to credit analysis, October 2018

» Kentucky Utilities Co.: Update to credit analysis, October 2018

» Louisville Gas & Electric Company: Update to credit analysis, October 2018

» PPL Electric Utilities Corporation: Update to credit analysis, August 2018

» Western Power Distribution Plc: Update to credit analysis, April 2018

» Western Power Distrib (East Midlands) Plc: Update to credit analysis, March 2018

» Western Power Distrib (West Midlands) Plc: Update to credit analysis, March 2018

» Western Power Distrib (South Wales) Plc: Update to credit analysis, March 2018

» Western Power Distribution (South West) Plc: Update to credit analysis, March 2018

Outlook

» Regulated utilities - US: 2019 outlook shifts to negative due to weaker cash flows, continued high leverage, June 2018

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CREDIT OPINION
7 June 2018

Update

Rate this Research

RATINGS

PPL Corporation

Domicile	Allentown, Pennsylvania, United States
Long Term Rating	Baa2
Type	LT Issuer Rating - Dom Curr
Outlook	Stable

Please see the ratings section at the end of this report for more information. The ratings and outlook shown reflect information as of the publication date.

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PPL Corporation

Update to credit analysis

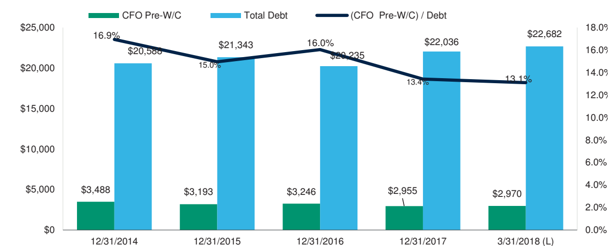
Summary

PPL Corporation's (PPL) credit strengths include the low business risk profile of its Pennsylvania and UK regulated utilities, as well as the credit supportive regulatory environments where all of its utilities operate, including Kentucky. As a fully regulated utility holding company, PPL generates approximately 70% of its earnings and cash flows from a networks or transmission and distribution (T&D) platform in the US and UK. The remaining 30% comes from vertically integrated utility operations in Kentucky, which include 8 GW of power generation that is mostly coal-fired. All of these operations provide good earnings and cash flow visibility.

We see the UK regulatory environment as one of the most transparent and credit supportive environments globally. However, there is substantial debt leverage at the parent holding company and large capital investment programs, resulting in significant negative free cash flow. Although PPL has foreign currency exchange exposure due to its operations in the UK, PPL has been actively mitigating the risk by placing hedges on foreign currency exchange rates.

We expect PPL's cash flow from operations before changes in working capital (CFO pre-WC) to debt to range from 12% to 14% over the next 2 years, slightly weaker than its 2017 actual level. The US Tax Cuts and Jobs Act had a negative impact on PPL's overall cash flow since approximately half of its cash flow is generated in the US. We estimate the impact on PPL's key cash flow to debt metric to be around a 100 basis point (bps) decrease. The impact was mitigated by a $1.7 billion equity issuance completed early May 2018.

Exhibit 1
Historical CFO Pre-WC, Total Debt and CFO Pre-WC to Debt
($MM)



Source: Moody's Financial Metrics™

Credit Strengths

» Stable earnings and cash flow generated by regulated utilities

» Constructive regulatory environments supporting rate base growth

» Consistent financial metrics

Credit Challenges

» Large capital investment programs

» Relatively high level of holding company debt

» Foreign currency exchange exposure

Rating Outlook

The stable outlook reflects PPL's relatively low business risk, as well as our expectations that it will continue to generate stable financial metrics, including a ratio of CFO pre-WC to debt in the 12%-14% range. The stable outlook also assumes that its regulated operating subsidiaries will continue to be supported by constructive regulatory environments and its large capital investments will be financed with a balanced mix of debt and equity.

Factors that Could Lead to an Upgrade

PPL's rating could be upgraded if its consolidated financial metrics improve, including CFO pre-WC to debt above 16% on a sustained basis. An upgrade is also possible if PPL lowers its percentage of holding company debt to below 20% of total consolidated debt on a sustained basis. A rating upgrade could also be considered if PPL's utility subsidiaries are upgraded.

Factors that Could Lead to a Downgrade

A rating downgrade could be considered if its consolidated key metrics deteriorate significantly, including if its CFO pre-WC to debt falls below 12% on a sustained basis. Also, a significant increase in parent debt could pressure the rating downward. Additional rating pressure could occur should PPL experience any unexpected negative regulatory developments, its ability to earn appropriate returns on its investments is reduced significantly, or if its utility subsidiaries are downgraded. Furthermore, negative ratings actions could occur if the company fails to properly manage its foreign exchange exposure, associated with earnings generated from its UK operations.

Key Indicators

Exhibit 2
PPL Corporation

	Dec-14	Dec-15	Dec-16	Dec-17	Mar-18 (L)
CFO pre-WC + Interest / Interest	4.9x	4.4x	4.5x	4.2x	4.1x
CFO pre-WC / Debt	16.9%	15.0%	16.0%	13.4%	13.1%
CFO pre-WC – Dividends / Debt	12.2%	10.2%	10.9%	8.5%	8.3%
Debt / Capitalization	54.6%	60.9%	58.8%	61.9%	61.7%

All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
Source: Moody's Financial Metrics™

Profile

PPL Corporation is a utility holding company headquartered in Allentown, PA with three regulated jurisdictions: United Kingdom, Kentucky, and Pennsylvania. Its UK regulated operations include Western Power Distribution Plc (WPD, Baa3 stable), a pure wires-only distribution company with no retail exposure. Kentucky regulated utilities include Louisville Gas & Electric Company (LG&E, A3 stable)

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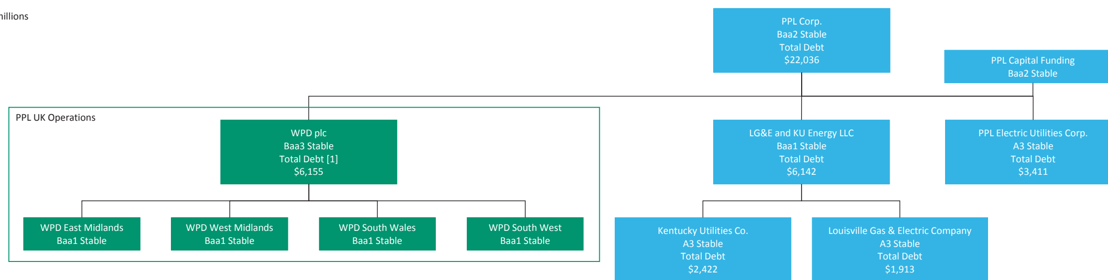
and Kentucky Utilities Company (KU, A3 stable), which operate under a traditional integrated utility model. The two Kentucky utilities are held under an intermediate holding company, LG&E and KU Energy LLC (Baa1 stable). Its Pennsylvania operation is comprised of PPL Electric Utilities Corporation (PPLEU, A3 stable), a transmission business mostly regulated by the Federal Energy Regulatory Commission (FERC), and a distribution operation regulated by the Pennsylvania Public Utility Commission (PAPUC). PPL, through its Kentucky operating subsidiaries, controls or owns about 8,000 MW of generating capacity in the US and sells electricity and natural gas to about 10.5 million customers in the US and UK.

Exhibit 3
Organizational Structure
As of 12/31/2017
$ in millions



[1] As of 3/31/2017
[2] Total debt is based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
Source: Moody's Financial Metrics, Company

Detailed Credit Considerations

Stable and consistent earnings and cash flow generated by regulated utilities

PPL, as a regulated utility holding company, has low business risk compared to many of its peers because all of its subsidiaries are regulated utility companies. Approximately 50% of PPL's net income is produced by its UK based distribution operations, which are consolidated under the intermediate holding company Western Power Distribution Plc. The remaining 50% of cash flow is produced in the US with about 30% generated from its two Kentucky utilities, Louisville Gas & Electric Company and Kentucky Utilities Company and the remaining 20% from its utility in Pennsylvania, PPL Electric Utilities Corporation.

As a distribution network operator (DNO) in the UK, WPD's subsidiaries do not have any commodity production or procurement responsibilities, effectively eliminating all of its exposure to commodities. Although PPLEU is a wires-only utility, it maintains some commodity exposure because it has provider of last resort (POLR) obligations for the customers who do not choose an alternative power supplier within PPLEU's service territory. The risk associated with this exposure is small given the transparent purchased power cost pass-through mechanism that is in place. Additionally, PPLEU mitigates this risk by entering into full requirement supply agreements to serve its POLR customers. PPL's Kentucky utilities have the most exposure to commodities as vertically integrated utilities because they own and operate generation assets to produce power for their customers. Although LG&E and KU have direct commodity exposure, Kentucky allows the cost of fuel to be recovered through a fuel adjustment clause within four months.

Constructive US regulatory environments supporting rate base growth

We view the US regulatory environments for PPL to be credit supportive, resulting in stable and predictable earnings and cash flow generated from roughly $15 billion of rate base. The Kentucky Public Service Commission (KPSC) has approved various tracker mechanisms that provide for timely cost recovery outside of a general rate case. These tracker mechanisms include a Fuel Adjustment Clause (FAC), an Environmental Cost Recovery Surcharge (ECR), a Gas Supply Clause (GSC), a Gas Line Tracker (GLT), and a Demand-Side Management Cost (DSM) Recovery Mechanism.

The last rate case in Kentucky was settled. The KPSC issued its modified order in June 2017, which authorized a base electricity rate increase of $52 million for KU and a base electricity rate increase of $57 million and base gas rate of $7 million for LG&E based on an

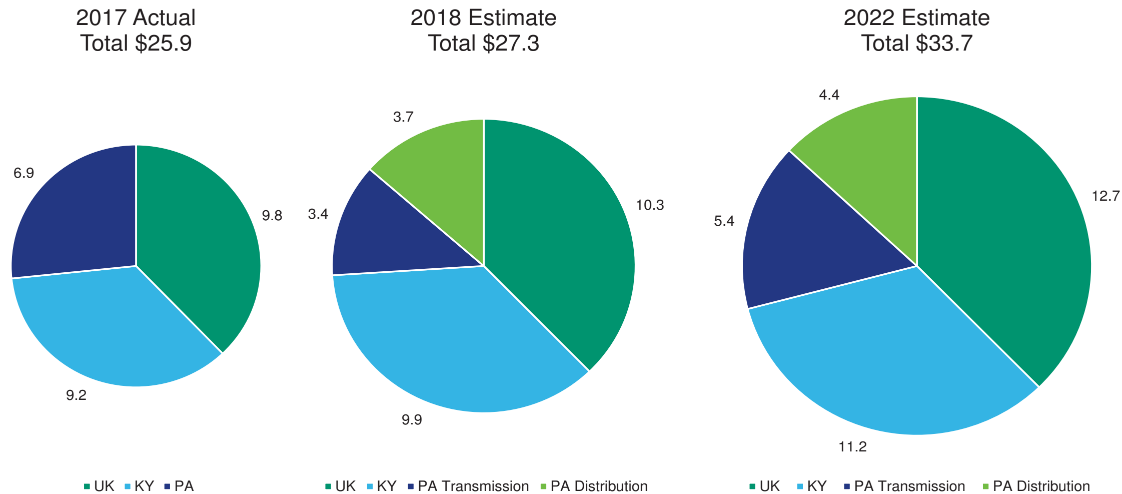
authorized return on equity (ROE) of 9.7%. The rate case resulted in a base electricity rate increase of 3.2% at KU and base electricity and gas rate increases of 5.2% and 2.1%, respectively, at LG&E. These became effective 1 July 2017. Overall, we view the settlement as credit supportive and representative of a constructive regulatory environment which continues to settle rate cases in a timely manner.

In June 2017, the KPSC also approved an authorized ROE of 9.7% for all of LG&E's and KU's existing approved ECR plans and projects, replacing the prior authorized ROE levels of 9.8% for coal projects and 10% for all other ECR approved projects, effective with bills issued in August 2017. The impact of this new authorized ROE is not expected to be significant in 2017.

In Pennsylvania, PPLEU has historically received reasonable and timely decisions in its rate cases, including the most recent distribution rate case that was settled in November 2015. In this rate case, the company was authorized to use a forward test year and reached a settlement with interveners within 6 months. PPLEU requested an 18.5% revenue increase and received about 74% of the request ($124 million versus $167.5 million) in the settlement.

Relative to other electric utilities, a high percentage of PPLEU's rate base consists of FERC regulated transmission assets. PPL expects the rate base contribution from its FERC-regulated transmission assets to be around 47% in 2017 and to increase to 55% by 2022. We consider FERC regulation to be predictable and credit supportive due to the formulaic nature of its rate case mechanisms. Based on the formula rate mechanism, PPLEU is currently authorized to earn an 11.68% ROE on its existing transmission assets, while the $650 million Susquehanna-Roseland transmission project is authorized to earn a 12.93% ROE due to incentive-based rate treatments. We note that there is an ROE complaint filed in PJM, where PPLEU is located, to reduce the FERC allowed ROE. The timing, scope and content of the final resolution are uncertain.

Exhibit 4
Projected Rate Base Growth
$ in billions



Source: Company Reports

Transparent and consistent regulatory environment in the UK

We consider the regulatory environment its WPD subsidiaries to be among the strongest and is among the most transparent globally. As the top performer among its DNO peers, the WPD utilities have benefitted from performance-based rate making mechanisms, which results in incentive bonus payments annually along with higher authorized ROE compared to its UK peers. For the regulatory year ending 30 September 2017, WPD's performance included $75 million of incentive revenues. Additionally, as the only DNO to qualify for fast-track incentives, WPD companies are allowed to retain 70% of realized cost efficiencies.

The UK electric and gas regulator Ofgem (Office of Gas and Electricity Markets) uses the RIIO (Revenue = Incentive + Innovation + Outputs) model. The reviews of RIIO determine the allowed revenues for all electricity distribution companies. The first phase of the rate review set the revenues operators are allowed to earn over the next eight years, from April 2015 to March 2023.

In early May, Ofgem decided not to hold a mid-period review in the current rate plan. The consultation period ended on 2 May 2018 and Ofgem's final review on the price control allowances is expected to be published in 2022. The second RIIO (also known as RIIO-Electric Distribution 2 or RIIO-ED2) will start in April 2023.

Exhibit 5
Western Power Distribution service area

Source: Energy Networks Association

Exhibit 6
Price control overview

			GB Electricity Distribution	
Regulator / Price Control				Ofgem / RIIO-ED1
Term of price control				2015-23
Allowed return on RAV (vanilla real)				3.56% (2018-19) 3.27% (2019-20)
Regulated Businesses	EMID	WMID	SWALES	SWEST
Regulated Asset Value (Ofgem) at March 2018	£2.35 bn	£2.35 bn	£1.06 bn	£1.56 bn

Note: Regulated Asset Value post November 2017 iteration
Source: Ofgem

Adequate financial metrics but relatively high parent debt

PPL has maintained stable financial metrics historically with its CFO pre-WC to debt in the mid-teens. However, we expect its metrics to slightly weaken to the 12%-14% range over the next 12-18 months. Metrics at these levels still position the company reasonably well relative to its low risk peers with a similar credit profile and metrics. As of the latest twelve months (LTM) period ending 31 March 2018, CFO pre-WC to debt was 14.7%. The decline in metrics is expected due to elevated capital expenditure programs as well as the negative impact from tax reform. However, prudent recovery mechanisms that are in place should result in more timely recovery of investments and help PPL to maintain its key metrics in the expected ranges. Furthermore, its recent equity issuance totaling approximately $1.7 billion also helped to mitigate the pressure on its cash flow to debt metric.

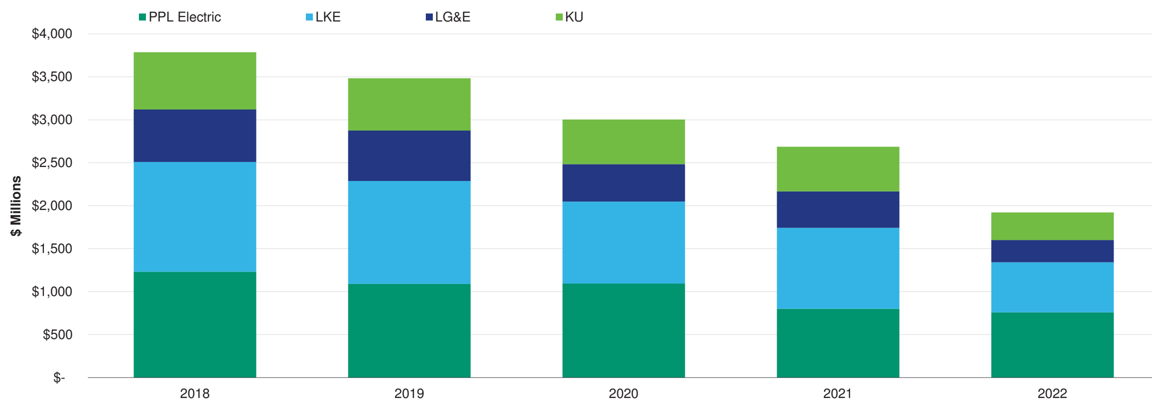
With approximately $7.4 billion of holding company debt, which includes debt at the parent holding company and intermediary holding companies in the US and UK, PPL's holding company debt accounts for approximately 35% of total consolidated debt. Holding company debt at these levels generally leads to a multiple notch differential between the parent company and its operating subsidiaries. PPL's overall credit profile, including its high parent debt level, is about two notches lower than the average credit profile of its US regulated subsidiaries.

Large but declining capital investment program

Based on their most recent earnings presentation, the company is projected to spend approximately $15.4 billion in capital expenditures between 2018 and 2022. In comparison, PPL's planned capital investment represents about 53% of the company's US and UK rate base, estimated an approximately $23.5 billion.

We expect a significant amount of the investment costs will be recovered through regulatory recovery mechanisms outside of the traditional base rate case proceedings. For instance in Kentucky, the KPSC has adopted the ECR mechanism for the recovery of certain construction work-in-progress, reducing regulatory lag. In Pennsylvania, the FERC transmission formula rate, Distribution System Improvement Charges (DSIC) mechanism and other recovery mechanisms are in place to reduce regulatory lag and provide for a more timely recovery of costs and a return on investments. All together these mechanisms allow PPL to receive timely returns between 80% and 90% of its investment.

Exhibit 7
Projected Capital Investment Plan for PPL's US Regulated Utilities



Source: Company Reports

Additional risk from and strategic attention to managing foreign currency exchange exposure

With a significant portion of earnings and cash flow generated in the UK, PPL must manage its foreign currency risk closely. As of early May 2018, PPL's foreign exchange exposure is 100% hedged for 2018 and 2019 at an average rate of $1.32 per GBP and $1.39 per GBP, respectively. For 2020, PPL has hedged 50% at average rate of $1.49 per GBP. PPL plans to maintain its three year forward hedging program, which we view as a credit positive as it mitigates volatility in earnings related to currency exchange from the otherwise stable and predictable UK operations.

Over the next three years, we expect PPL to generate about 50% of its cash flow from its UK operations while about 34% of PPL's debt is either denominated in GBP or has been swapped into GBP. As a result, we do not expect a GBP depreciation to heavily influence the CFO pre-WC to debt metric. In addition, if depreciation of the GBP against other currencies leads to higher import prices in the UK, inflation as measured by the Retail Prices Index (RPI) could increase modestly. Since WPD's revenues and regulatory assets are adjusted annually by RPI, this could lead to higher earning in GBP terms.

Liquidity Analysis

We expect PPL to maintain an adequate liquidity profile over the next 12-18 months. Although PPL does not have a short-term rating, its financing subsidiary PPL Capital Funding, Inc. (PPL Capital, Baa2 stable) has a P-2 short-term rating. The borrowings at PPL Capital are unconditionally guaranteed by PPL.

PPL's liquidity is supported by stable cash flow generated from its seven low risk utility subsidiaries. In addition to a steady stream of predictable cash flow, PPL has a significant amount of cash on hand totaling $629 million as of 31 March 2018.

At the parent level, PPL maintains a $950 million syndicated credit facility expiring in January 2023 and a $300 million syndicated credit facility expiring in November 2018. Drawings under these two revolving credit facilities are not subject to a material adverse change clause. As of 31 March 2018, there was $345 million borrowed against these facilities (letters of credit), leaving approximately $905 million of capacity available. PPL Capital Funding has a commercial paper program of $1.0 billion to provide additional short-term financing. Additionally, PPL maintains a $100 million bilateral credit facility due in March 2019.

Approximately $3.4 billion of bilateral and syndicated credit facilities are issued by various entities throughout the PPL family in the US and £1.3 billion in the UK. The expiration dates of the remaining facilities located at the operating subsidiaries are between October 2018 and January 2023. As of 31 March 2018, there was approximately $2.2 billion of availability remaining in the US and £816 million in the UK out of the $5 billion approximate total. Also, WPD has a £130 million uncommitted credit facility with £126 million available as of 31 March 2018. KU also has a separate letter of credit facility and it was fully utilized.

Over the LTM period ending 31 March 2018, PPL generated approximately $2.9 billion of cash flow from operations, spent about $3.2 billion in capital investments and paid $1.1 billion in dividends resulting in negative free cash flow of approximately $1.4 billion. Due to the high level of planned capital investments, we expect PPL to be negative free cash flow after dividends over the next 12-18 months.

Rating Methodology and Scorecard Factors

Exhibit 8

Rating Factors				
PPL Corporation				
Regulated Electric and Gas Utilities Industry Grid [1][2]	Current LTM 3/31/2018		Moody's 12-18 Month Forward View As of Date Published [3]	
Factor 1 : Regulatory Framework (25%)	**Measure**	**Score**	**Measure**	**Score**
a) Legislative and Judicial Underpinnings of the Regulatory Framework	Aa	Aa	Aa	Aa
b) Consistency and Predictability of Regulation	Aa	Aa	Aa	Aa
Factor 2 : Ability to Recover Costs and Earn Returns (25%)				
a) Timeliness of Recovery of Operating and Capital Costs	A	A	A	A
b) Sufficiency of Rates and Returns	A	A	A	A
Factor 3 : Diversification (10%)				
a) Market Position	A	A	A	A
b) Generation and Fuel Diversity	Baa	Baa	Baa	Baa
Factor 4 : Financial Strength (40%)				
a) CFO pre-WC + Interest / Interest (3 Year Avg)	4.3x	Baa	4x - 4.5x	Baa
b) CFO pre-WC / Debt (3 Year Avg)	14.2%	Baa	12% - 14%	Baa
c) CFO pre-WC – Dividends / Debt (3 Year Avg)	9.2%	Baa	7% - 10%	Ba
d) Debt / Capitalization (3 Year Avg)	60.8%	Ba	58% - 60%	Ba
Rating:				
Grid-Indicated Rating Before Notching Adjustment		A3		A3
HoldCo Structural Subordination Notching	-2	-2	-2	-2
a) Indicated Rating from Grid		Baa2		Baa2
b) Actual Rating Assigned		Baa2		Baa2

[1] All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
[2] As of 3/31/2018(L)
[3] This represents Moody's forward view; not the view of the issuer; and unless noted in the text, does not incorporate significant acquisitions and divestitures.
Source: Moody's Financial Metrics™

Ratings

Exhibit 9

Category	Moody's Rating
PPL CORPORATION	
Outlook	Stable
Issuer Rating	Baa2
WESTERN POWER DISTRIB (WEST MIDLANDS) PLC	
Outlook	Stable
Issuer Rating	Baa1
Senior Unsecured -Dom Curr	Baa1
WESTERN POWER DISTRIB (EAST MIDLANDS) PLC	
Outlook	Stable
Issuer Rating	Baa1
Senior Unsecured -Dom Curr	Baa1
PPL CAPITAL FUNDING, INC.	
Outlook	Stable
Bkd Senior Unsecured	Baa2
Bkd Jr Subordinate	Baa3
Bkd Commercial Paper	P-2
WESTERN POWER DISTRIBUTION (SOUTH WEST) PLC	
Outlook	Stable
Issuer Rating	Baa1
Senior Unsecured -Dom Curr	Baa1
WESTERN POWER DISTRIBUTION (SOUTH WALES) PLC	
Outlook	Stable
Senior Unsecured -Dom Curr	Baa1
PPL ELECTRIC UTILITIES CORPORATION	
Outlook	Stable
Issuer Rating	A3
Senior Secured	A1
Sr Unsec Bank Credit Facility	A3
Commercial Paper	P-2
KENTUCKY UTILITIES CO.	
Outlook	Stable
Issuer Rating	A3
Bkd LT IRB/PC	A1
Senior Secured	A1
Sr Unsec Bank Credit Facility	A3
Commercial Paper	P-2
Bkd Other Short Term	P-2
LOUISVILLE GAS & ELECTRIC COMPANY	
Outlook	Stable
Issuer Rating	A3
Bkd LT IRB/PC	A1
Senior Secured	A1
Sr Unsec Bank Credit Facility	A3
Commercial Paper	P-2
Bkd Other Short Term	P-2
WESTERN POWER DISTRIBUTION PLC	
Outlook	Stable
Issuer Rating -Dom Curr	Baa3
Senior Unsecured	Baa3
LG&E AND KU ENERGY LLC	
Outlook	Stable
Issuer Rating	Baa1
Senior Unsecured	Baa1

Source: Moody's Investors Service

Appendix

Exhibit 10

Cash Flow and Credit Measures [1]

($MM)

CF Metrics	2013	2014	2015	2016	2017
As Adjusted					
FFO	**3,507**	**3,601**	**3,368**	**3,520**	**3,102**
+/- Other	152	(113)	(175)	(274)	(147)
CFO Pre-W/C	**3,659**	**3,488**	**3,193**	**3,246**	**2,955**
+/- ΔWC	(350)	210	(173)	(25)	(34)
CFO	**3,309**	**3,698**	**3,020**	**3,221**	**2,921**
- Div	903	982	1,019	1,045	1,084
- Capex	4,395	3,764	3,611	2,999	3,210
FCF	**(1,990)**	**(1,048)**	**(1,610)**	**(823)**	**(1,372)**
(CFO Pre-W/C) / Debt	16.0%	16.9%	15.0%	16.0%	13.4%
(CFO Pre-W/C - Dividends) / Debt	12.0%	12.2%	10.2%	10.9%	8.5%
FFO / Debt	15.3%	17.5%	15.8%	17.4%	14.1%
RCF / Debt	11.4%	12.7%	11.0%	12.2%	9.2%

[1] All figures and ratios are calculated using Moody's estimates and standard adjustments. Periods are Financial Year-End unless indicated. LTM = Last Twelve Months.

Source: Moody's Financial Metrics™

Exhibit 11

Peer Comparison [1]

	PPL Corporation Baa2 Stable			National Grid Plc Baa1 Stable			Dominion Energy, Inc. Baa2 Negative			Duke Energy Corporation Baa1 Negative			Southern Company (The) Baa2 Negative		
(in US millions)	FYE Dec-16	FYE Dec-17	LTM Mar-18	FYE Dec-15	FYE Dec-16	LTM Sep-17	FYE Dec-16	FYE Dec-17	LTM Mar-18	FYE Dec-15	FYE Dec-16	FYE Dec-17	FYE Dec-16	FYE Dec-17	LTM Mar-18
Revenue	7,517	7,447	7,622	24,517	19,917	19,568	11,737	12,586	12,668	22,371	22,743	23,565	19,896	23,031	23,632
CFO Pre-W/C	3,246	2,955	3,341	6,768	6,718	5,572	4,010	4,702	4,769	6,833	6,655	7,444	4,548	7,081	7,361
Total Debt	20,235	22,036	22,682	39,861	40,768	35,391	36,454	38,825	38,692	41,536	49,843	54,169	48,028	51,110	52,269
(CFO Pre-W/C) / Debt	16.0%	13.4%	14.7%	15.6%	15.7%	16.7%	11.0%	12.1%	12.3%	16.5%	13.4%	13.7%	9.5%	13.9%	14.1%
(CFO Pre-W/C - Dividends) / Debt	10.9%	8.5%	9.9%	9.5%	9.9%	-2.0%	6.1%	7.0%	7.0%	11.0%	8.7%	9.2%	6.2%	9.1%	9.3%
Debt / EBITDA	4.5x	5.7x	5.8x	5.2x	6.4x	6.7x	6.4x	6.0x	6.2x	4.4x	5.1x	5.0x	6.2x	8.3x	8.3x
Debt / Book Capitalization	58.8%	61.9%	61.7%	61.0%	59.8%	54.2%	58.0%	61.1%	59.9%	44.2%	47.5%	53.0%	53.1%	59.8%	59.9%

[1] All figures & ratios calculated using Moody's estimates & standard adjustments. FYE = Financial Year-End. LTM = Last Twelve Months. RUR* = Ratings under Review, where UPG = for upgrade and DNG = for downgrade.

Source: Moody's Financial Metrics™

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CREDIT OPINION
6 June 2017

Update

Rate this Research

RATINGS

PPL Corporation

Domicile	Allentown, Pennsylvania, United States
Long Term Rating	Baa2
Type	LT Issuer Rating - Dom Curr
Outlook	Stable

Please see the ratings section at the end of this report for more information. The ratings and outlook shown reflect information as of the publication date.

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PPL Corporation

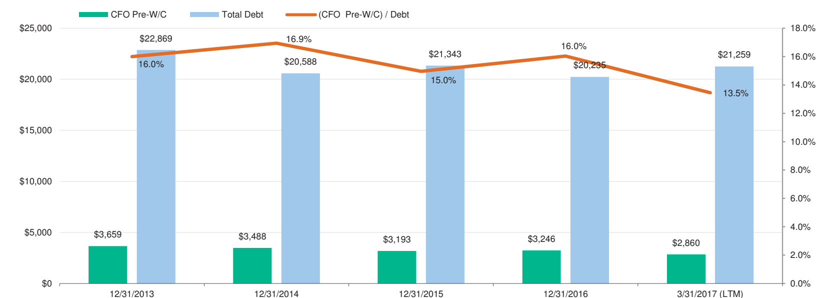
A Regulated Utility Holding Company

Summary Rating Rationale

PPL Corporation's (PPL) Baa2 senior unsecured rating reflects the mostly low business risk profile of its US and UK regulated utilities as well as the substantial debt leverage at the parent holding company. Its regulated utilities' operations are characterized by credit supportive regulatory environments and large capital expenditure programs, resulting in substantial negative free cash flow. As a fully regulated company, PPL generates approximately 70% of its earnings and cash flows from a networks or transmission and distribution (T&D) platform in the US and UK while the remaining 30% comes from vertically integrated utility operations, which include 8 GW of generation that are mostly coal-fired in the US, all of which provide good visibility from an earnings and cash flow perspective.

PPL's cash flow from operations before changes in working capital (CFO Pre-WC) to debt is expected to be in the 12% to 15% range and its retained cash flow (RCF) to debt in the 8% to 11% range over the next 12-18 months. Although PPL has foreign currency exchange exposure due to its operations in the UK, PPL has been actively mitigating the risk by placing hedges for foreign currency exchange rates, a credit positive.

Exhibit 1
CFO Pre-W/C, Total Debt and CFO Pre-W/C to Debt
($MM)



Source: Moody's Investors Service

Credit Strengths

» Stable earnings and cash flow generated by regulated utilities

» Constructive regulatory environments supporting rate base growth

» Consistent financial metrics

Credit Challenges

» Large capital expenditure programs

» Relatively high level of holding company debt

» Foreign currency exchange exposure

Rating Outlook

PPL's stable rating outlook reflects our expectations that it will continue to remain a regulated utility holding company with stable financial metrics, including a ratio of CFO pre-WC to debt in the 12%-15% range and RCF to debt ratio in the 8%-11% range. The stable outlook also assumes that its regulated operating subsidiaries will continue to be supported by constructive regulatory environments and its large capital expenditure will be financed with a balanced mix of debt and equity.

Factors that Could Lead to an Upgrade

PPL's rating could be upgraded if its consolidated financial metrics improve, including its CFO pre-WC to debt is in the high teens range and its RCF to debt increases to the mid-teens range, on a sustained basis. An upgrade could also be possible if PPL lowers its percentage of holding company debt to a level below 20% of total consolidated debt on a sustained basis. A rating upgrade could be considered if PPL's utility subsidiaries are upgraded.

Factors that Could Lead to a Downgrade

A rating downgrade could be considered if its consolidated key metrics deteriorate significantly, including its CFO pre-WC to debt fall to the low-teens or RCF to debt fall to mid-single digits. Also, a significant increase in the parent debt could pressure the rating downward. Additional rating pressure could occur should PPL experience any unexpected negative regulatory developments or its ability to earn appropriate returns on its investments is reduced significantly, or if its utility subsidiaries are downgraded. Furthermore, negative ratings actions could occur if the company fails to properly manage its foreign exchange exposure, associated with earnings generated from its UK operations.

Key Indicators

Exhibit 2

KEY INDICATORS [1]

PPL Corporation

	12/31/2013	12/31/2014	12/31/2015	12/31/2016	3/31/2017(L)
CFO pre-WC + Interest / Interest	4.4x	4.9x	4.4x	4.5x	4.1x
CFO pre-WC / Debt	16.0%	16.9%	15.0%	16.0%	13.5%
CFO pre-WC – Dividends / Debt	12.0%	12.2%	10.2%	10.9%	8.5%
Debt / Capitalization	57.1%	54.6%	60.9%	58.8%	59.8%

[1] All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
Source: Moody's Investors Service

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Detailed Rating Considerations

- Stable and consistent earnings and cash flow generated by regulated utilities

As a holding company of seven rate regulated utilities, PPL maintains a lower business risk profile when compared to its peers. Approximately 50% of PPL's cash flow is produced by its UK based T&D operations, which are consolidated under the intermediate holding company Western Power Distribution PLC (WPD, Baa3 stable). The remaining 50% of cash flow is produced in the US with about 30% generated from its two Kentucky utilities, Louisville Gas & Electric Company (LG&E, A3 stable) and Kentucky Utilities Company (KU, A3 stable) and the remaining 20% from its incumbent utility in Pennsylvania, PPL Electric Utilities Corporation (PPLEU, A3 stable). The two Kentucky utilities are held under an intermediate holding company, LG&E and KU Energy LLC (Baa1 stable).

In general, PPL has limited commodity exposure. From a commodity exposure perspective, WPD has no commodity risk and PPLEU has limited exposure through its role as the Provider of Last Resort (POLR). LG&E and KU are vertically integrated utilities and have commodity exposure through the fuel used to produce power.

As a distribution network operator (DNO) in the UK, WPD's subsidiaries do not have any commodity production or procurement responsibilities, effectively eliminating all of its exposure to commodities. Although PPLEU is a wires-only utility, it maintains some commodity exposure because it functions as the Provider of Last Resort (POLR) for the ratepayers within its service territory. As the designated POLR entity, PPLEU is the default service provider that procure power for customers who are not served by a competitive retail energy provider. The risk associated with this exposure is very small given the transparent purchased power cost pass-through mechanism that is in place. Additionally, PPLEU mitigates this risk by entering into full-requirement supply agreements to serve its POLR customers.

PPL's Kentucky utilities have the most exposure to commodities as vertically integrated utilities, who own and operate the generation assets used to produce power for their customers. Although LG&E and KU have direct commodity exposure, Kentucky allows the cost of fuel used to generate power to be recovered through a fuel adjustment clause within four months.

- Constructive regulatory environments supporting rate base growth

PPL's utilities operate under supportive regulatory environments, which leads to stable and predictable earnings and cash flow generated from roughly $24 billion of rate base. The regulatory environment for WPD subsidiaries is considered to be the strongest, which is among the most transparent globally. As the top performer among its DNO peers, WPD utilities have benefitted from performance-based rate making mechanisms, which results in incentive bonus payments annually along with higher authorized returns on equity (ROE) when compared to other UK peers. For the regulatory year ending 31 March 2017, WPD's performance included $95 million of incentive revenues. Additionally, as the only DNO to qualify for fast-track incentives, WPD companies are allowed to retain 70% of realized cost efficiencies.

The regulatory environments in Kentucky and Pennsylvania are also considered credit supportive. The Kentucky Public Service Commission (KPSC) has approved various tracker mechanisms that provide for timely cost recovery outside of a general rate case. These tracker mechanisms include a Fuel Adjustment Clause (FAC), an Environmental Cost Recovery Surcharge (ECR), a Gas Supply Clause (GSC), a Gas Line Tracker (GLT), and a Demand-Side Management Cost (DSM) Recovery Mechanism.

On 19 April 2017, the Kentucky utilities and its interveners filled a settlement agreement with the KPSC to resolve its most recent rate case, which was filed in November 2016. Under the terms of the settlement, LG&E is allowed to implement a $59 million electric and a $7.5 million gas rate increase, while KU is authorized to implement a $55 million electric rate increase. The revenue increases are based on an 9.75% authorized ROE, with rates scheduled to become effective on 1 July. Overall, we view the settlement to be credit positive and representative of a constructive regulatory environment which continues to settle rate cases in a timely manner.

In Pennsylvania, PPLEU has historically received reasonable and timely decisions in its rate cases, including the most recent distribution rate case that was settled in November 2015. In this rate case, the company was authorized to use a forward test year and reached a settlement with interveners within 6 months. PPLEU requested an 18.5% revenue increase and received about 74% of the request ($124 million versus $167.5 million) in the settlement.

Relative to other electric utilities, a high percentage of PPLEU's rate base consists of FERC regulated transmission assets. PPL expects the rate base contribution from its FERC-regulated transmission assets to be about 47% in 2017, increasing to 55% by 2021. We consider the FERC regulations to be predictable and credit supportive due to the formulaic nature of its rate case mechanisms. Based on the formula rate mechanism, PPLEU is currently authorized to earn an 11.68% ROE on its existing transmission assets, while the $650 million Susquehanna-Roseland transmission project is authorized to earn a 12.93% ROE due to incentive-based rate treatments. We note that there is an ROE complaint filed in PJM where PPLEU is located to reduce the FERC allowed ROE. The timing of the final resolution and the final resolution itself are uncertain as FERC currently lacks a quorum.

- Adequate and stable financial metrics

We expect PPL to maintain stable financial metrics that are consistent with its historical levels. For example, we expect PPL to continue to produce CFO pre-WC to debt in the 12%-15% range and RCF to debt in the 8%-11% range over the next 12-18 months. Metrics at these levels position the company reasonably well relative to its low risk peers in the Baa rating category. As a result of elevated capital expenditure programs and some lag in cost recovery at the regulated utility subsidiaries, the key metrics will weaken slightly. However, prudent recovery mechanisms that are in place should result in more timely recovery of investments and help PPL to maintain its key metrics in the expected ranges.

- Large capital expenditure programs

Based on their most recent earnings presentation, the company is projected to spend approximately $15.8 billion in capital expenditures between 2017 and 2021. In comparison, PPL's planned capital expenditure represents about 66% of the company's rate base estimated an approximately $24 billion at year-end 2016. There are generally two potential credit implications when a capital investment program is this significant. First, with a large capital program, the company is more exposed to project execution risk. Second, capital spending tends to place downward pressure on cash flow to debt ratios because debt is used to fund construction but most of the cash flows will only be generated after the project has been placed into service.

In PPL's case, we do not view the execution risk to be a major concern because most of the projects are not technically complex and have a moderate to low level of execution risk. In addition, the lagging effect on cash flow is less of a concern due to PPL's ability to recover a significant amount of their investments through regulatory recovery mechanisms outside of the traditional base rate case proceedings. For instance in Kentucky, the KPSC has adopted the ECR mechanism and recovery on certain construction work-in-progress, reducing regulatory lag. In Pennsylvania, the FERC transmission formula rate, Distribution System Improvement Charges (DSIC) mechanism and other recovery mechanisms are in place to reduce regulatory lag and provide for a more timely recovery of costs and a return on investments. All together these mechanisms allow PPL to recover approximately 79% of their investments in less than one year with about 70% being recovered in the first 6 months.

- Relatively high level of holding company debt

With approximately $5.8 billion of holding company debt, which includes debt at the parent holding company and intermediary holding companies in the US and UK, PPL's holding company debt accounts for approximately 33% of total consolidated debt. Holding company debt at these levels generally leads to a multiple notching differential between the parent company and its operating subsidiaries. PPL's Baa2 rating is two notches below the level of its US regulated subsidiaries, which we assess as having an average credit profile of A3.

- Additional risk and strategic attention to manage foreign currency exchange exposure

With a significant portion of earnings and cash flow generated in the UK, PPL must manage its foreign currency risk closely. In the third quarter of 2016, PPL entered into additional hedges in order to protect WPD dominated earnings from a rapidly depreciating British pound sterling (GBP) after the UK voted to leave the European Union. The liquidation of existing hedges resulted in a realized gain of $310 million, which PPL used to enter into new contracts at market rates. As of 20 April 2017, PPL's foreign exchange exposure is 100% hedged for the remainder of 2017 at an average rate of $1.21 per GBP and 99% hedged for 2018 and 2019 at average rates of $1.41 and $1.32 per GBP respectively. PPL plans to maintain its three year forward hedging program, which we view as a credit positive as it mitigates volatility in earnings related to currency exchange from the otherwise stable and predictable UK operations.

Over the next three years, we expect PPL to generate about 45% of its cash flow from its UK operation while about 36% of PPL's debt is either denominated in GBP or has been swapped into GBP. As a result, we do not expect a GBP depreciation to heavily influence the CFO Pre-WC to debt metric. In addition, if depreciation of GBP against other currencies leads to higher import prices in the UK, inflation as measured by the Retail Prices Index (RPI) could increase modestly. Since WPD's revenues and regulatory assets are adjusted annually by RPI, this could lead to higher earning in GBP terms.

Liquidity Analysis

We expect PPL to maintain an adequate liquidity profile over the next 12-18 months.

PPL's liquidity is supported by stable cash flow generated from its seven low risk utility subsidiaries. In addition to a steady stream of predictable cash flow, PPL has a significant amount of cash on hand totaling $409 million at the end of the first quarter 2017.

At the parent level, PPL maintains a $950 million syndicated credit facility expiring in January 2022 and a $300 million syndicated credit facility expiring in November 2018. Drawings under these two revolving credit facilities are not subject to a material adverse change clause. As of 31 March 2017, there was $189 million borrowed against these facilities leaving approximately $1.0 billion of capacity available. In January 2016, PPL Capital Funding increased their commercial paper program from $600 million to $1.0 billion to provide additional short-term financing. Additionally, PPL maintains a $150 million bilateral credit facility due in March 2018.

Approximately $4.4 billion of bilateral and syndicated credit facilities are issued by various entities throughout the PPL family. The majority of the remaining facilities located at the operating subsidiaries expire between 2021 and 2022. As of the end of the first quarter 2017, there was approximately $3.0 billion of availability remaining out of the $4.4 billion total. Also, WPD has a £90 million, or approximately $117 million, uncommitted credit facility. It was £86 million, or $112 million, available at the end of the first quarter 2017. KU also has a separate letter of credit facility and it was fully utilized.

Over the last twelve month period ending 31 March 2017, PPL generated approximately $2.5 billion of cash flow from operations, spent about $3.0 billion in capital expenditures and paid $1.0 billion in dividends resulting in negative free cash flow of approximately $1.5 billion. Due to the high level of planned capital expenditures, we expect PPL to have between $1.0 billion and $1.5 billion of negative free cash flow after dividends. We expect the company will finance the shortfall with a balanced mix of debt and equity and will maintain their current capital structure.

Profile

PPL Corporation is a utility holding company headquartered in Allentown, PA with three areas of regulated operations: UK regulated, Kentucky regulated, and Pennsylvania regulated. UK regulated includes Western Power Distribution PLC, a pure wires-only distribution company in the United Kingdom with no retail exposure. Kentucky regulated includes Louisville Gas & Electric Company and Kentucky Utilities Company, which operate under a traditional integrated utility model. Pennsylvania regulated is comprised of PPL Electric Utilities Corporation, a transmission business mostly regulated by Federal Energy Regulatory Commission, and a distribution operation regulated by the Pennsylvania Public Utility Commission. PPL, through its operating subsidiaries, controls or owns about 8,000 MW of generating capacity in the US and sells electricity and natural gas to about 10.4 million customers in the US and UK.

Rating Methodology and Scorecard Factors

Exhibit 3

Rating Factors				
PPL Corporation				
Regulated Electric and Gas Utilities Industry Grid [1][2]	Current LTM 3/31/2017		Moody's 12-18 Month Forward View As of Date Published [3]	
Factor 1 : Regulatory Framework (25%)	**Measure**	**Score**	**Measure**	**Score**
a) Legislative and Judicial Underpinnings of the Regulatory Framework	Aa	Aa	Aa	Aa
b) Consistency and Predictability of Regulation	Aa	Aa	Aa	Aa
Factor 2 : Ability to Recover Costs and Earn Returns (25%)				
a) Timeliness of Recovery of Operating and Capital Costs	A	A	A	A
b) Sufficiency of Rates and Returns	A	A	A	A
Factor 3 : Diversification (10%)				
a) Market Position	A	A	A	A
b) Generation and Fuel Diversity	Baa	Baa	Baa	Baa
Factor 4 : Financial Strength (40%)				
a) CFO pre-WC + Interest / Interest (3 Year Avg)	4.4x	Baa	3.5x - 4x	Baa
b) CFO pre-WC / Debt (3 Year Avg)	14.0%	Baa	12% - 15%	Baa
c) CFO pre-WC – Dividends / Debt (3 Year Avg)	9.4%	Baa	8% - 11%	Baa
d) Debt / Capitalization (3 Year Avg)	58.8%	Ba	56% - 60%	Ba
Rating:				
Grid-Indicated Rating Before Notching Adjustment		A3		A3
HoldCo Structural Subordination Notching	-2	-2	-2	-2
a) Indicated Rating from Grid		Baa2		Baa2
b) Actual Rating Assigned		Baa2		Baa2

[1] All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
[2] As of 3/31/2017(L)
[3] This represents Moody's forward view; not the view of the issuer; and unless noted in the text, does not incorporate significant acquisitions and divestitures.
Source: Moody's Investors Service

Ratings

Exhibit 4

Category	Moody's Rating
PPL CORPORATION	
Outlook	Stable
Issuer Rating	Baa2
WESTERN POWER DISTRIB (WEST MIDLANDS) PLC	
Outlook	Stable
Issuer Rating	Baa1
Senior Unsecured -Dom Curr	Baa1
WESTERN POWER DISTRIB (EAST MIDLANDS) PLC	
Outlook	Stable
Issuer Rating	Baa1
Senior Unsecured -Dom Curr	Baa1
PPL CAPITAL FUNDING, INC.	
Outlook	Stable
Bkd Senior Unsecured	Baa2
Bkd Jr Subordinate	Baa3
Bkd Commercial Paper	P-2
WESTERN POWER DISTRIBUTION (SOUTH WEST) PLC	
Outlook	Stable

Issuer Rating	Baa1
Senior Unsecured -Dom Curr	Baa1
WESTERN POWER DISTRIBUTION (SOUTH WALES) PLC	
Outlook	Stable
Senior Unsecured -Dom Curr	Baa1
PPL ELECTRIC UTILITIES CORPORATION	
Outlook	Stable
Issuer Rating	A3
First Mortgage Bonds	A1
Senior Secured	A1
Sr Unsec Bank Credit Facility	A3
Commercial Paper	P-2
KENTUCKY UTILITIES CO.	
Outlook	Stable
Issuer Rating	A3
First Mortgage Bonds	A1
Sr Unsec Bank Credit Facility	A3
Commercial Paper	P-2
LOUISVILLE GAS & ELECTRIC COMPANY	
Outlook	Stable
Issuer Rating	A3
First Mortgage Bonds	A1
Sr Unsec Bank Credit Facility	A3
Commercial Paper	P-2
LG&E AND KU ENERGY LLC	
Outlook	Stable
Issuer Rating	Baa1
Senior Unsecured	Baa1

Source: Moody's Investors Service

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REPORT NUMBER 1072959

MOODY'S
INVESTORS SERVICE

CREDIT OPINION

6 December 2016

Update

Rate this Research

RATINGS

PPL Corporation

Domicile	Allentown, Pennsylvania, United States
Long Term Rating	Baa2
Type	LT Issuer Rating - Dom Curr
Outlook	Stable

Please see the ratings section at the end of this report for more information. The ratings and outlook shown reflect information as of the publication date.

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PPL Corporation

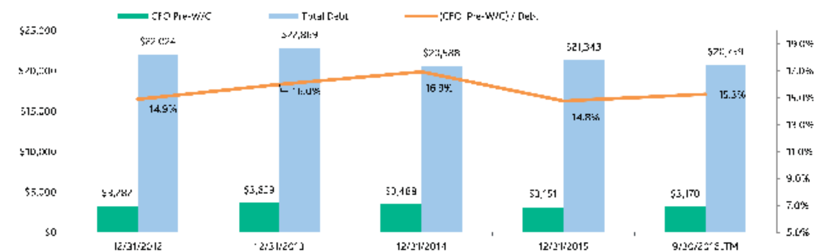
A Regulated Utility Holding Company

Summary Rating Rationale

PPL's Baa2 rating reflects the low business risk of its US and UK regulated utilities, offset by substantial debt leverage at the parent holding company. The regulated business is characterized by credit supportive regulatory environments and a large capital expenditure program across all major subsidiaries, resulting in substantial negative free cash flow. As a fully regulated business PPL generates approximately 70% of its earnings and cash flows from a networks or transmission and distribution (T&D) platform in the US and UK while the remaining 30% comes from integrated utility operation in the US, all of which provide good visibility from a recovery, earnings and cash flow perspective. Prospectively, PPL's CFO Pre-WC to debt is expected to be in the 13% to 15% range and its retained cash flow to debt in the 9% to 10% range, both of which compare well with other low risk Baa holding companies rated under our Regulated Electric and Gas Utility methodology. Although PPL has foreign exchange exposure due to its operations in the UK, we currently do not view the risk as a significant credit driver.

Exhibit 1

Ratio of CFO pre-W/C to Debt Historical Trend



Source: Moody's Investors Service

Credit Strengths

» Mostly low risk, regulated wires-only subsidiaries

» Financial metrics adequate for its rating

» Constructive regulatory environments support rate base growth

Credit Challenges

» Large capital expenditure program

» High level of holding company debt

» Exposure to depreciation of the British Pound

Rating Outlook

PPL's stable outlook is supported by its strong regulated business operations in the US and UK and our expectation that management will maintain an appropriate capital structure during its large capital expenditure cycle as well as credit metrics, such as 13%-15% CFO pre-WC to debt and 9-10% RCF to debt.

Factors that Could Lead to an Upgrade

A rating upgrade could be possible if its consolidated CFO Pre-WC to debt rises to the high teens and its RCF to debt increases to the mid-teens. An upgrade could also occur if PPL lowers its percentage of holding company debt to a level below 20% of total consolidated debt.

Factors that Could Lead to a Downgrade

The potential for a rating downgrade is likely should the company increase its debt level, especially at the holding company level. A downgrade could also result should its consolidated CFO-Pre WC to debt fall to the low-teens or if its RCF to debt falls to mid-single digits. Additional pressure could occur should PPL experience any unexpected negative regulatory developments or concerns about its ability to earn appropriate returns on its investments. Additionally, negative ratings actions could occur if the company fails to properly manage its exposure to a declining foreign exchange rate, following Britain's vote to leave the European Union.

Key Indicators

Exhibit 2

PPL Corporation

	9/30/2016(L)	12/31/2015	12/31/2014	12/31/2013	12/31/2012
CFO pre-WC + Interest / Interest	4.4x	4.4x	4.9x	4.4x	4.1x
CFO pre-WC / Debt	15.3%	14.8%	16.9%	16.0%	14.9%
CFO pre-WC – Dividends / Debt	10.3%	10.0%	12.2%	12.0%	11.0%
Debt / Capitalization	59.9%	60.9%	54.6%	57.1%	59.8%

[1]All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations. Source: Moody's Financial Metrics™
Source: Moody's Investors Service

Detailed Rating Considerations

- Mostly low risk, wires-only utility operations

As a holding company of seven rate regulated utilities, PPL maintains a lower business risk profile when compared to peers in the Baa rating category. Approximately 50% of PPL's cash flow is produced by its UK based T&D operations, which are consolidated under the intermediate holding company Western Power Distribution PLC (WPD, Baa3 stable). The remaining 50% of cash flow is produced in

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the US with about 30% generated at its two Kentucky utilities, Louisville Gas & Electric Company (LG&E, A3 stable) and Kentucky Utilities Company (KU, A3 stable) and 20% from its incumbent utility in Pennsylvania, PPL Electric Utilities Corporation (PPLEU, A3 stable). The two Kentucky utilities are held under an intermediate holding company, LG&E and KU Energy LLC (Baa1 stable).

From a commodity exposure perspective, WPD is considered the least risky, followed by PPLEU and then its utilities in Kentucky. As a distribution network operator (DNO) in the UK, WPD's subsidiaries have no commodity exposure because they do not have any commodity production or procurement responsibilities. PPLEU has more commodity exposure because it functions as the Provider of Last Resort (POLR) for the end-users within its service territory although it is a T&D utility. As the designated POLR entity, PPLEU is the default service provider that produces power for customers who are not served by a competitive retail energy provider. The risk associated with this exposure is very small given the transparent purchased power cost pass-through mechanism that is in place. Additionally, PPLEU mitigates this risk by entering into full-requirement supply agreements to serve its POLR customers.

PPL's Kentucky utilities have the most exposure to commodities as vertically integrated utilities. They own and operate power generation and the output from their power generation is used to serve their customer base. Although LG&E and KU have direct commodity exposure as the primary fuel for their generation fleet is coal, Kentucky allows the cost of fuel used to generate power to be recovered through a fuel adjustment clause within four months.

- Constructive regulatory environment supporting regulated growth

PPL's utilities operate under supportive regulatory environments, which lead to stable and predictable earnings and cash flow generated from roughly $24 billion of rate base. The regulatory environment for WPD subsidiaries is considered to be the strongest, operating under UK's regulatory process, which is among the most transparent globally. As the top performer among its DNO peers, WPD utilities has greatly benefitted from performance-based rate making mechanisms, which results in incentive bonus payments of $35 million annually along with higher authorized returns on equity (ROE) for WPD utilities. Additionally, as the only DNO to qualify for Fast-track incentives, WPD companies are allowed to retain 70% of realized cost efficiencies.

The regulatory environments in Kentucky and Pennsylvania are also considered credit supportive. The Kentucky Public Service Commission (KPSC) has approved various tracker mechanisms that provide for timely cost recovery outside of a general rate case. These tracker mechanisms include a Fuel Adjustment Clause (FAC), an Environmental Cost Recovery Surcharge (ECR), a Gas Supply Clause (GSC), a Gas Line Tracker (GLT), and a Demand-Side Management Cost (DSM) Recovery Mechanism. The last rate case settled in Kentucky in 2015 provided a $125 million annual revenue increase for KU's electricity operations and a $7 million increase for LG&E gas operations. The settlement agreed to no base revenue increase for LG&E's electric operations. Although it didn't specify an allowed ROE with respect to the base rates, a 10% allowed ROE was authorized for the ECR and GLT riders. On 23 November 2016, LG&E and KU filed their most recent rate case. In the filing, LG&E requested a $94 million electric rate increase and a $14 million gas rate increase, while KU filed for a $103 million electric rate increase. The filings are based on a test year of July 2017 through June 2018 and a requested return on equity (ROE) of 10.23%. The KPSC usually processes rate cases in a timely manner as was evident in the 2015 decision, which was settled 7 months after being filed.

In Pennsylvania, PPLEU has historically received reasonable and timely decisions in its rate cases, including the most recent distribution rate case that was concluded in November 2015. In this rate case, the company was allowed to use a forward test year and reached a settlement with interveners in about 5 months. PPLEU requested an 18.5% revenue increase and received about 74% of the request ($124 million versus $167.5 million) in the settlement.

Relative to other electric utilities, a high percentage of PPLEU's rate base is related to FERC regulated transmission assets. PPL expects the rate base contribution from transmission assets to be about 48% in 2017, growing to 55% by 2020. PPLEU's transmission infrastructure is regulated by the FERC under a formula ratemaking mechanism, which we consider to be predictable and thus credit supportive. Based on the formula rate mechanism, PPLEU is currently authorized to earn an 11.68% ROE on its existing transmission assets, while the $650 million Susquehanna-Roseland transmission project is authorized to earn a 12.93% ROE due to incentive-based rate treatments.

- Large capital investment program

PPL's utilities currently have a high level of capital expenditures that could apply pressure on their credit metrics. Based on the its third quarter earnings presentation, the company is projected to spend approximately $15.4 billion in capital expenditures between

2016 and 2020. In comparison, that represents about 64% of the company's rate base worth approximately $23.9 billion in 2016. When a company's capital plans reach these elevated levels there are generally two major credit implications. First, with a large capital expenditure program, the company is more exposed to project completion risk. Second, capital spending tends to place downward pressure on cash flow to debt ratios because debt is used to fund construction but most of the cash flows will only be generated after the project has been placed into service.

In PPL's case we do not view the completion risk to be a major concern because most of the projects are not technically complex and have a moderate to low level of completion risk. In addition the lagging effect on cash flow is less of a concern due to PPL's ability to recover a significant amount of their investments through regulatory recovery mechanisms outside of the traditional base rate case proceedings. For instance in Kentucky, the KPSC has adopted the ECR mechanism and recovery on certain construction work-in-progress, reducing regulatory lag. In Pennsylvania, the FERC transmission formula rate, Distribution System Improvement Charges (DSIC) mechanism and other recovery mechanisms are in place to reduce regulatory lag and provide for a more timely recovery of costs and a return on investments. All together these mechanisms allow PPL to recover approximately 79% of their investments in less than one year with about 71% being recovered in the first 6 months.

- High level of holding company debt

PPL's regulated subsidiaries have an average stand-alone credit profile of A3. However, with approximately $6 billion of holding company debt, which includes debt at the parent holding company and intermediary holding companies in the US and UK, PPL's rating is Baa2, two notches below its operating subsidiaries. PPL's holding company debt accounts for about 33% of total consolidated debt and the two notch treatment is consistent with other utilities that have substantial holding company debt.

- Adequate and stable financial metrics

PPL's consolidated CFO Pre-WC to debt has ranged between 15% to 16% for the past three years and is expected to decline to the 13% to 14% range. PPL's retained cash flow to debt has been in the 10% to 12% range for the past three years and is expected to fall to about 8% to 10% going forward. These credit metrics position the company reasonably well relative to the range of 11% to 19% for CFO Pre-WC to Debt and 7% to 15% for RCF to debt for the Baa rating category as a lower risk company rated under our Regulated Electric and Gas Utility methodology. The declines in cash flow to debt ratios are not considered a credit negative because they were mainly driven by the divestment of the unregulated generation business, which operated with a higher cash flow to debt ratios but also a higher business risk.

- Exposure to foreign currency risk

With a significant portion of earnings and cash flow generated in the UK, PPL must manage its foreign currency risk closely. Despite rapid depreciation of the British Pound (GBP) after the UK voted to leave the European Union, we do not believe there will be a negative impact on credit metrics. Following the vote PPL was able to realize a $310 million dollar increase in cash from hedge gains which they used to pay down debt.Over the next three years, we expect PPL to generate about 45% of its cash flow from its UK operation while about 36% of PPL's debt is either denominated in GBP or has been swapped into GBP. As a result, we do not expect a GBP depreciation to heavily influence the CFO Pre-WC to debt metric. In addition, if depreciation of the pound against other currencies leads to higher import prices in the UK, inflation as measured by the Retail Prices Index (RPI) could increase modestly. Since WPD's revenues and regulatory assets are adjusted annually by RPI, this could lead to higher earning in GBP terms.

Liquidity Analysis

PPL has an adequate liquidity profile supported by stable cash flow generated from its seven low risk utility subsidiaries. In addition to a steady stream of predictable cash flow, PPL has a significant amount of cash on hand totaling $416 million at the end of the third quarter 2016 and approximately $4 billion of bilateral and syndicated credit facilities issued by various entities throughout the PPL family. At the parent level, PPL maintains a $950 million syndicated credit facility expiring in January 2022 and a $300 million syndicated credit facility expiring in November 2018. Drawings under these two revolving credit facilities are not subject to a material adverse change clause. As of 30 September 2016, there were no borrowing against the facilities leaving the full $1.0 billion of capacity available. In January 2016, PPL Capital Funding increased their commercial paper program from $600 million to $1.0 billion to provide additional short-term financing. Additionally, PPL maintains a $150 million bilateral credit facility due in March 2017. The majority of the remaining facilities located at the operating subsidiaries expire between 2020 and 2021. As of the end of the third quarter 2016, there was approximately $2.1 billion of availability reaming out of the $4 billion total.

Over the last twelve month period ending 30 September 2016, PPL generated roughly $3.2 billion of cash flow from operations, spent about $3.1 billion in capital expenditures and paid $1.0 billion in dividends resulting in negative free cash flow of approximately $900 million. Due to the high level of planned capital expenditures we expect PPL to have between $1.0 billion and $1.5 billion of negative free cash flow after dividends going forward. We expect the company will finance the shortfall with a balanced mix of debt and equity and will maintain their current capital structure.

Profile

PPL Corporation is a utility holding company headquartered in Allentown, PA with three areas of regulated operations: UK regulated, Kentucky regulated, and Pennsylvania regulated. UK regulated includes Western Power Distribution PLC , a pure wires business in the United Kingdom with no retail exposure. Kentucky regulated includes Louisville Gas & Electric Company and Kentucky Utilities Company, which operate under a traditional integrated utility model. Pennsylvania regulated is comprised of PPL Electric Utilities Corporation, a transmission business mostly regulated by Federal Energy Regulatory Commission (FERC), and a distribution operation regulated by the Pennsylvania Public Utility Commission. PPL, though its operating subsidiaries, controls or owns about 8,000 MW of generating capacity in the US and sells electricity and natural gas to about 10.4 million customers in the US and UK.

Rating Methodology and Scorecard Factors

Exhibit 3

Exhibit 4

Rating Factors				
PPL Corporation				
Regulated Electric and Gas Utilities Industry Grid [1][2]	Current LTM 9/30/2016		Moody's 12-18 Month Forward View As of Date Published [3]	
Factor 1 : Regulatory Framework (25%)	Measure	Score	Measure	Score
a) Legislative and Judicial Underpinnings of the Regulatory Framework	Aa	Aa	Aa	Aa
b) Consistency and Predictability of Regulation	Aa	Aa	Aa	Aa
Factor 2 : Ability to Recover Costs and Earn Returns (25%)				
a) Timeliness of Recovery of Operating and Capital Costs	A	A	A	A
b) Sufficiency of Rates and Returns	A	A	A	A
Factor 3 : Diversification (10%)				
a) Market Position	A	A	A	A
b) Generation and Fuel Diversity	Baa	Baa	Baa	Baa
Factor 4 : Financial Strength (40%)				
a) CFO pre-WC + Interest / Interest (3 Year Avg)	4.6x	A	3.5x - 4x	Baa
b) CFO pre-WC / Debt (3 Year Avg)	15.3%	Baa	12% - 15%	Baa
c) CFO pre-WC – Dividends / Debt (3 Year Avg)	10.7%	Baa	8% - 11%	Baa
d) Debt / Capitalization (3 Year Avg)	58.6%	Ba	56% - 60%	Ba
Rating:				
Grid-Indicated Rating Before Notching Adjustment		A3		A3
HoldCo Structural Subordination Notching	2	2	2	2
a) Indicated Rating from Grid		Baa2		Baa2
b) Actual Rating Assigned		Baa2		Baa2

[1]All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
[2]As of 9/30/2016(L); Source: Moody's Financial Metrics™
[3]This represents Moody's forward view; not the view of the issuer; and unless noted in the text, does not incorporate significant acquisitions and divestitures.
Source: Moody's Investors Service

Ratings

Exhibit 5

Category	Moody's Rating
PPL CORPORATION	
Outlook	Stable
Issuer Rating	Baa2

WESTERN POWER DISTRIB (WEST MIDLANDS) PLC	
Outlook	Stable
Issuer Rating	Baa1
Senior Unsecured -Dom Curr	Baa1
WESTERN POWER DISTRIB (EAST MIDLANDS) PLC	
Outlook	Stable
Issuer Rating	Baa1
Senior Unsecured -Dom Curr	Baa1
PPL CAPITAL FUNDING, INC.	
Outlook	Stable
Bkd Senior Unsecured	Baa2
Bkd Jr Subordinate	Baa3
Bkd Commercial Paper	P-2
WESTERN POWER DISTRIBUTION (SOUTH WEST) PLC	
Outlook	Stable
Issuer Rating	Baa1
Senior Unsecured -Dom Curr	Baa1
WESTERN POWER DISTRIBUTION (SOUTH WALES) PLC	
Outlook	Stable
Senior Unsecured -Dom Curr	Baa1
PPL ELECTRIC UTILITIES CORPORATION	
Outlook	Stable
Issuer Rating	A3
First Mortgage Bonds	A1
Senior Secured	A1
Sr Unsec Bank Credit Facility	A3
Commercial Paper	P-2
KENTUCKY UTILITIES CO.	
Outlook	Stable
Issuer Rating	A3
First Mortgage Bonds	A1
Sr Unsec Bank Credit Facility	A3
Commercial Paper	P-2
LOUISVILLE GAS & ELECTRIC COMPANY	
Outlook	Stable
Issuer Rating	A3
First Mortgage Bonds	A1
Sr Unsec Bank Credit Facility	A3
Commercial Paper	P-2
LG&E AND KU ENERGY LLC	
Outlook	Stable
Issuer Rating	Baa1
Senior Unsecured	Baa1
PPL WEM HOLDINGS LTD	
Outlook	Stable
Bkd Senior Unsecured	Baa3

Source: Moody's Investors Service

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REPORT NUMBER 1051696

MOODY'S
INVESTORS SERVICE

INFRASTRUCTURE AND PROJECT FINANCE

CREDIT OPINION
25 October 2018

Update

Rate this Research

RATINGS

Kentucky Utilities Co.

Domicile	Lexington, Kentucky, United States
Long Term Rating	A3
Type	LT Issuer Rating
Outlook	Stable

Please see the ratings section at the end of this report for more information. The ratings and outlook shown reflect information as of the publication date.

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Kentucky Utilities Co.

Update to credit analysis

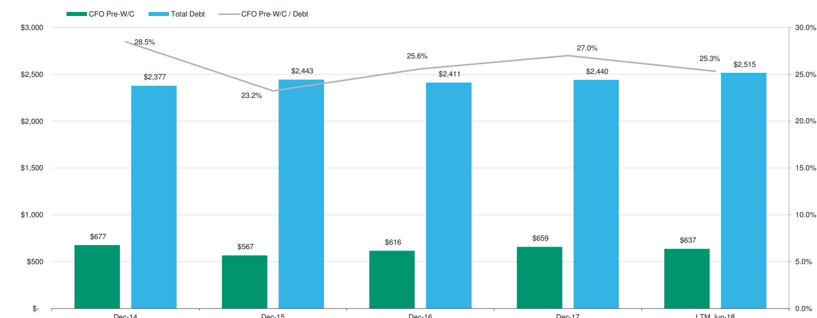
Summary

Kentucky Utilities' (KU) credit strengths include its constructive regulatory environments in Kentucky and Virginia where it has utility operations. KU has stable utility operations that produce relatively consistent credit metrics historically. KU represents approximately 22% of the cash flow to its ultimate parent company, PPL Corporation (PPL). These positive factors are somewhat offset by KU's large capital investment program, which may slightly pressure certain credit metrics, and to a lesser extent, a lack of fuel and geographic diversity.

The Kentucky and Virginia regulatory environments are supportive due to their transparent recovery framework. KU has been approved various tracker mechanisms by the regulatory commissions, providing a timely cost recovery. KU has been active in its general rate case filings. In September 2018, KU filed for an electric rate case requesting a $112 million rate increase by the Kentucky Public Service Commission (KPSC). A final decision is expected by April 2019. Its last rate case in Kentucky concluded in June 2017.

We expect KU's ratio of cash flow from operations before changes in working capital (CFO pre-WC) to debt to range from 20% to 24%, which is weaker than its historical level.

Exhibit 1
Historical CFO pre-WC, Total Debt and CFO pre-WC to Debt ***($MM)***



Source: Moody's Financial Metrics

Credit strengths

» Supportive regulatory environment in Kentucky and Virginia

» Stable financial profile with transparent and predictable cash flows

Credit challenges

» Large capital investment program

» High coal concentration in its generation fuel mix

» Elevated carbon transition risk

Rating outlook

The stable outlook reflects our expectation that the regulatory environments in Kentucky and Virginia will remain credit supportive for regulated utilities. The stable outlook also incorporates our view that KU will continue to generate stable cash flow and adequate financial metrics while it executes a large capital investment program, including a ratio of CFO pre-WC to debt in the 20%-24% range.

Factors that could lead to an upgrade

KU's rating could be upgraded if its financial metrics improve, including CFO pre-WC to debt at or above 26% on a sustained basis. An upgrade is also possible if KU's regulatory environment materially improves and provides more favorable regulatory recovery mechanisms. However, it is unlikely that KU's rating will be upgraded while the company executes on its large capital investment program and faces a slight negative impact in cash flows due to tax reform.

Factors that could lead to a downgrade

KU's ratings could be downgraded if there is a significant deterioration in the credit supportiveness of the regulatory environments. Additionally, KU's rating could be downgraded if its financial metrics deteriorate, such that CFO pre-WC to debt declines below 20% for an extended period of time.

Key indicators

Exhibit 2

Kentucky Utilities Co. [1]

	Dec-14	Dec-15	Dec-16	Dec-17	LTM Jun-18
CFO Pre-W/C + Interest / Interest	9.6x	7.8x	7.3x	7.8x	7.4x
CFO Pre-W/C / Debt	28.5%	23.2%	25.6%	27.0%	25.3%
CFO Pre-W/C – Dividends / Debt	22.2%	17.0%	15.3%	17.7%	15.3%
Debt / Capitalization	36.9%	36.2%	35.0%	37.7%	38.0%

[1] All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
Source: Moody's Financial Metrics

Profile

Kentucky Utilities (KU) is a wholly owned regulated public utility subsidiary of LG&E and KU Energy LLC (LKE, Baa1 Stable) that is engaged in the generation, transmission and distribution of electricity. KU provides electric service to approximately 525,000 customers in 77 counties of Kentucky and 28,000 customers in five counties of Virginia. KU is regulated by the Kentucky Public Service Commission and Virginia State Corporate Commission.

KU and its affiliate, Louisville Gas and Electric Company (LG&E, A3 Stable), are the two main operating entities of LKE. LKE is wholly owned by PPL Corporation (PPL, Baa2 Stable), a diversified utility holding company headquartered in Allentown, PA.

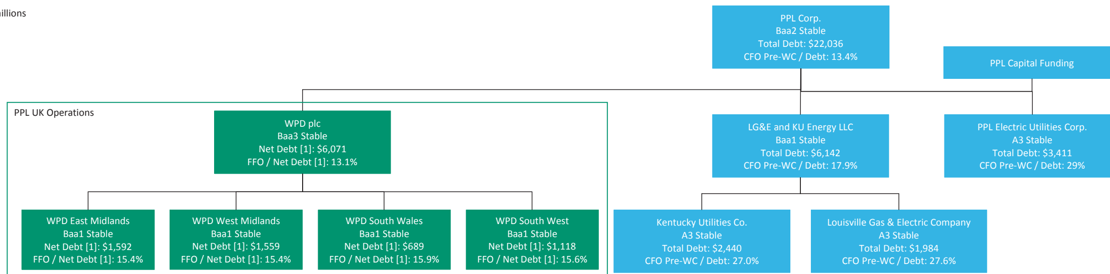
This publication does not announce a credit rating action. For any credit ratings referenced in this publication, please see the ratings tab on the issuer/entity page on www.moodys.com for the most updated credit rating action information and rating history.

Exhibit 3

Organizational Structure

As of 12/31/2017

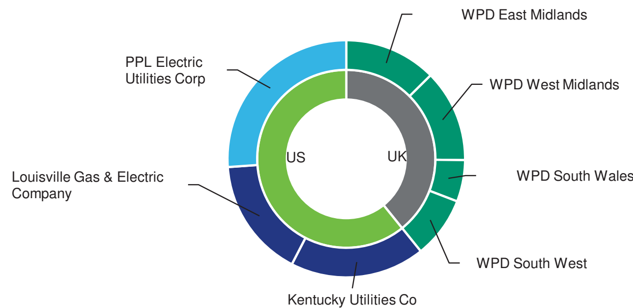
$ in millions



[1] As of 3/31/2018; CFO Pre-WC to Debt is not a key metric we use for WPD and subsidiaries. WPD and subsidiaries are assessed under the Regulated Electric and Gas Networks Industry Grid
[2] Metrics are based on 'adjusted' financial data and incorporate Moody's Global Standard Adjustments for non-financial corporations.
Source: Moody's Financial Metrics

Exhibit 4

PPL's rate base breakdown between the US and UK jurisdictions



Source: Company Reports

Detailed credit considerations

Supportive regulatory environment in Kentucky and Virginia

KU is a regulated electric and gas utility that has operations in Kentucky and Virginia and is regulated by the Kentucky Public Service Commission (KPSC) and the Virginia State Corporation Commission (SCC), respectively. We consider the regulatory environments in these states to be constructive for long-term credit quality. In Kentucky, the KPSC has approved various tracker mechanisms, allowing timely cost recovery for certain utility investments outside of a rate case, a credit positive. KU's tracker mechanisms include a Fuel Adjustment Clause (FAC), an Environmental Cost Recovery Surcharge (ECR) and a Demand-Side Management (DSM) Cost Recovery Mechanism. KU does not have a decoupling mechanism in place, which subjects KU's revenue to some volatility. However, an impact on its revenue due to non-weather related demand fluctuations is minimized because of the DSM mechanism.

KU's last general rate rase in Kentucky concluded in June 2017 when a settlement was reached and approved. KU was authorized a $52 million of revenue increase based on the approved settlement compared to its initial $103 million increase request. The revenue increase was based on a 9.7% return on equity (ROE) but the settlement did not specify the allowed equity capitalization. In its order, the KPSC also excluded the recovery of certain costs for funding employee retirement plans.

In March 2018, the KPSC required KU's rates to be reduced by $108 million over the period between April 2018 and April 2019 to account for the impact of the TCJA. In September 2018, the KPSC adopted a revised tax-related rate reduction of $101 million for KU.

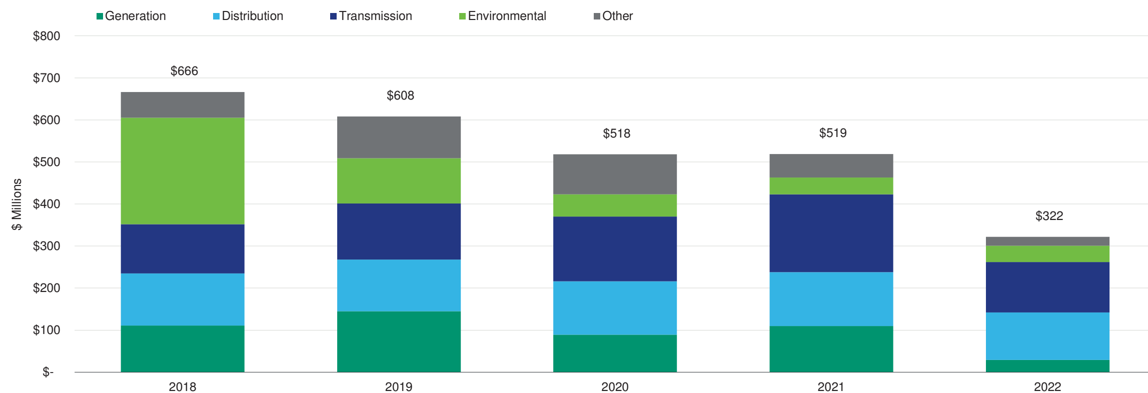
Also in September 2018, KU filed for its latest rate case with the KPSC, requesting a $112 million electric rate increase based on a 10.42% ROE and equity layer of 52.84% with a capitalization for ratemaking value estimated around $4.1 billion using a test year ending April 2020. The final decision is expected to be in April 2019.

The last rate case in Virginia was filed in September 2017 and the new rates became effective in June 2018. A settlement was approved by the SCC and KU was authorized a $1.8 million rate increase. KU had requested a $6.7 million rate increased based on a 10.42% ROE and a 53.85% equity layer. The SCC staff had recommended a $1.3 million rate increase based on a 9.2% ROE. Although the specifics of the settlement were not disclosed, the involved parties agreed that a ROE range of 9%-10% was reasonable. The primary reason for the filing was to recover costs related to environmental compliance. However, based on the settlement agreement reached, including the impact of the TCJA on rates, resulted with an outcome of a $1.8 million rate increase.

Large capital investment plan over the next five years

Over the next five years, KU plans to spend approximately $2.6 billion in capital expenditures, which is sizable considering the latest estimated value of its $4 billion capitalization for ratemaking KU expects to invest. Approximately $709 million will be spent on transmission facilities, $615 million on distribution facilities, $493 million on environmental, $484 million on generating facilities, and $332 million on other expenses. The total projected capital investment represents about 40% of KU's net book value of property, plant and equipment, which was about $6.7 billion at the end of year end 2017.

Exhibit 5
Projected Capital Investment Plan



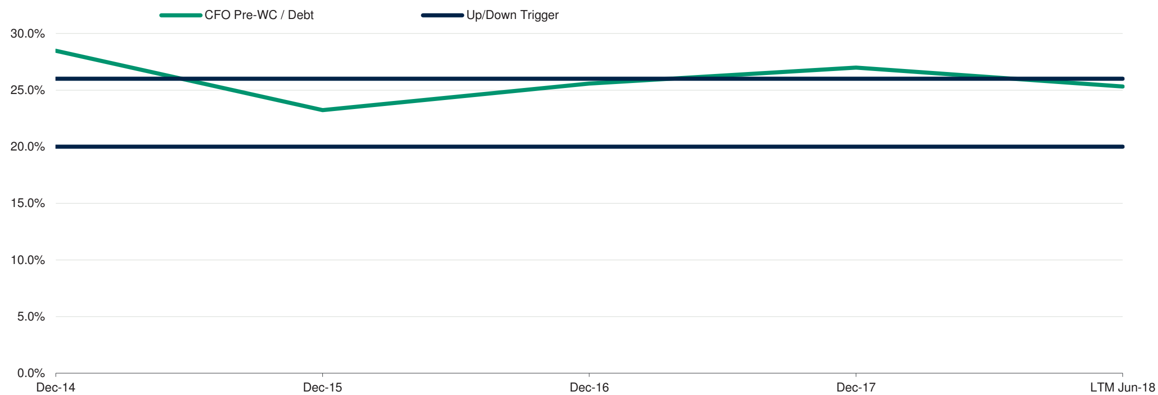
Source: Company Reports

We expect the regulatory lag related to KU's large capital investment to be somewhat moderated by Kentucky's supportive regulatory environment, especially regarding the environmental expenditures through the ECR. The KPSC is also authorized to grant return on construction work in progress (CWIP) in rate case proceedings, a credit positive. Moreover, the ECR minimizes regulatory lag for investments associated with the coal combustion waste. The terms of the ECR allow KU to receive a return on and of investments two months after the capital is deployed. We view this to be credit supportive compared to the traditional rate-making process where there would be longer regulatory lag due to the length of the construction period and subsequent rate case proceedings.

Stable financial profile, but weakening credit metrics

KU has historically maintained a strong financial profile with its ratio of CFO pre-WC to debt in the mid-20% range. However, we expect metrics to slightly weaken to the low-20% range over the next 12-18 months. Metrics at these levels still position the company in-line with its credit profile. As of the last twelve months (LTM) period ending 30 June 2018, CFO pre-WC to debt was 25.3% and 25.1% on average for the past three years. The decline in metrics is caused by elevated capital investments as well as the negative impact of tax reform. However, prudent cost recovery mechanisms that are in place should result in timely recovery of investments and should help KU maintain its key credit metrics within the adequate ranges. Also, a capital contribution received from PPL of approximately $45 million as of LTM 30 June 2018 has slightly helped mitigate the pressure on its cash flow.

Exhibit 6
KU's Historical CFO pre-WC to Debt vs Rating Triggers

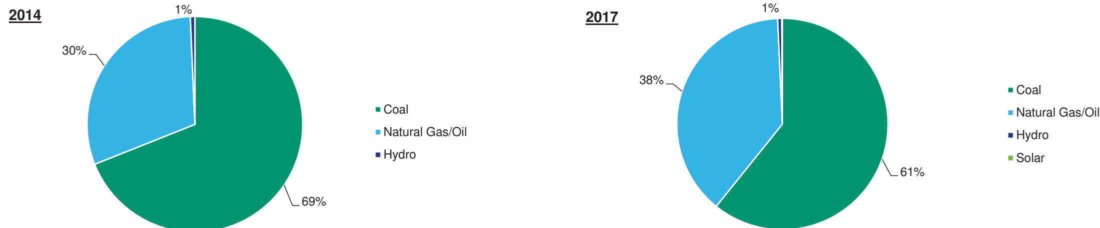


Source: Moody's Financial Metrics

Elevated carbon transition risk within the regulated utility sector

KU has elevated carbon transition risk within the US regulated utility sector because it is a vertically integrated utility that has a large, fossil based, installed generation capacity. Kentucky's political and regulatory environment is supportive of coal mining and related industries. KU has a total generation capacity of 5.1 GW, and 3.1 GW (61%) is coal-fired, which provides the majority (82%) of the electricity generation output. The remaining 18% of the generating capacity is comprised mainly of gas/oil-fired, hydro, and solar facilities. KU's generation fuel mix became more diversified when a new gas-fired power plant replaced its older coal-fired power plants. When Cane Run 7, a 660 MW power plant, became operational in June 2015. It replaced three older coal-fired plants which had a combined generating capacity of 797 MW.

Exhibit 7
KU Generation Mix (MW)



Source: Company reports

Fuel concentration in coal is typically considered to be a significant credit negative. However, we do not view KU's high reliance on coal to be as negative as some other companies because the state of Kentucky is very supportive of the coal industry. This support is evidenced by the ECR, which provides the company with credit supportive terms for its investments in coal-related environmental expenditures. However, KU is exposed to the risk of potentially needing to make a more rapid transition to clean energy in the future if carbon policies change.

Liquidity analysis

We expect KU to maintain an adequate but weakened liquidity profile over the next 12-18 months. KU has a P-2 short-term commercial program rating.

KU's liquidity is supported by a $400 million syndicated credit facility that expires in January 2023 and a $198 million letter of credit facility expiring in October 2020. As of 30 June 2018, the credit facility had $267 million of available capacity. KU's credit facility

contains one financial covenant, a limitation on the ratio of debt to capitalization of 70%, which the company was in compliance with at the end of the second quarter of 2018. The facility does not contain a material adverse change clause.

Over the LTM period ending 30 June 2018, KU generated cash flow from operations of approximately $661 million, spent about $531 million in capital investments and paid $252 million in dividends, resulting in a negative free cash flow of approximately $122 million. The shortfall was partially financed with equity contributions from the parent. Due to the high level of planned capital investments, we expect KU to remain in a negative free cash flow position over the next 12-18 months.

KU's next long-term debt maturity is $500 million of senior secured notes maturing in November 2020.

LG&E and KU Energy (LKE), the intermediate parent company of KU, manages the liquidity of its utility operations through its two subsidiaries on a consolidated basis, although each utility has a separate credit facility. Also, the $75 million syndicated credit facility at LKE expires on 30 October 2018 and LG&E has a separate $500 million syndicated credit facility maturing in January 2023. As of 30 June 2018, LG&E had $317 million available. Also, LG&E's $200 million term loan due October 2019 became current. LG&E's facility contains a financial covenant requiring that the companies' debt to total capitalization not exceed 70%. All entities were in compliance as of 30 June 2018.

Rating methodology and scorecard factors

Exhibit 8

Rating Factors				
Kentucky Utilities Co. -Private				
Regulated Electric and Gas Utilities Industry Grid [1][2]	Current LTM 6/30/2018		Moody's 12-18 Month Forward View As of Date Published [3]	
Factor 1 : Regulatory Framework (25%)	**Measure**	**Score**	**Measure**	**Score**
a) Legislative and Judicial Underpinnings of the Regulatory Framework	A	A	A	A
b) Consistency and Predictability of Regulation	A	A	A	A
Factor 2 : Ability to Recover Costs and Earn Returns (25%)				
a) Timeliness of Recovery of Operating and Capital Costs	Baa	Baa	Baa	Baa
b) Sufficiency of Rates and Returns	A	A	A	A
Factor 3 : Diversification (10%)				
a) Market Position	Baa	Baa	Baa	Baa
b) Generation and Fuel Diversity	Baa	Baa	Baa	Baa
Factor 4 : Financial Strength (40%)				
a) CFO pre-WC + Interest / Interest (3 Year Avg)	7.3x	Aa	6x - 7x	Aa
b) CFO pre-WC / Debt (3 Year Avg)	25.1%	A	20% - 24%	Baa
c) CFO pre-WC – Dividends / Debt (3 Year Avg)	15.8%	Baa	10% - 15%	Baa
d) Debt / Capitalization (3 Year Avg)	35.9%	A	36% - 39%	A
Rating:				
Grid-Indicated Rating Before Notching Adjustment		A3		A3
HoldCo Structural Subordination Notching		0	0	0
a) Indicated Rating from Grid		A3		A3
b) Actual Rating Assigned		A3		A3

[1] All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
[2] As of 06/30/2018(L)
[3] This represents Moody's forward view; not the view of the issuer; and unless noted in the text, does not incorporate significant acquisitions and divestitures.
Source: Moody's Financial Metrics

Appendix

Exhibit 9
Cash Flow and Credit Metrics [1]

CF Metrics	Dec-14	Dec-15	Dec-16	Dec-17	LTM Jun-18
As Adjusted					
FFO	**679**	**641**	**652**	**689**	**667**
+/- Other	(2)	(74)	(36)	(30)	(30)
CFO Pre-WC	677	567	616	659	637
+/- ΔWC	(102)	50	(1)	(15)	24
CFO	**575**	**617**	**615**	**644**	**661**
- Div	148	153	248	226	252
- Capex	613	528	359	442	531
FCF	**(186)**	**(64)**	**8**	**(24)**	**(122)**
(CFO Pre-W/C) / Debt	28.5%	23.2%	25.6%	27.0%	25.3%
(CFO Pre-W/C - Dividends) / Debt	22.2%	17.0%	15.3%	17.7%	15.3%
FFO / Debt	28.6%	26.3%	27.1%	28.2%	26.5%
RCF / Debt	22.3%	20.0%	16.8%	19.0%	16.5%
Revenue	1,737	1,728	1,749	1,744	1,786
Cost of Goods Sold	1,070	1,013	945	929	960
Interest Expense	78	84	98	97	99
Net Income	220	234	265	259	288
Total Assets	7,741	8,055	8,129	8,298	8,397
Total Liabilities	4,557	4,793	4,830	4,964	4,992
Total Equity	3,184	3,262	3,299	3,334	3,405

[1] All figures and ratios are calculated using Moody's estimates and standard adjustments. Periods are Financial Year-End unless indicated. LTM = Last Twelve Months
Source: Moody's Financial Metrics

Exhibit 10
Peer Comparison Table [1]

	Kentucky Utilities Co. A3 Stable			Kentucky Power Company Baa2 Negative			Black Hills Power, Inc. A3 Stable			Empire District Electric Company (The) Baa1 Stable		
(in US millions)	FYE Dec-16	FYE Dec-17	LTM Jun-18	FYE Dec-16	FYE Dec-17	LTM Jun-18	FYE Dec-16	FYE Dec-17	LTM Jun-18	FYE Dec-16	FYE Dec-17	LTM Jun-18
Revenue	1,749	1,744	1,786	655	643	659	268	288	293	613	627	682
CFO Pre-W/C	616	659	637	110	150	136	87	87	96	210	202	258
Total Debt	2,411	2,440	2,515	936	934	940	354	351	351	927	893	894
CFO Pre-W/C / Debt	25.6%	27.0%	25.3%	11.7%	16.1%	14.5%	24.5%	24.7%	27.5%	22.7%	22.7%	28.8%
CFO Pre-W/C – Dividends / Debt	15.3%	17.7%	15.3%	7.0%	12.3%	12.6%	9.6%	12.7%	12.7%	17.8%	18.6%	21.9%
Debt / Capitalization	35.0%	37.7%	38.0%	41.3%	46.8%	45.8%	37.4%	41.2%	41.4%	42.6%	44.9%	44.7%

[1] All figures & ratios calculated using Moody's estimates & standard adjustments. FYE = Financial Year-End. LTM = Last Twelve Months. RUR* = Ratings under Review, where UPG = for upgrade and DNG = for downgrade
Source: Moody's Financial Metrics

Ratings

Exhibit 11

Category	Moody's Rating
KENTUCKY UTILITIES CO.	
Outlook	Stable
Issuer Rating	A3
First Mortgage Bonds	A1
Senior Secured	A1
Sr Unsec Bank Credit Facility	A3
Bkd LT IRB/PC	A1
Commercial Paper	P-2
Bkd Other Short Term	P-2
ULT PARENT: PPL CORPORATION	
Outlook	Stable
Issuer Rating	Baa2
PARENT: LG&E AND KU ENERGY LLC	
Outlook	Stable
Issuer Rating	Baa1
Senior Unsecured	Baa1

Source: Moody's Investors Service

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CREDIT OPINION
27 October 2017

Update

Rate this Research

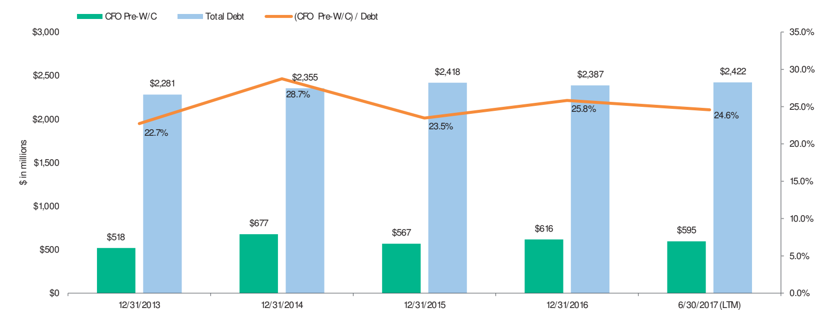
Kentucky Utilities Co.

Update to credit analysis

Summary

Kentucky Utilities' (KU, A3 stable) credit strengths includes its stable financial performance and the credit supportive regulatory environments in Kentucky and Virginia where it operates. However, these are slightly offset, in part, by a large multiple year capital expenditure program and, to a lesser extent, a lack of fuel and geographic diversity.

Exhibit 1
Historical CFO Pre-WC, Total Debt and CFO Pre-WC to Debt



Source: Moody's Financial Metrics

Credit Strengths

» Supportive regulatory environment in Kentucky and Virginia

» Strong and stable financial metrics

Credit Challenges

» Large capital expenditure program over the next five years

» High coal concentration in its generation fuel mix

Rating Outlook

KU's stable outlook reflects its supportive regulatory environments and consistent financial performance. Also, it incorporates the expectation that KU's credit metrics will be maintained around low 20%.

RATINGS

Kentucky Utilities Co.

Domicile	Lexington, Kentucky, United States
Long Term Rating	A3
Type	LT Issuer Rating
Outlook	Stable

Please see the ratings section at the end of this report for more information. The ratings and outlook shown reflect information as of the publication date.

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Factors that Could Lead to an Upgrade

It is unlikely that KU's rating will be upgraded while the company executes on its large capital investment program. However, ratings could be upgraded if the company receives more favorable regulatory recovery mechanisms for non-environmental related capital expenditures or maintains its cash flow from operations before changes in working capital (CFO Pre-WC) to debt ratio at 26% or above on a sustained basis.

Factors that Could Lead to a Downgrade

KU's ratings could be downgraded should the company experience materially unfavorable regulatory developments or unanticipated changes are made to the regulatory compact that currently provides for timely recovery of costs. A downgrade could also be considered if CFO pre-WC to debt declines below 20% for an extended period of time.

Key Indicators

Exhibit 2

KEY INDICATORS [1]
Kentucky Utilities Co. -Private

	12/31/2013	12/31/2014	12/31/2015	12/31/2016	6/30/2017(L)
CFO pre-WC + Interest / Interest	8.2x	9.6x	7.8x	7.3x	7.0x
CFO pre-WC / Debt	22.7%	28.7%	23.5%	25.8%	24.6%
CFO pre-WC – Dividends / Debt	17.3%	22.5%	17.1%	15.4%	14.5%
Debt / Capitalization	38.1%	36.6%	35.8%	34.7%	34.6%

[1]All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations. Source: Moody's Financial Metrics™
Source: Moody's Financial Metrics

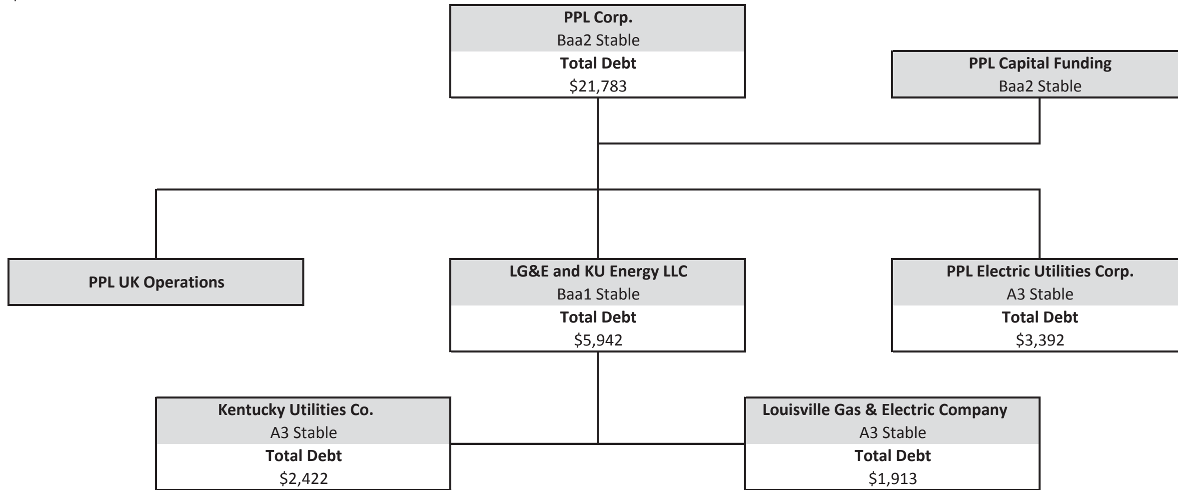
Profile

Kentucky Utilities (KU, A3 stable) is a regulated public utility engaged in the generation, transmission and distribution of electricity. KU provides electric service to approximately 521,000 customers in Kentucky and 28,000 customers in Virginia. Its service territory covers approximately 4,800 square miles.

KU is a wholly-owned subsidiary of LG&E and KU Energy LLC (LKE, Baa1 stable). KU and its affiliate, Louisville Gas and Electric Company (LG&E, A3 stable), are the two main operating entities of LKE. LKE, in turn, is wholly owned by PPL Corporation (PPL, Baa2 stable), a utility holding company headquartered in Allentown, PA.

This publication does not announce a credit rating action. For any credit ratings referenced in this publication, please see the ratings tab on the issuer/entity page on www.moodys.com for the most updated credit rating action information and rating history.

Exhibit 3
Organization Structure
As of 30 June 2017
$ in millions



Total debt is based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
Source: Moody's Financial Metrics, company

Detailed Credit Considerations

- Supportive regulatory environments provide for timely investment cost recovery

We consider the Kentucky Public Service Commission (KPSC) to be supportive of long term credit quality. For example, the KPSC has approved various tracker mechanisms, allowing timely cost recovery for utility investments outside of a rate case. KU's tracker mechanisms include a Fuel Adjustment Clause (FAC), an Environmental Cost Recovery Surcharge (ECR) and a Demand-Side Management (DSM) Cost Recovery Mechanism. KU does not have a decoupling mechanism in place, which subjects KU's net revenue to weather volatilities. The lack of a decoupling mechanism is less of an issue for non-weather related demand fluctuations because KU has the DSM mechanism.

The last general rate case in Kentucky concluded in June 2017 when a settlement was reached and approved. In the settlement, KU was authorized a $51.6 million electric revenue increase. The settlement provided for a 9.7% return on equity (ROE) but did not specify the allowed equity capitalization. In its order, the KSPC excluded the recovery of certain costs for funding employee retirement plans. Prior to the settlement sent before the commission, KU agreed to withdraw its request to recover costs related to its Advanced Meter System Project reducing its revenue requirement by about $6.3 million. The withdrawal of its request to recover those costs does not preclude KU from asking the commission to consider cost recovery in the future.

In January 2016, KU and affiliate utility Louisville Gas & Electric Company (LG&E, A3 stable) submitted applications to the KPSC, requesting ECR rate treatment for projects related to the EPA's regulations addressing the handling of coal and combustion by products and MATS (mercury and air toxics standards). In August 2016, the KPSC approved the settlement and authorized a 9.8% ROE for the projects. However, on 23 June 2017, the KPSC lowered the authorized ROE to 9.7% for all of LG&E's and KU's existing approved ECR plans and projects. Effective August 2017 the lower ROE replaces the previously authorized ROE for approved ECR projects.

In September 2017, KU filed a rate case with the Virginia State Corporation Commission (SCC). In its rate case filing KU is requesting an approximate $6.7 million increase in base rates based on a 10.42% ROE and a 53.85% equity layer. The primary reason for the filing is to recover costs related to environmental compliance. A final decision is expected by June 2018 with new rates effective in July 2018.

- Large capital expenditure planned over the next five years

KU's total capital expenditures over the next five years are estimated to be $2.7 billion, with $789 million related to environmental investments. Between 2012 and 2016, KU's total capital expenditure was approximately $2.8 billion. The total projected capital expenditure represents about 41% of KU's net book value of property, plant and equipment, which was about $6.6 billion at the end of the second quarter of 2017.

We expect the regulatory lag related to KU's large capital expenditures to be meaningfully moderated by Kentucky's supportive regulatory environment, especially regarding the environmental expenditures through the ECR. The KPSC is also authorized to grant return on construction work in progress (CWIP) in rate case proceedings, a credit positive. Moreover, the ECR minimizes any regulatory lag for investments associated with complying with the Clean Air Act compliance and coal combustion waste and by-product environmental requirements. The terms of the ECR allow KU to receive a return on and of investments two months after the capital is deployed. We view this to be credit supportive compared to the traditional rate-making process where there would be longer regulatory lag due to the length of the construction period and subsequent rate case proceeding.

- Stable financial profile

KU's financial metrics have been consistently strong. As of 30 June 2017, CFO pre-WC to debt was 24.6% for the last twelve months (LTM) and 25.2% on average for the past three years. Its LTM debt to capitalization ratio was 35% and 35.2% on average over the past three years. We expect KU's financial metrics to remain stable as it continues to benefit from the extension of bonus depreciation through its large capital expenditure program.

- High reliance on coal as fuel for generation

KU's current generation capacity heavily relies on coal. Of its 5.1 GW of generating capacity, 3.1 GW (61%) is coal-fired, which provides the majority (77%) of the electricity generation output. The remaining 39% of the generating capacity is comprised mainly of gas- or oil-fired facilities. KU's generation fuel mix became more diversified when a new gas-fired power plant replaced its older coal-fired

power plants. When Cane Run 7, a new 640 MW power plant, became operational in June 2015, it replaced three older coal-fired plants which had a combined generating capacity of 555 MW.

Fuel concentration, especially in coal, is normally considered to be a significant credit negative. However, we do not view KU's high reliance on coal to be as negative as some other companies because the state of Kentucky is very supportive of the coal industry. This support is evidenced by the ECR, which provides the company with credit supportive terms for its investments in coal-related environmental expenditures. Kentucky is also one of the states that filed lawsuits to overturn the Clean Power Plan (CPP), which the Supreme Court stayed on 9 February 2016. Both KU and LG&E have decided not to incorporate their CPP spending in their current capital plan as the issue continues to be litigated.

Liquidity Analysis

KU's short-term rating is P-2 and we expect the utility to maintain adequate liquidity over the next 12-18 months.

KU has a $400 million syndicated credit facility expiring in January 2022 and a $198 million letter of credit facility expiring in October 2020. As of 30 June 2017, KU had issued $51 million of commercial paper and had $349 million of unused capacity under its syndicated credit facility. Its $198 million of letter of credit facility was fully used. For the LTM ending 30 June 2017, KU had negative free cash flow of $19 million which is likely to remain negative in coming years given its large capital expenditure program. KU's next debt maturity is $500 million of Secured Notes maturing in 2020.

LG&E and KU Energy (LKE, Baa1 stable), the intermediate parent company of KU, manages the liquidity of its utility operations through its two subsidiaries on a consolidated basis, although each utility has a separate credit facility. Also, LKE has a $75 million syndicated credit facility that expires in October 2018 and LG&E has a $500 million syndicated credit facility maturing in January 2022. As of 30 June 2017, LKE had the entire $75 million available and LG&E had $293 million available. Each facility contains a financial covenant requiring that the companies' debt to total capitalization not exceed 70%. All entities were in compliance as of 30 June 2017.

Rating Methodology and Scorecard Factors

Exhibit 4

Rating Factors				
Kentucky Utilities Co. -Private				
Regulated Electric and Gas Utilities Industry Grid [1][2]	Current LTM 6/30/2017		Moody's 12-18 Month Forward View As of Date Published [3]	
Factor 1 : Regulatory Framework (25%)	**Measure**	**Score**	**Measure**	**Score**
a) Legislative and Judicial Underpinnings of the Regulatory Framework	A	A	A	A
b) Consistency and Predictability of Regulation	A	A	A	A
Factor 2 : Ability to Recover Costs and Earn Returns (25%)				
a) Timeliness of Recovery of Operating and Capital Costs	Baa	Baa	Baa	Baa
b) Sufficiency of Rates and Returns	A	A	A	A
Factor 3 : Diversification (10%)				
a) Market Position	Baa	Baa	Baa	Baa
b) Generation and Fuel Diversity	Baa	Baa	Baa	Baa
Factor 4 : Financial Strength (40%)				
a) CFO pre-WC + Interest / Interest (3 Year Avg)	7.8x	Aa	6x - 8x	Aa
b) CFO pre-WC / Debt (3 Year Avg)	25.2%	A	24% - 28%	A
c) CFO pre-WC – Dividends / Debt (3 Year Avg)	17.3%	A	17% - 21%	A
d) Debt / Capitalization (3 Year Avg)	35.2%	A	33% - 37%	A
Rating:				
Grid-Indicated Rating Before Notching Adjustment		A2		A2
HoldCo Structural Subordination Notching			0	0
a) Indicated Rating from Grid		A2		A2
b) Actual Rating Assigned		A3		A3

[1]All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
[2]As of 6/30/2017(L)
[3]This represents Moody's forward view; not the view of the issuer; and unless noted in the text, does not incorporate significant acquisitions and divestitures.
Source: Moody's Financial Metrics

Ratings

Exhibit 5

Category	Moody's Rating
KENTUCKY UTILITIES CO.	
Outlook	Stable
Issuer Rating	A3
Bkd LT IRB/PC	A1
Senior Secured	A1
Sr Unsec Bank Credit Facility	A3
Commercial Paper	P-2
Bkd Other Short Term	P-2
ULT PARENT: PPL CORPORATION	
Outlook	Stable
Issuer Rating	Baa2
PARENT: LG&E AND KU ENERGY LLC	
Outlook	Stable
Issuer Rating	Baa1
Senior Unsecured	Baa1

Source: Moody's Investors Service

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REPORT NUMBER 1096368

MOODY'S
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MOODY'S INVESTORS SERVICE

CREDIT OPINION
25 October 2018

Update

Rate this Research

RATINGS

Louisville Gas & Electric Company

Domicile	Louisville, Kentucky, United States
Long Term Rating	A3
Type	LT Issuer Rating
Outlook	Stable

Please see the ratings section at the end of this report for more information. The ratings and outlook shown reflect information as of the publication date.

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Louisville Gas & Electric Company

Update to credit analysis

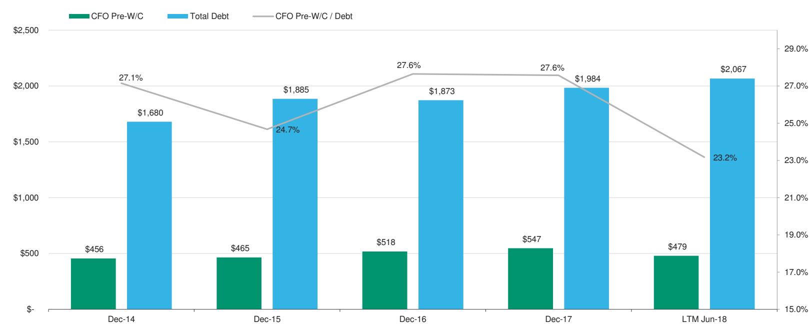
Summary

Louisville Gas & Electric Company's (LG&E) credit strengths include the credit supportive regulatory environment in Kentucky and a stable financial profile that produces relatively consistent credit metrics. LG&E represents approximately 17% of the cash flow to its ultimate parent company, PPL Corporation (PPL). LG&E's cash flow was negatively impacted by the US Tax Cuts and Jobs Act, but the credit metrics remain adequate for its credit profile. We expect LG&E's large capital investment program to slightly pressure certain credit metrics. Some of the other credit negative drivers include a lack of fuel and geographic diversity.

The Kentucky regulatory environment is supportive due to its transparent recovery framework. LG&E has various tracker mechanisms approved by the commission and they provide a timely recovery of the company's investment costs. In September 2018, LG&E filed for a rate case requesting an electric and gas rate increase of $35 million and $25 million, respectively. A final decision is expected by April 2019.

We expect LG&E's ratio of cash flow from operations before changes in working capital (CFO pre-WC) to debt to range from 20% to 24%, which is weaker than its historical level.

Exhibit 1
Historical CFO pre-WC, Total Debt and CFO pre-WC to Debt
($MM)



Source: Moody's Financial Metrics

Credit strengths

» Supportive regulatory environment in Kentucky

» Adequate financial profile with transparent and predictable cash flows

Credit challenges

» Large capital investment program

» High coal concentration in its generation fuel mix

» Elevated carbon transition risk

Rating outlook

The stable outlook reflects our expectation that Kentucky regulatory environment will remain credit supportive for regulated utilities and will provide a long-term transition with respect to the use of coal in its fuel mix. The stable outlook also incorporates our view that LG&E will continue to generate stable cash flow and adequate financial metrics while it executes a large capital investment program, including a ratio of CFO pre-WC to debt in the 20%-24% range.

Factors that could lead to an upgrade

LG&E's rating could be upgraded if its financial metrics improve, including CFO pre-WC to debt at or above 26% or a sustained basis. An upgrade is also possible if LG&E's regulatory environment materially improves and provides more favorable regulatory recovery mechanisms. However, it is unlikely that LG&E's rating will be upgraded while the company executes on its large capital investment program and faces a slight negative impact in cash flows due to tax reform.

Factors that could lead to a downgrade

LG&E's ratings could be downgraded if there is a significant deterioration in the credit supportiveness of the regulatory environments. Additionally, LG&E's rating could be downgraded if its financial metrics deteriorate, such that CFO pre-WC to debt declines below 20% for an extended period of time.

Key indicators

Exhibit 2

Louisville Gas & Electric Company [1]

	Dec-14	Dec-15	Dec-16	Dec-17	LTM Jun-18
CFO Pre-W/C + Interest / Interest	10.1x	8.8x	8.0x	8.5x	7.5x
CFO Pre-W/C / Debt	27.1%	24.7%	27.6%	27.6%	23.2%
CFO Pre-W/C – Dividends / Debt	20.5%	18.4%	20.8%	17.9%	15.9%
Debt / Capitalization	37.0%	37.5%	35.3%	39.1%	39.4%

[1] All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
Source: Moody's Financial Metrics

This publication does not announce a credit rating action. For any credit ratings referenced in this publication, please see the ratings tab on the issuer/entity page on www.moodys.com for the most updated credit rating action information and rating history.

Profile

Louisville Gas and Electric Company (LG&E) is a wholly owned regulated public utility subsidiary of LG&E and KU Energy LLC (LKE, Baa1 Stable) that is engaged in the generation, transmission and distribution of electricity and the storage, distribution and sale of natural gas in Kentucky. LG&E provides electric service to approximately 411,000 customers in Louisville and delivers natural gas service to approximately 326,000 customers in its electric service area and eight additional counties in Kentucky. LG&E is regulated by the Kentucky Public Service Commission.

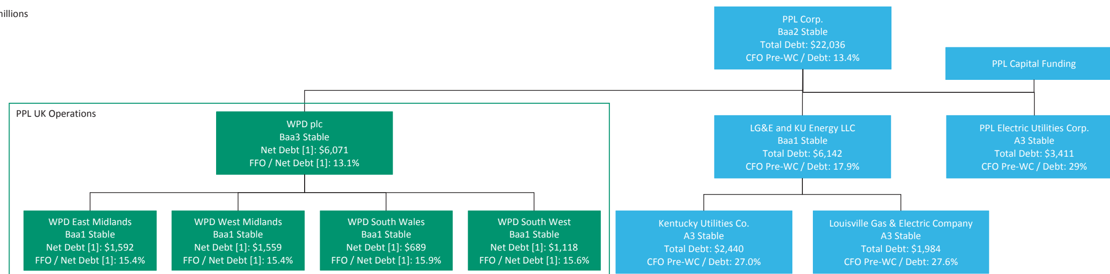
LG&E and its affiliate, Kentucky Utilities Company (KU, A3 Stable), are the two main operating entities of LKE. LKE is wholly owned by PPL Corporation (PPL, Baa2 Stable), a diversified utility holding company headquartered in Allentown, PA.

Exhibit 3

Organizational Structure

As of 12/31/2017

$ in millions



[1] As of 3/31/2018; CFO Pre-WC to Debt is not a key metric we use for WPD and subsidiaries. WPD and subsidiaries are assessed under the Regulated Electric and Gas Networks Industry Grid

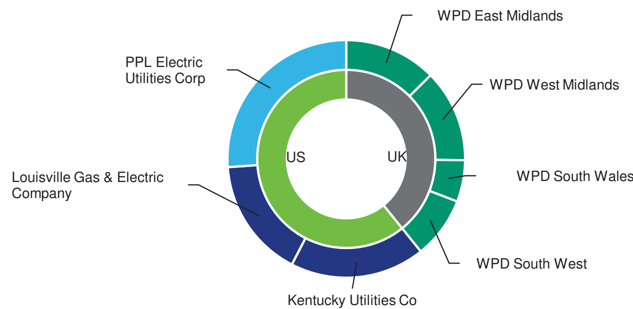
[2] Metrics are based on 'adjusted' financial data and incorporate Moody's Global Standard Adjustments for non-financial corporations.

Source: Moody's Financial Metrics, Company

Exhibit 4

PPL's rate base breakdown between the US and UK jurisdictions

Regulated network
Regulated utility without generation
Regulated utility with generation



Source: Company Reports

Detailed credit considerations

Supportive regulatory environment in Kentucky

LG&E is a regulated electricand gas utility in Kentucky regulated by the Kentucky Public Service Commission (KPSC). From a credit perspective, we consider the regulatory framework in Kentucky to be constructive for long-term credit quality. In Kentucky, the KPSC has approved various tracker mechanisms, allowing timely cost recovery for utility investments outside of a rate case, credit positive, since LG&E is going through a large capital expenditure plan. LG&E's tracker mechanisms include a Fuel Adjustment Clause (FAC),

an Environmental Cost Recovery Surcharge (ECR) and a Demand-Side Management (DSM) Cost Recovery Mechanism. Riders for LG&E's gas operations include a Cas Supply Clause (GSC) and Gas Line Tracker (GLT). LG&E does not have a decoupling mechanism in place, which subjects LG&E's revenue to some volatility. However, LG&E's impact on its revenue from non-weather related demand fluctuations is adjusted through the DSM mechanism.

LG&E's last general rate rase concluded in June 2017. LG&E had requested a $94 million electric revenue increase and a $14 million gas revenue increase. LG&E was authorized $57 million and $7 million, respectively, based on a settlement. The settlement provided for a 9.7% return on equity (ROE) but did not specify the allowed equity capitalization. In its order, the KPSC excluded the recovery of certain costs for funding employee retirement plans.

In March 2018, the KPSC required LG&E's electric and gas rates to be reduced by $79 million and $17 million, respectively, over the period of April 2018 through April 2019, to account for the impact of the federal Tax Cuts and Jobs Act (TCJA) of 2017. In September 2018, the KPSC adopted a revised tax-related rate reduction of $74 million and $16 million for LG&E.

In September 2018, LG&E filed for its latest rate case with the KPSC, requesting a $35 million electric rate increase and $25 million gas rate increase based on a 10.42% ROE, equity layer of 52.84%, and a test year ending April 2020. This rate case filing will also reconsider the existing proceeding relating to the rate reduction impact of the TCJA. The final decision is expected to be in April 2019.

High capital investment plan over the next five years

Over the next five years, LG&E plans to spend approximately $2.3 billion in capital expenditures, which is sizable considering the latest estimated value of its $3.4 billion capitalization for rate making LG&E expects to invest. Approximately $1.1 billion on distribution facilities, $408 million on generating facilities, $335 million on environmental, $161 million will be spent on transmission facilities, and $331 million on other expenses. The total projected capital investment represents about 44% of LG&E's net book value of property, plant and equipment, which was about $5.3 billion at the end of year end 2017.

Exhibit 5
Projected Capital Investment Plan

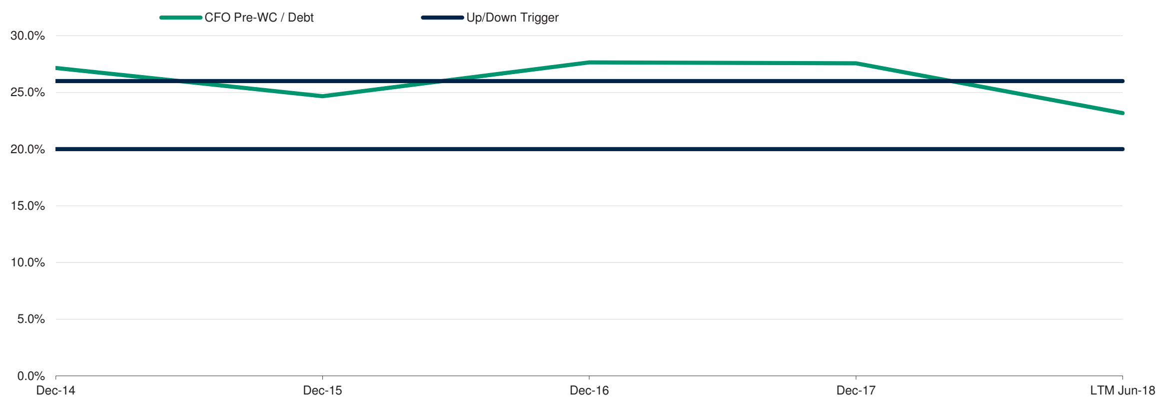
Source: Company Reports

We expect the regulatory lag related to LG&E's large capital investment to be somewhat moderated by Kentucky's supportive regulatory environment, especially regarding the environmental expenditures through the ECR. The KPSC is also authorized to grant return on construction work in progress (CWIP) in rate case proceedings, a credit positive. Moreover, the ECR minimizes regulatory lag for investments associated with coal combustion waste. The terms of the ECR allow LG&E to receive a return on and of investments two months after the capital is deployed. We view this to be credit supportive compared to the traditional rate-making process where there would be longer regulatory lag due to the length of the construction period and subsequent rate case proceedings.

Adequate financial profile, but weaker credit metrics

LG&E has historically maintained a strong financial profile with its ratio of CFO pre-WC to debt staying in the mid to high-20% range. However, we expect metrics to weaken to the low-20% range over the next 12-18 months. Metrics at these levels still position the company in-line with its credit profile. As of the last twelve months (LTM) period ending 30 June 2018, CFO pre-WC to debt was 23.2% and 25.1% on average for the past three years. The decline in metrics is caused by elevated capital investments as well as the negative impact of tax reform. However, existing cost recovery mechanisms should result in timely recovery of investments and should help LG&E maintain its key credit metrics within the adequate ranges. Also, the $73 million capital contribution received from PPL as of LTM 30 June 2018 slightly helped to mitigate the pressure on its metrics.

Exhibit 6
LG&E's Historical CFO pre-WC to Debt vs Rating Triggers

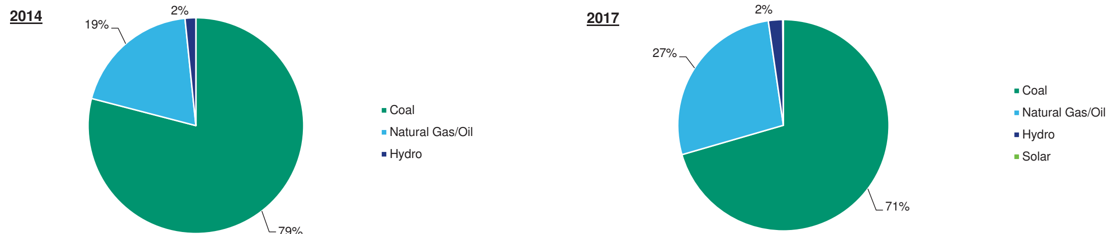


Source: Moody's Financial Metrics

Elevated carbon transition risk within the regulated utility sector

LG&E has elevated carbon transition risk within the US regulated utility sector because it is a vertically integrated utility that has a large, fossil based, installed generation capacity. Kentucky's political and regulatory environment is supportive of coal mining and related industries. LG&E has a total generation capacity of 2.9 GW, and 2.1 GW (71%) is coal-fired, which provides the majority (90%) of LG&E's electricity generation output. The remaining 10% of the generating output is comprised mainly of gas/oil-fired, hydro, and solar facilities. LG&E's generation fuel mix became more diversified when a new gas-fired power plant replaced its older coal-fired power plants. In June 2015, the 660 MW gas plant at Cane Run started its commercial operations, replacing a retired coal-fired plant at Cane Run.

Exhibit 7
LG&E Generation Mix (MW)



Source: Company Reports

Fuel concentration in coal is typically considered to be a significant credit negative. However, we do not view LG&E's high reliance on coal to be as negative as some other companies because the state of Kentucky is very supportive of the coal industry. This support

is evidenced by the ECR, which provides the company with credit supportive terms for its investments in coal-related environmental expenditures. However, LG&E is exposed to the risk of potentially needing to make a more rapid transition to clean energy in the future if carbon policies change.

Liquidity analysis

We expect LG&E to maintain an adequate but weaker liquidity profile over the next 12-18 months. LG&E has a P-2 short-term commercial paper rating.

LG&E's liquidity is supported by a $500 million syndicated credit facility that expires in January 2023 and a $200 million term loan credit facility expiring in October 2019. This $200 million term loan is now current, weaking LG&E's overall liquidity. As of 30 June 2018, the credit facility had $317 million of available capacity. LG&E's credit facility contains one financial covenant, a limitation on the ratio of debt to capitalization of 70%, which the company was in compliance with at the end of the second quarter of 2018. The facility does not contain a material adverse change clause.

Over the LTM period ending 30 June 2018, LG&E generated cash flow from operations of approximately $516 million, spent about $590 million in capital investments and paid $151 million in dividends, resulting in a negative free cash flow of approximately $225 million. The shortfall was partially financed with equity contributions from the parent. Due to the high level of planned capital investments, we expect KU to remain in a negative free cash flow position over the next 12-18 months.

LG&E's next long-term debt maturity is $300 million of secured notes due in 2025.

LG&E and KU Energy (LKE), the intermediate parent company of LG&E, manages the liquidity of its utility operations through its two subsidiaries on a consolidated basis, although each utility has a separate credit facility. Also, LKE has a $75 million syndicated credit facility that expires on 30 October 2018, further weakening overall family's liquidity. KU has a separate $400 million syndicated credit facility maturing in January 2023. As of 30 June 2018, KU had $267 million available. The facility contains a financial covenant requiring that the companies' debt to total capitalization not exceed 70%. All entities were in compliance as of 30 June 2018.

Rating methodology and scorecard factors

Exhibit 8
Rating Factors
Louisville Gas & Electric Company

Rating Factors				
Louisville Gas & Electric Company -Private				
Regulated Electric and Gas Utilities Industry Grid [1][2]	Current LTM 6/30/2018		Moody's 12-18 Month Forward View As of Date Published [3]	
Factor 1 : Regulatory Framework (25%)	**Measure**	**Score**	**Measure**	**Score**
a) Legislative and Judicial Underpinnings of the Regulatory Framework	A	A	A	A
b) Consistency and Predictability of Regulation	A	A	A	A
Factor 2 : Ability to Recover Costs and Earn Returns (25%)				
a) Timeliness of Recovery of Operating and Capital Costs	Baa	Baa	Baa	Baa
b) Sufficiency of Rates and Returns	A	A	A	A
Factor 3 : Diversification (10%)				
a) Market Position	Baa	Baa	Baa	Baa
b) Generation and Fuel Diversity	Baa	Baa	Baa	Baa
Factor 4 : Financial Strength (40%)				
a) CFO pre-WC + Interest / Interest (3 Year Avg)	7.7x	Aa	5.5x - 6.5x	Aa
b) CFO pre-WC / Debt (3 Year Avg)	25.1%	A	20% - 24%	Baa
c) CFO pre-WC – Dividends / Debt (3 Year Avg)	17.1%	A	10% - 15%	Baa
d) Debt / Capitalization (3 Year Avg)	37.0%	A	37% - 40%	A
Rating:				
Grid-Indicated Rating Before Notching Adjustment		A2		A3
HoldCo Structural Subordination Notching		0	0	0
a) Indicated Rating from Grid		A2		A3
b) Actual Rating Assigned		A3		A3

[1] All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
[2] As of 6/30/2018(L)
[3] This represents Moody's forward view; not the view of the issuer; and unless noted in the text, does not incorporate significant acquisitions and divestitures.
Source: Moody's Financial Metrics

Appendix

Exhibit 9

Cash Flow and Credit Metrics [1]

CF Metrics	Dec-14	Dec-15	Dec-16	Dec-17	LTM Jun-18
As Adjusted					
FFO	**473**	**526**	**589**	**557**	**551**
+/- Other	(17)	(61)	(71)	(10)	(72)
CFO Pre-WC	**456**	**465**	**518**	**547**	**479**
+/- ΔWC	(79)	111	11	(22)	37
CFO	**377**	**576**	**529**	**525**	**516**
- Div	112	119	128	192	151
- Capex	662	699	452	471	590
FCF	**(397)**	**(242)**	**(51)**	**(138)**	**(225)**
(CFO Pre-W/C) / Debt	27.1%	24.7%	27.6%	27.6%	23.2%
(CFO Pre-W/C - Dividends) / Debt	20.5%	18.4%	20.8%	17.9%	15.9%
FFO / Debt	28.2%	27.9%	31.4%	28.1%	26.7%
RCF / Debt	21.5%	21.6%	24.6%	18.4%	19.4%
Revenue	1,533	1,444	1,430	1,453	1,492
Cost of Goods Sold	641	504	457	451	471
Interest Expense	50	60	74	73	74
Net Income	171	180	205	216	242
Total Assets	5,682	6,124	6,360	6,619	6,709
Total Liabilities	3,521	3,810	3,900	4,107	4,113
Total Equity	2,161	2,314	2,460	2,512	2,596

[1] All figures & ratios calculated using Moody's estimates & standard adjustments. Periods are Financial Year-End unless indicated. LTM = Last Twelve Months.
Source: Moody's Financial Metrics

Exhibit 10

Peer Comparison Table [1]

	Louisville Gas & Electric Company A3 Stable			Kentucky Power Company Baa2 Negative			Black Hills Power, Inc. A3 Stable			Empire District Electric Company (The) Baa1 Stable		
	FYE	FYE	LTM	FYE	FYE	LTM	FYE	FYE	LTM	FYE	FYE	LTM
(in US millions)	Dec-16	Dec-17	Jun-18	Dec-16	Dec-17	Jun-18	Dec-16	Dec-17	Jun-18	Dec-16	Dec-17	Jun-18
Revenue	1,430	1,453	1,492	655	643	659	268	288	293	613	627	682
CFO Pre-W/C	518	547	479	110	150	136	87	87	96	210	202	258
Total Debt	1,873	1,984	2,067	936	934	940	354	351	351	927	893	894
CFO Pre-W/C / Debt	27.6%	27.6%	23.2%	11.7%	16.1%	14.5%	24.5%	24.7%	27.5%	22.7%	22.7%	28.8%
CFO Pre-W/C – Dividends / Debt	20.8%	17.9%	15.9%	7.0%	12.3%	12.6%	9.6%	12.7%	12.7%	17.8%	18.6%	21.9%
Debt / Capitalization	35.3%	39.1%	39.4%	41.3%	46.8%	45.8%	37.4%	41.2%	41.4%	42.6%	44.9%	44.7%

[1] All figures & ratios calculated using Moody's estimates & standard adjustments. FYE = Financial Year-End. LTM = Last Twelve Months.
Source: Moody's Financial Metrics

Ratings

Exhibit 11

Category	Moody's Rating
LOUISVILLE GAS & ELECTRIC COMPANY	
Outlook	Stable
Issuer Rating	A3
First Mortgage Bonds	A1
Senior Secured	A1
Sr Unsec Bank Credit Facility	A3
Bkd LT IRB/PC	A1
Commercial Paper	P-2
Bkd Other Short Term	P-2
ULT PARENT: PPL CORPORATION	
Outlook	Stable
Issuer Rating	Baa2
PARENT: LG&E AND KU ENERGY LLC	
Outlook	Stable
Issuer Rating	Baa1
Senior Unsecured	Baa1

Source: Moody's Investors Service

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MOODY'S
INVESTORS SERVICE

CREDIT OPINION
27 October 2017

Update

Rate this Research

RATINGS

Louisville Gas & Electric Company

Domicile	Louisville, Kentucky, United States
Long Term Rating	A3
Type	LT Issuer Rating
Outlook	Stable

Please see the ratings section at the end of this report for more information. The ratings and outlook shown reflect information as of the publication date.

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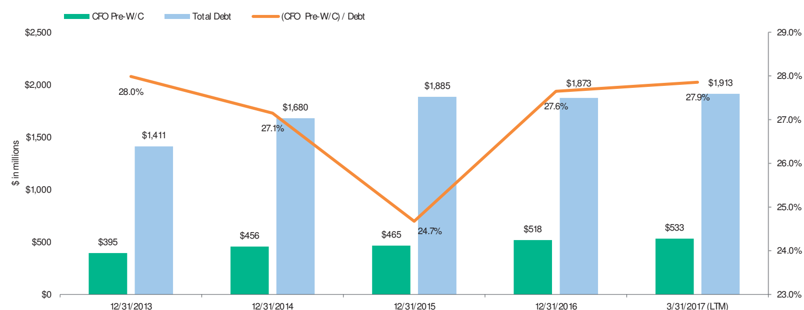
Louisville Gas & Electric Company

Update to credit analysis

Summary

Louisville Gas & Electric Company's (LG&E, A3 stable) credit strengths includes its stable financial performance and the credit supportive Kentucky regulatory environment under which it operates. These are slightly offset, in part, by a large capital expenditure program and, to a lesser extent, a lack of fuel and geographic diversity.

Exhibit 1
Historical CFO Pre-WC, Total Debt, and CFO Pre-WC to Debt



Source: Moody's Financial Metrics

Credit Strengths

» Supportive regulatory environment in Kentucky

» Strong and stable financial metrics

Credit Challenges

» Large capital expenditure program

» High coal concentration in its generation fuel mix

Rating Outlook

LG&E's stable outlook reflects its supportive regulatory environment in Kentucky and stable financial performance. Also, it incorporates in our expectation that LG&E's credit metrics remain stable.

Factors that Could Lead to an Upgrade

It is unlikely that LG&E's rating will be upgraded in the near-term, given its large upcoming capital expenditure program and funding needs. However, ratings could be upgraded if the company received more favorable regulatory recovery mechanisms for non-environmental related capital expenditures and maintained its cash flow from operation before changes in working capital (CFO Pre-WC) to debt ratio at 26% or above on a sustained basis.

Factors that Could Lead to a Downgrade

LG&E's ratings could be downgraded should there be any materially unfavorable regulatory developments or unanticipated changes are made to the regulatory compact that currently provides for timely recovery of costs, resulting in the company's CFO pre-WC to debt declining below 20% for an extended period of time.

Key Indicators

Exhibit 2

KEY INDICATORS [1]

Louisville Gas & Electric Company -Private

	12/31/2013	12/31/2014	12/31/2015	12/31/2016	6/30/2017(L)
CFO pre-WC + Interest / Interest	11.9x	10.1x	8.8x	8.0x	8.1x
CFO pre-WC / Debt	28.0%	27.1%	24.7%	27.6%	27.9%
CFO pre-WC – Dividends / Debt	21.0%	20.5%	18.4%	20.8%	18.0%
Debt / Capitalization	35.7%	37.0%	37.5%	35.3%	35.6%

[1]All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations. Source: Moody's Financial Metrics™
Source: Moody's Financial Metrics

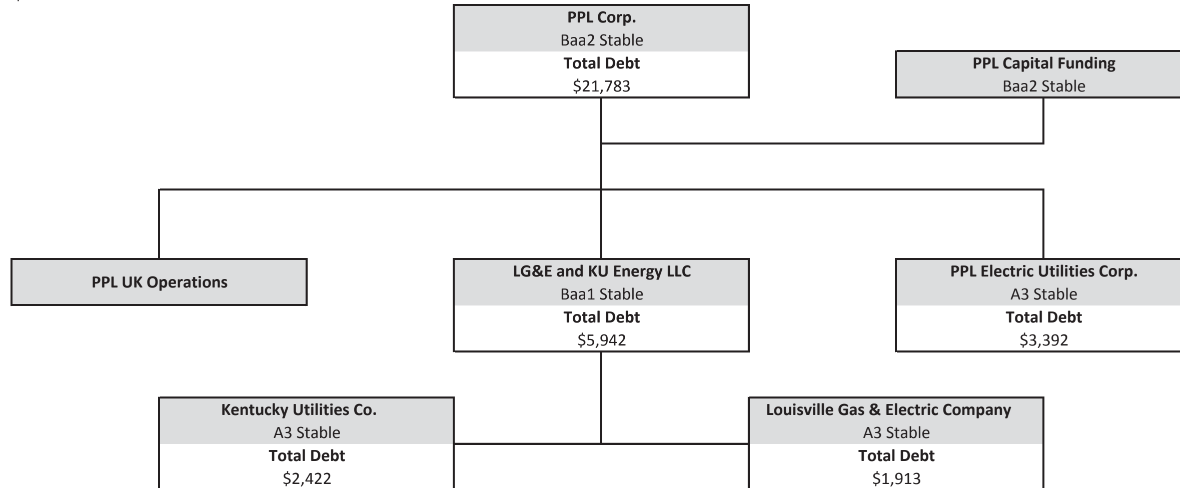
Profile

Louisville Gas and Electric Company (LG&E, A3 stable) is a regulated public utility engaged in the generation, transmission and distribution of electricity and the storage, distribution and sale of natural gas in Kentucky. It provides electricity to approximately 407,000 customers in Louisville and adjacent areas and delivers natural gas service to approximately 324,000 customers in its electric service area and eight additional counties in Kentucky. LG&E's service area covers approximately 700 square miles.

LG&E is a wholly-owned subsidiary of LG&E and KU Energy LLC (LKE, Baa1 stable). LG&E and its affiliate, Kentucky Utilities (KU, A3 stable), are the two main operating entities of LKE. LKE, in turn, is wholly owned by PPL Corporation (PPL, Baa2 stable), a utility holding company headquartered in Allentown, PA.

This publication does not announce a credit rating action. For any credit ratings referenced in this publication, please see the ratings tab on the issuer/entity page on www.moodys.com for the most updated credit rating action information and rating history.

Exhibit 3
Organizational Structure
As of 30 June 2017
$ in millions



Total debt is based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
Source: Moody's Financial Metrics, company

Detailed Credit Considerations

- Supportive regulatory environment provides timely cost recovery

We consider the Kentucky Public Service Commission (KPSC) to be supportive of long-term credit quality and note that it has approved various tracker mechanisms that provide for timely cost recovery outside of a rate case, shortening regulatory lag. LG&E's tracker mechanisms include a Fuel Adjustment Clause (FAC), an Environmental Cost Recovery Surcharge (ECR), a Gas Supply Clause (GSC), a Gas Line Tracker (GLT) and a Demand-Side Management (DSM) Cost Recovery Mechanism. LG&E does not have a decoupling mechanism in place, which subjects LG&E's net revenue to weather volatilities. The lack of a decoupling mechanism is less of an issue for non-weather related demand fluctuations because LG&E has the DSM mechanism.

LG&E's last general rate case concluded in June 2017 when its case was settled. In the settlement, LG&E agreed to electric and gas revenue increases of $57.1 million and $6.8 million, respectively. The settlement provided for a 9.7% return on equity (ROE) but did not specify the allowed equity capitalization. In its order, the KSPC excluded the recovery of certain costs for funding employee retirement plans. Prior to the settlement sent before the commission, LG&E agreed to withdraw its request to recover costs related to its Advanced Meter System Project reducing its revenue requirement by about $5.9 million. The withdrawal of its request to recover those costs does not preclude LG&E from asking the commission to consider cost recovery in the future.

In January 2016, LG&E and affiliate utility Kentucky Utilities (KU, A3 stable) submitted applications to the KPSC, requesting the ECR rate treatment for projects related to the US Environmental Protection Agency's (EPA) regulations addressing the handling of coal and combustion by-products and MATS (mercury and air toxics standards). In August 2016, the KPSC approved the settlement and authorized a 9.8% ROE for the projects. However, on 23 June 2017, the KPSC also lowered the authorized ROE to 9.7% for all of LG&E's and KU's existing approved ECR plans and projects. Effective August 2017, the lower ROE replaces the previously authorized ROE for approved ECR projects. The company expects that this change will have a low impact on 2017.

- High capital expenditure planned over the next five years

LG&E's 2017-2021 capital expenditure plan is estimated to be $2.7 billion compared to $2.6 billion spent between 2012 and 2016. Of the $2.7 billion planned capital expenditure, approximately $645 million will be related to its environmental investments. The total estimated amount represents about 54% of the company's net book value of property, plant and equipment, which stood at about $5 billion at the end of the second quarter of 2017.

We expect the potential disallowance risk associated with large capital expenditures to be meaningfully moderated by Kentucky's supportive regulatory environment, especially regarding the environmental expenditures through the ECR. The KPSC is also authorized to grant return on construction work in progress (CWIP) in rate case proceedings, a credit positive. Moreover, the ECR minimizes regulatory lag for investments associated with complying with the Clean Air Act compliance and coal combustion waste and by-product environmental requirements. The terms of the ECR allows LG&E to receive the return of and a return on the investment starting two months after making the investment. This is more credit supportive compared to the traditional process where there would be longer regulatory lag due to the length of the construction period plus the rate case proceeding.

- High reliance on coal as fuel for generation

LG&E's current generation fuel mix is heavily biased towards coal. Of its 2.9 GW of generating capacity, 2.1 GW (71%) is coal-fired, which provides the majority (87%) of the electricity generation output. The remaining 29% of the generating capacity is comprised mainly of gas- or oil- fired facilities. LG&E's fuel mix improved over the last two years with the addition of a new gas-fired combined-cycle power plant. In June 2015, the 640-MW gas plant at Cane Run started its commercial operations, replacing a retired coal-fired plant at Cane Run.

The fuel concentration in coal is credit negative. However, the risk associated with coal is mostly mitigated by Kentucky's support of the coal industry. This support is evidenced by the passage of the ECR, which provides the company with credit supportive terms and cost recovery for its investments in coal-related environmental expenditures. Kentucky is also one of the 30 states that filed lawsuits to overturn the Clean Power Plan (CPP), which the Supreme Court stayed on 9 February 2016. LG&E has decided not to incorporate its CPP spending in its current capital plan as the issue continues to be litigated.

- Stable financial profile supports robust capital expenditure

LG&E's financial metrics have been strong. As of 30 June 2017, CFO pre-WC to debt was 27.9% for the last twelve months (LTM) and averaged 27% for the past three years. Total debt to capitalization was 35.6% for the last twelve months and averaged 37% for the past three years. We expect LG&E's financial metrics to remain at similar levels over the next few years as it benefits from the extension of bonus depreciation tax credit while the large capital expenditure program continues. Also, we expect the pace of the cash flow from operations to keep up with the investment as a result of the various rider mechanisms that are in place and of the latest rate case outcome.

Liquidity Analysis

LG&E's short-term rating is P-2 and we expect LG&E to maintain adequate liquidity over the next 12-18 months.

LG&E has a $500 million syndicated credit facility maturing in January 2022. As of 30 June 2017, after accounting for all commercial paper and letter of credits issued, LG&E had $293 million of the revolving facility available. For the past twelve months ending June 2017, LG&E had negative free cash flow of $95 million, which is likely to remain negative in coming years given its large capital expenditure program. LG&E's next debt maturity is $300 million of Secured Notes maturing in 2025.

LG&E and KU Energy LLC (LKE, Baa1 stable), the intermediate parent company of LG&E, manages the liquidity of its Kentucky utility operations on a consolidated basis. In addition to the credit facility at LG&E, LKE and KU have separate stand-alone revolving credit facilities. LKE has its own $75 million of syndicated credit facility that expires in October 2018. KU has a $400 million syndicated credit facility expiring in January 2022 and a $198 million letter of credit facility expiring in October 2020. Each facility contains a financial covenant requiring the companies' debt to total capitalization not to exceed 70%. All entities were in compliance as of 30 June 2017.

Rating Methodology and Scorecard Factors

Exhibit 4

Rating Factors				
Louisville Gas & Electric Company -Private				
Regulated Electric and Gas Utilities Industry Grid [1][2]	Current LTM 6/30/2017		Moody's 12-18 Month Forward View As of Date Published [3]	
Factor 1 : Regulatory Framework (25%)	**Measure**	**Score**	**Measure**	**Score**
a) Legislative and Judicial Underpinnings of the Regulatory Framework	A	A	A	A
b) Consistency and Predictability of Regulation	A	A	A	A
Factor 2 : Ability to Recover Costs and Earn Returns (25%)				
a) Timeliness of Recovery of Operating and Capital Costs	Baa	Baa	Baa	Baa
b) Sufficiency of Rates and Returns	A	A	A	A
Factor 3 : Diversification (10%)				
a) Market Position	Baa	Baa	Baa	Baa
b) Generation and Fuel Diversity	Baa	Baa	Baa	Baa
Factor 4 : Financial Strength (40%)				
a) CFO pre-WC + Interest / Interest (3 Year Avg)	8.7x	Aaa	7x - 9x	Aaa
b) CFO pre-WC / Debt (3 Year Avg)	27.5%	A	28% - 32%	Aa
c) CFO pre-WC – Dividends / Debt (3 Year Avg)	19.9%	A	21% - 25%	A
d) Debt / Capitalization (3 Year Avg)	36.0%	A	33% - 37%	A
Rating:				
Grid-Indicated Rating Before Notching Adjustment		A2		A2
HoldCo Structural Subordination Notching			0	0
a) Indicated Rating from Grid		A2		A2
b) Actual Rating Assigned		A3		A3

[1]All ratios are based on 'Adjusted' financial data and incorporate Moody's Global Standard Adjustments for Non-Financial Corporations.
[2]As of 6/30/2017(L)
[3]This represents Moody's forward view; not the view of the issuer; and unless noted in the text, does not incorporate significant acquisitions and divestitures.
Source: Moody's Financial Metrics

Ratings

Exhibit 5

Category	Moody's Rating
LOUISVILLE GAS & ELECTRIC COMPANY	
Outlook	Stable
Issuer Rating	A3
Bkd LT IRB/PC	A1
Senior Secured	A1
Sr Unsec Bank Credit Facility	A3
Commercial Paper	P-2
Bkd Other Short Term	P-2
ULT PARENT: PPL CORPORATION	
Outlook	Stable
Issuer Rating	Baa2
PARENT: LG&E AND KU ENERGY LLC	
Outlook	Stable
Issuer Rating	Baa1
Senior Unsecured	Baa1

Source: Moody's Investors Service

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Research Update:

PPL Corp. Ratings Affirmed; Outlook Stable

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Research Update:

PPL Corp. Ratings Affirmed; Outlook Stable

Overview

- U.S. regulated utility holding company PPL Corp. has demonstrated a gradual improvement in profitability as its level of earned returns has stabilized, strengthening its competitive position.
- The improvement in profitability reflects the company's transformation into a fully regulated utility holding company following the spin-off of its merchant generation in 2015 combined with improved regulatory risk management as the company has successfully recovered costs through various regulatory mechanisms.
- We are affirming all our ratings on PPL Corp., including the 'A-' issuer credit rating. The outlook remains stable.
- The stable outlook is based on the company's steady fully regulated utility business model and ongoing cost recovery that supports steady operating cash flow.

Rating Action

On Sept. 15, 2017, S&P Global Ratings affirmed its 'A-' issuer credit rating and 'A-2' short-term rating on PPL Corp. The outlook is stable.

Rationale

The ratings on PPL Corp. (PPL) are based on its low-risk, electric utility operations in the U.S. and the U.K., along with natural gas distribution operations in Kentucky. PPL maintains credit protection measures in the 13%-14% range.

The company's competitive position has improved as we project more consistent returns at PPL's various operating subsidiaries, which include Kentucky Utilities, Louisville Gas and Electric, PPL Electric Utilities, and Western Power Distribution (located in the U.K.). The profitability improvement reflects in part recently approved rate cases across its U.S. jurisdictions which demonstrate better regulatory risk management. PPL routinely takes advantage of various regulatory mechanisms that allow the company to recover costs with limited regulatory lag in the U.S. while also benefiting from predictable U.K. regulation, which sets revenues eight years in advance and provides incentives that allow companies to earn above their allowed returns. The spin-off of its merchant assets in 2015, which transformed the company into a fully rate-regulated company, has also contributed to the stable trend. As a result, we now consider PPL's competitive position as excellent, to acknowledge the company's enhanced ability to earn its allowed return on a consistent basis. The change does not affect ratings, but it strengthens the

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company's position within the 'A-' category.

We view PPL's business risk profile as excellent incorporating the company's ownership solely of regulated integrated and low-risk transmission and distribution utility operations. Moreover, PPL's business risk profile benefits from geographic and regulatory diversity, serving about 10 million customers across two states in the U.S. as well as across the U.K. Although the service territories demonstrate only modest growth, residential and commercial customers contribute the majority of revenue and sales, providing a measure of stability and predictability to cash flow generation.

PPL's regulated utility subsidiaries benefit from operations under constructive, transparent, and generally stable regulatory frameworks in the U.S. and U.K. Moreover, these subsidiaries take full advantage of various constructs available within their respective regulatory frameworks to consistently earn returns that are close to or at the authorized levels.

We assess PPL's financial risk profile as being in the significant category using our more moderate financial ratio benchmarks. Under our base-case scenario, we project that PPL will achieve FFO to debt of 13%-14% over the next few years. We expect credit measures to improve, benefiting from rate case decisions and the timely recovery of invested capital, primarily in transmission investments as well as from approved environmental compliance spending in Kentucky. We anticipate that the company's debt leverage will remain elevated with debt to EBITDA that is close to 5x, in large part influenced by the capitalization of the U.K. subsidiaries.

Liquidity

We assess PPL's liquidity as adequate because we believe its liquidity sources are likely to cover uses by more than 1.1x over the next 12 months and meet cash outflows even with a 10% decline in EBITDA. The assessment also reflects the company's generally prudent risk management, sound relationships with banks, and a satisfactory standing in credit markets.

Principal liquidity sources:

- Revolving credit facility availability of about $4.5 billion;
- Cash and liquid investments of about $470 million; and
- Cash FFO of about $3.1 billion.

Principal liquidity uses:

- Debt maturities, including outstanding commercial paper, of about $2.2 billion;
- Capital spending of $3.5 billion;
- Dividend of about $1.1 billion; and
- Working capital outflow of $50 million.

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Outlook

The stable outlook on PPL Corp. and its subsidiaries is based on our assessments of the company's excellent business risk profile that we view at the upper end of the range and significant financial risk profile, which is at the lower end of the range. Under our base-case scenario we expect that FFO to debt will range from 13% to 14% while debt to EBITDA will remain elevated at over 5x.

Downside scenario

We could lower the ratings on PPL and its subsidiaries if core credit ratios weaken such that FFO to debt is below 13% on a consistent basis while maintaining the current level of business risk.

Upside scenario

Given our assessment of business risk and our base-case scenario for financial performance, we do not anticipate higher ratings during the outlook period. However, higher ratings would largely depend on PPL achieving FFO to debt of more than 18% on a consistent basis while maintaining the current level of business risk.

Ratings Score Snapshot

Corporate Credit Rating: A-/Stable/A-2

Business risk: Excellent
- Country risk: Very low
- Industry risk: Very low
- Competitive position: Excellent

Financial risk: Significant
- Cash flow/Leverage: Significant

Anchor: a-

Modifiers
- Diversification/Portfolio effect: Neutral
- Capital structure: Neutral
- Financial policy: Neutral
- Liquidity: Adequate
- Management and governance: Satisfactory
- Comparable rating analysis: Neutral

Stand-alone credit profile : a-
- Group credit profile: a-

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Related Criteria

- General Criteria: Methodology For Linking Long-Term And Short-Term Ratings , April 7, 2017
- Criteria - Corporates - General: Methodology And Assumptions: Liquidity Descriptors For Global Corporate Issuers, Dec. 16, 2014
- Criteria - Corporates - General: Corporate Methodology: Ratios And Adjustments, Nov. 19, 2013
- Criteria - Corporates - General: Corporate Methodology, Nov. 19, 2013
- Criteria - Corporates - Utilities: Key Credit Factors For The Regulated Utilities Industry, Nov. 19, 2013
- General Criteria: Group Rating Methodology, Nov. 19, 2013
- General Criteria: Country Risk Assessment Methodology And Assumptions, Nov. 19, 2013
- General Criteria: Methodology: Industry Risk, Nov. 19, 2013
- Criteria - Corporates - Utilities: Collateral Coverage And Issue Notching Rules For '1+' And '1' Recovery Ratings On Senior Bonds Secured By Utility Real Property, Feb. 14, 2013
- General Criteria: Methodology: Management And Governance Credit Factors For Corporate Entities And Insurers, Nov. 13, 2012
- General Criteria: Use Of CreditWatch And Outlooks, Sept. 14, 2009
- Criteria - Insurance - General: Hybrid Capital Handbook: September 2008 Edition, Sept. 15, 2008
- Criteria - Corporates - General: 2008 Corporate Criteria: Rating Each Issue, April 15, 2008

Ratings List

Ratings Affirmed

PPL Corp.
PPL Electric Utilities Corp.
PPL Capital Funding Inc.
Louisville Gas & Electric Co.
Kentucky Utilities Co.
LG&E and KU Energy LLC

Corporate Credit Rating	A-/Stable/--

PPL Corp.
PPL Electric Utilities Corp.
PPL Capital Funding Inc.
Louisville Gas & Electric Co.
Kentucky Utilities Co.

Commercial Paper	A-2

Kentucky Utilities Co.
Louisville Gas & Electric Co.
PPL Electric Utilities Corp.

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Senior Secured	A
Recovery Rating	1+
PPL Corp.	
LG&E and KU Energy LLC	
PPL Capital Funding Inc.	
Senior Unsecured	BBB+
PPL Capital Funding Inc.	
Junior Subordinated	BBB

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S&P Global
Ratings

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Summary:
Kentucky Utilities Co.

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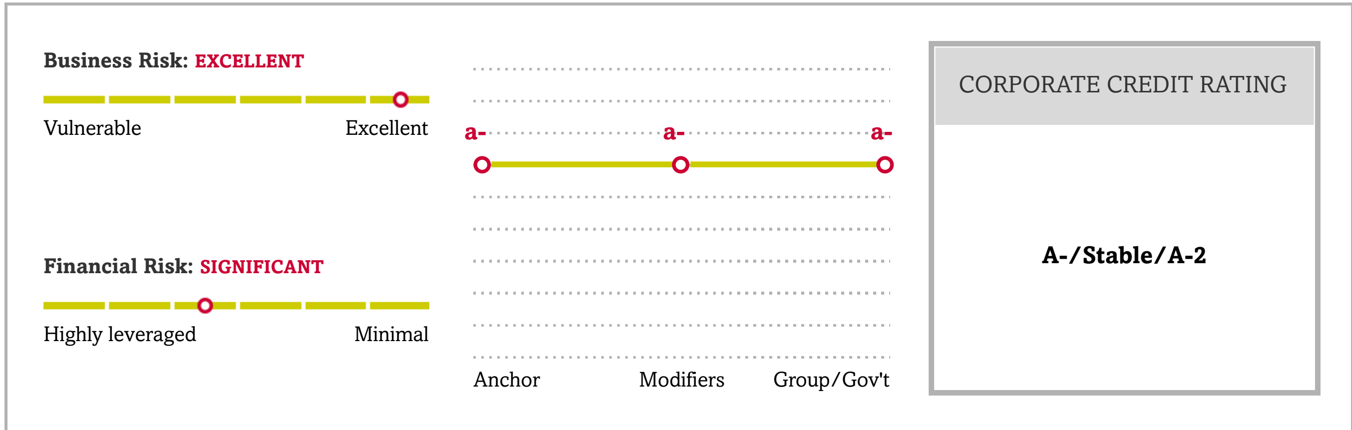
Summary:

Kentucky Utilities Co.



Rationale

Business Risk: Excellent	Financial Risk: Significant
• Regulated and vertically integrated electric utility. • Operates under a generally constructive and credit-supportive regulatory framework in Kentucky. • Limited geographic diversity and relatively small customer base. • Material exposure to coal-fired generation results in some operating and environmental risk.	• Core credit ratios support the assessment of a significant financial risk profile using moderate financial benchmarks compared to the typical corporate issuer. • Balanced capital structure supports overall credit profile. • Capital expenditures, primarily driven by environmental spending, leading to negative discretionary cash flows.

Outlook: Stable

The stable rating outlook on Kentucky Utilities Co. (KU) reflects S&P Global Ratings' outlook on its parent, PPL Corp. (PPL), because KU is viewed as a core subsidiary of its parent.

The stable outlook on PPL is based on the company's excellent business risk profile that we view at the upper end of the range and significant financial risk profile, which is at the lower end of the range. Under our base case scenario we expect that funds from operations (FFO) to debt will range from 13%-14% while debt to EBITDA will remain elevated at over 5x.

Downside scenario

We could lower the ratings on PPL and its subsidiaries, including KU, if core credit ratios weaken such that FFO to debt is below 13% on a consistent basis over the next 12 to 18 months, while maintaining the current level of business

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risk.

Upside scenario

Given our assessment of business risk and our base-case scenario for financial performance, we do not anticipate higher ratings on PPL and its subsidiaries during the outlook period. However, higher ratings would largely depend on PPL achieving FFO to debt of more than 18% on a consistent basis over the next 12 to 18 months, while maintaining the current level of business risk.

Our Base-Case Scenario

Assumptions

- Gross margin growth primarily benefits from anticipated base-rate increases and the timely recovery of planned environmental compliance costs.
- Elevated capital spending of about $550 million to $650 million per year through 2019 mainly for upgrading generation to meet environmental regulations and investment on transmission and distribution infrastructure.
- All debt maturities are refinanced.

Key Metrics

	2016A	2017E	2018E
FFO to debt (%)	23.8	21-23	20-22
Debt to EBITDA (x)	3.4	About 3.5	About 3.5

A--Actual. E—Estimate. FFO—Funds from operations.

Company Description

KU is a vertically integrated electric utility providing service to about 550,000 customers mostly in Kentucky.

Business Risk: Excellent

We assess KU's business risk profile based on the company's regulated integrated utility operations under a generally constructive regulatory framework in Kentucky that provides for timely recovery of approved capital expenditures.

KU lacks scale and geographic diversity since it operates mainly in the state of Kentucky with some operations in Virginia. The customer mix is mostly residential and commercial, which insulates the company from fluctuations in electricity demand and results in relatively stable cash flows.

The company has generation capacity of about 5,000 megawatts (MW). Because much of the generation is coal-fired, the company has been upgrading its plants to comply with environmental regulations. However, the company can recover the costs for these upgrades through an environmental cost recovery mechanism, which limits regulatory lag and is supportive of the credit profile. Under the regulation of the Kentucky Public Service Commission (PSC), the company benefits from other recovery mechanisms such as a pass-through fuel cost and a purchased power cost recovery rider. These mechanisms increase the stability of the company's returns. Moreover, the company's low-cost,

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coal-fired generation and efficient operations contribute to the overall competitive rates for customers.

Financial Risk: Significant

Under our base-case scenario, we project that KU's FFO to debt will range from 20%-23% and debt to EBITDA will remain about 3.5x. Over the next few years, we expect credit measures to benefit from the use of regulatory mechanisms to recover its invested capital cost. Our assessment also includes a recently approved base-rate increase of about $50 million.

We assess KU's financial risk profile as significant using moderate financial benchmarks compared to the typical corporate issuer, accounting for the company's low-risk regulated electric transmission and distribution operations, which are partially offset by relatively higher-risk regulated generation.

Liquidity: Adequate

We assess KU's liquidity as adequate to cover its needs over the next 12 months. We expect that the company's liquidity sources will exceed its uses by 1.1x or more, the minimum threshold for this designation under our criteria and that the company will also meet our other requirements for such a designation.

We view KU as having well-established and solid bank relationships, the ability to absorb high-impact, low-probability events without the need for refinancing, and a satisfactory standing in credit markets.

Additionally, we expect that KU's liquidity will benefit from stable cash flow generation, a $400 million revolving credit facility, sufficient liquidity support provided by the parent to meet ongoing needs, and manageable debt maturities over the next few years.

Principal Liquidity Sources	Principal Liquidity Uses
• Minimal cash balance assumed; • Revolving credit facility of $400 million; and • Cash FFO of $660 million-$665 million.	• Debt maturities of about $50 million; • Capital expenditure of $600 million; and • Common stock dividends of about $265 million to $270 million.

Group Influence

KU is subject to our group rating methodology criteria. We assess KU as a core subsidiary of parent PPL Corp. because it is highly unlikely to be sold, is integral to the group's overall strategy, possesses significant management commitment, is a significant contributor to the group, and is closely linked to the parent's reputation. Moreover, there are no meaningful insulation measures in place that protect KU from its parent. As a result, the issuer credit rating on KU is 'A-', in line with PPL's group credit profile of 'a-'.

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Ratings Score Snapshot

Corporate Credit Rating

A-/Stable/A-2

Business risk: Excellent

- **Country risk:** Very low
- **Industry risk:** Very low
- **Competitive position:** Strong

Financial risk: Significant

- **Cash flow/Leverage:** Significant

Anchor: a-

Modifiers

- **Diversification/Portfolio effect:** Neutral (no impact)
- **Capital structure:** Neutral (no impact)
- **Financial policy:** Neutral (no impact)
- **Liquidity:** Adequate (no impact)
- **Management and governance:** Satisfactory (no impact)
- **Comparable rating analysis:** Neutral (no impact)

Stand-alone credit profile : a-

- **Group credit profile:** a-
- **Entity status within group:** Core (no impact)

Issue Ratings

The short-term rating on KU is 'A-2', based on the issuer credit rating of 'A-'.

Recovery Analysis

KU's first-mortgage bonds benefit from a first-priority lien on substantially all of the utility's real property owned or subsequently acquired. Collateral coverage of over 1.5x supports a recovery rating of '1+' and an issue rating one notch above the issuer credit rating.

Related Criteria

- Criteria - Corporates - General: Reflecting Subordination Risk In Corporate Issue Ratings, Sept. 21, 2017

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Summary: Kentucky Utilities Co.

- General Criteria: Methodology For Linking Long-Term And Short-Term Ratings, April 7, 2017
- Criteria - Corporates - General: Methodology And Assumptions: Liquidity Descriptors For Global Corporate Issuers, Dec. 16, 2014
- Criteria - Corporates - General: Corporate Methodology: Ratios And Adjustments, Nov. 19, 2013
- Criteria - Corporates - General: Corporate Methodology, Nov. 19, 2013
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- General Criteria: Methodology: Management And Governance Credit Factors For Corporate Entities And Insurers, Nov. 13, 2012
- General Criteria: Use Of CreditWatch And Outlooks, Sept. 14, 2009
- Criteria - Insurance - General: Hybrid Capital Handbook: September 2008 Edition, Sept. 15, 2008

Business And Financial Risk Matrix

	Financial Risk Profile					
Business Risk Profile	Minimal	Modest	Intermediate	**Significant**	Aggressive	Highly leveraged
Excellent	aaa/aa+	aa	a+/a	**a-**	bbb	bbb-/bb+
Strong	aa/aa-	a+/a	a-/bbb+	bbb	bb+	bb
Satisfactory	a/a-	bbb+	bbb/bbb-	bbb-/bb+	bb	b+
Fair	bbb/bbb-	bbb-	bb+	bb	bb-	b
Weak	bb+	bb+	bb	bb-	b+	b/b-
Vulnerable	bb-	bb-	bb-/b+	b+	b	b-

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S&P Global
Ratings

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Summary:

Louisville Gas & Electric Co.

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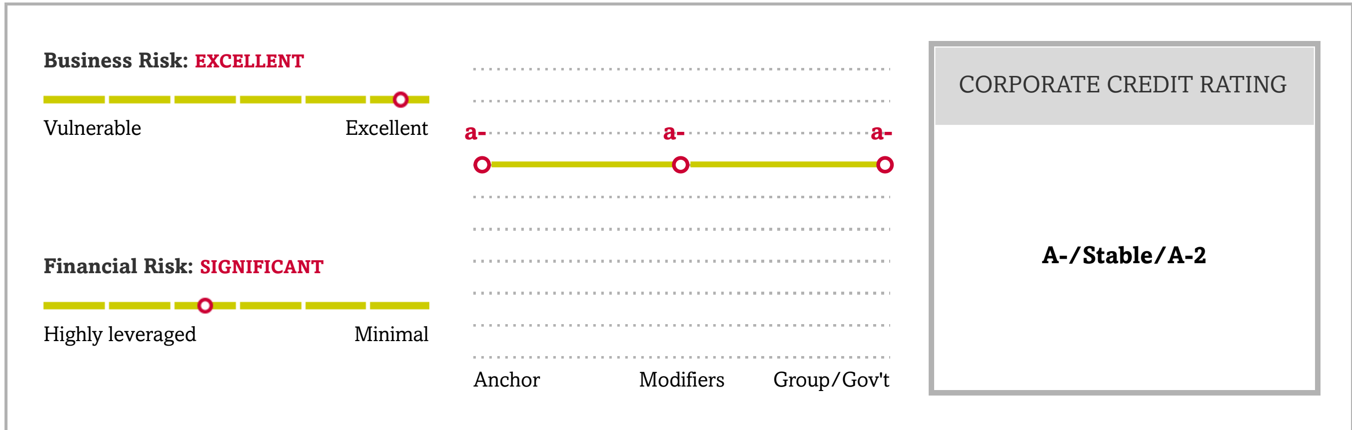
Summary:

Louisville Gas & Electric Co.



Rationale

Business Risk: Excellent	Financial Risk: Significant
• Vertically integrated electric and natural gas distribution utility. • Operates under a generally constructive and credit-supportive regulatory framework in Kentucky. • Limited service territory and midsized customer base.	• Core credit ratios support a significant financial risk profile assessment using moderate financial benchmarks compared to the typical corporate issuer. • Elevated capital expenditure program, with focus on distribution infrastructure investment and environmental compliance spending, leading to negative discretionary cash flow. • Balanced capital structure supports overall credit profile.

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Summary: Louisville Gas & Electric Co.

Outlook: Stable

The stable rating outlook on Louisville, Ky.-based Louisville Gas & Electric Co. (LG&E) reflects the rating outlook on its parent, PPL Corp. (PPL), because S&P Global Ratings views LG&E as a core subsidiary of its parent.

The stable outlook on PPL is based on the company's excellent business risk profile that we view at the upper end of the range and significant financial risk profile, which is at the lower end of the range. Under our base-case scenario we expect that funds from operations (FFO) to debt will range from 13%-14% while debt to EBITDA will remain elevated at over 5x.

Downside scenario

We could lower the ratings on PPL and its subsidiaries, including LG&E, if core credit ratios weaken such that FFO to debt is below 13% on a consistent basis over the next 12 to 18 months, while maintaining the current level of business risk.

Upside scenario

Given our assessment of business risk and our base-case scenario for financial performance, we do not anticipate higher ratings during the outlook period. However, higher ratings would largely depend on PPL achieving FFO to debt of more than 18% on a consistent basis over the next 12 to 18 months, while maintaining the current level of business risk.

Our Base-Case Scenario

Assumptions

- Gross margin growth is primarily driven by anticipated base rate increases and the timely recovery of planned environmental compliance costs.
- Elevated capital spending of about $600 million annually for the next few years, mainly for distribution infrastructure investment and upgrading generation to comply with environmental regulations.
- Discretionary cash flow to remain negative due to higher capital expenditures and dividends.
- All debt maturities are refinanced.

Key Metrics

	2016A	2017E	2018E
FFO/debt (%)	25.5	21-23	21-23
Debt/EBITDA (x)	3.4	About 3.5	About 3.5

A--Actual. E—Estimate. FFO—Funds from operations.

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Company Description

LG&E operates in and around Louisville, Ky., where it provides electricity service to 400,000 customers and natural-gas distribution service to 320,000 customers.

Business Risk: Excellent

We assess LG&E's business risk profile based primarily on the company's regulated integrated electric utility and natural gas distribution operations under the generally constructive regulatory framework in Kentucky.

LG&E has limited scale, scope, and diversity, serving a customer base of about 400,000 electric and about 320,000 natural gas customers in Louisville. The customer base consists largely of residential and commercial customers, insulating the company from fluctuations in demand and providing stability to the company's cash flows. Our assessment also accounts for the modest operating diversity of the company due to its electric and natural gas operations.

The company has about 3,000 megawatts (MW) of generation capacity, which has higher operating risk than transmission and distribution (T&D) operations. The company has been upgrading its coal-fired generation plants to comply with environmental regulations. While the capital costs of these upgrades are significant, spending can be recovered through an environmental cost recovery mechanism, which limits regulatory lag and is supportive of the credit profile. Under the regulation of the Kentucky Public Service Commission (PSC), the company benefits from other mechanisms such as a gas line tracker and a pass-through fuel cost mechanism. These mechanisms increase the stability of the company's returns.

Moreover, the company's low-cost coal-fired generation and efficient operations contribute to overall competitive rates for customers.

Financial Risk: Significant

Under our base-case scenario, we project that LG&E's FFO to debt will range from 21%-23% and debt to EBITDA will remain about 3.5x. Over the next few years, we expect credit measures to benefit from the company's use of regulatory mechanisms to recover its invested capital. Our assessment also includes recently approved rate case outcomes that increased electric rates by about $57 million and gas rates by about $7 million.

We assess LG&E's financial risk profile as significant using moderate financial benchmarks compared to the typical corporate issuer, accounting for the company's low-risk regulated electric T&D and natural gas distribution operations, which are partially offset by relatively higher-risk regulated generation.

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Liquidity: Adequate

We assess LG&E's liquidity as adequate to cover its needs over the next 12 months. We expect that the company's liquidity sources will exceed its uses by 1.1x or more, the minimum threshold for this designation under our criteria and that the company will also meet our other requirements for such a designation.

We view LG&E as having well-established and solid bank relationships, the ability to absorb high-impact, low-probability events without the need for refinancing, and a satisfactory standing in credit markets.

Additionally, we expect that LG&E's liquidity will benefit from stable cash flow generation, a $500 million revolving credit facility, sufficient liquidity support provided by the parent to meet ongoing needs, and manageable debt maturities over the next few years.

Principal Liquidity Sources	Principal Liquidity Uses
• Minimal cash balance assumed; • Revolving credit facility of $500 million; and • Cash FFO of about $550 million.	• Debt maturities of about $200 million; • Maintenance capital expenditure of about $550 million; and • Common stock dividends of about $145 million.

Group Influence

We assess LG&E as a core subsidiary of parent PPL Corp. because it is highly unlikely to be sold, is integral to the group's overall strategy, possesses significant management commitment, is a major contributor to the group, and is closely linked to the parent's reputation. Moreover, there are no meaningful insulation measures in place that protect LG&E from its parent. As a result, the issuer credit rating on LG&E is 'A-', in line with the group credit profile of 'a-'.

Ratings Score Snapshot

Corporate Credit Rating

A-/Stable/A-2

Business risk: Excellent

- **Country risk:** Very low
- **Industry risk:** Very low
- **Competitive position:** Excellent

Financial risk: Significant

- **Cash flow/Leverage:** Significant

Anchor: a-

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Modifiers

- **Diversification/Portfolio effect:** Neutral (no impact)
- **Capital structure:** Neutral (no impact)
- **Financial policy:** Neutral (no impact)
- **Liquidity:** Adequate (no impact)
- **Management and governance:** Satisfactory (no impact)
- **Comparable rating analysis:** Neutral (no impact)

Stand-alone credit profile : a-

- **Group credit profile:** a-
- **Entity status within group:** Core (no impact)

Issue Ratings

The short-term rating on LG&E is A-2, based on our issuer credit rating of 'A-'.

Recovery Analysis

LG&E's first-mortgage bonds benefit from a first-priority lien on substantially all of the utility's real property owned or subsequently acquired. Collateral coverage of over 1.5x supports a recovery rating of '1+' and an issue rating one notch above the issuer credit rating.

Related Criteria

- Criteria - Corporates - General: Reflecting Subordination Risk In Corporate Issue Ratings, Sept. 21, 2017
- General Criteria: Methodology For Linking Long-Term And Short-Term Ratings, April 7, 2017
- Criteria - Corporates - General: Methodology And Assumptions: Liquidity Descriptors For Global Corporate Issuers, Dec. 16, 2014
- Criteria - Corporates - General: Corporate Methodology: Ratios And Adjustments, Nov. 19, 2013
- Criteria - Corporates - General: Corporate Methodology, Nov. 19, 2013
- Criteria - Corporates - Utilities: Key Credit Factors For The Regulated Utilities Industry, Nov. 19, 2013
- General Criteria: Group Rating Methodology, Nov. 19, 2013
- General Criteria: Country Risk Assessment Methodology And Assumptions, Nov. 19, 2013
- General Criteria: Methodology: Industry Risk, Nov. 19, 2013
- Criteria - Corporates - Utilities: Collateral Coverage And Issue Notching Rules For '1+' And '1' Recovery Ratings On Senior Bonds Secured By Utility Real Property, Feb. 14, 2013
- General Criteria: Methodology: Management And Governance Credit Factors For Corporate Entities And Insurers, Nov. 13, 2012
- General Criteria: Use Of CreditWatch And Outlooks, Sept. 14, 2009
- Criteria - Insurance - General: Hybrid Capital Handbook: September 2008 Edition, Sept. 15, 2008

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Business And Financial Risk Matrix

Business Risk Profile	Financial Risk Profile					
	Minimal	Modest	Intermediate	**Significant**	Aggressive	Highly leveraged
Excellent	aaa/aa+	aa	a+/a	**a-**	bbb	bbb-/bb+
Strong	aa/aa-	a+/a	a-/bbb+	bbb	bb+	bb
Satisfactory	a/a-	bbb+	bbb/bbb-	bbb-/bb+	bb	b+
Fair	bbb/bbb-	bbb-	bb+	bb	bb-	b
Weak	bb+	bb+	bb	bb-	b+	b/b-
Vulnerable	bb-	bb-	bb-/b+	b+	b	b-

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LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 85

Responding Witness: Daniel K. Arbough

Q-85. Provide the corporate credit and bond ratings assigned to PPL, Louisville Gas & Electric, and Kentucky Utilities since the year 2012 by S&P, Moody's, and Fitch. For any change in the credit and/or bond rating, provide a copy of the associated report.

A-85. The most recent ratings and outlook assigned by S&P and Moody's are provided below. In January 2015, Fitch withdrew its ratings for PPL, LG&E, and KU at the request of the Companies. Please see attached for copies of reports for changes in credit and/or bond rating.

LG&E Credit Ratings

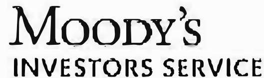
Date	Moody's		S&P		Fitch	
	Issuer/Corp. Credit Rating	Secured Debt Rating	Issuer/Corp. Credit Rating	Secured Debt Rating	Issuer/Corp. Credit Rating	Secured Debt Rating
1/1/2012	Baa1	A2	BBB	A-	A-	A+
1/31/2014	**A3**	**A1**	BBB	A-	A-	A+
1/9/2015	A3	A1	BBB	A-	**Ratings Withdrawn**	
6/1/2015	A3	A1	**A-**	**A**		

KU Credit Ratings

Date	Moody's		S&P		Fitch*	
	Issuer/Corp. Credit Rating	Secured Debt Rating	Issuer/Corp. Credit Rating	Secured Debt Rating	Issuer/Corp. Credit Rating	Secured Debt Rating
1/1/2012	Baa1	A2	BBB	A-	A-	A+
1/31/2014	**A3**	**A1**	BBB	A-	A-	A+
1/9/2015	A3	A1	BBB	A-	**Ratings Withdrawn**	
6/1/2015	A3	A1	**A-**	**A**		

PPL Corp. Credit Ratings

Date	Issuer/Corp. Credit Rating		
	Moody's	S&P	Fitch
1/1/2012	Baa3	BBB	BBB+
1/9/2015	Baa3	BBB	**Ratings Withdrawn**
5/11/2015	**Baa2**	BBB	
6/1/2015	Baa2	**A-**	



Moody's upgrades the ratings of PPL US utility subsidiaries and confirms the rating of PPL Corp. and LKE; rating outlook stable.

31 Jan 2014

Approximately $10.8 Billion of Debt Affected

New York, January 31, 2014 -- Moody's Investors Service today upgraded the ratings of PPL Corporation's US utility operating subsidiaries: the rating of PPL Electric Utilities (PPLEU) was upgraded to Baa1 from Baa2 and the ratings of Louisville Gas & Electric Company (LGE) and Kentucky Utilities (KU) were upgraded to A3 from Baa1. Moody's confirmed the senior unsecured ratings of PPL Corporation (PPL) at Baa3 and of LG&E and KU Energy LLC (LKE) at Baa2. This rating action completes our review of PPL and its regulated operations initiated on November 8, 2013. The outlook for all PPL entities is stable.

The primary driver of today's positive rating action on PPL's US utility operating companies was Moody's more favorable view of the relative credit supportiveness of the US regulatory environment, as detailed in our September 2013 Request for Comment titled "Proposed Refinements to the Regulated Utilities Rating Methodology and our Evolving View of US Utility Regulation."

The review, however, did not result in a corresponding upgrade for the parent holding company PPL because the upgrades of PPL's US regulated utilities, which represent 31% of earnings, did not shift PPL's consolidated credit profile sufficiently. PPL's consolidated financial metrics are also weak for its rating category. LKE did not receive an upgrade because of the high debt level at LKE relative to the consolidated LKE. Moreover, because there is free movement of cash between PPL and LKE, PPL has a constraining effect on LKE's ratings.

RATINGS RATIONALE

The ratings of PPL and its utility subsidiaries are underpinned by regulatory environments that, while they may vary somewhat from jurisdiction to jurisdiction, are generally supportive of utility credit quality and by an energy commodity market that has alleviated some of the pressure on rates generally. Additionally, PPL's rating is reflective of the consolidated credit profile which has been transformed from a heavily merchant commodity driven and regionally focused operation, to a more diversified and mostly rate regulated platform. These positive factors are balanced against financial metrics on a consolidated basis that have been on the lower end of the range for benchmarks established for regulated utilities. As of end of third quarter 2013, PPL's CFO Pre-WC/debt averaged over the past three years is 15.5%, while the benchmark for regulated utilities in the Baa category is between 13% and 22%.

Rating Outlook

The stable outlook for PPL reflects our view that PPL's credit quality has been fortified through the growing share of its regulated business. The stable outlook also incorporates a view that the company's large capital investment will be prudently financed, to include if needed, the issuance of common equity. The unregulated generation assets' cash flow generating capacity is expected to be lower over the next several years but further downsides are moderated by hedging and its declining share to the consolidated cash flow.

What Could Change the Rating -- Up

Potential for upgrade is currently limited by its financial metrics which are weak for its ratings. Upgrade is possible if exposure to unregulated activity continue to decline while cash flow to debt ratio improves 20% or above on a sustained basis.

What Could Change the Rating - Down

While we do not foresee any particular event that would result in a negative rating action, the company's cash flow to debt credit metrics are expected to be weaker going forward due to the declining cash flow coming from its unregulated operations. As a result, the company has a smaller margin of error for a negative rating action.

The principal methodology used in this rating was Regulated Electric and Gas Utilities published in December 2013. Please

see the Credit Policy page on www.moodys.com for a copy of this methodology.

Issuer: PPL Corporation

Outlook revised to stable from RUR-UP

Confirmed:

LT Issuer Rating: Baa3

Pref. Shelf ratings: (P)Ba2

Issuer: PPL Electric Utilities Corporation

Outlook revised to stable from RUR-UP

Upgraded:

LT Issuer Rating to Baa1 from Baa2

Senior unsecured to Baa1 from Baa2

Senior secured to A2 from A3

First Mortgage Bonds to A2 from A3

Preference Shelf to (P)Baa3 from (P)Ba1

Senior Secured Shelf to (P)A2 from (P)A3

Affirmed:

Commercial paper rating of P-2

Issuer: LG&E and KU Energy LLC

Outlook revised to stable from RUR-UP

Confirmed:

LT Issuer Rating: Baa2

Senior unsecured: Baa2

Senior unsecured Self: (P)Baa2

Issuer: Louisville Gas & Electric Company

Outlook revised to stable from RUR-UP

Upgraded:

LT Issuer Rating to A3 from Baa1

Senior unsecured to A3 from Baa1

Senior secured to A 1 from A2

Senior secured Shelf to (P)A1 from (P)A2

Affirmed:

Commercial Paper ratings: P-2

Issuer: Kentucky Utilities Co.

Outlook revised to stable from RUR-UP

Upgraded:

LT Issuer Rating to A3 from Baa1

Senior unsecured to A3 from Baa1

Senior secured to A1 from A2

Senior secured Shelf to (P)A1 from (P)A2

Affirmed:

Commercial Paper rating: P-2

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Research Update:

PPL Corp. Rating Raised To 'A-' From 'BBB' On Improved Business Risk Profile; Stable Outlook

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Research Update:

PPL Corp. Rating Raised To 'A-' From 'BBB' On Improved Business Risk Profile; Stable Outlook

Overview

- U.S. utility company PPL Corp. (PPL) has completed the spin-off of its merchant generation assets leading to a material improvement to the company's business risk profile.
- PPL will now focus on regulated utility operations in the US and the UK.
- We are raising the issuer credit rating on PPL and its U.S.-based subsidiaries to 'A-' from 'BBB' and removing the ratings from CreditWatch with positive implications. The outlook is stable.

Rating Action

On June 1, 2015, Standard & Poor's Ratings Services raised its issuer credit rating on PPL Corp. and its U.S.-based subsidiaries to 'A-' from 'BBB' and removed the ratings from CreditWatch, where they were placed with positive implications on June 10, 2014 . The outlook is stable.

Rationale

PPL has completed the spin-off of its merchant generation assets resulting in sufficient improvement in business risk to move the company's business risk profile to the "excellent" category from "strong". We are raising the issuer credit rating on PPL and its US-based subsidiaries PPL Electric Utilities Corp. (PPLEU), LG&E and KU Energy LLC (LKE), Louisville Gas & Electric Co. (LG&E) and Kentucky Utilities Co. (KU) to 'A-' from 'BBB'.

PPL's "excellent" business risk profile accounts for the company's ownership of solely regulated utility operations, both integrated as well as lower risk transmission and distribution utilities. PPL's regulated subsidiaries benefit from operations under constructive, transparent and generally stable regulatory frameworks and they take full advantage of all constructs available within the respective regulatory framework to consistently earn returns that are close to or at the authorized levels. Moreover, PPL's business risk profile benefits from scale, serving more than 10 million customers in two countries and and two states, and operating and regulatory diversity, although the service territory demonstrates only modest growth.

We assess PPL's financial risk profile as being in the "significant" category using the medial volatility financial ratio benchmarks. Under our base-case scenario, we project that PPL will achieve funds from operations (FFO) to debt of 14% to 15% over the next few years, benefiting from pending rate case decisions and the timely recovery of invested capital, primarily in transmission investments. We anticipate that the company's debt leverage will remain elevated with debt to EBITDA that is

close to 5x, in large part influenced by the capitalization of the U.K. subsidiaries.

Liquidity

We assess PPL's liquidity as "adequate" to cover its needs over the next 12 months. We expect the company's liquidity sources to exceed its uses by 1.1x or more, the minimum threshold for regulated utilities under our criteria, and that the company will also meet our other requirements for such a designation. We expect that PPL's liquidity will benefit from stable cash flow generation, ample availability under the revolving credit facilities, and manageable debt maturities over the next few years.

The PPL group has about $4 billion in revolving credit facilities, with $815 million available at the parent, $300 million available at PPLEU, $500 million available at Louisville Gas & Electric, $598 million available at Kentucky Utilities, and about $1.75 billion available at the U.K. operations. The facilities mature from 2016 through 2019.

Principal liquidity sources:

- Revolving credit facilities totaling about $3.3 billion.
- Cash on hand of about $1.5 billion.
- Cash from operations of about $2.5 billion to $2.7 billion.

Principal liquidity uses:

- Debt maturities of about $2.2 billion, including commercial paper.
- Maintenance capital spending averaging about $2.3 billion.
- Dividends of about $1 billion annually.

Outlook

The stable outlook on PPL and its subsidiaries is based on the company's "excellent" business risk profile that we view at the upper end of the range and "significant" financial risk profile, which is at the lower end of the range. Under our base case scenario we expect that FFO to debt will range from 14% to 15% while debt to EBITDA will remain elevated at about 5x.

Downside Scenario

We could lower the ratings on PPL and its subsidiaries if core credit ratios weaken such that FFO to debt is below 13% and debt to EBITDA exceeds 5x on a consistent basis.

Upside Scenario

Given our assessment of business risk and our base-case scenario for financial performance, we do not anticipate higher ratings during the outlook period. However,

higher ratings would largely depend on PPL achieving FFO to debt of more than 18% on a consistent basis, while maintaining the current level of business risk.

Ratings Score Snapshot

	To	From
Corporate Credit Rating	A-	BBB
Business Risk	Excellent	Strong
Country Risk	Very Low	Very Low
Industry Risk	Very Low	Low
Competitive Position	Strong	Strong
Financial Risk	Significant	Significant
Cash Flow/Leverage	Significant	Significant
Anchor	a-	bbb
Modifiers		
Diversification/Portfolio effect	Neutral	Neutral
Capital structure	Neutral	Neutral
Financial policy	Neutral	Neutral
Liquidity	Adequate	Adequate
Management and Governance	Satisfactory	Satisfactory
Comparable rating analysis	Neutral	Neutral

Related Criteria And Research

Related Criteria

- Criteria - Corporates - General: Methodology And Assumptions: Liquidity Descriptors For Global Corporate Issuers - December 16, 2014
- Criteria - Corporates - Utilities: Key Credit Factors For The Regulated Utilities Industry - November 19, 2013
- Criteria - Corporates - General: Corporate Methodology: Ratios And Adjustments - November 19, 2013
- General Criteria: Methodology: Industry Risk - November 19, 2013
- General Criteria: Group Rating Methodology - November 19, 2013
- Criteria - Corporates - General: Corporate Methodology - November 19, 2013
- General Criteria: Country Risk Assessment Methodology And Assumptions - November 19, 2013
- Criteria - Corporates - Utilities: Collateral Coverage And Issue Notching Rules For '1+' And '1' Recovery Ratings On Senior Bonds Secured By Utility Real Property - February 14, 2013

- General Criteria: Methodology: Management And Governance Credit Factors For Corporate Entities And Insurers - November 13, 2012
- General Criteria: Use Of CreditWatch And Outlooks - September 14, 2009
- Criteria - Corporates - Utilities: Notching Of U.S. Investment-Grade Investor-Owned Utility Unsecured Debt Now Better Reflects Anticipated Absolute Recovery - November 10, 2008
- Criteria - Corporates - General: 2008 Corporate Criteria: Rating Each Issue - April 15, 2008

Ratings List

	Ratings	
	To	From
PPL Corp.		
Corporate credit rating		
Foreign and Local Currency	A-/Stable/--	BBB/Watch Pos/--
Kentucky Utilities Co.		
Corporate credit rating		
Foreign and Local Currency	A-/Stable/A-2	BBB/Watch Pos/A-2
Senior Secured		
Local Currency [#1]	A/A-2	A-/Watch Pos/A-2
Recovery Rating [#1]	1+	1+
Local Currency [#2]	A/A-2	A-/Watch Pos/A-2
Recovery Rating [#2]	1+	1+
Local Currency [#3]	A/A-2	A-/Watch Pos/A-2
Recovery Rating [#3]	1+	1+
Local Currency [#4]	A/A-2	A-/Watch Pos/A-2
Recovery Rating [#4]	1+	1+
SPUR [#4]	A/A-2	A-/Watch Pos/A-2
Local Currency [#5]	A	A-/Watch Pos
Recovery Rating [#5]	1+	1+
SPUR [#5]	A	A-/Watch Pos
Local Currency [#4]	A	A-/Watch Pos
Recovery Rating [#4]	1+	1+
SPUR [#4]	A	A-/Watch Pos

Ratings List Continued...

Local Currency	A	A-/Watch Pos
Recovery Rating	1+	1+
Commercial Paper		
Local Currency	A-2	A-2
LG&E and KU Energy LLC		
Corporate credit rating		
Foreign and Local Currency	A-/Stable/--	BBB/Watch Pos/--
Senior Unsecured		
Local Currency	BBB+	BBB-/Watch Pos
Louisville Gas & Electric Co.		
Corporate credit rating		
Foreign and Local Currency	A-/Stable/A-2	BBB/Watch Pos/A-2
Senior Secured		
Local Currency [#6]	A/A-2	A-/Watch Pos/A-2
Recovery Rating [#6]	1+	1+
Local Currency [#7]	A	A-/Watch Pos/NR
Recovery Rating [#7]	1+	1+
Local Currency [#6]	A	A-/Watch Pos/NR
Recovery Rating [#6]	1+	1+
Local Currency [#7]	A/A-2	A-/Watch Pos/A-2
Recovery Rating [#7]	1+	1+
Local Currency [#6]	A	A-/Watch Pos
Recovery Rating [#6]	1+	1+
Local Currency [#7]	A	A-/Watch Pos
Recovery Rating [#7]	1+	1+
Local Currency	A	A-/Watch Pos
Recovery Rating	1+	1+

Ratings List Continued...

Commercial Paper		
Local Currency	A-2	A-2
PPL Capital Funding Inc.		
Senior Unsecured		
Local Currency[1]	BBB+	BBB-/Watch Pos
Junior Subordinated		
Local Currency[1]	BBB	BB+/Watch Pos
PPL Electric Utilities Corp.		
Corporate credit rating		
Foreign and Local Currency	A-/Stable/A-2	BBB/Watch Pos/A-2
Senior Secured		
Local Currency [#8]	A	A-/Watch Pos
Recovery Rating [#8]	1+	1+
Local Currency [#9]	AA-/Stable	AA-/Stable
Recovery Rating [#9]	1+	1+
SPUR [#9]	A	A-/Watch Pos
Local Currency [#10]	AA-/Stable	AA-/Stable
Recovery Rating [#10]	1+	1+
SPUR [#10]	A	A-/Watch Pos
Local Currency[2]	A	A-/Watch Pos
Recovery Rating	1+	1+
SPUR	A	A-/Watch Pos
Local Currency	A	A-/Watch Pos
Recovery Rating	1+	1+
Commercial Paper		
Local Currency	A-2	A-2

[1] Dependent Participant(s): PPL Corp.

[2] Dependent Participant(s): Ambac Assurance Corp.

[#1] Issuer: Carroll Cnty, OBLIGOR: Kentucky Utilities Co.

[#2] Issuer: Mercer Cnty, OBLIGOR: Kentucky Utilities Co.

[#3] Issuer: Muhlenberg Cnty, OBLIGOR: Kentucky Utilities Co.

[#4] Issuer: Carroll Cnty, INSPRO: Ambac Assurance Corp., OBLIGOR: Kentucky Utilities Co.

[#5] Issuer: Trimble Cnty, INSPRO: Ambac Assurance Corp., OBLIGOR: Kentucky Utilities Co.

[#6] Issuer: Louisville & Jefferson Cnty Metro Govt, OBLIGOR: Louisville Gas & Electric Co.

[#7] Issuer: Trimble Cnty, OBLIGOR: Louisville Gas & Electric Co.

[#8] Issuer: Pennsylvania Econ Dev Fing Auth, OBLIGOR: PPL Electric Utilities Corp.

[#9] Issuer: Lehigh Cnty Indl Dev Auth, INSPRO: National Public Finance Guarantee Corp., OBLIGOR: PPL Electric Utilities Corp.

[#10] Issuer: Lehigh Cnty Indl Dev Auth, INSPRO: MBIA Insurance Corp., INSPRO: National Public Finance Guarantee Corp., OBLIGOR: PPL Electric Utilities Corp.

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MOODY'S
INVESTORS SERVICE

Rating Action: Moody's upgrades PPL Corp. to Baa2 and LKE to Baa1; outlooks stable

Global Credit Research - 11 May 2015

Approximately $ 4.8 billion of debt securities upgraded

New York, May 11, 2015 -- Moody's Investors Service today upgraded the senior unsecured ratings of PPL Corporation (PPL) to Baa2 from Baa3 and its LG&E and KU Energy LLC (LKE) subsidiary to Baa1 from Baa2. At the same time, we have revised PPL Corp and LKE's outlook to stable from positive and revised its PPL Electric Utilities (PPLEU Baa1) subsidiary outlook to positive from stable. The rating actions on PPL and LKE are taken in anticipation that PPL's unregulated subsidiary PPL Energy Supply (Supply; Ba2 stable) will be spun off from PPL on June 1, 2015.

Post spinoff, PPL will have lower business risk because all of its material subsidiaries will be regulated utility companies, leading to an improved credit risk profile. The positive outlook on PPLEU's reflects the continued improvement in Pennsylvania's cost recovery mechanisms as well as the growing share of the transmission operations within PPLEU, which have highly favorable credit characteristics.

Upgrades:

..Issuer: LG&E and KU Energy LLC

.... Issuer Rating, Upgraded to Baa1 from Baa2

....Senior Unsecured Regular Bond/Debenture, Upgraded to Baa1 from Baa2

..Issuer: PPL Capital Funding, Inc.

....Junior Subordinated Regular Bond/Debenture, Upgraded to Baa3 from Ba1

....Senior Unsecured Regular Bond/Debenture, Upgraded to Baa2 from Baa3

..Issuer: PPL Corporation

.... Issuer Rating, Upgraded to Baa2 from Baa3

Affirmations:

..Issuer: PPL Electric Utilities Corporation

.... Issuer Rating, Affirmed Baa1

....Senior Secured First Mortgage Bonds, Affirmed A2

....Senior Secured Regular Bond/Debenture, Affirmed A2

....Senior Unsecured Bank Credit Facility, Affirmed Baa1

....Senior Unsecured Commercial Paper, Affirmed P-2

Outlook Actions:

..Issuer: LG&E and KU Energy LLC

....Outlook, Changed To Stable From Positive

..Issuer: PPL Capital Funding, Inc.

....Outlook, Changed To Stable From Positive

..Issuer: PPL Corporation

....Outlook, Changed To Stable From Positive

..Issuer: PPL Electric Utilities Corporation

....Outlook, Changed To Positive From Stable

RATINGS RATIONALE

PPL's Baa2 rating reflects the low business risk of its US and UK regulated utilities, offset by substantial debt leverage at the parent holding company. The regulated business is characterized by credit supportive regulatory environments and a currently large capital expenditure program across all major subsidiaries, resulting in substantial negative free cash flow and depressed key credit metrics. As a fully regulated business after the spinoff, PPL will have 70% of its earnings and cash flows coming from a networks or transmission and distribution (T&D) platform and 30% from integrated utilities buisness, all of which provide good visibility from a recovery, earnings and cash flow perspective.

PPL's consolidated CFO Pre-WC to debt has ranged in the 15% to 16% for the past three years and is expected to decline to the 13% to 14% range going forward after the spin. PPL's retained cash flow (RCF) to debt has been in the 11% to 12% range for the past three years and is expected to fall to about 9% to 10% going forward. These credit metrics position the company reasonably well relative to the range of 11% to 19% for CFO Pre-WC/Debt and 7% to 15% for RCF/debt for the Baa rating category as a lower risk concern under our Regulated Electric and Gas Utility methodology. We consider National Grid Plc (Baa1 stable) as the closest peer comparison to PPL.

Liquidity

PPL's liquidity is marginally adequate, but not a significant concern given its low business risk profile after the spin. Due to a high level of capital expenditure, we expect PPL to have more than $1.5 billion of negative free cash flow after dividends each year, plus about $1.8 billion of debt refinancing needs over the next eighteen months. While PPL has significant amount of cash on hand ($1.3 billion at the end of the first quarter of 2015), we expect most of this cash to be used to fund upcoming negative free cash flow. After the spin, the primary source of liquidity will be mainly comprised of $4 billion of bilateral and syndicated credit facilities issued by various entities throughout the PPL family. As of the end of first quarter 2015, there was about $2.7 billion of availability remaining out of the $4 billion total.

Outlook

PPL's stable outlook is supported by its strong regulated business operations in the US and UK and our expectation that management will maintain its capital structure with equity issuance as needed in the face of large capital expenditures and pressure to increase dividends.

What Could Change the Rating -- Up

The potential for a rating upgrade is low due to the large upcoming capital expenditure program and high level of holding company debt. However, upward pressure could result should its consolidated CFO Pre-WC/debt rise to the high teens and its RCF/debt rises to the mid-teens.

What Could Change the Rating - Down

The potential for a rating downgrade could occur should the company increase its debt level, especially at the holding company level. A downgrade could also result should its consolidated CFO-Pre WC/debt falls to the low-teens range or its RCF/debt falls to mid-single digits.

The principal methodology used in these ratings was Regulated Electric and Gas Utilities published in December 2013. Please see the Credit Policy page on www.moodys.com for a copy of this methodology.

Company Profile

PPL Corporation is a utility holding company headquartered in Allentown, PA. It has three areas of regulated operations: UK regulated, Kentucky regulated, and Pennsylvania regulated. UK regulated is a pure wires business in the United Kingdom with no retail exposure. Kentucky regulated operates under a traditional integrated utility model. Pennsylvania regulated is comprised of a transmission business, mostly regulated by FERC, and a

distribution operation regulated by the Pennsylvania Public Utility Commission. After the spin, PPL will control or own about 9,000 MW of generating capacity in the US and sell electricity and natural gas to about 10.3 million customers in the US and UK.

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For ratings issued on a program, series or category/class of debt, this announcement provides certain regulatory disclosures in relation to each rating of a subsequently issued bond or note of the same series or category/class of debt or pursuant to a program for which the ratings are derived exclusively from existing ratings in accordance with Moody's rating practices. For ratings issued on a support provider, this announcement provides certain regulatory disclosures in relation to the rating action on the support provider and in relation to each particular rating action for securities that derive their credit ratings from the support provider's credit rating. For provisional ratings, this announcement provides certain regulatory disclosures in relation to the provisional rating assigned, and in relation to a definitive rating that may be assigned subsequent to the final issuance of the debt, in each case where the transaction structure and terms have not changed prior to the assignment of the definitive rating in a manner that would have affected the rating. For further information please see the ratings tab on the issuer/entity page for the respective issuer on www.moodys.com.

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Fitch Withdraws PPL and its U.S. Subsidiaries' Ratings

Ratings Endorsement Policy

09 Jan 2015 3:47 PM (EST)

Fitch Ratings-New York-09 January 2015: Fitch Ratings withdraws the ratings of PPL Corporation and its U.S. subsidiaries for business reasons. A complete list of ratings follows this press release.

For further information, please refer to the Fitch's press release 'Fitch Upgrades PPL Electric to 'BBB+'; PPL Corp's Outlook to Positive; Plans to Withdraw Ratings' dated Dec. 10, 2014.

Fitch withdraws the following ratings:

PPL Corporation
--Long-term Issuer Default Rating (IDR) at 'BBB';
--Short-term IDR at 'F2';
--Rating Outlook Positive.

PPL Capital Funding Inc.
--Senior unsecured debt at 'BBB';
--Junior subordinated notes at 'BB+';
--Rating Outlook Positive.

PPL Electric Utilities Corp.
--Long-term IDR 'BBB+';
--Secured debt at 'A';
--Short-term IDR at 'F2';
--Commercial paper at 'F2';
--Rating Outlook Stable.

LG&E and KU Energy LLC
--Long-term IDR at 'BBB+';
--Senior unsecured debt at 'BBB+';
--Short-term IDR at 'F2';
--Rating Outlook Stable.

Kentucky Utilities Company
--Long-term IDR at 'A-';
--Secured debt at 'A+';
--Secured pollution control bonds at 'A+/F2';
--Senior unsecured debt at 'A';
--Short-term IDR at 'F2';
--Commercial paper at 'F2';
--Rating Outlook Stable.

Louisville Gas and Electric Company
--Long-term IDR at 'A-';
--Secured debt 'A+';
--Secured pollution control bonds at 'A+/F2';
--Senior unsecured debt at 'A';
--Short-term IDR at 'F2';
--Commercial paper at 'F2';
--Rating Outlook Stable.

PPL Energy Supply, LLC.
--Long-term IDR at 'BB';
--Senior unsecured debt at 'BB';
--Short-term IDR at 'B';

--Commercial paper at 'B';
--Rating Watch Negative.

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Additional information is available at 'www.fitchratings.com'.

Applicable Criteria and Related Research:
--'Corporate Rating Methodology' (May 28, 2014);
--'Recovery Ratings and Notching Criteria for Utilities' (Nov. 18, 2014);
--'Parent and Subsidiary Rating Linkage' (Aug. 5, 2013);
--'Rating U.S. Utilities, Power and Gas Companies' (March 11, 2014).

Applicable Criteria and Related Research:
Corporate Rating Methodology - Including Short-Term Ratings and Parent and Subsidiary Linkage
Recovery Ratings and Notching Criteria for Utilities
Parent and Subsidiary Rating Linkage Fitch's Approach to Rating Entities within a Corporate Group Structure
Rating U.S. Utilities, Power and Gas Companies (Sector Credit Factors)

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LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 86

Responding Witness: Daniel K. Arbough

Q-86. Provide the breakdown in the expected return on pension plan assets for Louisville Gas & Electric and Kentucky Utilities. Specifically, provide the expected return on different assets classes (bonds, US stocks, international stocks, etc.) used in determining the expected return on plan assets. Provide all associated source documents and work papers.

A-86. See attached.

EROA Assumption: Illustrative building blocks for pension plans

Component	Equity/Alternatives	FI - Corporate	FI - Treasury
Inflation	2.00%	2.00%	2.00%
Real Risk-free Return	-0.20%	-0.20%	-0.20%
Term Premium	0.70%	0.70%	0.70%
Credit Spread	N/A	0.70%	N/A
Equity Risk Premium	5.50%	N/A	N/A
Total	8.00%	3.20%	2.50%
Asset Allocation	55%	30%	15%
Gross Result	4.40%	0.94%	0.38%
Total		5.72%	
Portfolio Effect		0.50%	
Active Management		0.30%	
Non-investment Expense		-0.30%	
Expected Return from Swaps Portfolio		1.00%	
Net Result		7.22%	
Anticipated EROA Assumption		**7.00%**	

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 87

Responding Witness: Daniel K. Arbough

Q-87. For the past five years, provide the dates and amount of: (1) cash dividend payments made to PPL by Louisville Gas & Electric or Kentucky Utilities; and (2) cash equity infusions made by PPL into Louisville Gas & Electric or Kentucky Utilities.

A-87. All dividend payments from Louisville Gas and Electric Company or Kentucky Utilities Company are made to LKE. Similarly, all cash equity infusions to Louisville Gas and Electric Company or Kentucky Utilities Company are made by LKE. See attached for the amount of these dividends paid and cash equity payments received from LKE.

Payment Date	Summary of Dividends Paid by LG&E to LKE (1)	Summary of Capital Contibutions Paid by LKE to LG&E (2)
3/27/2013	19,000,000	25,000,000
6/27/2013	29,000,000	29,000,000
9/27/2013	19,000,000	-
12/30/2013	32,000,000	32,000,000
Total Paid 2013	99,000,000	86,000,000
3/28/2014	27,000,000	
6/27/2014	33,000,000	53,000,000
9/29/2014	23,000,000	20,000,000
12/30/2014	29,000,000	84,500,000
Total Paid 2014	112,000,000	157,500,000
3/30/2015	23,000,000	-
6/29/2015	35,000,000	20,000,000
9/29/2015	23,000,000	-
12/30/2015	38,000,000	70,000,000
Total Paid 2015	119,000,000	90,000,000
3/30/2016	25,000,000	30,000,000
6/29/2016	36,000,000	17,000,000
9/29/2016	26,000,000	-
12/29/2016	41,000,000	24,000,000
Total Paid 2016	128,000,000	71,000,000
3/30/2017	87,000,000	-
6/29/2017	35,000,000	-
9/28/2017	28,000,000	-
12/28/2017	42,000,000	30,000,000
Total Paid 2017	192,000,000	30,000,000
3/28/2018	34,000,000	-
6/28/2018	47,000,000	43,000,000
9/27/2018	32,000,000	-
Total Paid 2018	113,000,000	43,000,000

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 88

Responding Witness: Daniel K. Arbough

Q-88. Provide the Company's authorized and earned return on common equity for Louisville Gas & Electric and Kentucky Utilities over the past five years. Provide copies of all associated work papers and source documents. Provide copies of the source documents, work papers, and data in both hard copy and electronic (Microsoft Excel) formats, with all data and formulas intact.

A-88. The historical earned return on common equity for Louisville Gas and Electric is calculated in the attachment being provided in Excel format.

Period	Authorized ROE	Case No:
2013 – 6/30/2015	10.25%	2012-00222
7/1//2015 – 6/30/2017	10.00%*	2014-00372
7/1/2017 – present	9.70%	2016-00371

**On June 30, 2015, the KPSC approved a settlement agreement. The settlement did not establish a specific return on equity with respect to the base rates, but an authorized 10% return on equity was determined for the ECR and GLT mechanisms.*

The attachment is being provided in a separate file in Excel format.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 89

Responding Witness: Christopher M. Garrett

Q-89. Provide copies of the financial statements (balance sheet, income statement, statement of cash flows, and the notes to the financial statements) for PPL, Louisville Gas & Electric, and Kentucky Utilities for 2016, 2017, and 2018 (when available). Provide copies of the financial statements in both hard copy and electronic (Microsoft Excel) formats, with all data and formulas intact.

A-89. See Filing Requirement 807 KAR 5:001 Section 16(7)(p) for the integrated 2016 and 2017 Forms 10-K. These documents contain PPL Corporation's, Louisville Gas and Electric Company's, and Kentucky Utilities Company's notes to the financial statements beginning on page 131 of the 2016 Form 10-K and page 136 of the 2017 Form 10-K. The 2017 Form 10-K contains PPL Corporation's (beginning on page 106), LG&E's (beginning on page 125), and KU's (beginning on page 131) financial statements for the past two years. The 2018 Form 10-K will be provided upon its filing with the Securities and Exchange Commission. The Companies do not maintain these statements in Excel.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 90

Responding Witness: Robert M. Conroy

Q-90. Please refer to paragraph 4.5 of the Stipulation and Recommendations in 2016-00370 and 2016-00371.

a. Since the entry of the Order on June 22, 2017 in 2016-00371, has LG&E modified the GLT or made changes to the GLT? If so, please state the changes that have been made.

b. Since the entry of the Order on June 22, 2017 in 2016-00371, have any additional costs been added? If so, please state the amount of the costs, the date the costs were added and the reason for its expenditures resulting in the added costs.

c. Is LG&E seeking any modifications to the GLT in the current case? If so, please state the nature of the modifications.

d. Is LG&E seeking to recover in this case any additional gas line costs with base rates or by inclusion in the GLT? If so, please state the amount of the costs and the nature of the expenditures that led to the costs.

A-90.

a. LG&E has not modified the GLT per the June 22, 2017 Case No. 2016-00371 In Case No. 2018-00057, LG&E filed and the KPSC approved, the annual required application for revised rates to be recovered through its GLT.

b. See Case No. 2018-00057 filing regarding the amount of the costs, the date the costs, and the reasons for its expenditures resulting in the costs.

c. LG&E is not seeking any modification to the GLT in this case.

d. LG&E is not seeking to recover, in this case, of any additional gas line costs by inclusion in the GLT. However, as described on page 66-67 of Mr. Conroy's testimony, LG&E is seeking $120 million in total non-mechanism gas capital expenditures from January 1, 2018 through October 31, 2019.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated November 13, 2018

Case No. 2018-00295

Question No. 91

Responding Witness: Lonnie E. Bellar

Q-91. Please refer to the answers to the Question beginning on line 18, page 56 of the testimony of Lonnie Bellar.

a. Please detail all of the gas safety metrics that LG&E measures.

b. For each such safety measure, please describe the measure, the purpose of it and how each measure is computed.

c. For each such measure, please state LG&E's score for each month from January 1, 2016 – October 2018.

d. Please state what "additional resources" were assigned beginning January 2018, to include but not be limited to the number of personnel by position, salaries of personnel so assigned, and capital or supplies dedicated to the assignment.

e. Please state with specificity the names and number of employees "free[d] up" for emergency orders and specific qualifications required to handle for emergency work.

f. What is R11R and what scale is used?

g. How many recordable incidents were handled by contractors? Why were the recordable incidents higher for employees than contractors?

A-91.

a. The safety metrics used by LG&E are applied across all lines of business including Gas. The Company measures employee safety using the Recordable Illness and Injury Rate (RIIR), Days Away, Restricted or Transferred (DART) rate, and Lost Work-Day Case Rate (LWDCR). The Company measures Contractor safety metrics of RIIR and LWDCR. Additionally, the gas department tracks the Average Emergency Response Time (ERT) and the Response Under 60 minutes.

b. RIIR is determined using the number of work-related injuries and illnesses that meet the general OSHA reporting criteria, defined in 29 CFR part 1904 - Recording and Reporting Occupational Injuries and Illnesses, for the time period of reporting. RIIR is computed by the following formula: ((Number of Recordable Illness and Injury Cases) X 200,000) / (Annual hours worked by all employees) = RIIR

   DART rate is determined using the number of OSHA recordable illness and injury cases that involved days away from work, job transfers, and work restrictions as a result of the illness or injury for the time period of reporting. DART rate is computed through the following formula: ((Number of cases involving days away from work and the number of cases involving job transfers or work restrictions) X 200,000) / (Annual hours worked by all employees) = DART rate

   LWDCR is determined using the number of OSHA recordable illness and injury cases that resulted in lost work-days (time-off work). ((Number of cases involving lost work-days) x 200,000) / (Annual hours worked by all employees) = LWDCR

   Average Emergency Response Time - The average amount of time in minutes, measured from the completion of a potential gas leak report, typically by phone, until a LG&E technician has arrived at the location.

   Response Under 60 - Percentage of ERT orders where the LG&E technician arrived on the scene in under 60 minutes.

c. See attached.

d. Effective January 1, 2018, five (5) incremental contractors were brought in to handle some of the non-emergency orders historically handled by the Gas Trouble Office. Billable rate of $64.66/hr for January, 2018 – March, 2018, $66.28/hr, April, 2018 - October, 2018 (inclusive of labor, truck, equipment, and tools).

e. 13 Trouble Techs, whose shifts overlap those of the contractors in response to (d) above had more availability to respond to emergencies. In addition to the qualifications of those in (d) above, these Trouble Technicians are qualified in leak investigation, emergency response, and carbon monoxide investigations.

f. See the response to part b.

g. For the time period of January 2018 through July of 2018, Gas Distribution contractors experienced one (1) recordable injury. Gas Distribution employees experienced five (5) injuries and illness cases during the same time period; two (2) of those cases were hearing loss cases. LG&E only measures contractor safety performance for work performed on the LG&E system; LG&E contractors may have other incidents, not reported to or measured by LG&E, for work performed off of the LG&E system.

2016	RIIR (YTD for each month)	LWDCR (YTD for each month)	DART (YTD for each month)	Average ERT (minutes)	Response Under 60
January	0.9	0	0	37.9	87.9%
February	0.61	0	0	38.6	84.7%
March	0.91	0.13	0.13	34.4	91.1%
April	0.8	0.09	0.09	35.4	89.2%
May	0.86	0.07	0.14	30.9	93.7%
June	0.97	0.12	0.18	33.5	91.7%
July	0.87	0.1	0.15	31.9	94.0%
August	1.08	0.09	0.23	32.2	93.1%
September	1.13	0.12	0.23	38	86.5%
October	1.09	0.11	0.25	39.5	85.3%
November	1.12	0.13	0.35	42	81.3%
December	1.12	0.15	0.35	41.4	81.1%
2017	RIIR	LWDCR	DART	Average ERT	Response Under 60
January	0.46	0	0.46	39.3	84.8%
February	1.02	0.41	0.81	42.9	83.1%
March	1.03	0.23	0.57	37.8	84.8%
April	1.33	0.18	0.53	38.9	84.4%
May	1.28	0.14	0.5	34	90.3%
June	1	0.24	0.47	33	91.6%
July	1.13	0.31	0.51	31.6	93.8%
August	1.04	0.27	0.45	35.1	88.3%
September	1.05	0.31	0.5	36.3	88.2%
October	0.98	0.28	0.46	38.6	83.0%
November	0.96	0.26	0.48	36.3	88.4%
December	0.97	0.27	0.53	36.9	87.0%
2018	RIIR	LWDCR	DART	Average ERT	Response Under 60
January	0.92	0	0.46	31.2	93.1%
February	1.21	0	0.4	32.1	92.1%
March	1.02	0.11	0.57	30.4	94.6%
April	1.92	0.09	0.44	33	91.0%
May	1.55	0.07	0.35	29.7	95.6%
June	1.46	0.12	0.35	29.9	95.3%
July	1.42	0.1	0.36	31	93.4%
August	1.36	0.09	0.34	30.8	93.4%
September	1.26	0.08	0.31	31.5	92.7%
October	1.45	0.21	0.41	35.4	90.1%

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 92

Responding Witness: Lonnie E. Bellar

Q-92. Please refer to the answer to the Question on line 10 of page 57 of Mr. Bellar's testimony.

a. Please attach a copy of the SIMP.

b. What is the implementation status of each recommendation in the SIMP?

c. What incremental expenditures have been made as a result of the implementation of the recommendations in the SIMP?

d. What additional recommendations in the SIMP have yet to be implemented; when will they be implemented; and what are the incremental costs of those yet to be implemented recommendations.

e. Are all of the storage facilities referred to a part of LG&E's distribution system? If not, please state which storage facilities are part of the distribution system and which are not. Please state the location, name, and capacity of all of LG&E's natural gas storage facilities.

f. Please provide the citation to the new PHMSA regulations referred to at page 57, line 14.

g. Please provide the citation to the pending Plastic Pipeline Rule and its effective date. What is being tested in Phase 1 by LG&E and in general what are the requirements in Phase 1.

h. What are the services described in Phase 2 in line 10, page 58 of Mr. Bellar's testimony?

i. For each of the inspection tools described beginning at line 17, please describe the function of each tool and state when each became fully operational.

j. Are the transmission pipelines described throughout Mr. Bellar's testimony part of LG&E's distribution system?

A-92.

a. See attached copy of SIMP plan.

b. SIMP program status:
   1) Written SIMP Plan & procedures development - complete
   2) Well Control Contingency Plan development- complete
   3) Risk model development - complete
   4) Initial risk assessment - complete

c. Incremental SIMP expenses incurred:
   1) SIMP program, procedures, and risk model development – $168K
   2) Well control contingency plan development – $37K
   3) Initial SIMP program implementation - $201K
   4) PHMSA gas storage safety assessment fees (2017-2018) – $229K

d. SIMP program initiatives:
   1) SIMP program implementation – underway, one group leader and two storage specialist positions added to support program, incremental 2019 budget (O&M):
      a. Group leader - $73K
      b. Storage specialist #1 - $78K
      c. Storage specialist #2 - $78K
   2) Storage well integrity inspections – under implementation, 2019 budget (O&M) increase over 2018 projected costs - $527K

e. LG&E's storage facilities are part of the gas distribution system. List of storage facilities (fields), locations, and capacities provided below:
   1) Center Storage Field, Metcalfe/Green/Barren Counties Kentucky, Total Capacity 5.1 billion cubic feet.
   2) Doe Run Storage Field, Meade County Kentucky and Harrison County Indiana, Total Capacity 5.8 billion cubic feet.
   3) Magnolia Upper Storage Field, Hart/Green/Larue Counties Kentucky, Total Capacity 6.0 billion cubic feet.
   4) Magnolia Deep Storage Field, Hart/Green/Larue Counties Kentucky, Total Capacity 4.4 billion cubic feet.
   5) Muldraugh Storage Field, Meade County Kentucky, Total Capacity 4.6 billion cubic feet.

f. Federal Register Notice – "91860 Federal Register / Vol. 81, No. 243 / Monday, December 19, 2016 / Rules and Regulations".

g. See the response to AG 1-21(a) and (b). LG&E is testing the application and associated devices (barcode scanner and GPS device) to capture the information on the plastic components. Phase 1 is intended to implement the application and began capturing plastic component information electronically for mains and associated services installed at the time the main is installed.

h. The services in Phase 2 refers to gas services that are installed not at the time the main is installed.

i.
1) Geometry - Identifies changes in the pipeline cross-sectional shape such as dents, wrinkle bends and buckles and identifies physical features such as wall thickness, bends, alignment and location. Technology first available in early 1980s, LG&E first used this technology in mid-2000s.
2) Axial Magnetic Flux Leakage - Utilizes changes in magnetic flux to identify internal and external metal loss features and some pipe manufacturing defects oriented in the circumferential direction. Technology first available in early 1980s, LG&E first used this technology in mid-2000s.
3) Circumferential Magnetic Flux Leakage - Utilizes changes in magnetic flux to identify internal and external metal loss features, pipe manufacturing defects, narrow features like gouges and some cracks that are oriented in the longitudinal direction. Technology first available in 2002, LG&E first used this technology in 2014.
4) Electromagnetic Acoustic Transducers - Utilizes electro-magnetic acoustic energy to identify coating disbondments and crack-like features. Technology first available in 2006, LG&E first used this technology in 2018.
5) Pipe Grade Sensors - Determines pipe grade and determines properties used for grouping pipe of similar properties. Technology first available in 2016, LG&E first used this technology in 2018.

j. Yes

Integrity Management Program

For Underground Gas Storage

As Required by:

49 CFR 192.12
Gas Storage Integrity Management

Effective January 18, 2018

Prepared By:
EN Engineering

Storage Integrity Management Plan

Revision 0 – Effective 1/18/18

Revision 1 –	
Section	Comments

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1.0 COMPANY OVERVIEW

Headquartered in Louisville, Kentucky, Louisville Gas and Electric Company (THE COMPANY) delivers natural gas to more than 321,000 residential, commercial and industrial customers within the Louisville Metropolitan/Jefferson County, Kentucky area.

In 1838, investors formed Louisville Gas and Water to provide gas-fired street lighting mandated by Louisville's city fathers to deter crime. The company sold gas from its local coal plant to fuel the gaslights. In 1842, the company dropped plans to build a waterworks and changed its name to Louisville Gas. In 1890, Louisville Gas amended its charter to buy stock in electric companies, and it acquired control of Louisville Electric Light. In 1913, through the merger of Louisville Gas, Louisville Lighting (founded in 1903) and Kentucky Heating, Louisville Gas and Electric Company (THE COMPANY or the Company) was formed.[1]

THE COMPANY's current gas storage system is comprised of 5 Underground Gas Storage Fields that contain 450 storage wells. These Underground Gas Storage fields support THE COMPANY's system gas supply requirements.

[1] http://www.lge-ku.com/about_lge.asp

2.0 SCOPE

Code Requirement: §192.12 No later than January 18, 2018 a gas storage operator must develop and implement an integrity management program that includes a written integrity management plan.

The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) amended the Federal Pipeline Safety Regulations on December 19, 2016.

The purpose of the SIMP program is to address critical safety issues related to downhole facilities, including wells, wellbore tubing, and casing at underground gas storage facilities. This written Storage Integrity Management Plan applies to underground gas storage fields operated by THE COMPANY in Kentucky and Indiana in depleted gas reservoirs and aquifer reservoirs. Gas storage fields includes wellhead valves and fittings, well casing, well tubing.

This plan does not cover pipelines, gas conditioning and liquid handling, compressors, and ancillary facilities associated with gas storage. Nor does it cover storage fields in abandoned salt caverns. The exclusion of pipelines in this paragraph is specific to the following:

Gathering lines – pipelines and associated facilities that transport gas from a current production facility to a transmission line or main. THE COMPANY does not operate any gas production wells therefore does not operate any gathering lines.

Transmission lines – pipelines and associated facilities, other than a gathering line, that:

(1) transports gas from a gathering line or storage facility to a distribution center, storage facility, or large volume customer that is not down-stream from a distribution center;

(2) operates at a hoop stress of 20 percent or more of the specified minimum yield strength; or

(3) transports gas within a storage field.

3.0 PURPOSE AND OBJECTIVES

The purpose of the SIM program is to enhance safety by monitoring and verifying the functional integrity of THE COMPANY's underground storage fields. This SIM Plan was developed and customized to meet THE COMPANY's unique operating characteristics.

Activities described within this document conform with the practices outlined in American Petroleum Institute Recommended Practice 1171 "Functional Integrity of Natural Gas Storage in Depleted Hydrocarbon Reservoirs and Aquifer Reservoirs" (API 1171).

4.0 COMPANY ROLES & RESPONSIBILITIES

The Gas Control and Storage department will have the responsibility of implementing and executing requirements within this SIM plan, specifically, threat and hazard identification, risk assessment, evaluation and ranking, preventive and mitigative measures to address risks, monitoring results, evaluating effectiveness, periodic evaluation, reporting results, and documenting and retaining records. All procedures identified in the SIM plan will be coordinated by the Gas Storage Reservoir Services group as delegated by the Director Gas Control & Storage unless otherwise specifically indicated within the procedures.

The implementation of measures to address risk will be the responsibility of THE COMPANY'S Gas Control and Storage Department and/or employee to whom the applicable company OM&I assigns the responsibility.

Title	Responsibilities	Job
Director, Gas Control & Storage	• Ensure compliance with federal gas safety requirements CFR Part 192.12 "*Underground Natural Gas Storage Facilities*"	• Provide resources and funding for storage compliance program • Ensure overall compliance program meets regulatory requirements.
Group Leader, Gas Storage Reservoir Services	• Direct development and implementation of the compliance program including policies, procedures, and practices to comply with federal gas safety requirements CFR Part 192.12 "*Underground Natural Gas Storage Facilities*"	• Review/update compliance plan and procedures • Establish metrics to monitor compliance activities • Allocate resources to meet compliance requirements • Assure compliance tasks are completed by compliance date(s)
Engineer - Gas Storage Reservoir Services Specialist	• Maintain knowledge of the system • Identify Threats • Evaluate and rank risk(s) of the Storage System • Identify and implement measure to address risk(s) • Measure Performance • Monitor Results • Evaluate Effectiveness • Periodic Evaluation	• Calculate Performance Measures • Perform Effectiveness evaluations • Evaluate the results • Review the written plan • Report Performance Measures

Title	Responsibilities	Job
Engineer- Integrity Management	• Identify Threats • Evaluate and rank risk(s) of the Storage System	• Perform risk calculation(s) • Calculate Performance Measures • Report Performance Measures

5.0 DEFINITIONS

The definitions provided in 49 CFR, §191.3 and §192.3 shall apply to this Storage Integrity Management (SIM) Plan. The following additional definitions and acronyms may also apply to this plan.

Annulus: Space between well bore and casing or between different casings

API: American Petroleum Institute

BOP: Blowout Preventor

GIS: Graphical Information System

IADC: International Association of Drilling Contractors

Master Valve: Valve connecting well head to gas storage well production casing or tubing string

NOAA: The U.S. National Oceanic and Atmospheric Administration

P&M: Preventive and Mitigative

PHMSA: The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration.

Pipeline: All parts of those physical facilities through which gas moves in transportation, including pipe, valves, and other appurtenances attached to pipe, compressor units, metering stations, regulator stations, delivery stations, holders, and fabricated assemblies (reference §192.3).

Risk: A relative measure of the likelihood of a failure associated with a threat and the potential consequences of such a failure.

Risk Model: The integration of facility data, operational data, SME input, and established algorithms to estimate the relative risk associated with a gas storage system.

SME: Subject Matter Expert. An SME is an individual who is judged by the operator to have specialized knowledge or relevant information based on their experience, expertise, or training.

Storage Integrity Management Program Files: Operator records, databases, and/or files that contain either material incorporated by reference in the Appendices of the SIM Plan or outdated material that was once contained in the SIM Plan Appendices but is being retained in order to comply with record keeping requirements.

SSV: Surface Safety Valve

SSSV: Subsurface Safety Valve

UGS: Underground Gas Storage

USGS: The U.S. Geological Survey Department.

Wellhead: The system of spools, valves and assorted adapters that provide control of a gas storage well and connections to storage field pipelines for injection/withdrawal operations, connections to test/service a gas storage well.

Wireline: A general term used to describe well-intervention operations conducted using single-strand or multistrand wire or cable for intervention in oil or gas wells. Although applied inconsistently, the term commonly is used in association with electric logging and cables incorporating electrical conductors. Similarly, the term slickline is commonly used to differentiate operations performed with single-strand wire or braided lines

6.0 REFERENCES

Company Gas Operation, Maintenance, & Inspection Manuals (OM&I) contain company procedures gas pipeline and gas storage facilities. Company OM&Is found in Table 1 were developed in conjunction with this SIM plan.

Policy Number	OM&I Name
Maintenance	
GOMI-SO-MA-001	Hydrogen Sulfide Testing
GOMI-SO-MA-002	Biocide Application
GOMI-SO-MA-003	Blowdown of Drips
GOMI-SO-MA-004	Checking Annular Pressure
Operations	
GOMI-SO-OP-001	Open Close Well
GOMI-SO-OP-002	Inspection of Active Wells
GOMI-SO-OP-003	Inspection of Plugged Wells
GOMI-SO-OP-004	Well Logging
GOMI-SO-OP-005	Pressure MIT of Casing
GOMI-SO-OP-006	Weight Loss Coupon Installation
Reservoir	
GOMI-SO-RS-001	Back Pressure Testing
GOMI-SO-RS-002	Inventory Verification
Well Work	
GOMI-SO-WW-001	Site Preparation for Well Work
GOMI-SO-WW-002	Drilling New Well
GOMI-SO-WW-003	Cementing Casing
GOMI-SO-WW-004	New Well Completion
GOMI-SO-WW-005	Care and Handling of Casing and Tubing
GOMI-SO-WW-006	Pulling or Installing Well Tubing
GOMI-SO-WW-007	Perforating
GOMI-SO-WW-008	Killing a Gas Storage Well
GOMI-SO-WW-009	Setting and Retrieving a Bridge Plug
GOMI-SO-WW-010	Casing Patch
GOMI-SO-WW-011	Well Casing Liner Installation
GOMI-SO-WW-012	Plugging Wells
GOMI-SO-WW-013	Acidizing Wells
GOMI-SO-WW-014	Lubricator Setup
GOMI-SO-WW-015	Removing Spent Acid

Table 1: Storage Operations OM&I

The documents listed in Table 2 are company plans, procedures, and/or policies that may be applicable for gas storage facilities.

Document Number	Document Name
GAOP-GN-001	DOT RSPA PART 199 (GAS) Random Drug Testing Pool Control Procedure
GOM&I-CC-AC-001	Atmospheric Corrosion
GOM&I-FM-003	Recordkeeping/Maps of Facilities
GOM&I-GN-SR-001	Safety Related Condition Reports

GOM&I-P0-05	Damage Prevention
GOM&I-PO-EC-001	External Corrosion Control
GOM&I-PO-EC-003	External Corrosion Control- Electric Isolation
GOM&I-PO-IC-001	Internal Corrosion Control
GOM&I-PO-IF-001	Investigation of Failures
GOM&I-PO-PA-001	Patrolling
GOM&I-PO-PE-001	Public Education
GOM&I-PO-RM-01	Remedial Measures
GOM&I-PO-VM-001	Valve Inspection and Maintenance
Not Applicable	Emergency Response Plan
Not Applicable	Operator Qualification Plan
Not Applicable	Public Awareness Plan

Table 2: Company Plans, Policies, and/or Procedures

7.0 Asset Identification / Engineering Characterization

The intent of this procedure is to create and maintain a thorough, accurate, and complete inventory of gas storage assets. Storage field assets include the reservoir itself, individual wells, the casing and/or tubing system, all associated wellhead equipment and valves. Well and reservoir characterization will be based on original completion data. This asset information will be the foundation for future evaluations as well as trending analyses.

7.1 Timelines / Frequency

THE COMPANY anticipates completing its initial characterization of assets based on readily available records by January 18, 2018. Additional record searches, digitization, and compilation is expected to continue during ongoing storage field operations. Once all assets have been inventoried, THE COMPANY may perform an annual review to ensure any new, modified, or removed assets have been captured.

7.2 Asset Identification

THE COMPANY will identify and characterize its storage field assets including but not limited to injection/withdrawal wells, observation wells, water disposal wells, and shale withdrawal wells.

7.3 Well Map

THE COMPANY will maintain a well map for each of its storage fields. The map may include the following information for each well, if available:

- Location
- Well type (injection/withdrawal, observation, water disposal, shale withdrawal)
- Status (active, temporarily abandoned, and permanently plugged)
- Reservoir detail (formation, caprock depth(s), structural contours / isopach)
- Construction details (depth, casing depths, cement, valves)

7.4 Storage Field Maps

In addition to well maps, storage field maps of each active storage field may be created and maintained to store pertinent, available information such as:

- Well location & type
- Storage pipelines with nominal sizes, reducers, tees, etc.
- Mainline / Isolation valves
- Blowdown risers
- Processing and water removal equipment such as filter-separators, drips dehydration, compressors, etc.
- Metering points
- Pigging facilities
- Cathodic Protection (CP) system groundbeds, rectifiers, test stations (if applicable)

7.5 Reservoir Characterization

THE COMPANY will consider the quantity and type of records available for this characterization. As applicable additional testing/monitoring or data gathering may be performed. Reservoir data for THE COMPANY's Storage fields is located in company electronic files and paper files. The storage field maps are stored electronically in a GeoGraphix mapping program.

If results of this reservoir characterization indicate potential mechanical integrity issues or other potential threats, further investigation or mitigation may be undertaken. Refer to Sections 11.0, 12.0, and 13.0 of this plan.

7.5.1 Reservoir Data Collection

For existing reservoirs, data collection may be limited to historical records which could be supplemented if/when new wells are developed within the reservoir. Reservoir analyses performed at the time of field development may be used and supplemented with data covering the life span of the field from initial development through current operation. Data sources to be considered when available include:

- Historical well performance
- Well and Field pressures
- Drilling data & logs
- Fluid samples

- Cores & cuttings from both hydrocarbon & water wells
- Survey data such as seismic, gravity, and/or magnetic surveys

For development of new reservoirs, refer to Section 8.1 of this document.

7.5.2 Geologic Analysis

THE COMPANY will maintain a geologic map and analysis for each of its storage fields. The geologic characterization will be use to establish/reconfirm the vertical and areal buffer zone necessary to protect reservoir integrity and maintain performance of the storage field.

The scope of the geologic assessment includes evaluation of the following anomalous features, where available and may include other characteristics where appropriate:

- Extent of the porous rock interval (reservoir)
- Storage lease boundary and buffer zone boundary
- Confinement/sealing mechanisms used to contain hydrocarbon accumulation
- Characterization of the structural trap

The above information will be presented as a geologic map and analysis. The analysis scope will include the reservoir itself, adjacent areas, and other applicable features, if available. For new facilities the following information will be gathered from historical records, field testing, or a combination of two. For existing facilities, available records will be utilized. Data to be considered in the analysis includes but is not limited to:

- Reservoir rock and sealing mechanism(s)
- Lithology
- Porosity
- Permeability
- Reservoir sealing mechanism(s)
- Vertical interval above and below the reservoir
- Areas where gas could potentially migrate (i.e. saddles, faults, etc.)
- Areas adjacent to the reservoir to which gas could migrate or become entrapped
- Location of wells – active or abandoned

- Underground wastewater disposal wells
- Mining or other industrial activities
- Surface topography and land use, as applicable

7.5.3 Pore Fluid Analysis

THE COMPANY will review and/or characterize the pore fluid chemistry data for each of its active storage field reservoirs. This characterization will incorporate available historical records including but not limited to reservoir development studies, drilling completion records (vertical and/or offset wells) and well stimulation records.

The following properties of the pore fluids will be considered when available:

- Chemical properties – review for compatibility issues, impurities which could affect gas quality (i.e. above tariff limits)
- Physical properties
- Corrosive potential of fluids – determine corrosion management strategy as applicable
- Drilling or treatment chemicals used (or anticipated to be used) – review for compatibility
- Initial and current reservoir pressure

7.5.4 Reservoir Pressures & Containment

THE COMPANY will create maximum pressure limit documentation for each of its storage fields and retain this information as the historical documented design basis. Source information for this documentation may include original design studies and simulations as well as historical operating records.

Prior to developing new reservoirs, THE COMPANY will document the design basis for maximum reservoir pressure. The maximum reservoir pressures will be available within THE COMPANY's gas storage files.

Existing well completions may be evaluated for containment assurance by reviewing operation volumes, pressures, and flow rates. The results of this evaluation will be documented and saved in THE COMPANY's gas storage files. Where connectivity with another porous zone is indicated, the review will also address mitigation methods employed such as: gas migration control, gas recovery, zonal control, pressure limitations, and expansion of the reservoir buffer zone.

7.5.5 Operational Data Review

THE COMPANY evaluates operational data from existing storage fields to determine interaction between the storage operation and the rock-fluid system of the reservoir as well as indications of possible mechanical integrity issues at existing wells. Data evaluation may include the following where available:

- Initial versus current reservoir pressure may be evaluated on an annual basis. For existing facilities with unknown or limited initial reservoir pressure data, trending and comparison may be based off historical levels
- Instances of anomalous pressures or hydrocarbons may be evaluated on a routine basis
- Water well test data – for new reservoirs baseline groundwater data may be taken for comparison and trending. Baseline groundwater data is not available for existing facilitates
- Individual well data may include:
    - Flow rates
    - Pressures
    - Fluid collection volumes

7.6 Well Characterization

Once asset records have been collected and compiled. THE COMPANY will conduct a thorough review to characterize each well. The intent of this review is to make a preliminary assessment of mechanical integrity, verify suitability for intended design, and protection of reservoir integrity. This characterization may serve as a preliminary risk assessment and be used as an input for the Threat Identification process. Refer to Section 9.0 of this plan.

7.6.1 All Wells

Priority may be given to characterizing active injection/withdrawal wells. Items to be considered for each well include:

- Casing – materials, configuration, set depths, & integrity
- Cement – materials, placement depth, surface return notes, quality
- Location – nearness to populated dwellings, roads
- Open flow capacity of the well

7.6.2 Plugged & Abandoned Wells

For plugged and abandoned wells, the plugging practices used may also be addressed in the review. Prior to plugging and abandonment contact the Kentucky Department of Mines and Minerals or Indiana Department of Natural Resources[2]. The Gas Storage Reservoir Services group will prepare a plugging affidavit and submit to the appropriate state agency. A copy of the plugging affidavit will be stored permanently in the well file. The state inspector reviews and approves the well plugging plan and may elect to be on-site during the process.

Refer to Section 10.0 regarding continual monitoring of plugged and abandoned wells. The intent is to determine whether plugging method was sufficient to prevent fluid migration. Factors to be considered include but are not limited to:

- Plugging materials
- Plug placement

The plugging and abandoning processes are not considered complete until the jurisdictional authority issues a satisfactory inspection report.

7.7 Records Used

Original hard copy records for each field and well are retained in THE COMPANY's files. In order to facilitate the asset identification process and to ensure accessibility of information, pertinent records may be digitized and key information captured in an electronic format. This file will then be used for risk assessment/prioritization and selection of preventive & mitigative measures.

[2] Indiana Department of Natural Resources for wells located in Indiana. Kentucky Department of Mines and Minerals for wells located in Kentucky.

8.0 Baseline Engineering Analyses

Baseline Engineering Analyses are performed prior to and during development of a new storage field reservoir or well. This section describes typical and required analyses that are performed. Going forward these analyses will be documented and retained for all new reservoirs.

8.1 Reservoir Engineering Analyses

For development of new reservoirs, THE COMPANY along with geologic or other consultants will evaluate and characterize the reservoir throughout the design phase. Additional data collection is performed as needed and incorporated into the reservoir characterization. Data sources to be considered are the same as described in Section 7.5 above.

THE COMPANY's design will address alternative geological characterizations that are consistent with the data and will also include plans for mitigating integrity issues associated with potential alternative interpretations.

The Gas Storage Reservoir Services group will evaluate anomalous geologic features in terms of their potential for compromising reservoir integrity with respect to the containment of stored gas. Such features may include faulting, natural fracturing, folding, cap rock quality, saddle points and unconformities.

All records associated with storage field Design Basis are documented and retained at the East Service Center.

8.2 Well Engineering Analysis & Permitting

Well design from site selection to drilling design, completion, and commissioning is strictly regulated. Wells may be used for injection/withdrawal, observation, or disposal. Each type may have specialized design requirements. THE COMPANY complies with all applicable local, state, and federal requirements for any new or re-purposed wells.

Permitting process and the anticipated duration will be agreed upon and accounted for in the overall project schedule. THE COMPANY will account for any contingencies such as data requests, public comment period, etc. that may extend the permit process.

8.2.1 Site Location

Prior to drilling any new wells, the Gas Storage Reservoir Services group will evaluate suitable sites. Considerations include but are not limited to:

- Location within the reservoir's geologic formation (estimated depth, production capabilities, etc.)
- Distance from existing underground structures (THE COMPANY or third-party wells, aquifers, etc.)
- Distance to homes and/or buildings
- Distance to roads, railroads, navigable waterways, etc.
- Land and mineral rights availability
- Land use of surrounding area; future / planned use of land in surrounding area
- Accessibility for drilling and completion as well as operations

When new wells are to be added to existing reservoirs, THE COMPANY analyzes gas storage operational records to confirm suitability. This may include review of water well test data (for depleted gas reservoirs with a water drive), review of reservoir data to determine if characterization consistent with field findings. THE COMPANY may determine whether additional data gathering is needed prior to or during construction. Supplemental reports are also retained for the life of the well.

8.2.2 Well Drilling & Completion Design

THE COMPANY may utilize third-party contractors to assist in well design and completion. In such cases, designs will be in accordance with THE COMPANY standard practices which meet or exceed regulatory permit requirements. These may include but are not limited to:

- Maximum Pressure Determination - Wellhead and wellhead equipment rated to withstand maximum expected pressure
- Casing Design – Casing of sufficient size and strength to maintain well integrity and perform effectively. Considerations include:
    - Both axial and bi-axial stresses
    - Collapse and burst strength
    - Potential flow velocity for likely conditions (dry gas versus wet or particle-laden flow) when sizing to limit the potential for flow erosion

    - API 5C3 "Technical Report on Equations and Calculations for Casing, Tubing, and Line Pipe Used as Casing or Tubing; and Performance Properties Tables for Casing and Tubing" guidance
    - Subsequent drilling operation needs
- Cement casings
- Tubing and Packer assemblies
- Shut-off valves to allow monitoring of annulus pressure
- Surface or Subsurface Safety Valves (SSV or SSSV) to maintain control of well at all times to prevent release or discharge of gas or fluids

In addition to downhole considerations, well design parameters will take into account the impacts of the intended operating pressure range on the following:

- Facility flow erosion
- Hydrate potential
- Fluid disposal capability
- Impact of operating pressure range on corrosive potential of fluids in the system
- Interaction with adjacent wells which may operate at different pressures and flow rates

8.3 Drilling & Completion Process

Drilling, completion, and testing of wells are performed by a qualified contractor under the guidance of THE COMPANY's Gas Storage Reservoir Services group. Separate third-party vendors are typically utilized for each task. No work may commence until the permit application has been approved. Refer to applicable GOMI procedures for more detailed information. After wells are drilled and open hole logging is complete, casing is set and cemented in place in accordance with the process outlined in the permit application. The Gas Storage Reservoir Services group along with Storage Field Personnel and third-party contractors obtain cement bond logs for newly constructed or cased wells prior to commissioning as part of the permitting process.

Data recorded during the drilling and completion process is retained for the life of the well and incorporated into applicable databases and file structures.

9.0 Risk, Threats, and Data

THE COMPANY is developing a risk analysis process which will be used to prioritize well/reservoir assessments, monitoring, and Preventative & Mitigative (P&M) measures. This section serves to describe how data is collected and how threats are to be analyzed in order to develop this risk analysis process.

9.1 Risk Assessment Process Development

THE COMPANY is developing, implementing, and documenting a program to manage risk. Threats and hazards as outlined in API 1171 are considered. This program standardizes risk analysis based on the estimation of the likelihood of occurrence and potential severity of the consequences associated with an occurrence. Additionally, THE COMPANY is actively developing and implementing preventative, mitigative, and monitoring processes in order to reduce the likelihood of occurrence and/or severity of consequences related to threats. This also requires periodic review and reassessment of these processes to maintain reservoir and well integrity.

9.2 Data Collection

THE COMPANY has created an inventory list of active and plugged wells based available original hard copy records for each field and well. Key data collected from the individual documents were incorporated into an asset list as well as the LGE Storage Risk Model. A gap analysis of the records inventory can provide THE COMPANY with information to determine which documentation and corresponding key data is missing from each individual reservoir or well.

9.2.1 Records Digitization, Retention, & Data

THE COMPANY's Gas Storage Reservoir Services group will ensure that available original hard copy records are scanned and digitized. These records are to be kept updated and consistent in Company records for the life of THE COMPANY's wells and reservoirs. For further details on the record keeping, see Section 15.

Upon the determination of the most critical documents and key data, this information is then populated into the records for Gas Storage, and is maintained in accordance with any new or changing data provided by additional records.

The data entered within the Gas Storage files will be maintained by THE COMPANY's Gas Storage Reservoir Services group or designee to ensure the accuracy of the information. This data will serve as a resource in order to track threats, risk, and P&M measures.

9.3 Threats

THE COMPANY's Gas Storage Reservoir Services group has identified potential threats and consequences that could impact storage wells and reservoirs, these are shown and described within the "***Risk Assessment Development Guide***". THE COMPANY has built a threat analysis document utilizing criteria from API 1171 Table 1 "Potential Threats and Consequences". THE COMPANY's threat analysis is located within the ***LGE Storage Field Risk Model*** spreadsheet. At their discretion, THE COMPANY has chosen to incorporate additional threats to the matrix based on site-specific assessments. Sections below identify the threats, associated subtypes, descriptions, common indicators and potential consequences deemed applicable to gas storage by THE COMPANY's Gas Storage Reservoir Services group.

9.3.1 Well Threats

THE COMPANY has identified the following threats related to the wells:

Well Integrity

Improperly sealed storage wells can lead to gas containment failure. There are several unique threats that can lead to potential issues involving well integrity and gas containment including but not limited to casing corrosion, cement bond failure, material defect, surface valve failure, subsurface valve failure, and wellhead equipment failures. Common documentation that may show indications of these issues are casing inspection logs, cement bond logs, maintenance records, and discovering the same issues with similar wells. The potential consequences of these well integrity threats include loss of stored gas inventory, damage to well site facilities and equipment, safety hazard to company personnel and the public, loss of use of water source and/or wells, and the decrease or loss of field performance.

Well Design

In cases of inadequately completed wells, inadequately sealed/plugged well(s), failure of cement, or inadequate pressure rating of components it is possible to have gas containment failure from the well. These problems may occur when designing or performing work on new wells, existing wells, and plugged & abandoned wells. They are often indicated through maintenance records and issues with similar wells. When these issues arise, they bring the possibility of release of gas to the atmosphere, loss of stored gas inventory, damage to well site facilities and equipment, safety hazard to company personnel and the public, loss of use of water source and/or wells, and the decrease or loss of field performance.

Well O&M Activities

The presence of threats during operation and maintenance activities are most likely to be present in cases of inadequate procedures, failure to follow procedures, inadequate training, and inexperienced personnel and/or supervision. These issues can occur during normal well operations, well shut-in, and well work over. Possible presence of these issues can be seen by reviewing past incidents, near misses, lessons learned, QA audits, root cause analysis, and length of service & training records. The potential consequences of the threats involved with O&M activities are loss of stored gas inventory, damage to well site facilities and equipment, safety hazard to company personnel and the public, loss of use of water source and/or wells, and the decrease or loss of field performance.

Well Intervention

Instances of well intervention that have the potential to create a gas containment failure are drilling, reconditioning, stimulation, logging, and other downhole work.

Well intervention entails the potential consequences of damage to drilling rig or service rig, loss of tools in wellbore, hazard to operator and service company personnel on well site, safety hazard to public, decrease or loss of field performance, and potential loss of the well.

Third-party Damage

Third-Party damage may be intentional or unintentional, such as vandalism, terrorism, and moving objects (e.g. cars, farm equipment). Common indicators of the likelihood of third-party damage include the proximity of well to roadways or farm fields, population, site security, barriers, and a historical evidence of vandalism. When this third-party damage occurs it can potentially come with several consequences including of loss of ancillary facilities, well on/off status changes, impact to service reliability, and an impact on neighboring public/storage gas loss.

Outside Force/Natural Causes

There are several weather and ground movement related issues that can be caused by heavy rain or flooding, lightning, earth movement/seismic, ground water table changes, and subsidence deposits. The chances of these events occurring are often indicated by NOAA climate data, FEMA floodplains, USGS databases, state testing information, soil type testing, and known occasions of reduced accessibility due to poor ground conditions. The occurrence of these nature related incidents can bring along the potential consequences of damage to facilities and an impact to service reliability.

9.3.2 Reservoir Threats

THE COMPANY has identified the following threats related to the reservoir:

Third-party Damage

When either intentional or unintentional damage to the reservoir caused by a third party occurs, it can create threats/hazards that vary depending on the type of work being performed. There is potential for damage during drilling, completion, and workover work in or near the reservoir. It can also occur as a result of production, injection or disposal operations at third-party wells within the proximity of the reservoir.

Drilling into, through, or adjacent to the storage reservoir could result in loss of containment. Damage can also occur. The potential consequences of this threat/hazard includes the decrease in field performance (both working gas cycling and deliverability), loss of stored gas inventory, safety hazard if pressure rating of production facilities are not as high as storage pressure, inability to meet design performance requirements, and damage to third-party/public property and personnel.

Geological Uncertainty

Geological circumstances or events, that may be unknown to THE COMPANY, can create additional threats to the reservoir. There are various geological events that have the potential to affect a reservoir. One event that can create a threat/hazard is the uncertainty of extent of the reservoir boundary. In order to determine whether the boundary is known or not, the original reservoir records will be reviewed and compared to operational data to determine if it supports the original records. The likely consequences of this includes gas migration beyond control of storage wells, behavior of field under storage operations different than under production that could result in storage gas loss, the inability to meet design performance requirements, and possible damage to third-party/public property and personnel.

Also, when there is expansion, contraction, and migration due to operations this could result in the inability to meet design performance requirements and loss of stored gas inventory. Some indicators that may be able to show this is occurring are inventory checks to find loss of gas and periodic monitoring that may find gas in unexplained locations.

Additionally, the failure of caprock can cause vertical gas migration, likely during testing phase, initial activation, or when initial pressure is exceeded that could result in gas migration into willower zones including water sources. Additionally, this can lead to the loss of stored gas inventory and within an existing field the potential abandonment or requirement of re-cycling facilities. This is issue

can also be discovered through inventory checks to find loss of gas and periodic monitoring that may find gas in unexplained locations.

Outside Force/Natural Causes

When there is ground movement and weather related incidents caused by heavy rain or flooding, lightning, earth movement/seismic, ground water table changes, and subsidence deposits, it can become a threat/hazard to the reservoir. The chances of these events occurring are often indicated by NOAA climate data, FEMA floodplains, USGS databases, state testing information, and soil type testing. With the occurrence of these events there can be potential consequences such as damage to facilities and an impact to service reliability.

Fluid Compatibility Issues

It is possible that the storage reservoir can become contaminated through foreign fluids. This contamination can occur from wellbore damage caused by drilling and completion fluids, water/chemical floods, H2S generating bacteria, stored gas quality, etc. Other indications that this threat/hazard could possibly be present is the consideration of the proximity to other wells, the proximity to groundwater table, and unusual liquid production. The potential consequences of this contamination includes internal corrosion that could result in a degradation to field performance (both working gas cycling and deliverability) and the need for well and/or pipeline repairs.

Reservoir Connectivity

When developing a new reservoir, THE COMPANY Gas Storage Reservoir Services group will analyze the field to determine if there is connectivity from a reservoir to another porous zone. If this can be accommodated without loss of functional integrity, then the design will address gas migration control & containment risk mitigation methods. The methods used for new wells may include but are not limited to gas recovery, pressure limitations, zonal control, and expansion of the vertical and lateral dimensions of the buffer zone. This analysis for new wells will be part of the state permitting evaluations.

9.3.3 Surface Threats

THE COMPANY Gas Storage Reservoir Services group has identified the following threats related to the surface:

Third-Party Damage

Third-party damage to the surface is instances when there is intentional or unintentional damage that is likely present when there is vandalism, terrorism, and moving objects such as cars, trucks, farm equipment, etc. The common indicators that these things may occur near a well/reservoir are proximity to roadways or farm fields, site security, barriers, and historical evidence of vandalism.

These threats can lead to the loss of ancillary facilities, well on/off status changes, impact to service reliability, and impact to neighboring public/storage gas loss.

Surface encroachments including buildings/roadways/structures construction, cathodic protection current, power line current and overhead wires, expansion of park lands, mining, and flood control dams, etc. Typical indicators of these potential treats includes proximity to these various surface encroachments in addition to CP survey readings, CP isolation, power line loads, modeling results, and state permit records. These types of work at the surface of a well/reservoir can lead to the potential consequences of the inability to access, operate, or maintain facilities, complete facility abandonment, and reduced ability to site additional wells and facilities due to setback restrictions.

Outside Force/Natural Causes

Weather and ground movement events can present a threat/hazard to the surface of a well/reservoir site and are often by heavy rain or flooding, lightning, earth movement/seismic, ground water table changes, and subsidence deposits. The chances of these events occurring can be indicated by NOAA climate data, FEMA floodplains, USGS databases, state testing information, and soil type testing. When these events are present they can bring along the potential consequences of damage to facilities and an impact to service reliability.

9.4 Risk Analysis

THE COMPANY will develop and implement a standardized risk assessment process including, but not limited to:

- Identification of threats
- Evaluating likelihood of events and associated consequences
- Determining risk ranking to develop P&M measures
- Providing ability to obtain data feedback and validation
- Perform periodic evaluation to update information and evaluate effectiveness of applied inspection/assessment methods

Upon the collection and population of threat information for each reservoir and well, the risk model will calculate a risk score that includes the likelihood and consequence of each threat for each well, reservoir, and surface. Refer to ***Risk Model Detailed User Guide*** for additional information on the storage risk model.

9.4.1 Gap Analysis / Risk Evaluation

THE COMPANY has completed an initial gap analysis and preliminary threat identification to determine the threats, and their associated consequences, that are most likely to have an effect on THE COMPANY's wells and reservoirs. Refer to the "***Risk Assessment Development Guide*"** for more detailed threat information.

THE COMPANY has developed a risk analysis ranking methodology found within "***Risk Assessment Development Guide*"**. In creating this risk analysis, THE COMPANY consulted with subject matter experts familiar with either general gas storage knowledge or with specific knowledge of LG&E's storage fields to ensure that it has been built in a logical fashion.

Additionally, LG&E's Sr. Gas Storage Specialist will maintain a consistent process that defines the data to be reviewed, data trending or normalization in regards to the risk assessment, as well as any other conditions that may require an evaluation at shorter frequency.

LG&E has defined performance measures that are to be used to monitor and to be reviewed in determining if risk management or P&M measures need to be modified. This review and reassessment of risk will be done by a multi-disciplinary team, as appointed by LG&E.

9.5 Risk Output

The prioritization of additional assessments and reassessments, as outlined in Section 11.1.1, are to be established in consideration of the determined risk level. This section also applies to standard monitoring frequencies, which may become varied based upon the determined risk.

The well and/or reservoir locations with threats/hazards present that warrant preventive and mitigative measures are also chosen using this risk output, refer to Section 13 for more information on these measures. LG&E's Sr. Gas Storage Specialist is to confirm that the appropriately chosen prevention and mitigation is in place at the designated well/reservoir.

The Sr. Gas Storage Specialist will document the risk outputs and reasoning for all assessments, monitoring, and P&M measures and will also document physical feasibility of assessment, type of data to be collected during assessments, reassessment timing, etc.

9.6 Periodic Evaluation

Storage Operations personnel shall submit any new or change to existing information to Sr. Gas Storage Specialist. Data may include but not limited to assessments, monitoring, inspections, repairs and implementation of preventive and mitigative measures.

The Sr. Gas Storage Specialist reevaluates threats and updates the risk model on a periodic basis to account for new information collected. Any new information collected will be documented annually. During this review, there are considerations given to lessons learned reviews and industry events that have taken place within the current review year. Incorporating these items into the review allows LG&E to forecast additional threats and risks that may have an effect on wells/reservoirs.

Additionally, there will be a full reassessment of threats and the risk model performed every five years. LG&E utilizes the updated threats and risk model results to prioritize and update assessments, additional monitoring, and P&M measures for the year.

10.0 Routine Monitoring

LG&E performs routine monitoring at each of their natural gas storage fields. Routine monitoring includes techniques to monitor the reservoir, injection/withdrawal wells, observation wells, third party activity in the vicinity of the reservoir, and corrosion.

LG&E performs routine monitoring in a manner that documents findings, protects workers, protects members of the public and protects the environment from safety hazards. Refer to Section 20 for additional information on environmental and safety considerations.

10.1 Surface/Subsurface Safety Valve Systems & Wellhead Isolation Valves

THE COMPANY has formalized its inspection program to evaluate the condition and operability of existing surface and subsurface safety valve systems, as well as existing wellhead isolation valves. The inspection will be conducted per an approved procedure in which Storage Operations personnel close and reopen the valve. Storage Operations personnel inspect each master valve and isolation valve on an annual basis, for proper function and ability to isolate well. At the same time, field personnel perform a visual inspection on the aboveground equipment associated with the wellhead. THE COMPANY tracks completion status of routine activities with an electronic work management system.

If subsurface safety valves are incorporated into current or future well designs, THE COMPANY Storage Operation Personnel will manually test safety valves at defined intervals. These tests may be scheduled in conjunction with testing of surface valves. Storage Operations personnel document the inspection and notify the Gas Storage Reservoir Services group of any issues. Storage Operations personnel will notify the Gas Storage Reservoir Services group of any valves deemed not fully functional. Refer to Section 12 for remediation practices.

10.2 Well Pressure

THE COMPANY performs field shut-in tests to confirm reservoir inventory on a semi-annual basis. These are typically performed at the end of withdrawal season (May/June) when the reservoir gas inventory is low and again at the end of injection (October/November) when the reservoir gas inventory is high if operationally feasible.

Storage Operations personnel measure pressure readings at selected Injection/Withdrawal, observation and disposal wells weekly to monitor the integrity of casing. Selected wells have been used as historical monitoring points for the storage field. In addition, all wells are monitored as part of the semi-annual shut-in test process. For wells that have packer, pressure between the casing and

tubing is tested as well as between casing strings. Back pressure testing may also be performed periodically as applicable. Storage Operations personnel provides weekly and semi-annual pressure readings to the Gas Storage Reservoir Services group. This pressure data is maintained in Gas Storage Reservoir Services files.

The tubing and casing injection pressures and volumes for all UIC wells (i.e. disposal wells) are documented on "Quarterly Report of Operations" to the state regulatory agencies. Records are kept at Muldraugh storage field.

10.3 Leak Patrols / Leak Surveys

THE COMPANY performs annual leak survey of transmission pipelines and gas storage wellheads and considers the following when determining leak detection technology to be utilized:

- Detection limits for natural gas or liquids
- Response time, reproducibility
- Accuracy
- Distance from source
- Background lighting conditions
- Geography
- Meteorology

This survey is performed annually using instrumented leak detection equipment through a combination of aerial surveys, walking surveys, and mobile surveys (e.g. utility vehicle); If a leak is observed at the wellhead, Storage Field Operations Personnel will report the leak to the Gas Storage Reservoir Services group.

Leaks associated with the well or wellhead will be isolated and evaluated to determine the most effective remediation method per Section 12.0. Leaks associated with the storage transmission pipelines will be repaired per applicable O&M procedure.

10.4 Third Party / Encroachment

State permits and easement/storage agreements specify the operator's rights for ingress, egress and mutual setback distances from wells, structures, etc. Per state regulatory agencies, operator and local producers are required to participate in the permitting process.

When notified of proposed wells or underground facilities in the vicinity of the storage field, THE COMPANY's Gas Storage Reservoir Services group will analyze if the proposed well/facility could adversely affect THE COMPANY's storage reservoir. THE COMPANY may communicate concerns regarding the proposed well/facility with the state regulatory agencies per Section 18.

Storage Field Operations Personnel communicate with landowners and tenants in the vicinity of THE COMPANY's storage fields and take note of any activities that occur near the storage field. This information is communicated to the Gas Storage Reservoir Services group, when warranted.

11.0 Assessments / Physical Tests & Inspections

This section provides techniques utilized for periodic assessments of well mechanical integrity to ensure safety and operability. State and federal regulatory agencies define the intent of Mechanical Integrity Test (MIT) as “a test to determine if there is a significant leak in the well’s casing, tubing, or mechanical isolation device, or if there is significant fluid movement into an underground source of drinking water through vertical channels adjacent to the wellbore.”

11.1 Assessment/Inspection Program

Various assessment/inspection technologies are available to assess the well conditions. Tests can be run separately or in conjunction with one another. THE COMPANY utilizes third party contractors to perform assessments in a manner that protects workers, protects members of the public and protects the environment from safety hazards. Refer to Section 20 for additional information on environmental and safety considerations.

11.1.1 Prioritization

THE COMPANY has implemented a rotating casing inspection schedule. THE COMPANY will develop a formal assessment/inspection plan to prioritize the wellhead inspections. Wellheads that are included in this schedule include:

- Injection/withdrawal Wells
- Shut-in Wells
- Temporarily Abandoned Wells
- Waiting-on-completion and Suspended Operations Wells
- Disposal Wells

LG&E may elect to coordinate assessments with other well work in an effort to reduce the number of well interventions.

11.2 Assessment / Inspection Selection

The Sr. Gas Storage Specialist will select appropriate technology(ies) based on well configuration, results of prior assessments, and risk factors identified for each well. Test methods include the following:

- Mechanical Integrity Test (MIT) – Casing Inspections
  - Gauge rings
  - Calipers
  - MFL
  - Sonic/ Ultrasonic
  - Temperature
  - Noise
- Subsurface Mechanical Condition Surveys (e.g. Cement Bond Log)
- Reservoir Inspection
  - Gamma ray / neutron
  - Resistivity
  - Tracer
- Mechanical Integrity Test (MIT) – Pressure Test

Multiple tools may be selected and combined and utilized during the same inspection to minimize the number of well interventions, if feasible. As technology continues to improve, an alternative tool may be selected with approval.

11.2.1 Mechanical Integrity Test (MIT) – Casing Inspection

The Gas Storage Reservoir Services group will select the appropriate inspection tool(s) that is best suited for the well and intended purpose of inspection. Through-casing or through-tubing tools are considered depending on well configuration. Tool(s) can be used to examine casing internal and external surfaces, concentricity, and/or formations. THE COMPANY plans to use MFL logs and Gamma-Ray Neutron logs to inspect wells.

11.2.2 Subsurface Mechanical Condition Surveys

THE COMPANY utilizes subsurface mechanical condition surveys (i.e. cement bond inspection) to evaluate the cement conditions which will prevent zonal communication. While these inspections are conducted during the completion and commissioning process; THE COMPANY can also utilize this tool to assess the cement condition for an existing well. Logs are maintained for the life of the well.

11.2.3 Reservoir Inspection

The Gas Storage Reservoir Services group may select an inspection tool(s) to analyze the reservoir conditions at particular wells and thereby obtain information about the reservoir. Through-casing or through-tubing tools are considered based on well configuration.

11.2.4 Mechanical Integrity Test (MIT) – Pressure Test

LG&E may conduct a hydrostatic pressure test at each wellhead in conjunction with a casing inspection tool to detect well leaks and test the integrity of flanged / thread connections at wellheads.

11.3 Work Plans and Inspection

The Gas Storage Reservoir Services group will establish a work plan prior to perform the assessments / inspections of a storage well and inclusive components such as downhole valves. The work plan will be provided to and reviewed with the contractor prior to project kick-off. All work plan details and schedules are subject to enhancement based upon any change in and/or LG&E's risk analysis of each field, area in the field, and well as determined on a case by case basis following federal and state laws. Refer to GOMI for details of workover procedures.

The qualified contracting personnel under the guidance of the LG&E Sr. Gas Storage Specialist performs the inspection of the casing and well components.

Detailed work plan for well operations requiring well entry are determined on a case-by-case basis. Such work may include wireline/slickline, logging operations, well testing, and well workover /remediation.

11.4 Inspection Results

Upon inspection completion, the contractor provides the inspection results to the Sr. Gas Storage Specialist. The Sr. Gas Storage Specialist will analyze inspection results and compare with casing design specifications, current conditions, and expected future conditions and service. Based on the results, the Sr. Gas Storage Specialist will determine if remediation is necessary and if the planned re-inspection frequency is sufficient to ensure integrity of the casing until the next scheduled assessment. Refer to Section 12.0 if inspection results meet remediation criteria.

12.0 Remediation

LG&E takes prompt action to addresses indications and anomalies discovered through routine monitoring, inspections and assessments. This section discusses criteria and timeframes for evaluation and remediation.

12.1 Root Cause Analysis

When an abnormal condition indication is observed during routine monitoring, inspections or assessments, Storage Operations personnel or Contractor will notify the Sr. Gas Storage Specialist.

Abnormal condition indications observed during monitoring may include, but not limited to:

- Unanticipated pressure readings
- Leak survey indications
- Unexplained gas loss

The Sr. Gas Storage Specialist will determine whether a formal root cause analysis is warranted. Alternatively LG&E may perform additional tests and/or review historical and current data trends to characterize and adequately remediate the indication. The Sr. Gas Storage Specialist will use these results or formal root cause analysis to develop an action plan. LG&E may choose to perform the following as part of the root cause analysis or action plan:

- Perform monitoring to determine scale of issue (long or short term)
- Perform inspection (i.e. pressure test, temperature / noise log)
    - Visual inspection may identify an issue with the tubing and/or collars
    - Noise logs / temp logs can be used as diagnostic tool to locate leaks due to damaged collar or tubing
    - Pressure Test may be performed to identify packer seal issues
- Review historical data (i.e. pressure logs, cement bonds logs)

LG&E may also elect to plug and abandon wellhead in lieu of performing additional testing.

12.2 Response

LG&E's decision to perform and timing of well remediation will consider severity of the condition as well as the threats and risk associated with the location. Remediation method(s) are specific to the

location and mechanism. Some common failure mechanisms and corresponding remediation examples are shown in the table below:

Affects	Mechanism	Actions to be Considered
Tubing	Collar Leak	Replace collar and/or tubing joint(s)
	Observed pressure exceeding threshold between tubing and casing	Replace packer
Casing	Observed unexpected pressure during test	Cement squeeze
	Metal loss greater than threshold	Install liner or casing patch - may not be feasible for small diameter casing. Plug well
Surface and Subsurface	Leaking or won't fully close	Valve repair or replacement
Reservoir	Gas migration	Drawing down reservoir pressure or strategically controlling injection and withdrawal rates at key wells over subsequent cycles. Install gas recovery wells

12.2.1 Actions to Address Specific Findings

Upon determination of remediation required, an action plan will be developed by the Gas Storage Reservoir Services group. This action plan will document the justification, supporting documentation, and notification requirements and timeline for the remediation selected.

In the case where remediation may not be feasible immediately, a temporary action may be necessary to ensure safety.

Prior to well work activities, the Gas Storage Reservoir Services group confirms the crew has the appropriate qualifications per Section 17.2.

Section 19.1 provides guidance for actions during an emergency.

THE COMPANY will perform remediation activities in a manner that protects workers, protects members of the public and protects the environment from safety hazards. Refer to Section 20 for additional information on environmental and safety considerations.

12.3 Remediation Time

THE COMPANY will determine the response time associate with the remediation action plan. Specialist will incorporate industry guidance and regulatory requirements when determining whether remediation is required prior to the next scheduled MIT. This may be determined by the following:

- Wall loss percentage
- Predicted failure pressure
- Engineering assessment

12.4 Remediation Effectiveness

LG&E may perform additional test to verify the remediation technique selected was successful in repairing the anomaly. Testing may include the following:

- Cement bond log
- Annular pressure survey
- Open and close subsurface safety valve
- Well production comparison (i.e., well performance or pressure-transient testing)
- Gas Replace collar / tubing joint if gas is not

12.5 Documentation

LG&E will retain all remediation records in the Gas Storage files. Documentation may include but not limited to the following:

- Action plan
- Cementing reports
- Type of equipment used and location in well
- Well logs
- Workover and recompletion reports

13.0 Preventive and Mitigative Measures

Preventive and Mitigative (P&M) measures are implemented in order to reduce the likelihood of failure or reduce the consequences of a potential failure. P&M measures are selected in regard to a specific threat or threats. They may be implemented programmatically for all fields or on a case-by-case basis for particular well site location(s). Design elements or monitoring activities implemented above and beyond current code requirements may be considered P&M measures.

P&M measures described in the subsequent paragraphs need not be implemented for every location.

13.1 P&M Selection Process

Once identified threats and risk scores have been verified each year during the annual review, LG&E will consider threats with the highest relative risk scores for additional P&M measures. Only P&Ms applicable to the threat type or subtype to be addressed will reduce the threat score. An effective P&M measure will reduce either the likelihood or consequence factor thereby reducing risk.

P&M measures will be selected through consultation between the Sr. Gas Storage Specialist and Director Gas Control & Storage. Refer to Section 4 for definition of responsibilities.

Refer to "***Risk Assessment Development Guide***" for a matrix of P&M Measures relative to each threat or hazard.

13.2 Reservoir P&Ms

13.2.1 Geologic Uncertainty P&Ms

Well owners within each state are subject to state regulations regarding the drilling and operation of both production and storage wells. The permitting process covers several of the possible P&M measures recommended by API 1171. These include:

- Collect & review existing regional geological studies & data
- Collect geological, geophysical & reservoir data on existing wells in/adjacent to the storage field
- Establish buffer zone (vertical & horizontal) with governing agency & update as necessary
- Acquire property & mineral rights

LG&E operates observation wells across its five storage fields. All storage fields are mature and no additional observation wells are planned at this time. If necessary in the future, LG&E may develop a

process for siting new observation wells. Injection/withdrawal wells no longer performing at desired level may be converted to observation wells without a formal selection process.

LG&E conducts semi-annual inventory tests at each of its storage fields. This routine monitoring can act a preventive measure through early detection of any gas migration.

Additional testing (besides that required by Section 10 or 11) may be conducted as P&M measure when deemed suitable by the Sr. Gas Storage . This additional testing may be prompted by indications of possible gas migration, leaks or contamination during routine monitoring.

THE COMPANY complies with state regulatory regulations regarding plugging and abandoning wells. Currently there is no process for re-visiting previously plugged & abandoned wells to verify containment. THE COMPANY will develop a review process consisting of both records review and field visits where deemed appropriate.

13.2.2 Fluid Compatibility P&Ms

Fluid compatibility with the reservoir rock is considered during initial reservoir development and well permitting process.

THE COMPANY will develop or formally document processes for gas sampling to monitor gas quality and composition on an annual basis.

THE COMPANY may also consider conducting internal corrosion studies. Such studies would in turn be used to evaluate whether and which type of internal corrosion mitigation may be effective. THE COMPANY may collect wellbore produced fluids and/or solids, when feasible. Samples obtained are to be sent in for laboratory analysis. THE COMPANY may also collect annular and packer fluids and send in for laboratory analysis, when feasible, to determine the corrosion potential for that particular well.

13.2.3 Third Party Damage

The state regulatory permitting process discussed in Section xxx above also reduce the likelihood of third party damage from other underground activities. These include:

- Requirements for production wells to incorporate design features to isolate the storage horizon during drilling, completion, stimulation, and production.
- Access and observation during drilling, completion & production phases for wells with potential to impact storage reservoir

- Notifications of drilling & mining activity through permit process
- Vertical and lateral buffer zone requirements

THE COMPANY supports the state regulatory activities regarding storage wells and attends hearings as appropriate, particularly for hearings on proposed rule changes. Both the Gas Storage Reservoir Services group and Environmental departments receive and review state regulatory notices to determine whether the proposed action will potentially affect THE COMPANY.

THE COMPANY may consider collecting gas samples when communication between reservoirs or migration from the reservoir is suspected.

If third party damage is deemed to pose an immediate concern and other measures have been exhausted, THE COMPANY may pursue legal action such as condemnation, enjoinment, or acquisition of third party wells & mineral rights.

13.2.4 Reservoir Connectivity

Observation wells along perimeter of the reservoir enable THE COMPANY to monitor for unanticipated changes in pressure. In addition, THE COMPANY performs shut-in inventory test semiannually. Reservoir connectivity issues could be indicated if volumes vary significantly from expected values based on injection and withdrawal rates. THE COMPANY

13.3 Well P&Ms

13.3.1 MIT Casing Inspection Program

LG&E has maintained an ongoing program for monitoring casing condition of its injection/withdrawal wells with casing inspections performed on an approximate 12 year interval. As a P&M measure THE COMPANY may adjust the inspection frequency and/or perform a more comprehensive suite of complementary assessment methods based on the results of the Risk Analysis.

13.3.2 Plugged & Abandoned Well Procedures

THE COMPANY abandons and installs permanent markers for all plugged and abandoned wells in accordance with state regulatory guidance and regulations. For locations where the casing is cut and capped below grade, Electronic Marker Systems (e.g. marker balls) are installed above the capped well but below grade a sufficient depth to not disrupt surface activities such as farming. There is currently no provision for continual surveillance of previously plugged wells.

13.3.3 Plugged & Abandoned Well Surveillance

THE COMPANY will implement a survey of all known plugged and abandoned wells in its existing Storage fields to confirm gas containment. This survey will be conducted by Storage Operations personnel. Subsequent inspections of all known plugged and abandoned wells within the existing storage fields operated by THE COMPANY will be scheduled based on Risk Analysis.

If leak survey indicates gas is not fully contained, additional testing to confirm findings may be performed. Remediation up to or including reworking and re-plugging may be performed at the discretion of the Gas Storage Reservoir Services group.

13.3.4 Cathodic Protection (CP) Monitoring

At this time THE COMPANY does not apply cathodic protection (CP) systems to its gas storage wells. Corrosion control personnel or contractors maintain and monitor CP systems for its storage field pipelines and facilities which are typically isolated at the well head assembly. Downhole casing can be affected by adverse current flows associated with CP. Corrosion control personnel or contractors will periodically evaluate potential for interference currents. This evaluation may be based on risk or results of an MIT.

THE COMPANY evaluates tubular integrity and identifies defects caused by corrosion or chemical or mechanical damage per Section 11.2.

13.3.5 Internal Corrosion Monitoring

THE COMPANY's internal corrosion monitoring program includes MIT – Casing Inspections.

The COMPANY annually performs field tests and laboratory tests on fluids produced and captured during withdrawal at drips, low points on pipelines or other locations upstream of any processing or dehydration equipment. Laboratory analysis can identify composition of the fluid which in turn can be correlated to corrosivity and/or scaling tendencies. Currently, THE COMPANY treats the wells showing evidence of bacterial action with biocide downhole once a year between the withdrawal and injection seasons. Effectiveness of the biocide is evaluated through periodic monitoring liquid removed from drips within the storage pipeline system. As a P&M measure to address corrosion threat, THE COMPANY may elect to inject chemical treatment on a more frequent basis and/or during downhole activities such as well stimulation.

THE COMPANY evaluates tubular integrity and identifies defects caused by corrosion or chemical or mechanical damage per Section 11.2.

13.3.6 Valve Inspection & Maintenance

THE COMPANY has an ongoing maintenance and inspection program for valves and other equipment. Refer to monitoring Section 10.1 for further guidance. Valves are operated, inspected and maintained at least once per year.

13.3.7 Well Completion Design Standards

When proposing any new wells, the Gas Storage Reservoir Services group will review THE COMPANY design standards against current industry best practices, particularly those noted in API 1171. Prior to drilling, THE COMPANY's design standards will be updated accordingly. Such design standards will meet or exceed state regulatory requirements.

THE COMPANY designs new wells for full-diameter entry to the wellbore. Drilling and completion design may be developed by an outside contractor with specialized experience. THE COMPANY's Gas Storage Reservoir Services group will specify to the contractor casing type, size, and grade, tubing and packer, wellhead assembly configuration, and associated valves (e.g. isolation valves, surface safety valve (SSV), subsurface safety valve (SSSV)) as necessary.

13.3.8 Subsurface Safety Valves

THE COMPANY's Gas Storage Reservoir Services group will evaluate the need for emergency shutdown valves at new well locations. Existing wells, particularly those near population centers will be evaluated based on risk to determine whether an SSSV would be warranted as P&M measure. These evaluations and modifications would typically be performed in conjunction with a planned MIT assessment. Existing Well Functional Integrity

The Gas Storage Reservoir Services group will review results of historical and ongoing downhole well testing against completion records and well design features. If analysis shows trends for a particular well configuration or vintage, this information will be incorporated into THE COMPANY's risk assessment. As a P&M measure, the Gas Storage Reservoir Services group may recommend remediation or additional/more frequent monitoring of wells with similar characteristics.

13.3.9 Procedures

THE COMPANY will develop procedures for Operations & Maintenance activities specific to storage field operations. These procedures will be implemented across all storage fields. Procedure development will be the joint responsibility of the Gas Storage Reservoir Services group Department and Director Gas Control and Storage as applicable with the assistance of third-party contractors.

THE COMPANY provides high-level procedures to contract personnel and reviews the contractors' drilling and well servicing procedures prior to work being performed.

THE COMPANY Storage Operations personnel operate and maintain facilities from the wellhead up. Qualified contractors are employed to perform any downhole activities.

13.3.10 Training and Safety Programs

THE COMPANY Storage Operations personnel are operator qualified for applicable covered pipeline tasks. Storage-specific activities which are not covered tasks are generally trained based on operating procedures and guidelines. Ultimately THE COMPANY may develop a formal gas storage training curriculum which would be overseen and tracked by the Training & Safety Department but conducted by personnel experienced in performing said tasks.

For third-party contractors performing downhole work, THE COMPANY reviews a copy of their training and safety programs prior to contracting work. Work will be conducted with the more stringent of either THE COMPANY or the contractor's written procedures.

Safety records as well as applicable project experience are considered when awarding projects.

THE COMPANY reviews Contractor safety data on an annual basis to ensure contractors meet THE COMPANY's safety standards and remain eligible to work.

13.4 Surface P&Ms – Outside Force Threat

13.4.1 Routine Patrols

Storage Operations personnel conduct routine aboveground surveys on an annual basis per

Section 10.

13.4.2 Post-Event Patrols

Aboveground leak surveys will be conducted as soon as practicable of a significant outside force event. Such events include but are not limited to:

- Subsidence or liquefaction reported
- Flooding
- Lightning strikes affecting the wellhead, aboveground equipment, measurement or control instrumentation associated with the well or wellhead

- Seismic activity (earthquake) greater than magnitude 5.0 or VI on the Modified Mercalli Intensity scale.

Magnitude	Typical Maximum MMI	Modified Mercalli Intensity Scale Description[3]
5.0 - 5.9	VI – VII	**VI.** Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight. **VII.** Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
6.0 - 6.9	VIII - IX	**VIII.** Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. **IX.** Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
7.0 and higher	X or higher	**X.** Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. **XI.** Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly. **XII.** Damage total. Lines of sight and level are distorted. Objects thrown into the air.

Lightning strikes affecting measurement of control instrumentation or cathodic protection equipment, may also warrant additional testing of the power, communication, or cathodic protection system. This determination will be made by Storage Operations Personnel and/or THE COMPANY's Corrosion Personnel.

13.4.3 Design Standards

Where appropriate, THE COMPANY will design new wellhead and pipeline locations to withstand flooding earth movement, river/stream bed movement, and other outside or weather-related forces. As applicable design features may be incorporated such as:

- Barriers to deflect flood debris
- River/stream crossings of sufficient depth to be unaffected by bed movement (e.g. directional drilled or bored crossings)
- Access to seasonally flooded locations
- Lightning arrestors on electronic equipment such as rectifiers or remote valve/equipment

[3] Adapted from USGS Earthquake Hazards Program Magnitude/Intensity Comparison. http://earthquake.usgs.gov/learn/topics/mag_vs_int.php

controllers

13.4.4 Site-Specific Plans

For areas deemed at high risk for outside force, THE COMPANY may elect to modify existing wellhead, pipeline, or facility layout to address known problems associated with flooding, earth movement, and other weather-related causes.

These mitigation measures may involve retrofit to new design standards as discussed in Section 8.2 or a unique design tailored to the specific location and threat being addressed. The Gas Storage Reservoir Services group with input from the Director Gas Control and Storage is responsible for design and construction.

13.4.5 Monitoring

THE COMPANY's Storage Operations personnel will monitor areas prone to flooding or earth movement after significant weather events. In addition to / in lieu of leak surveys, a patrol of the area will note any washouts or pipe/equipment exposure and report changes to the Gas Storage Reservoir Services group..

13.4.6 Remote Control Capabilities

For areas with seasonally unstable soil conditions or which are prone to flooding, remote control capabilities may be installed as a P&M measure. These P&Ms can be implemented to:

- Ensure monitoring and testing activities can be conducted regardless of soil conditions
- Ensure equipment operation (e.g. valve closure) regardless of soil conditions or accessibility of the wellhead

Remote monitoring and/or control equipment will be designed in accordance with approved COMPANY specifications.

13.4.7 Plug & Abandon / Replacement

THE COMPANY may plug and abandon a well rather than implement a P&M measure.

At this time THE COMPANY is not aware of any wells with known seismic or outside force threats which would prompt abandonment and drilling of a new well in an alternate location. This P&M measure would be implemented at the recommendation and agreement of the Gas Storage Reservoir Services group and Director Gas Control and Storage.

13.5 Surface P&Ms – Third Party Damage Threat

13.5.1 Design Standards – Third Party Damage

THE COMPANY considers likelihood of third-party damage to surface equipment when designing aboveground facilities. Depending on the susceptible threats THE COMPANY may elect to install:

- Isolation valves
- Emergency Shutdown systems and ESD alarms
- Barricades to prevent vehicular damage – berms, bollards, fencing
- Lock-Out devices to prevent accidental or unauthorized operation of valves or equipment
- Security cameras, lighting and alarms
- Over-pressurization protection for aboveground equipment

13.5.2 Land Rights

Operating rights agreements including ingress/egress and setback distances are included in state permitting regulations.

13.5.3 Monitoring Surface / Subsurface Setbacks

In addition to patrols / leak surveys conducted by THE COMPANY field personnel, THE COMPANY is notified by the state regulatory agencies of drilling activities being performed by other Operators.

13.5.4 Public Awareness

THE COMPANY has enhanced its pipeline Public Awareness program with a campaign targeted at landowners near its storage fields. This literature is specific to gas storage and will be issued annually to the affected public.

THE COMPANY's Storage Operations personnel work closely with and coordinate activities with affected landowners. This helps raise awareness, minimize negative impact and help foster a good working relationship.

THE COMPANY will develop and maintain a list of local planning, zoning, and other jurisdictional authorities to facilitate communication and awareness. Further details can be found within Section 19, Emergency Plans.

THE COMPANY participates in 811 Call-Before-You-Dig damage prevention program. Dig tickets near storage field assets are processed and appropriate personnel notifications are made similar to those along THE COMPANY's pipeline right-of-way. In the case of storage reservoirs, encroachments and setback distances from other drilling sites are managed through the state regulatory agencies.

13.5.5 Site Security

THE COMPANY will take measures to protect storage field assets from third-party damage, both intentional and inadvertent.

Although the storage fields do not currently meet the criteria as critical facilities, THE COMPANY recently expanded its corporate security plan to include important facilities such as storage fields.

Improvements to site security will be selected and prioritized based on identified threats. Refer to Section 13.5.1 for potential security features which may be incorporated into designs.

13.5.6 Cyber Security

In addition to physical security measures described in Section 13.5.5, THE COMPANY will address cyber security concerns as part of its Corporate Cyber Security Plan.

13.5.7 Blowout Contingency Plans

THE COMPANY has developed a "Well Control Emergency Response Plan (WCERP)" to respond to a loss of well control situation. . This plan will be reexamined and updated on a periodic basis. See Section 16 for additional information. THE COMPANY will share details about the WCERP with federal, state and local authorities as appropriate and communicate directly with potentially affected emergency responders

13.6 Automatic Shutdown and Remote Control Valves

THE COMPANY will review whether or not automated or remote-controlled emergency shutdown valves are required for its existing storage wells. This review will be performed by the Gas Storage Reservoir Services group and Director Gas Control and Storage considering the following:

- Distance of the well from dwellings, other structures intended for human occupancy, or outside areas where people gather (e.g. parks, campgrounds, etc.)
- Gas composition, total fluid flow & maximum flow potential of the well

- Added risks created by installation & servicing requirements of safety valves

The results of the evaluation whether ASV or RCV valves would be a suitable P&M measure for any of the wells will be documented as justification for their installation or exclusion.

A closed storage well safety valve system shall be manually reopened at the site of the valve after an inspection and not opened from a remote location.

13.7 P&M Measure Implementation

P&M Measures may apply system-wide, to a specific storage field, an individual well or group of wells. Some measures require construction or installation of new equipment, others merely procedural changes.

The Gas Storage Reservoir Services group and Director Gas Control and Storage will determine the impact of a new P&M Measure and communicate that via the Management of Change process, outlines in Section 16.

THE COMPANY's Storage Field Operations Personnel are trained on new P&M procedures or equipment as applicable.

Prior to the next P&M Measure selection process, the Gas Storage Reservoir Services group and Director Gas Control and Storage review the effectiveness of previously implemented P&Ms. They consider the following in making their future recommendations:

- Effectiveness of current P&Ms at reducing likelihood or consequence of failure
- New concerns introduced by the P&M – additional operational risks, costs, etc.
- Whether the current level of risk is acceptable or if additional P&Ms are necessary

14.0 Performance Plan

In order to ensure successful implementation of this program, THE COMPANY will periodically review and evaluate progress to date. In addition to evaluating program metrics, this performance plan also calls for periodic benchmarking against industry best practices and guidance.

14.1 Metrics:

The Gas Storage Reservoir Services group will compile the following benchmarking metrics each year.

Metric	Calculated Metrics	Purpose

# of active I/W wells	n/a	Quantify size of storage operations
Storage capacity	n/a	
# of preventive & mitigative measures implemented	n/a	Quantify program actions
# of downhole assessments performed	n/a	
# of wells with casing metal loss greater than 50%	Divide by # of casing assessments performed to determine %	Quantify adverse conditions Trend percentages by year to forecast future work
# of leaks or abnormal condition indications (e.g. unanticipated pressure readings, leak survey indications, unexplained gas loss)	Divide by # of wells	
# of casing remediations performed	Divide by # of casing assessments	Quantify actions taken Trend percentages by year to forecast future work
# of tubing remediations performed		
# of wellhead equipment (i.e. valve) replacements or repairs made as a result of inspections	Divide by # of wells	
# of wells abandoned & plugged	Divide by (# active I/W wells + # recently abandoned wells) to determine %	

Metrics will be trended from year to year. An uptick in average number of leaks, indications, or remediations per active well will indicate need for increased monitoring of similar wells (if not already abandoned), more frequent assessment, or additional preventive & mitigative measures. A decrease these averages will indicate the program is effectively managing risk.

14.2 Lessons Learned:

14.2.1 Company Operations

The Gas Storage Reservoir Services group will review any adverse events – unintentional gas release, well equipment inoperability, safety related conditions, deaths or injuries requiring medical attention – which occurred over the past year. Root cause analyses or post-incident safety analyses where applicable will be reviewed to determine whether any changes to existing procedures or programs are warranted to prevent similar events in the future. Modifications to procedures, equipment, risk assessment process, or P&M selection may be recommended as a result.

14.2.2 Industry Events

The Gas Storage Reservoir Services group will review significant events within the industry and evaluate whether to incorporate findings into THE COMPANY's Storage Integrity Management Plan. Examples of data sources to review include:

- State Regulatory or PHMSA regulatory updates, advisory bulletins, or workshops

- Reports or white papers related to natural gas storage by Department of Energy (DOE),
- American Petroleum Institute (API), American Gas Association (AGA), Society of Petroleum Engineers (SPE) or other professional organizations or laboratories
- Publicized incidents at other Operators' storage field facilities

15.0 Record Keeping

THE COMPANY will keep all records of processes, procedures, reassessments, mitigation measures required, and all well work. Records will be kept and maintained for the life of the applicable facility. The Gas Storage Reservoir Services group will ensure existing hard copy records are scanned and digitized; records associated with any future work will be saved electronically. These records are to be maintained for the life of these storage facilities.

Record scanning and digitization efforts will initially focus on active wells and fields.

15.1 Record Organization

THE COMPANY will maintain written and electronic records that are organized by storage field, well, and work type. .

15.1.1 Original Design Basis

During reservoir development key documents are generated such as design basis for maximum reservoir pressure, geological records, storage land & mineral ownership rights and control documents, and regulatory records. THE COMPANY maintains original copies of all fields developed by or purchased by THE COMPANY. Copies are saved electronically for the life of the facility.

15.1.2 Construction / Completion

THE COMPANY also maintains documents created during the construction/completion of wells and reservoirs. Records for monitoring of the construction along with regulatory records for project commissioning are maintained by THE COMPANY. Documents for reservoir work during this phase includes baseline pressure & volume conditions. For wells, THE COMPANY maintains records detailing the drilling completion, workover, plugging, and initial stimulation of wells. Additional well documentation includes information on remediation, closure, casing, casing cementing practices, and wellhead equipment and valve records. Test records and well actions taken during commissioning are also maintained.

15.1.3 Ongoing Operational Data

THE COMPANY will maintain records of work or maintenance performed on wells and/or reservoirs after initial construction/completion. Documents to be kept and maintained during these operations are additional drilling, completion, workover, plugging, and stimulation records. It is necessary to

keep details for reservoir and well mechanical integrity records and the P&M measures employed by THE COMPANY for each well/reservoir. THE COMPANY will also maintain records for storage inventory assessments, data used during & results of assessments/monitoring, periodic evaluation of performance metrics. Additionally, the continued upkeep of regulatory records is to be completed.

15.2 Document Validation

Subject matter experts, including the Gas Storage Reservoir Services group , use available records as well as system knowledge as basis for actions.

16.0 Management of Change

A Management of Change (MOC) process identifies changes that would trigger updates to other related processes, procedures, and technologies. A formal MOC process ensures communication between affected stakeholders as well as documentation of the change.

16.1 MOC Process

THE COMPANY will follow the requirements stated in the *Gas Organization Management of Change Policy*, latest revision. This will be the formal MOC process to identify and document changes to Storage Integrity Management Program and Operation. Types of changes subject to the MOC process are those that may have considerable impact to the Storage Integrity Management Program. This may include, but not limited to:

- Technical Changes made to wells or equipment
- Physical Changes such as new or abandoned well/reservoir, well configuration change,
- Procedural Change such as changes in MIT assessment, risk analysis, or repair/remediation procedures
- Organizational changes such as changes in roles and responsibilities

THE COMPANY personnel and contractors are responsible for documenting any planned, observed or emergency changes subject to the MOC process. Changes will be documented on the MOC form and provided to the MOC approver for review. THE COMPANY maintains the MOC form and revision logs related to the management of change process for the useful life of the storage field. In general, all changes with the exception of emergency changes will be documented and approved prior to implementation of the change.

Emergency changes do not require documentation or authorization prior to implementation. Refer to the written Storage Integrity Management of Change procedure and form SF16-1 for additional detail.

17.0 Quality Assurance

The purpose of the quality assurance process is to ensure personnel involved in Storage Integrity Management are qualified to fulfill their roles and responsibilities related to integrity management.

Additionally, the quality assurance process helps to ensure THE COMPANY meets all of the requirements of the documented Integrity Management Program.

17.1 Roles and Responsibilities

THE COMPANY defines the roles and responsibilities pertaining to the Storage Integrity Management Program. Refer to Section 4.0.

17.2 Personnel Qualifications

THE COMPANY personnel involved in the Storage Integrity Management Program are competent, aware of program activities and are properly trained to execute activities discussed in this plan. THE COMPANY will document the specific training requirements for operations, supervisory and contractor personnel as they relate to Storage Integrity Management Program.

THE COMPANY storage field personnel maintain their Operator Qualifications with the applicable Covered Tasks. Storage-specific activities which are not Covered Tasks are generally trained through the use of guidelines. THE COMPANY will formalize these operating guidelines into procedures and develop a formal gas storage training curriculum. Training activities will be overseen and tracked by the Training & Safety Department but conducted by personnel experienced in performing said tasks.

THE COMPANY uses qualified contractors. Gas Safety reviews a copy of their training and safety programs prior to contracting work. Work will be conducted with the more stringent of either THE COMPANY or the contractor’s written procedures. Safety records as well as applicable project experience are considered when awarding projects. THE COMPANY’s Sourcing Department performs an annual review of safety data to ensure contractors are eligible to work on THE COMPANY projects.

If the MOC process identifies a change that impacts the training program, such as technology, processes, procedures or facilities, THE COMPANY will modify the training programs to reflect the approved change.

17.3 Storage IM Review

THE COMPANY's Storage Integrity Management Program will be periodically reviewed to identify areas of nonconformance that could be improved upon. It will be subject to the following:

- Internal audits
- Third party audits
- Jurisdictional audit

Based on the findings of the reviews and audits, the Gas Storage Reservoir Services group may develop an action plan to prioritize the results and assign tasks, track revisions and document any deviations.

17.3.1 Data / Documentation / Records

Documentation, reporting & record keeping will be periodically reviewed to confirm that they are complete and meet the Storage Integrity Management Program requirements.

THE COMPANY will also review the reassessment of hazards and potential threats to validate the effectiveness of the integrity management program.

17.3.2 Performance Metrics

THE COMPANY will track performance metrics to evaluate program improvements and evaluate their effectiveness. Refer to Section 14.1.

18.0 Communications Plan

This communication plan outlines both internal communications regarding storage field integrity management program as well as specific conditions. Feedback loops help confirm that affected personnel have current information.

18.1 Internal Communications

18.1.1 Storage Integrity Management Program

The Gas Storage Reservoir Services group will maintain the overall Storage Integrity Management Program and will be responsible for communicating changes to the program to affected stakeholders. Such changes include but are not limited to new/updated procedures and forms. Information will be available via company SharePoint site.

An annual executive review of program results is also conducted.

18.1.2 Assessment Planning and Results

The Gas Storage Reservoir Services group will be responsible for communicating results of integrity assessments, schedule for upcoming assessments and various technologies being utilized.

The Gas Storage Reservoir Services group will consult with the Director Gas Control and Storage of any assessments that would be an impediment to continuous supply deliveries and planned well work and assessment activities for the coming year.

The Gas Storage Reservoir Services group will also provide feedback to field operations managers regarding the outcome of assessments, remediation activities, and implementation of P&M measures.

Storage Operations personnel work closely with the Gas Storage Reservoir Services group regarding all downhole facilities and related equipment. Records relating to maintenance, monitoring, testing, stimulation, and well workovers will be maintained electronically. This will enable access by all appropriate personnel.

18.2 External Communications

18.2.1 Jurisdictional Authorities

THE COMPANY's Director Gas Control and Storage will be responsible for coordinating all official communication with the Pipeline and Hazardous Materials Safety Administration (PHMSA) and with the state regulatory agencies.

18.2.2 Public Awareness

Public Awareness provides education to the public, appropriate government organizations, and persons engaged in excavation related activities in the use of One-call notification system prior to excavation and other damage prevention activities. Refer to THE COMPANY's Public Awareness Program for additional information.

Landowners and tenants in the vicinity of THE COMPANY's storage fields will receive periodic communication with company information as well as the following

- Product information
- Possible hazards associated with unintended release from a gas facility
- Physical indications that such a release may have occurred
- Steps that may be taken for public safety in the event of a gas release
- Methods for reporting such an event

Public officials and local emergency responders will also receive this information. Additional information may also be provided as part of Emergency Preparedness in Section 19.0. This information may include but is not limited to:

- Company contact information
- Facility maps
- Summary of emergency preparedness plans
- How to recognize, report and respond to a leak

19.0 Emergency Plans

The objectives of the Emergency Plan are as follows:

- To provide for the safety of the general public, employees, contractors and to protect property, both public and private.
- To prepare personnel who could be involved in an emergency to deal with the situation in an expeditious and safe manner.
- To maintain Liaison with appropriate public officials and emergency response organizations.

19.1 Emergency Response Plans

THE COMPANY has developed a "Well Control Emergency Response Plan" for its storage fields. THE COMPANY plans to develop a contract with a specialized well control provider to assist, in the event of a blowout or uncontrolled gas release.

The plans will:

- Identify emergency types
- Identify potentially impacted areas
- Establish protocols for communication & local emergency response coordination
- Identify initial response actions and intervention action plan

THE COMPANY's Gas Storage Reservoir Services group and Director Gas Control and Storage will review their respective Emergency Plans annually. Reviews will consider lessons learned and/or changes to the well, field or impacted areas since the last revision.

19.1.1 Emergency Types

Emergencies can result from a wide array of causes and have varying levels of impact. The most common emergency types which can affect a storage field include:

- Fire
- Explosion
- ESD (Emergency Shutdown)
- Gas Release
- Personnel Injuries

- Security

19.1.2 Warnings & Alerts

Depending on the nature of the emergency, different warning systems and alerts may be used. Warning systems are a way to alert personnel of system problems or Abnormal Operating Conditions. Warning systems may include smoke and fire alarms, and include alarms that communicated from Gas Control.

Warning systems and alerts can either alert on-site personnel of conditions that need their attention or remotely alarm. Remote alarms/alerts will dispatch qualified personnel to the site. Remote dispatching of alarms can dispatch a single qualified person or send multiple emails/text messages or phone calls.

Table 1 Possible Warning/Alert Methods by Emergency Type

Emergency Type	Warning System(s)
Fire	Fire/smoke alarms 911
Explosion	Fire/smoke alarms or ESD
Emergency Shutdown (ESD)	ESD alarms on equipment
Gas Release	Local equipment alarms SCADA alerts
Personnel Injuries	911
Security	

19.1.3 Local Emergency Responders

Each COMPANY storage field will maintain a contact list of emergency responders and nearby hospitals/healthcare facilities. The Gas Storage Reservoir Services group will maintain an electronic copy of this information for all three storage fields. This information will also be incorporated into any written Emergency Plans.

Periodic communication with local emergency response officials can aid in a more coordinated effort in the event of an actual emergency. THE COMPANY will work with local officials and government agencies through the Public Awareness Program. THE COMPANY will provide emergency responders contact information, will review local maps of facilities, and will provide opportunities to train emergency responders on how to recognize, report and respond to a leak.

THE COMPANY storage field personnel will coordinate emergency preparedness training or drills with local emergency responders as applicable.

19.1.4 Impacted Areas

For emergencies affecting the reservoir or individual wells (e.g. uncontrolled release), THE COMPANY will identify local areas that would be potentially impacted by such an event.

THE COMPANY will utilize maps and other information described in Section 7.0 to determine a probable "hot zone" and "warm zone" for each well or group of wells in the event of a blowout emergency.

This information will be utilized by THE COMPANY personnel, well control contractors, and emergency responders to:

- Establish command center and staging areas a safe distance from the event
- Establish evacuation/exclusion areas in which only trained, qualified responders may enter with proper PPE

19.1.5 Identify Resources

For emergencies affecting the reservoir or individual wells (e.g. uncontrolled release), the Gas Emergency Operating Plan will list potential resources needed to resolve the situation. Resources to consider include but are not limited to:

- Equipment, tools, and materials
- THE COMPANY & contract personnel
- Third-party technical experts – for consultation and/or field work

19.2 Communication Protocols

Except for those major emergencies, which call for the implementation of the Corporate Emergency Response Plan, the following procedures for notification for storage emergencies will apply:

19.2.1 Internal Communications

Storage personnel must notify Gas Control as required by 192.631(f)(2) Control Room Management when an emergency condition exists.

Notify other affected Departments as per THE COMPANY's Gas Emergency Operating Plan. Emergency Operating Plan.

19.2.2 External Communications

Questions from outside sources will be referred to Corporate Communications. If the situation warrants, a Corporate Communications representative will go to the scene of major occurrences, gather facts, and provide outsiders with appropriate level of communication.

- Reporting - Certain emergencies may be determined to be major/reportable incidents and may have to be reported to Government agencies, Police or Fire Departments. This will be done in accordance with procedures in the Emergency Operating Plan.
- Injured Employees - Area manager is responsible for notifying the family of any employee from his or her department who is injured.
- Public Relations and Liaison with Government Agencies – Company personnel will cooperate with the police and Fire Departments and furnish their representatives the necessary information to carry out their duties.

19.2.3 State Regulatory Communication During an Emergency

In the event of an emergency impacting oil and gas operations, the State Regulator will direct operators to take action to protect the public and environment, gather and disseminate information, and provide expertise as required. The regulator may formally assign various coordinators and establish media protocols.

THE COMPANY will provide daily updates during the emergency as required.

19.3 Training Drills

In addition to ensuring personnel are competent and trained to perform their job function, safety and emergency response training may be conducted. Emergency Response training may include on-site THE COMPANY or contract personnel, local fire department(s), ambulance, and police departments. Training can range from table top exercises to mock drills. Topics to include:

- Equipment shutdown / isolation valve closures
- Communication affected departments – field personnel, gas control, Gas Storage Reservoir Services
- Coordination with emergency responders
- Communication with jurisdictional authorities

20.0 Environmental and Safety Policies

This section provides considerations for safeguards to the environment, safety and health of workers and the public.

20.1 Environmental and Safety Considerations

THE COMPANY personnel and contractors perform storage field operations, maintenance and integrity management activities in a manner that minimizes environmental and safety risks. Storage activities are performed in a manner that meets current THE COMPANY safety and environmental policies and procedures. Activities subject to these policies and procedures include, but are not limited to:

- Routine monitoring
- Assessments
- Storage operations including well workovers and new well completions
- Routine maintenance or remediation activities

Environmental policies and procedures can be found in THE COMPANY's Environmental Operating Procedures.

THE COMPANY will design new storage wells and wellheads for long-term viability and functional integrity to maintain operation consistent with environmental regulations, as well as maintain personnel and public safety for life of the facility. At the same time, THE COMPANY addresses the protection of surface water and groundwater resources within the design of storage facilities.

21.0 Revision History

The SIM written plan is retained on the company's digital environment. Revision to this plan will take place on this version utilizing the "Track Changes" feature. SharePoint tracks and retains all versions of the plan. The company performs scheduled backups of the SharePoint environment to recover any information that could get lost if damage to the SharePoint servers occurred.

The SIMP risk model is retained on the Gas Storage share drive. Approved risk models are documented in the history log.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 93

Responding Witness: Lonnie E. Bellar

Q-93. Refer to the answer to the question beginning at page 59, line 21 of Mr. Bellar's testimony.

a. Please attach a copy of the Transmission Pipeline Modernization Program.

b. Please describe the difference between the transmission program improvement program described in lines 12-20 on page 58 and that described at the beginning of page 59.

c. For each of the projects described in lines 5-12 of page 59 to support growth, please provide a timeline and cost of implementation of each.

d. Is the Bullitt County pipeline referred to on line 8, the same project for which LG&E received a CPCN in PSC Case No. 2016-00371? If no, please explain the difference. If it is the same, please provide copies of all documents required to be filed pursuant to ordering paragraphs 10-14 of the Commission's order of June 22, 2017.

A-93.

a. Note that this answer is for the question starting on page 58, line 21. The Transmission Pipeline Modernization Program refers to transmission pipeline projects that will facilitate compliance with existing regulations and pending new regulations. These projects may include replacing entire pipelines, replacing sections of pipelines allowing for the use of enhanced ILI tools or other related projects on gas transmission facilities. The projects currently included in the Transmission Pipeline Modernization Program are listed in the response to Question No. 94b.

b. The pipeline projects on lines 12-20 of page 58 and the projects described starting on page 59, line 13 refer to the same set of projects.

c. For the section of referenced testimony the projects supporting growth are the Bullitt County and Nelson County pipeline projects. Please see the response to

the questions in the Bellar testimony starting on page 60, line 9 for the Bullitt County pipeline project and page 61, line 17 for the Nelson County pipeline project for cost information. The Bullitt County project is in progress (construction has not started yet) and it is desired to have the pipeline in service in 2020. Engineering and design work is scheduled to start for the Nelson County project in 2020 and anticipated to be in service in late 2021.

d. Yes, LG&E has not reached the milestones listed in the ordering paragraphs 10-14, thus the requested documents are not yet available.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 94

Responding Witness: Lonnie E. Bellar

Q-94. Refer to the answer to the Question on lines 13-14 of page 59 of Mr. Bellar's testimony.

a. Please state with specificity, (1) how enhanced inline inspections will support compliance with PHMSA regulations and (2) will expand construction documentation.

b. Please provide a capital improvement schedule with timeframe and costs for each of the projects described in response to the question at lines 13-14 of page 59 of Mr. Bellar's testimony.

A-94.

a. See the response to AG 1-198(a)

b. See capital improvement schedule of referenced projects below:

	Estimated Completion	**2019**	**2020**	**2021**	**2022**	**Total Project**
WK A 20" Standardization	11/30/2022	$ -	$ 1,997,900	$46,896,309	$1,500,000	**$50,394,209**
WK B 20" Standardization	5/31/2021	1,000,199	24,998,215	999,600	-	**26,998,014**
Mill Creek Replacement	9/30/2021	299,606	8,499,411	200,251	-	**8,999,268**
Mag 16 & 20 Road Crossing	6/30/2022	-	1,699,569	3,000,439	100,000	**4,800,008**
Total		**$1,299,805**	**$37,195,095**	**$51,096,599**	**$1,600,000**	**$91,191,499**

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 95

Responding Witness: Lonnie E. Bellar

Q-95. Please refer to the question at lines 1-2, page 61 of Mr. Bellar's testimony.

a. Do all four of the separate pressure systems operate at 2.0 psig? Is that considered low pressure?

b. Are there other pressure systems in Jefferson County that operate at 2.0 psig?

c. Are there other pressure systems in Jefferson County that operate at pressures other than 2.0 psig? If so, please state the pressure and location or name of each such system.

A-95.

a. All four of the systems referenced operate at 2.0 PSIG. This is not considered low pressure.

b. There are no systems in Jefferson County, except for the four referenced, that operate at 2.0 PSIG.

c. LG&E operates multiple distribution systems within Jefferson County that operate at pressures other than 2.0 PSIG.

The Low Pressure Distribution System operates at approximately 0.5 PSIG. There is a single Low Pressure System which operates in a section of the Core Business District of Jefferson County. The boundaries of the Low Pressure System are from Roy Wilkins Avenue to Brook Street and from Washington Street to Broadway. The completion of the Main Replacement Program has resulted in the elimination of the majority of LG&E's Low Pressure System.

Medium Pressure Distribution Systems operate between 10 PSIG and 55 PSIG with Maximum Allowable Operating Pressures (MAOP) between 15 PSIG and 60 PSIG. The remainder of Jefferson County (not served off Low Pressure or Elevated Pressure Systems) is served off Medium Pressure Distribution Systems.

In addition to the distribution systems mentioned, LG&E operates higher pressure pipelines, within Jefferson County, that deliver gas to the regulation facilities in the Low, Elevated, and Medium Pressure Systems. The highest MAOP of these pipelines is 502 PSIG.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 96

Responding Witness: Lonnie E. Bellar

Q-96. Please refer to the question at line 17, page 61 of Mr. Bellar's testimony.

a. What are the "issues" described at line 1, page 62?

b. Do all locations of the LG&E gas distribution systems have redundant supply?

c. Please provide a schedule showing the amount of gas provided to commercial customers and a separate one for industrial customers for each year 2008-2017 and the first 10 months of 2018.

A-96.

a. The "issues" referenced in this sentence would describe any circumstance that would result in the loss of gas supply from one of the existing regulator stations on the Bardstown Gas System. Examples of these issues would be third party damage to the regulator station itself, damage to nearby pipeline infrastructure that interrupts gas supply to or from the regulator station, or equipment malfunction.

b. Not all of the Company's gas systems have redundant supplies. As explained in the testimony the primary driver for this project is to extend an additional gas supply to the west side of the existing distribution system to accommodate additional growth, please see the response to AG 1-57(a) and (b) for additional information on this system.

c. See the following table for natural gas sales to commercial and industrial customers. Data through September 2018 is currently available.

Mcf	Commercial	Industrial
2008	9,435,219	1,479,252
2009	8,600,208	1,000,095
2010	9,114,340	1,108,078
2011	8,362,025	991,489
2012	7,533,452	984,689
2013	9,202,365	1,680,362
2014	10,136,744	1,482,249
2015	8,798,204	1,382,263
2016	8,485,621	1,247,075
2017	8,057,235	1,406,335
2018 (Jan-Sep)	6,558,293	999,482

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 97

Responding Witness: Lonnie E. Bellar

Q-97. Please refer to the Question at line 10-11, page 62 of Mr. Bellar's testimony.

a. Please provide a schedule for each project with a time frame for completion and costs.

b. Are there federal or state regulations such as EPA, PHMSA or otherwise that require the move from wet to dry amino processes? If so, please provide the citations.

c. Please provide a chart listing each compressor station on the LG&E system, to include name, location and whether it is dry or wet.

A-97.

a. The following chart summarizes projected capital spend and the estimated in-service dates for the Amine Plant Replacement projects at Magnolia and Muldraugh:

Project	Estimated Completion	2019	2020	2021	Total Project
Magnolia Amine Replacement	12/31/2019	$ 7,068,401	$ -	$ -	$ 7,068,401
Muldraugh Amine Replacement	12/31/2021	$ 3,501,987	$ 7,754,654	$ 532,975	$ 11,789,616
Total by Year		$ 10,570,388	$ 7,754,654	$ 532,975	$ 18,858,016

b. See the response to AG 1-23(c).

c. Magnolia Compressor Station; 650 LG&E Road, Magnolia, KY 42757 – two (2) wet systems and a dry system for peaking or polishing.

Center Compressor Station; 2098 Atwell Road, Hardyville, KY 42746 – dry system

Muldraugh Compressor Station – 500 LG&E Rd, Muldraugh KY 40155 - 3 wet systems.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 98

Responding Witness: Lonnie E. Bellar

Q-98. Please refer to the Question on lines 1-2, page 63 of Mr. Bellar's testimony.

a. Please provide the citation to the Control Room Management regulations.

b. What was the effective date for the regulation?

c. How many employees of LG&E communicate with gas control operations?

d. What is the expected increase in costs?

e. How many farm taps are on the LG&E system?

f. Please describe with specificity increases in maintenance costs, operating costs and incremental capital expenditures arising from the farm tap regulation.

A-98.

a. 49 CFR 192.631 – Control Room Management

b. PHMSA published the Control Room Management final rule on December 3, 2009, which became effective on February 1, 2010. Amendments and additions to the regulation have subsequently been made on February 3, 2010, June 16, 2011, and January 23, 2017 – which included the additional requirement for control room team training. The compliance deadline for control room team training is January 23, 2019.

c. LG&E has identified approximately 325 employees that could provide key information or decision-making input to controllers or otherwise influence operational control decisions during normal, abnormal, or emergency situations.

d. Two additional headcount were added to the Gas Control area to provide full time support for Control Room Management compliance, controller training, and control room team training. The additional headcount include:

1) Group Leader, Gas Control Room Management Engineering with an annual cost impact to GDO of $105,805.
2) Gas Control Room Management Trainer with an annual cost impact to GDO of $89,714.

e. Approximately 1,800

f. The increased maintenance cost due to the change in the inspection frequency for 2018 was $162,000. The inspection frequency was changed from ten (10) years to three (3). LG&E decided to include all farm tap gas facilities in the three year inspection cycle. 275 farm tap facilities are mentioned in the testimony as directly impacted by the new regulation.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 99

Responding Witness: Lonnie E. Bellar

Q-99. Please refer to the Question on lines 17-18, page 63 of Mr. Bellar's testimony.

a. Please provide the "cost and time" expended in creating the program and the complete costs of the five incremental positions referred to for each position.

b. With respect to all incremental costs described in lines 1-6 at page 64, please detail same with specificity.

A-99.

a. The words "cost and time" refers to creating the SIMP, see the response to Question No. 92(c). See response to Question No. 92(d) for costs associated with three incremental positions for SIMP. See the response to Question No. 98(d) for the costs associated with the two incremental positions for CRM.

b. The incremental costs are:
   - See the response to Question No. 98(f) for the incremental costs associated with the farm tap rule.
   - The Gas Storage Annual Safety Assessment Fee has increased from $62K in 2017 to $167K in 2018.
   - The Gas Transmission Annual Safety fees have increased from $125K in 2017 to $135K in 2018

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 100

Responding Witness: Lonnie E. Bellar

Q-100. Please refer to the answer to Question on lines 7-8, page 64 of Mr. Bellar's testimony and to the sentence on line 15, beginning with, "LG&E also expects…."

a. What are these incremental costs for the line locations and why are business partners being used? Who are the business partners?

b. Why does LG&E need line locating? Are its existing maps incorrect or incomplete? What is the state regulation that requires this?

c. For the sentences beginning on line 17, page 64 and continuing to line 2 on page 65, please provide the amount of all incremental costs by the category mentioned.

A-100.

a. The incremental costs are due to ensure compliance with the KY Damage Prevention Law. To ensure compliance based on projected locate requests it is anticipated incremental cost will be nearly 150% more than projected previously. Original projections for completing locates in 2019 was $4.2M; revised projections for 2019 are $11.7M.

Business partners are being used because we do not currently have the in-house resources, expertise, vehicles, equipment, etc., necessary to complete the task. Line locating volumes can vary greatly depending on construction activity and other factors. Using business partner resources allows more flexibility in managing necessary resources.

In late 2018 and following, ELM LLC and Utility Resource Group (URG), LLC will replace Olameter DPG as our locating partners.

b. For a gas utility, participating in the 811 call center program and line locating are part of an overall damage prevention effort mandated by the federal Department of Transportation/Pipeline and Hazardous Material Safety

Administration. Line locating is used as a means to avoid a damage to a natural gas pipelines, services and/or facilities.

LG&E's existing maps are as correct and complete as they can be given the potential for lag time between facility installation and/or removal and the additions/deletions being made in the GIS. Code reference: KRS 367.4901-4917

367.4901 Legislative declaration -- Short title for KRS 367.4901 to 367.4917. The General Assembly finds that the objective of underground facility damage prevention and the resulting benefits of public and workplace safety and protection of consumer services require an effective underground damage prevention procedure. KRS 367.4901 to 367.4917, which may be cited as the "Underground Facility Damage Prevention Act of 1994," are created to provide for this procedure and accomplish this objective.

c. The table below provides the incremental amounts for each of the expenses listed on line 17, page 64 through line 2, page 65 of Mr. Bellar's testimony.

Category	**Cost ($M)**
Line Locating	$ 2.8
Emergency Response	0.8
Safety & Technical Training	1.3
Regulatory Compliance	2.8
Customer Service	1.0
Total	**$ 8.7**

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 101

Responding Witness: Lonnie E. Bellar

Q-101. Please refer to the Question at line 3 of page 65 of Mr. Bellar's testimony, where the Gas Inspection and Traceability Program is discussed in detail. Please provide a copy of the program.

A-101. The program refers to the current projects to develop ipad based applications to capture plastic component information described in Mr. Bellar's testimony starting on line 1 of page 58 for details on this program. The final rule was issued and published in the Federal Register on November 20, 2018. See the response to AG 1-21(a) and (b)

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 102

Responding Witness: Lonnie E. Bellar

Q-102. Please refer to the chart at the bottom of page 66 and top of page 67. Please provide the page and line reference of Mr. Bellar's testimony where each category of expenditures is described.

A-102. Mr. Bellar's testimony does not describe every project in each line item listed in the chart at the bottom of page 66 and top of page 67. The individual projects described in Mr. Bellar's testimony are referenced below.

Category	Location in Mr. Bellar's Testimony
ENHANCE THE NETWORK	
Bullitt County	Page 59, line 7 Page 60, lines 9-22
Upgrade Elevated Pressure	Page 59, lines 9-10 Page 61, lines 1-16
Other	Page 58, lines 12-20 Page 58, line 21 thru Page 59, line 4 Page 59, line 13 thru Page 60, line 8
MAINTAIN THE NETWORK	Page 59, lines 10-12 Page 62, lines 10-22 Page 65, lines 15-21

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 103

Responding Witness: Lonnie E. Bellar

Q-103. Please refer to line 10, page 57 of Mr. Bellar's testimony and the Questions in the testimony of Mr. Kent Blake at lines 13-15, page 11-12. With specificity, please allocate the component parts of Mr. Blake's $22,000,000 total to the specific lines and page numbers of Mr. Bellar's testimony.

a. Please describe how the "mix of gas supply" relates to total pipeline purchases.

b. What is the volume for the total pipeline purchases?

c. What is the purpose of these pipeline purchases estimated and what is the "mix" of the gas supply?

A-103. In-line gas inspections ($10 million) are referenced on lines 11-15, page 64 of Mr. Bellar's testimony. Line locating expenses ($3 million) are referenced on lines 15-19, page 64 of Mr. Bellar's testimony. Other safety, technical training, and regulatory compliance initiatives and customer services (collectively $6 million for those specific categories) are referenced on line 19 on page 64 through line 2 on page 65. Mr. Blake's testimony includes an additional $3 million in categories not specifically referenced in Mr. Bellar's testimony.

a. As set forth in LG&E's filing requirement for 807 KAR 5:001 Section 16(7)(h)(8), all of LG&E's gas supply is purchased for delivery to LG&E by interstate pipelines.

b. The above-referenced filing requirements set forth the estimated volumes by year.

c. The pipeline purchases set forth in the above-referenced filing requirement are used to serve LG&E's retail gas sales customers. These gas purchases may be injected into LG&E's storage and then later withdrawn from LG&E's storage, but ultimately LG&E does not have access to gas from sources other than the interstate pipelines serving LG&E.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 104

Responding Witness: Elizabeth J. McFarland

Q-104. Please refer to the testimony of Paul W. Thompson at page 2, line 6. Of the 326,000 natural gas customers, how many are residents of Jefferson County?

A-104. As of November 14, 2018, there are approximately 279,000 natural gas customers in Jefferson County.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 105

Responding Witness: David S. Sinclair

Q-105. Please refer to the answer to the Question appearing at page 19, line 9 of the testimony of David Sinclair and Exhibit DSS-3 to his testimony.

a. What is the difference between the two categories “total volumes-calendar adjusted” and “total sales volumes-calendar adjusted?”

b. Please describe how the 30,393,746 number in the base period for total sales volumes in Exhibit DSS-3 was computed making reference to DSS-3.

A-105.

a. “Total volumes – calendar adjusted” is the sum of all rate forecasts and includes sales, transport, and generation customers. “Total sales volumes – calendar adjusted” includes only the sales customers. Because the first half of the base period includes billed actual volumes and the second half of the base period includes calendar forecasted volumes, it is necessary to include an unbilled adjustment to translate the billed volumes into calendar volumes.

b. This figure is the sum of the total column for all Rates with a category of Gas Volumes and the Volume Type of Sales, which includes the unbilled adjustment.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 106

Responding Witness: David S. Sinclair, Lonnie E. Bellar

Q-106. Please refer to line 11, page 19 of the David Sinclair's testimony.

a. Please provide the actual "Annual Natural Gas Volume Forecast Process" document or alternatively the page number in Tab 16 where it can be found.

b. Please provide changes to the methodologies and forecasting techniques from those used to prepare the natural gas forecast in the 2016-00371 case to the preparation of the forecast in the current case.

c. For each of the last ten (10) years, please provide tables or charts showing the forecasted volume of natural gas to be procured by LG&E for its customers and the actual amount of natural gas so procured for that year by LG&E.

A-106.

a. The Annual Natural Gas Volume Forecast Process document is filed as Attachment to Tab 16 - Item D, which can be found starting on page 813 of 2103 in the pdf document.

b. The methodologies and forecasting techniques remain consistent with those used for case 2016-00371. Specific inputs are the most up-to-date data that is available at the time of the forecast, but this does not change the underlying techniques and methodologies.

c. See attachment being provided in Excel format.

The attachment is being provided in a separate file in Excel format.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 107

Responding Witness: David S. Sinclair

Q-107. Please provide a copy of the natural gas prices forecast that the company used to prepare the natural gas forecast for the last ten (10) years.

A-107. See attachment being provided in Excel format.

The attachment is being provided in a separate file in Excel format.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 108

Responding Witness: David S. Sinclair

Q-108. For each of the last ten (10) years, please provide the natural gas price forecast and the actual price of natural gas used.

A-108. See attachment being provided in Excel format.

The attachment is being provided in a separate file in Excel format.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 109

Responding Witness: William Steven Seelye

Q-109. Please refer to the testimony of Robert Conroy on page 37 of his testimony in response to the question appearing on line 12.

a. Please describe what is meant by "not time-differentiated."

b. Please describe why the gas cost of service study is "not time-differentiated."

c. Please describe the refinement that has been made in the way that transmission costs are allocated in the study.

A-109.

a. The phrase "not time-differentiated" means that the gas cost of service study did not explicitly separate costs into hourly or daily on-peak and off-peak periods.

b. Time differentiated studies are common for electric utilities, whose production costs can vary significantly by time of day. Purchased gas commodity costs for gas utilities do not typically vary by time of day.

c. A change in the methodology for allocating transmission costs occurred in the cost of service study filed in Case No. 2016-00371. In the cost of service study filed in this proceeding, there are no methodological differences from the previous study. The Company updated the analysis of storage and non-storage related transmission plant for the current cost of service study.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 110

Responding Witness: William Steven Seelye

Q-110. Please refer to Mr. Conroy's testimony in response to the question listed on line 4, page 39. Please describe why the change is a "more accurate cost recovery each billing period"?

A-110. See the Direct Testimony of William Steven Seelye, page 14, Lines 2-16.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 111

Responding Witness: William Steven Seelye

Q-111. Please refer to Mr. Conroy's testimony in response to the question at line 20, page 39. Please state why the cost of service study in the current case increased the amount of recommended customer charge to $24.94 from that in the prior case (2016-00371).

A-111. LG&E is not proposing a Basic Service Charge of $24.94 for RGS in this proceeding. The proposed Basic Service Charge for RGS is equivalent to $19.78 per month.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 112

Responding Witness: William Steven Seelye

Q-112. Please refer to the testimony of Mr. William Steven Seelye, line 3, page 53. Please indicate why the proposal is for a daily basis service charge for CCF use, but if the rates are billed on an MCF basis, it will continue to have a monthly basic service charge.

A-112. Rates AAGS, FT, LGDS, and SGSS are all billed on an Mcf basis. It was not deemed necessary to develop a daily basic service charge for these rates. Customers served under these rates are typically larger gas consumers and are therefore less likely to move from one service location to another compared to customers served under rates that are billed on a Ccf basis. Customers in rate classes that move from one service location to another in the middle of the billing cycle (such as residential or commercial) are more likely to require proration of the basic service charge in order to effectuate billing.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to First Request for Information of the Louisville/Jefferson County Metro Government Dated November 13, 2018

Case No. 2018-00295

Question No. 113

Responding Witness: William Steven Seelye

Q-113. Please refer to the response to the question at line 20 of page 53 of Mr. Seelye's testimony. Please provide the actual calculation of the customer cost and the distribution delivery cost from the information contained in Exhibit WSS-9.

A-113. See the attachment to the response to PSC 1-53 named Att_LGE_PSC_1-53_Exhibit_WSS-9_WSS-10_WSS-11_WSS-12_WSS-33_WSS-34_LGE_Gas_COSS.xlsx.

The calculation of customer costs and distribution delivery costs is determined from information included and allocations made in the cost of service study.