BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Resource Plan of Aquila, Inc., d/b/a Aquila Networks-MPS and Aquila Networks-L&P Pursuant to 4 CSR 240-22	)))	Case No. EO-2007-0298

MISSOURI DEPARTMENT OF NATURAL RESOURCES ENERGY CENTER

REVIEW OF AQUILA INC.'S INTEGRATED RESOURCE PLANNING FILING

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Summary of Review

The Department of Natural Resources, Energy Center submits the following comments in response to the February 5, 2007, Integrated Resource Planning Compliance filing by Aquila, Inc.

The department participated in three informational meetings with representatives of Aquila and other parties on April 23, 24 and 30, 2007. Topics included demand-side resources, supply-side resources, risk and integration.

Aquila filed no waivers with its resource plan; therefore, the filing should be in compliance with all aspects of the rule. On May 14, 2007, Aquila supplied a supplementary CDRom titled "IRP Workpapers" to the department. The date on the CDRom is April 30, 2007, as this was apparently the date it was provided to Staff and the Office of Public Counsel. On May 7, the department contacted Aquila to request a copy of the CD-ROM that it had not yet received. The department's comments assume that these materials are part of Aquila's filing.

On May 24, 2007, Aquila provided responses to questions and information requests from the three meetings with the parties. Due to the time constraints of reviewing this additional information with eight working days remaining before comments were due to be filed in this case (June 5), the Commission approved a

request for an extension of time to file until June 19, 2007. The department is not aware of any other data requests or responses that would be considered part of the filing. Comments from the informational meetings of April 23, 24 and 30 2007 are not being considered part of Aquila's filing unless they were subsequently submitted by Aquila in writing as part of this case.

During these meetings, Aquila representatives stated that the IRP is being filed under the assumption that a proposed merger of Aquila with Kansas City Power and Light[1] will not be consummated. Similarly, the Department's comments on this IRP filing assume that the proposed merger will not take place. The Department reserves its right to comment separately on subsequent planning or regulatory issues that may arise if the proposed merger occurs.

[1] PSC Case EM-2007-0374, "Joint Application of Great Plains Energy Incorporated, Kansas City Power & Light Company, and Aquila, Inc. for Approval of the Merger of Aquila, Inc. with a Subsidiary of Great Plains Energy Incorporated and for Other Related Relief."

Summary of Resource Acquisition Strategy and Preferred Resource Plan

The Missouri Public Service Commission's Electric Utility Resource Planning rule, 4 CSR 240-22.010 through 22.080, requires the utility to file an officially adopted[2] resource acquisition strategy consisting of a preferred resource plan (PRP); implementation plans for supply-side and demand-side resources included in the PRP; and contingency plans.[3] The implementation plans are subject to the requirements of 4 CSR 240-22.070(9), and the contingency plans must meet the requirements of 4 CSR 240-22.070(10)(C) and (D).

Part 5, Section 5.5 of the Aquila's resource plan filing is titled "Implementation and Resource Acquisition Strategy." Section 5.5 is followed by a Signing Statement [4] with signatures by Aquila's Vice President of Power Generation and Director of Resource Planning. The Signing Statement attests that "it is Aquila's intent to follow the Implementation and Resource Acquisition Strategy" subject to changes in resource availability and price.

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[2] These comments use the term "officially adopted" as that term is defined in 4 CSR 240-22.070(10).

[3] 4 CSR 240-22.020 (47) defines resource acquisition strategy as including a preferred resource plan, an implementation plan and a set of contingency options for responding to events or circumstances that would render the preferred plan obsolete.

[4] These comments use the term "Signing Statement" to refer to the Statement in Part 5, Page 26 of the filing, titled Aquila Networks - Missouri 2007 Integrated Resource Plan" and dated 02/05/2007.

For the purpose of these comments, the department assumes that this Signing Statement refers to Section 5.5. However, statements that appear elsewhere in the filing could properly be included in Aquila's Implementation and Resource Acquisition Strategy. If Aquila determines that the Signing Statement should incorporate statements that appear elsewhere in the filing, the Signing Statement should be amended to explicitly include them.

The supply-side portion of Aquila's PRP includes an additional 975 megawatts (MW) of capacity through 2022: 475 MW of natural gas by 2013, 200 MW of coal in 2017 and 300 MW of nuclear in 2022.[5] This plan also includes several power purchase agreements in effect from 2008 through 2021. No renewable energy resources are included. Aquila stated that current offers for wind generation were marginally not cost effective, but that bids received in response to a February 2007 request for proposals for wind power may alter the preferred plan.[6] Aquila stated that it would continue to evaluate the viability of renewable generation technology options in its service territory during the 2008 through 2012 period.[7]

[5] Executive Summary, p.1. The Preferred Resource Plan also includes several Power Purchase Agreements from 2008 through 2021.
[6] Executive summary, p.23
[7] Executive summary, p.25

The demand-side portion of the resource acquisition strategy consists of all demand-side management (DSM) programs (seven residential energy efficiency programs, a comprehensive commercial and industrial energy efficiency program, four public purpose programs, an energy efficiency research and development program and three demand response programs) that were found to be cost-effective in the analysis conducted by Quantec, Aquila's DSM consultant. The proposed first-year budget for these programs is just under $5.5 million, and the budget for 2011 is about $8.9 million.[8] The energy efficiency programs and their budgets, according to Part 3 of the filing and the "Missouri Energy Efficiency Program Development Schedule" that Aquila provided on May 24, 2007, are as follows (in $1000):

EE Program	2007	2008	2009	2010	2011
Lighting	56	88	127	137	148
Thermal Envelope Improvements	283	455	718	728	740
HVAC Equipment &	228	382	571	575	579

[8] This sum is based on the first-year budgets of all programs listed in Part 3, Table 3.2 except Direct Load Control, which was eliminated in screening.

Appliance					
Prog T'stats & HVAC Mgmt	63	80	107	109	112
Residential New Construction	199	350	518	490	490
Residential Audit	154	242	377	383	390
Comprehensive Comm & Induct	1,568	2,846	4,242	4,215	4,403
Total	$2,551	$4,443	$6,660	$6,637	$6,862

In Part 3, Aquila projects peak demand to grow an average of 2.0 percent per year for the next 20 years. However, cost-effective DSM programs are estimated to reduce demand growth to less than 1.6 percent per year. Aquila equates the cumulative impact of DSM programs to avoiding the need for 218 MW of capacity and reducing the growth rate of peak demand by more than 20 percent.[9]

[9] Executive summary, p.1

Aquila's filing also includes a request in conformity with 4 CSR 240-22.080 (2) for nontraditional accounting procedures and information regarding associated ratemaking treatment to be sought by Aquila for demand-side resource costs.

List of Deficiencies and Proposed Remedies

(1) Deficiencies and Proposed Remedies for 4 CSR 240-22.040:

(A) Proposed remedies for deficiencies in analysis of dispatchable renewable resources

1. In its next scheduled IRP filing, Aquila should analyze dispatchable renewable resources that should have been included in this filing, but were omitted. These include landfill gas generation and additional biomass technologies. In addition, Aquila should analyze biomass as a separate supply category rather than as a subcategory of "waste."

(B) Proposed remedies for deficiencies in analysis of efficiency improvements and refurbishment at existing facilities

1. In its next scheduled IRP filing, Aquila should analyze efficiency improvements and refurbishment as supply-side resources.

(C) Proposed remedies related to wind resources

1. Within one month of final Commission action on the IRP, Aquila should provide information on the vendor proposals that were due on April 27, 2007, in response to Aquila's March 19, 2007 wind RFP.

2. During the period prior to its next scheduled IRP filing, Aquila should inform the parties concerning its plans for issuing future wind RFPs and its preliminary analysis of the viability of the proposals. New information should be provided at or prior to the next semiannual update meeting.

3. During the period prior to its next scheduled IRP filing, Aquila should inform the parties to this case concerning the schedule and analytic process that Aquila will use for determining whether to modify its preferred resource plan and resource acquisition strategy to incorporate wind energy resources. This information should be provided by the time of the next semiannual update meeting, with updates at subsequent semiannual meetings.

4. Aquila should perform an MIDAS analysis, or its equivalent, in a timely manner whenever preliminary analysis of new wind data indicates that new wind resources may be cost-effective. Information concerning this analysis should be provided by the time of the next semiannual update meeting, with updates at subsequent semiannual meetings.

(2) Deficiencies and Proposed Remedies for 4 CSR 240-22.050:

(A) Proposed remedies for deficiencies in analysis of point-of-use resources

1. In its next scheduled IRP filing, Aquila should include point-of-use resources such as distributed generation and thermal storage in the demand-side screening and analyze them on an equivalent basis with supply-side resources.

(B) Proposed remedies for deficiencies in the estimation of avoided capacity cost

1. In its next scheduled IRP filing, Aquila should comply with the requirements of 4 CSR 240-22.050(2) for estimating and documenting avoided capacity cost rather than simply assuming a value for avoided capacity costs.
2. In its next scheduled IRP filing, Aquila should consider avoided capacity cost when screening energy efficiency measures, or if it is not considered, explain why it was not considered.

(C) Proposed remedies for deficiencies in meeting requirements for demand-side research and evaluation

1. For its next IRP filing, if Aquila has conducted or plans to conduct the types of studies, data gathering or pilot projects described in 4 CSR 240-

22.050 (5), 4 CSR 240-22.050 (9)(C) and 4 CSR 240-22.050 (11)(E), these should be specifically identified and documented in the filing. If no such studies, data gathering or projects are planned for the future, Aquila should state this clearly and explain why they are not necessary to meet the rule requirements cited above.

(D) Proposed remedies for additional deficiencies in DSM analysis

1. As discussed in the comments, Aquila's filing presents inconsistent estimates of DSM program load impacts. This minor issues can probably be resolved by simple written clarification by Aquila of the reason for the discrepancy.
2. As discussed in the comments, Aquila's filing contains a possibly flawed characterization of clothes washers.. Aquila should investigate whether there were flaws in the method used to estimate energy savings from measures related to clothes washers and if so, to make appropriate adjustments in its implementation plans for promoting appliance efficiency.

(3) Deficiencies and Proposed Remedies for 4 CSR 240-22.060:

1. As part of it current filing, Aquila should develop and subject to MIDAS analysis at least one alternative resource plan with a larger DSM budget than the budget used for the alternative resource plans (ARPs).

2. Alternatively, as part of its contingency planning, Aquila should develop at least one ARP with a larger DSM budget, to be incorporated into contingency planning as a contingency plan that may be triggered if the utility enters a scenario under which a greater achievable potential for DSM could be expected.

(4) Deficiencies and Proposed Remedies for 4 CSR 240-22.070:

(A) Proposed remedies for deficiencies in Aquila's process for selecting the preferred resource plan

1. In its next scheduled IRP filing, Aquila should clearly explain the process used to select the preferred resource plan, including the relative weights given to the various performance measures and the rationale used by utility decision makers to judge the appropriate tradeoffs among competing planning objectives and between expected performance and risk, as required by 4 CSR 240-22.070 (11)(F); and to select the preferred resource plan from among the alternative resource plans that

have been analyzed as required by 4 CSR 240-22.070(6). If this involves an iterative process, it is not necessary to describe all the iterations.

(B) Proposed remedies for deficiencies in Aquila's application of scenario analysis

1. In its next scheduled IRP filing, if scenario analysis is used, Aquila should seek comment from stakeholders and independent experts for the purpose of assuring that the risk analysis and contingency planning fully incorporate the significant implications of the scenarios including aspects that are not readily quantified. Because every scenario is unique, greater specificity is not possible; however, the comments on this issue include illustrative examples of potentially significant implications of the Electric Power Horizons (EPH) scenarios that are not readily quantified.

(C) Proposed remedies for deficiencies in formulating and documenting the implementation and resource acquisition strategy

1. In its next scheduled IRP filing, Aquila should file an officially adopted implementation and resource acquisition strategy that meets all requirements of 4 CSR 240-22.070(9) and (10), taking into account any

waiver requests submitted at least six months in advance of the IRP filing that are approved by the Commission.

2. For the current filing, Aquila should agree to submit a revised, officially adopted resource acquisition strategy (RAS) that explicitly incorporates relevant statements in the filing that are not included in Section 5.5 of the filing. The purpose of amending the RAS is to resolve deficiencies in meeting the requirements of 4 CSR 240-22.070(9) and (10). In the department's view, several requirements that are not met by the current officially adopted RAS could be met by incorporating statements that already appear elsewhere in the filing. The resulting document should unambiguously state what has been officially adopted by Aquila management as its resource acquisition strategy.

3. For deficiencies in meeting the requirements of 4 CSR 240-22.070(9) and (10) that are not resolved in this manner, Aquila should work toward correcting these deficiencies during the period prior to the next scheduled filing. Aquila should report its progress in resolving the following issues at the semiannual update meetings:

(a) Clearly identify critical uncertain factors and develop and implement specific strategies to monitor them.

(b) Possible revisions in the RAS that are being seriously considered.

(c) Implementation plans for acquiring supply- and demand-side resources developed at an appropriate level of detail. Refinement of these plans will be an ongoing process.

(d) Evaluation plans for demand-side programs, developed at an appropriate level of detail. Refinement of these plans will be an ongoing process.

(e) Evaluation of demand-side technologies as contingency options, including energy efficiency and point-of-use technologies.

(f) Evaluation of renewable generation technologies as contingency options, including wind, landfill gas and biomass.

(D) Proposed remedies for deficiencies in formulating contingency options

1. In its next scheduled IRP filing, Aquila should not limit contingency options to supply-side resources and should evaluate demand-side technologies including energy efficiency and point-of-use technologies as contingency options.

2. Aquila should model at least one contingency option that includes a higher budget for demand-side programs, including energy efficiency programs, than the budget level in the preferred resource plan. In addition, Aquila should identify conditions, such as values of critical uncertain factors, under which the utility would consider implementing this contingency option.

(5) Deficiencies and proposed remedies for Aquila's failure to request waivers in accordance with 4 CSR 240-22.080

1. Prior to its next scheduled IRP filing, Aquila should request waivers from any rule requirements with which Aquila will not be able to comply. Aquila should make its best effort to submit waiver requests at least six months in advance of its next filing, or as soon as Aquila is aware of the necessity of the request.

2. An example of rule requirements for which Aquila should have filed a waiver request for its February 5, 2007 filing are the requirements in 4 CSR 240-22.040(1), (4) and (7) to include refurbishment and efficiency improvements in plants and transmissions and distribution lines in the supply-side analysis.

4 CSR 240-22.040 Supply-Side Resource Analysis

Deficiencies

Aquila's supply side screening and subsequent supply side analysis fails to consider certain resources whose consideration is required by the rule. Furthermore, Aquila does not report any reason for eliminating or failing to consider these resources as required by the reporting requirements in 4 CSR 240-22.040 (9)(A)(3).

Rule 4 CSR 240-22.040 (1) states that:

The analysis of supply side resources shall begin with the identification of a variety of potential supply-side resource options which the utility can reasonably expect to develop and implement solely through its own resources or for which it will be a major participant.

Rule 4 CSR 240-22.040 (2) (C) states that:

The utility shall rank all supply-side resource options identified pursuant to section (1)…. The utility shall indicate which supply-side options are considered to be candidate resource options for purposes of developing the alternative resource plans required by 4 CSR 240-22.060(3). The utility shall also indicate which options are eliminated from further

consideration on the basis of the screening analysis and shall explain the reasons for their elimination.

Subsection (2) lists the following as legitimate reasons for elimination:

Each of the supply-side resource options referred to in section (1) shall be subjected to a preliminary screening analysis. The purpose of this step is to provide an initial ranking of these options…. and to eliminate from further consideration those options that have significant disadvantages in terms of utility costs, environmental costs, operational efficiency, risk reduction or planning flexibility, as compared to other available supply-side resource options.

Finally, the reporting requirements in 4 CSR 240-22.040 (9)(A)(3) require the utility to state:

"an explanation of the reasons why each supply-side resource option rejected as a result of the screening analysis was not included as a candidate resource option."

As discussed below, Aquila's filing is deficient in meeting these requirements with respect to two categories of potential supply-side resources - renewable generation and improvements in the efficiency of current generating

resources.

A possible explanation for this deficiency is that the renewable generation technologies and supply-side efficiency improvements that are discussed below are not included in the Technical Assessment Guide (TAG) database that Aquila licensed from the Electric Power Research Institute (EPRI).

Aquila appears to have relied exclusively on EPRI TAG to identify potential supply-side resources. The filing states that "all available EPRI technologies were screened."[10]

It appears that if a technology was not included in EPRI TAG, Aquila did not include the technology in its screening. In order to fully comply with the rule's requirements, Aquila should have supplemented the EPRI TAG analysis using data sources for technologies not included in EPRI TAG.

(A)Deficiencies in analysis of dispatchable renewable resources:

Aquila's filing is deficient in failing to consider generation from landfill gas. Generation from landfill gas (LFG) is a proven technology which can cost effectively utilize an energy resource that is otherwise wasted. In Missouri alone, four new LFG generation plants have been installed during the past two years. The economics of LFG installations have site-specific characteristics that make

them less susceptible than other dispatchable technologies to analysis using a generic model such as EPRI TAG. However, Aquila's failure to provide any consideration of the potential role of LFG generation in meeting resource requirements is a deficiency in the filing.

In addition, Aquila's filing is deficient in limiting its consideration of biomass co-firing to a single technology (200 MW wood-coal co-fired boiler.) In its limited consideration of generation from biomass, Aquila treats biomass generation as a subcategory of "waste burning." This treatment confuses categories. For example, some waste (e.g. tire-derived fuel) is not biomass and some biomass (e.g. switchgrass) is not waste. Furthermore, waste burning more typically refers to municipal solid waste combustion, which involves unique policy issues that are not common to most forms of biomass combustion. Because the identification of biomass generation as "waste burning" confuses categories and tends to marginalize the potential for generation from biomass, it should be avoided in future filings.

Appendix 2-F, which presents screening analysis results for technologies included in the EPRI TAG database, indicates that Aquila considered several generation technologies based on combusting wood. These included a 200 MW

[10] Part 2, page 1

wood-coal co-fired boiler, a 50 MW wood-fired fluidized bed combustion and a 100 MW wood-fired gasification combined cycle.

An adequate analysis of biomass co-firing would have considered its potential using the two baseload technologies - pulverized coal (PC) and fluidized bed combustion (FBC) - that were passed along from its EPRI TAG screening. Examples of possible analyses include the following:

- Aquila should have considered feedstocks other than waste wood. For example, energy crops such as switchgrass may be more amenable than wood for co-firing in a pulverized coal (PC) plant.
- Aquila should have considered the introduction of gasified biomass into a PC plant as an overburn stage. This technology has a number of potential benefits including NOx reduction.
- Aquila should have considered the potential for co-firing coal and biomass using fluidized bed combustion (FBC) technology. FBC installations -- as Aquila representatives discussed during the stakeholder meetings, but not in the filing - can be designed to efficiently use a wide range of fuels. As a result, FBC technology is particularly suitable for co-firing of biomass as well as various opportunity fuels.

Aquila states that it screened out generation from "waste burning," including co-fired waste wood, because it "requires a support industry to supplement additional costs. Aquila has worked to identify possible waste burning support industries in our region and will evaluate specific proposals when they become available."[11] However, the documentation of Aquila's Resource Acquisition Strategy in Part 5 does not include any plans for monitoring or encouraging the development of such support industries over a 3-year or 20-year horizon.

Discussion of Aquila's analysis of non-dispatchable renewable resources:

Aquila included wind generation in its supply-side screening based on cost information that was received in early 2006 in response to an RFP as well as unsolicited wind offers received during 2006. From this information, Aquila developed estimates for the generic cost of wind for use in the IRP screening analysis.

Wind generation was not passed through to the integration stage. However, Aquila's Acquisition Resource Strategy (Part 5, Section 5.5) states that wind resources as modeled above were only "marginally not cost effective" and that "the bids received for wind power in the upcoming RFP may be cost-effective and

[11] Part 2, Page 20, Table 6-1

may alter the preferred resource plan."

In addition to wind, Aquila considered and eliminated from consideration two solar-based non-dispatchable renewable technologies, photovoltaic (PV) and solar thermal generation. The department's comments on Aquila's treatment of PV generation are included in the discussion of deficiencies in complying with 4 CSR 240-22.050

(B) Deficiencies in analysis of efficiency improvements and refurbishment in existing facilities

Relevant rule sections include:

Rule 4 CSR 240-22.040 (1) states that:

> ***The analysis of supply side resources shall begin with the identification of a variety of potential supply-side resource options…These options include…life extension and refurbishment at existing generating plants;…efficiency improvements which reduce the utility's own use of energy; … and upgrading of the transmission and distribution systems to reduce power and energy losses.***

Rule 4 CSR 240-22.040 (4) also states that:

The utility shall identify and analyze opportunities for life extension and refurbishment of existing generation plants, taking into account their current condition to the extent that it is significant in the planning process.

And 4 CSR 240-22.040 (7) states that:

The utility shall…analyze the feasibility and cost-effectiveness of transmission and distribution system loss-reduction measures as a supply-side resource.

Aquila's treatment of the required analysis of efficiency improvements in its generation facilities is deficient. The rule requires the utility to consider efficiency improvements in its generating facilities as part of its filing. If such improvements are screened from further consideration, the utility should explicitly state the reason for the elimination based on the possible reasons listed in 4 CSR 240-22.040 (2).

In his position statement on behalf of Aquila in conjunction with Case No. EO-2006-0495 "In the Matter of the Consideration of Adoption of PURPA Section 111(d)(3) Fossil Fuel Generation Efficiency Standard as Required by Section 1251 of the Energy Policy Act of 2005," J. Matt Tracy

stated that:

> Aquila already complies with the IRP requirements in 4 CSR 40-22(040)(1) to consider **life extension and refurbishment at existing generating plants and efficiency improvements which reduce the utility's own use of energy….**

However, there is no evidence in the filing that Aquila considered or analyzed refurbishment or efficiency improvements at its existing generation facilities as a supply side resource. Refurbishments and efficiency improvements are not among the EPRI TAG technologies listed in Appendix 2-F, and there is no indication that Aquila conducted an analysis external to the EPRI TAG analysis. In the filing, Aquila comments that the utility plans to "maintain its current level of capacity with necessary preventative maintenance." (Part 2, page 4). Consistent with this statement, the estimates of future supply side resources in Appendix 5-D indicate that the capacity of its existing power plants will remain constant over the planning horizon.

Part 2, page 5 states that Aquila has contracted with Black and Veatch to study opportunities for efficiency improvements at the power plants that

Aquila currently operates. This study could identify opportunities to increase capacity at the existing plants. However, the study was scheduled to be completed after Aquila's IRP filing and therefore does not constitute compliance with the rule requirements cited above. Because Aquila knew that the study would not be completed in time to include in the filing, the utility should have requested a waiver from these rule requirements.

Aquila's treatment of the required analysis of efficiency improvements in its transmission and distribution lines is also deficient. Chapter 2 of Aquila's filing states that:

> The generation and transmission groups within ANM are not allowed to share information under regulations of the Federal Energy Regulatory Commission (FERC). Because of this separation, the resource planning group within ANM is not allowed to perform or obtain any analysis of the age, condition, and efficiency level of the transmission system or the feasibility of loss-reduction measures as a supply-side resource as outlined in the IRP requirements.

Aquila should have anticipated the effect of these FERC regulations and requested a waiver from these rule requirements.

4 CSR 240-22.050 Demand-Side Resource Analysis

General findings

If Aquila implements the energy efficiency programs included in its preferred resource plan, it will have exceeded the funding goal in ER-2007-0004 Stipulation and Agreement, paragraph 11, p.7, which states:

> Aquila will only implement the programs shown in Case No. EO-2007-0298 to be cost-effective at adequate funding levels, with a funding goal of one percent of its annual revenues to implement cost-effective *energy efficiency programs* by 2010.[12] (Emphasis supplied)

Aquila contracted with Quantec, LLC, an energy economics consultant in Portland, Oregon, to conduct DSM resource analysis and develop a Demand-Side Management Plan for the period 2007through 2011. Aquila is including in its preferred resource plan total DSM program budgets for all energy efficiency, public purpose, research and development and demand response programs beginning at approximately $5.5 million in Year 1 (2007) and increasing to $10.5 million in Year 5 (2010).[13]

[12] ER-2007-0004 Stipulation and Agreement, paragraph 11, p.7, filed April 4, 2007.
[13] Part 3 Demand-Side Research Analysis, p.4-5

Aquila states that the 2010 budget represents an estimated two percent of Aquila electric revenues in Missouri. The measure of compliance with this provision of the stipulation is whether the funding level for only *energy efficiency programs* in 2010 (Year 4) is one percent of Aquila's annual revenues. For purposes of this analysis, Residential Programs, Non-Residential Programs and Public Purpose Programs are included as energy efficiency programs.[14] Energy efficiency program funding for Year 1 (2007) is $3,041,000; Year 2 (2008) is $5,178,000; Year 3 (2009) is $7,640,000; Year 4 (2010) is $7,617,000; and Year 5 (2011) is $7,842,000. One percent of Aquila's 2005 annual revenues would be $4,635,598. In Year 4 (2010), the proposed funding level for energy efficiency programs alone is $7,617,000, an amount that represents approximately 1.64 percent of Aquila's annual revenues.

This is a significant commitment by Aquila to implement cost-effective energy efficiency programs, and the Department supports Aquila's commitment to initiatives that reduce the need to build additional electric generation plants and other infrastructure investments. Energy efficiency is often the most cost-effective way to address the challenges of growing energy demand, higher energy prices, and concerns over energy security and independence, reliability and environmental

[14] Ibid., Table 3-2

quality. Energy efficiency programs provide a means by which consumers and businesses can save money through lower electric bills. Increasing energy efficiency will reduce load growth, diversify energy resources, enhance the reliability of the electricity grid, reduce air pollution and emissions, mitigate electricity and fuel price increases and reduce customer exposure to price volatility. Energy efficiency does not rely on any fuel and is not subject to shortages of supply or increased prices for natural gas or other fuels.

The department's review of Aquila's compliance with the specific requirements of 4 CSR 240-22.050 identified deficiencies in the following areas: identification and screening of renewable energy sources and distributed energy technologies; market research studies and other activities to inform the design and implementation of cost effective energy efficiency programs; time-differentiated load impacts of energy efficiency programs; evaluation plans and protocols to continue data collection to estimate market potential of energy efficiency programs.

Deficiencies

(A) Deficiencies in the treatment of point-of-use resources

Rule 4 CSR 240-22.050 (1) (D) states:

(1) Identification of End-Use Measures. The analysis of demand-side resources shall begin with the development of a menu of energy efficiency and energy management measures that provides broad coverage of ….(D) Renewable energy sources and energy technologies that substitute for electricity at the point of use.

In Part 3 and Appendices 3A through 3H, Aquila provides a list of the energy efficiency (EE) measures identified for screening. This list is reasonably consistent with other examples of EE measure screening with which the department is familiar. However, the menu is deficient due to its failure to consider or screen point-of-use generation and storage as required by 4 CSR 240-22.050(1) (D).

- In general, 4 CSR 240-22.050(1) (D) requires the utility to consider both point-of-use or "distributed" technologies that are owned by the utility and those that are owned by the end user. In practice, it is reasonable to analyze utility-scale point-of-use resources through the supply side screening analysis required by 4 CSR 240-22.040 and to analyze user-owned resources as part of the DSM analysis required by 4 CSR 240-22.050. It should be noted that the ownership

requirements of 4 CSR 240-22.040(1)[15] do not apply to the point-of-use resource analysis required by 4 CSR 240-22.050(1) (D).

- Aquila fails to consider distributed generation technologies for generation at point of use as required in 4 CSR 240-22.050(1)D). Several of the key technologies that are primary candidates for DG - for example, photovoltaic (PV) solar, microturbines, fuel cells, and IC engines - were considered by Aquila in its supply side screening, but they were screened assuming utility-scale implementation. For example, Appendix 2F indicates that PV was modeled as arrays ranging from 1MW to 50 MW capacity.

  Screening of these resources at utility scale is appropriate for the supply side screening in accordance with 4 CSR 240-22.040(1), which requires the utility to consider only resources that it "can reasonably expect to develop and implement solely through its own resources or for which it will be a major participant."

  However, point of use generation resources, which may be owned by the user rather than the utility, should be screened at a scale appropriate to end user distributed generation in accordance with 4 CSR 240-22.050(1)(D).

[15] 4 CSR 240-22.040(1) limits supply-side screening to resources that "the utility can reasonably expect to develop and implement solely through its own resources or for which it will be a major participant."

- Similarly, Aquila fails to consider or screen resources that store energy at the point of use. Aquila's supply-side screening includes several utility-scale storage technologies such as compressed air storage and pumped storage. However, as with generation, storage can be a resource controlled by the utility or a distributed resource installed and controlled by the end user. It is common to include point-of-use storage technologies such as thermal storage in DSM analysis. However, thermal storage is not among the demand side measures listed in Appendix 2B and apparently was not included anywhere in Aquila's screening analysis.

(B) Deficiencies in the estimation of avoided capacity cost

Rule 4 CSR 240-22.050(2) states that

the utility shall calculate and document the avoided capacity costs per kilowatt year for each year of the planning horizon.

This requirement to document methods used to estimate avoided costs is reiterated in 4 CSR 240-22.050(11) (D).

Part 3 of the Aquila filing[16] states that "Quantec used $100/kW-year (2006$, escalated) as a proxy for the avoided capacity costs. This value was based on Quantec's professional judgment as a reasonable proxy for avoided capacity

costs."

Aquila should have presented information demonstrating that Quantec's methodology for calculating avoided capacity costs is consistent with the methodology required by 4 CSR 240-22.050(2) or should have requested a waiver from these requirements.

In addition, Aquila should clarify the technical reasons for not using avoided capacity costs when screening energy efficiency programs. In a written response to parties' questions that Aquila distributed on May 24, 2007, Aquila states that:

> The avoided energy costs used in the DSM screening and included in Appendix 3-C do not include capacity costs. Quantec utilized these energy costs for the energy efficiency program screening and the estimated capacity costs for the demand response program screening.

Aquila's approach may be compatible with the requirements of 4 CSR 240-22.050(2) for calculating avoided costs. However, the filing does not appear to state that consideration of avoided capacity cost was limited to demand response screening, or explains why it was not applied to energy efficiency screening. Aquila should supply this explanation.

[16] Part 3 - Demand Side Resource Analysis

(C) Deficiencies in meeting requirements for demand-side research:

Rule 4 CSR 240-22.050 (5) states:

The utility shall conduct market research studies, customer surveys, pilot demand-side programs, test marketing programs and other activities as necessary to estimate the technical potential of end-use measures and to develop the information necessary to design and implement cost-effective demand-side programs.

Related reporting requirements include 4 CSR 240-22.050 (9) (C) and 4 CSR 240-22.050 (11)(E). The first, 4 CSR 240-22.050 (9) (C), states:

The utility shall develop protocols to collect data regarding demand-side program market potential, participation rates, utility costs, participant costs, and total costs.

And 4 CSR 240-22.050 (11)(E) requires the utility to provide:

Copies of completed market research studies, pilot programs, test marketing programs and other studies as required by section (5) of this rule, and descriptions of those studies that are planned or in progress and the scheduled completion dates…

Appendix 2A states that for energy efficiency programs, the documents relevant to meeting the requirement of 4 CSR 240-22.050 (5) are listed in Section II Data Sources of "Aquila Networks State of Missouri Electric Demand-Side Management Plan 2007-2011" (Appendix 3-B of the IRP).

However, this section lists no relevant studies or pilot projects conducted by Aquila.[17] Aquila's Resource Acquisition Strategy includes no plans for such studies or pilot projects, and Aquila staff indicated during the stakeholder meeting that the utility has no such plans.

The filing provides no specific plans to implement continued data gathering on DSM market potential, as required in 4 CSR 240-22.050(9)(C), other than a statement in Part 3 that Aquila will conduct an energy efficiency research and development (R&D) program. Part 3 indicates that the budget will be set at $30,000 in the first year and increase to $80,000 by the fifth year. However, Aquila does not clearly describe the R&D program that is envisioned. Appendix 3B, p. V-39, states that "Aquila plans to join a new statewide data collection effort sponsored by the Department of Natural Resources." However, the effort that it describes was completed before the IRP was filed, and Quantec made use of the

[17] Aquila did contribute funds toward the RLW Saturation study listed in Section II.

study that resulted in its DSM analysis.[18]. The Department currently has no plans to continue the study to which Aquila refers.

If Aquila has conducted or plans to conduct the types of studies or pilot projects envisioned in 4 CSR 240-22.050 (5), these should be specifically identified and documented in the filing. If no such studies or projects are planned for the future, Aquila should state this clearly and should explain why they are not necessary to meet the requirements of 4 CSR 240-22.050 (5).

(D) Additional deficiencies:

(a) Inconsistent estimates of program load impact:

Rule 4 CSR 240-22.050 (8) states:

For each demand-side program that passes the total resource cost test, the utility shall develop time-differentiated load impact estimates over the planning horizon at the level of detail required by the supply system simulation model that is used in the integrated resource analysis required by 4 CSR 240-22.060(4).

[E] Executive Summary p. ES-6

Aquila's filing presents two different sets of load impact estimates for energy efficiency programs. One set of estimates, which were calculated by Aquila and carried forward to the integration analysis, are summarized in Part 4, Table 4-1. The other set of estimates, which appear in various tables[19] in Appendix 3-B, were calculated by its consultant Quantec using a different methodology. Aquila staff acknowledge during stakeholder meetings that the estimates are different, but the utility has not filed a written acknowledgment and explanation of the difference.

(b) Characterization of clothes washers:

Rule 4 CSR 240-22.050 (1) (C) states:

> ***(1) Identification of End-Use Measures. The analysis of demand-side resources shall begin with the development of a menu of energy efficiency and energy management measures that provides broad coverage of… (C) All major end uses, including at least lighting, refrigeration, space cooling, space heating, water heating and motive power;…***

Following standard practice, Aquila does include advanced clothes washers in the menu of technologies subjected to DSM screening. However, in Part 3 of its filing (p. III-2), Aquila states that "clothes washer and dishwasher measures are modeled within the water heat end use." This classification is problematic because

[19] Appendix 3-B Tables 30, 35, 40, 45, 50, 56, 60 and 70

the primary benefit of highly efficient clothes washers is not reduced water heating.

According to the RLW Analytics Missouri Residential Efficiency Saturation study[20], "the Energy Star clothes washer actually uses slightly more electric energy during the spin cycle to wring more water out, thus reducing the time required for drying, thus deducting from the overall savings attributed to electric water heating." The apparent misclassification may not have had a practical effect on Aquila's measure screening. The large differential in energy savings projected for horizontal and vertical axis clothes washers suggests that the impact on dryers may have been taken into account. This cannot be confirmed because in its filing and even in supplementary work paper materials supplied to stakeholders after the filing, Aquila does not provide sufficient work papers to determine the specific data sources and assumptions used to model specific DSM measures.

[20] RLW Analytics, 2006 Missouri Statewide Residential Lighting and Appliance Efficiency Saturation Study, Final Report, November 15, 2006, p. 130

Rule 4 CSR 240-22.060 Integrated Resource Analysis

Deficiencies

The IRP rule includes only general guidelines on how the utility should design alternative resource plans (ARPs). For example, 4 CSR 240-22.060(1) states:

> ***The utility shall design alternative resource plans to satisfy at least the objectives and priorities identified in 4 CSR 240-22.010(2).***

And 4 CSR 240-22.010(3) states that:

> ***The utility shall use appropriate combinations of candidate demand-side and supply-side resources to develop a set of alternative resource plans, each of which is designed to achieve one (1) or more of the planning objectives identified in 4 CSR 240-22.010(2).***

In its filing, Aquila designs six ARPs that are submitted to integration analysis. All six ARPs assume the same level of DSM programs and budget. Aquila should have (a) explained more clearly why this budget level is assumed in the integration analysis, or (b) should have subjected to integration analysis additional ARPs that were based on higher DSM budget levels.

The DSM budget assumed in the integration analysis is as follows (in thousands of dollars):[21]

	2007	2008	2009	2010	2011
Energy efficiency programs	2,551	4,443	6,660	6,637	6,862
Energy efficiency R&D	30	52	76	76	80
Demand response programs	2,422	1,613	1,762	968	1,000
Low-income & education	490	735	980	980	980
Total	$5,493	$6,843	$9,478	$8,661	$8,922

Aquila states (Part 3, p. 2) that this budget level is "designed to capture the achievable energy-efficiency and demand-response potential" identified by Quantec in the DSM screening analysis." The integration analysis, in turn, assumes that the ARPs being analyzed include a DSM program that captures the achievable energy-efficiency and demand-response potential identified by Quantec.

Aquila's current filing does not explain clearly the reasons for Aquila's assertion that this budget level will capture the achievable potential identified by

[21] These numbers are based on Part 3 Table 3.2 and are consistent with the "Missouri Energy Efficiency Program Development Schedule" provided by Aquila on May 24, 2007. The "Demand response programs" and "Total"

Quantec. Aquila documents in Appendix 3B, page ES1-10, the criteria that were used in select the budget levels. However, the statement of these criteria falls short of demonstrating the relationship between the budget specified in Table 3.2 and the achievable potential identified by Quantec.

numbers presented here do not include funds for a Direct Load Control (DLC) program because the DLC program did not pass DSM screening.

4 CSR 240-22.070 Risk Analysis and Strategy Selection

Deficiencies

(A) Deficiencies in Aquila's process for selecting the preferred resource plan

Rule 4 CSR 240-22.070(6) states:

> ***The utility shall select a preferred resource plan from among the alternative plans that have been analyzed pursuant to the requirements of 4 CSR 240-22.060 and sections (1) -(5) of this rule. The preferred resource plan shall satisfy at least the following conditions:***
>
> ***(A) In the judgment of utility decision makers, the preferred plan shall strike an appropriate balance between the various planning objectives specified in 4 CSR 240-22.010(2); and***
>
> ***(B) The trend of expected unsaved hours for the preferred resource plan must not indicate a consistent increase in the need for emergency imported power over the planning horizon.***

The process for Aquila's selection of its preferred resource plan (PRP) diverges as follows from the process required in the rule:

(a) Aquila did not select a preferred resource plan from among the alternative plans (ARPs) that were analyzed in Part 4. Instead, Aquila constructed a new PRP based on elements drawn from those ARPs.

(b) Aquila provides some discussion of advantages of different elements of the PRP. However, Aquila does not provide a clear explanation of the process by which it was constructed as required in 4 CSR 240-22.070 (11)(F).

(B) Deficiencies in Aquila's application of scenario analysis

Aquila employed scenarios provided by Electric Power Horizons (EPH) in its analysis of risk that could affect the performance of alternative plans. In the department's opinion, use of scenario analysis, while not required by the IRP rule, is justified because it provides a means to account for the interaction of multiple "uncertain factors" that might affect resource plan performance.

Because the IRP rule has no provisions related to scenario analysis, Aquila's approach to scenario analysis is not in conflict with any provisions of the IRP rule. Nevertheless, there appear to be flaws in Aquila's application of the EPH scenarios. The following examples illustrate that Aquila should have more fully applied the scenario specifications that were supplied by EPH.

(a) EPH states that under its "Terrorism and Turmoil" (T&T) scenario, no new coal plants will be built before 2016 and no new nuclear plants will be built during Aquila's 20-year planning horizon. (Appendix 5B, Table ES-1). Nevertheless, Aquila's optimal resource plan for the T&T scenario calls for a 200MW share in a coal plant in 2013 and two 100MW shares in a nuclear plant in 2020 and 2023.

(b) EPH states that under its "Technology Evolution" (TE) scenario, the public develops a conservation ethic. Included in the acceleration of technology development are demand-side, carbon sequestration and power storage (battery) technology. (Appendix 5B, pp. 4-6 ff) It would have been appropriate to model an Aquila TE scenario that took advantage of the opportunities presented under this scenario. For example, an optimal plan under an EPH scenario could include an increase in the budget for DSM, some distributed generation, a share in an IGCC plant and the use of advanced storage technology to levelize the output from wind generation.[22]

[18] Flow battery technologies that would be suitable for this purpose are currently under development with status ranging from laboratory based research and development to field demonstrations to the verge of commercialization. These developments are documented on the EPRI web site and elsewhere.

(C) Deficiencies in formulating and documenting the implementation and resource acquisition strategy

Rule 4 CSR 240-22.070(9) and (10) state the following requirements for developing and documenting an implementation and resource acquisition strategy:

(9) The utility shall develop an implementation plan that specifies the major tasks and schedules necessary to implement the preferred resource plan over the implementation period. The implementation plan shall contain -

(A) A schedule and description of ongoing and planned research activities to update and improve the quality of data used in load analysis and forecasting;

(B) A schedule and description of ongoing and planned demand-side programs, program evaluations and research activities;

(C) A schedule and description of all supply-side resource acquisition and construction activities; and

(D) Identification of critical paths and major milestones for each resource acquisition project, including decision points for committing to major expenditures.

(10) The utility shall develop, document and officially adopt a resource acquisition strategy. This means that the utility's resource acquisition strategy shall be formally approved by the board of directors, a committee of senior management, an officer of the company or other responsible party who has been duly delegated the authority to commit the utility to the course of action described in the resource acquisition strategy. The officially adopted resource acquisition strategy shall consist of the following components:

(A) A preferred resource plan selected pursuant to the requirements of section (6) of this rule;

(B) An implementation plan developed pursuant to the requirements of section (9) of this rule;

(C) A specification of the ranges or combinations of outcomes for the critical uncertain factors that define the limits within which the preferred resource plan is judged to be appropriate, and an explanation of how these limits were determined;

(D) A set of contingency options that are judged to be appropriate responses to extreme outcomes of the critical uncertain factors, and an

explanation of why these options are judged to be appropriate responses to the specified outcomes; and

(E) A process for monitoring the critical uncertain factors on a continuous basis and reporting significant changes in a timely fashion to those managers or officers who have the authority to direct the implementation of contingency options when the specified limits for uncertain factors are exceeded.

The reference in (9)(B) to a requirement for program evaluation is supplemented by the following requirement in 4 CSR 240-22.050(9):

The utility shall develop evaluation plans for all demand-side programs that are included in the preferred resource plan selected pursuant to 4 CSR 240-22.070(6)

Part 5, Section 5.5 of the Aquila's resource plan filing is titled "Implementation and Resource Acquisition Strategy." Section 5.5 is followed by a Signing Statement that appears to meet the requirements of 4 CSR 240-22.070 (10) for "official adoption" of the resources acquisition strategy. The Signing Statement attests that "it is Aquila's intent to follow the Implementation and Resource Acquisition Strategy," subject to changes in resource availability and

price. For the purpose of these comments, the department assumes that at present, the Signing Statement refers only to statements contained in Sections 5.5.

After reviewing the requirements of 4 CSR 240-22.070(9) and (10), the department has concluded that many of these requirements are not met. Some requirements simply are not met anywhere in the filing. Other requirements could be met if Aquila's officially adopted implementation and resource acquisition strategy were expanded to include statements that appear elsewhere in the filing. For example, many DSM-related requirements of 4 CSR 240-22.070(9) and (10) could be met if the signing statement specifically included statements that presently appear in Appendix 3B or in written materials provided to the intervenors after February 5.

The following is a list of specific requirements that do not appear to be met:

1. Aquila is required to provide the implementation schedule for the preferred resource plan over the implementation period. Part 5 of the filing states the year that each supply side option will be acquired, and the "Missouri Energy Efficiency Program Development Schedule" provided by Aquila on May 24 states the year that each energy efficiency program will be launched.

This level of generality may be appropriate for long-term resources. However, for resources to be added in the near future, Aquila should provide more specific plans than those included in the filing. Ideally, these would meet the rule requirements to identify critical paths and major milestones for each resource acquisition project, including decision points for committing to major expenditures.

Aquila is required to provide implementation plans and evaluation plans for DSM. Implementation and evaluation plans for specific DSM programs are scattered throughout Appendix 3B of the filing. However, Part 5 of the filing does not refer to these materials. Section 5.5.1 is limited to the general statement that "various implementation strategies will be investigated with input from Quantec" and a discussion of media that could be used to advertise the program. Moreover, the discussion of publicizing the programs does not consider the use of the energy audit program to promote customer participation in other efficiency programs.

2. Aquila fails to provide a schedule and description for ongoing and planned supply side research activities. If none are planned, Aquila should so state and justify this.

3. Aquila fails to provide a schedule and description for ongoing and planned DSM research activities. If none are planned, Aquila should so state and justify this.

4. Aquila's discussion of plans for monitoring uncertain factors and acting on the information is limited to the following statement: "The ANM electric planning group will be monitoring the emissions costs and fuel prices and updating the load forecasts to ensure that there is an ability to evaluate any contingency and develop additional strategies to respond to extreme scenarios."

   This very general statement does not indicate whether or how Aquila plans to meet the rule's requirements to "provide ranges or combinations of outcomes for the critical uncertain factors within which the preferred resource plan is judged appropriate or to explain how these limits are to be determined." Nor is the statement sufficiently specific to meet the rule's requirement to "identify a process for monitoring the critical uncertain factors on a continuous basis and reporting to persons who have authority to implement contingency options."

   If Aquila does not intend to undertake the disciplined, quantitatively oriented approach to contingency planning and monitoring that is required by the rule, Aquila should so state and justify this decision in a waiver request.

One required contingency planning element that does not appear in Section 5.5 is identification of "critical uncertain factors" whose values will be monitored and specification of the values that would trigger implementation of a contingency plan. Although Aquila's filing did not identify "critical uncertain factors" by name, Section 5.2.4 presents a sensitivity analysis that concludes "the variables with the most downside risk are environmental costs, cost of capital, costs of construction for new plants, and natural gas prices." In the department's judgment, these are probably critical uncertain factors that could be used to develop the level of contingency planning required by the rule.

As discussed in the department's comments on 4 CSR 240-22.070, the contingency planning elements of Aquila's resource acquisition strategy should also be extended by considering demand- as well as supply-side contingency options.

(D) Deficiencies in formulating contingency options

Rule 4 CSR 240-22.070 (10)(d) states that:

… The officially adopted resource acquisition strategy shall consist of the following components:… (D) A set of contingency options that are judged to be appropriate responses to extreme outcomes of the critical uncertain

factors, and an explanation of why these options are judged to be appropriate responses to the specified outcomes…

Rule 4 CSR 240-22.010(2)(a) requires the utility to

…consider and analyze Demand-Side efficiency and energy management measures on an equivalent basis with Supply-Side alternatives in the resource planning process,"

Aquila should also consider demand-side measures**.** Aquila's filing contains general statements about supply-side contingency options that might be pursued in response to issues or opportunities that could arise. For example:

- Part 5 Section 5.5 states that Aquila will monitor CO2 legislation, pursue discussion with other parties concerning PPAs and participation in a coal or nuclear plant and "continue to evaluate the viability of renewable generation technology options in ANM service territory."
- Part 5 Section 5.4.7 indicates that based on revised data, Aquila might shift to generating resources not included in the PRP such as IGCC, wind generation or fluidized bed combustion (FBC).

- Part 5 Section 5.4.7 mentions that one advantage of fluidized bed combustion technology (FBC) is its fuel flexibility. A point mentioned by Aquila staff during stakeholder meetings, although not mentioned in the filing, is that this fuel flexibility could extend to biomass co-firing.

The inclusion of these statements in the filing indicates that Aquila recognizes the value of contingency planning and developing contingency options.

However, these statements are deficient for the following reasons:

(a) They fail to meet the rule's requirement to specify the "extreme outcomes of the critical uncertain factors" that would trigger the options and to explain "why these options are judged to be appropriate."

(b) When formulating contingency options, Aquila fails to consider demand-side options on an equivalent basis with supply-side options as required in 4 CSR 240-22.010(2)(a). To remedy this deficiency, Aquila should also consider demand-side measures as contingency options. For example, Aquila should consider whether there are some conditions under which additional DSM or distributed generation would be an appropriate response. Furthermore, if Aquila's review results in considering only

supply-side options, the utility should provide an explanation for this result as required by 4 CSR 240-22.070 (10)(d).

WHEREFORE, the Missouri Department of Natural Resources respectfully files its review of Aquila's Integrated Resource Planning filing in the above-styled matter.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing have been mailed, hand-delivered, transmitted by facsimile or e-mailed to all counsel of record this 19th day of June, 2007.

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Shelley A. Woods