Recommendations for Frankfort Plant Board's Participation in KyMEA

Redacted Version

16 June 2017

Energy+Environmental Economics

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1. Executive summary

A. **Project Background**

Kentucky Municipal Energy Agency (KyMEA or Agency) was formed in September 2015, pursuant to the Interlocal Cooperation Act, whereby public agencies are able to cooperate in joint purchases of power and in sharing of resources to achieve mutual benefits. A brief summary of the chronology is provided below:

- Frankfort Electric & Water Plant Board (FPB), a Kentucky municipal utility, executed the Interlocal Cooperation Agreement Creating the Kentucky Municipal Energy Agency (Interlocal Agreement) in June 2015 with service commencing on 01 June 2019. At a high level, the Interlocal Agreement describes the powers of the Agency, services the Agency provides to Members, and how Agency actions are carried out. The term of KU service pursuant to the Second Amended and Restated Contract for Electric Service for Frankfort Electric and Water Plant Board Rate Schedule FERC No. 190 expires on 30 April 2019. KyMEA intends to supply power to FPB during May 2019 with market purchases.
- In September 2015, KyMEA issued a solicitation for capacity and energy to serve KyMEA Members (September 2015 Solicitation). The solicitation recommended contracting with two coal plants (BREC and Joppa) and a new build combined cycle plant with estimated commercial operations date in 2022.[1] The solicitation considered the following products[2]. Renewable energy was not considered because its cost was expected to be higher than conventional generation, its generation profile was "not expected to coincide with customer energy usage patterns" and "cost-effective, proven storage options are not yet available"[3].
    - Baseload and Intermediate Resources
        - Coal
        - Combined Cycle
        - Firm LD Energy (bilaterally contracted firm energy product with liquidated damages for failure to deliver)
    - Peaking Resources
    - All Requirements Service

[1] NFront 2015 Evaluation, pages 1-2.
[2] NFront 2015 Evaluation, page 4
[3] NFront 2015 Evaluation, page 6.

- All of the Peaking Capacity and Energy product responses were rejected at the 16 April 2016 meeting of the KyMEA Board of Directors.[4] A second solicitation issued in April 2016 identified the Paducah plant as the optimal resource for providing peaking capacity.[5]
- In July 2016, KyMEA executed three PPAs (BREC, Joppa, Paducah) to procure power for Members.
- In August 2016, after the Agency had executed these three PPAs, FPB executed the Kentucky Municipal Energy Agency All Requirements Power Sales Contract (AR Contract). Broadly, the AR Contract delineates logistics regarding Agency procurement of power for Members, transfer of Member contracts to the Agency, and methods of passing costs and savings through to Members.

In April 2017, Energy + Environmental Economics, Inc. (E3) was engaged by FPB to (a) analyze the economic and contractual risks and benefits of the Interlocal Agreement, the AR Contract, and other related contracts, (b) provide recommendations for any clarifications and/or changes that should be made to the contracts, and (c) to identify future analysis that should be performed. The recommendations we make in this report seek to ensure that FPB will retain the ability provide its customers with the mix of resources that best meets customer needs, both now and in the future. Specifically, we seek to ensure that under the terms of the KyMEA contract structure FPB can freely pursue customer-side programs such as energy efficiency, demand response (DR) and net energy metering (NEM), grid-scale resources such as renewable resources or local opportunities, and that FPB will receive power at lowest cost according to the attributes of a given portfolio of resources including consideration for how much of the portfolio is hedged (contracted) versus market purchases. Most importantly, we seek to ensure that the appropriate controls and accountability to Members are established at KyMEA. KyMEA is not a "risk warehouse" – the benefits and risks of all transactions that KyMEA engages in flow through to Members and ultimately to customers. It is therefore **critical** that Members are aware of and comfortable with the risks and costs that KyMEA incurs and that they participate in key decisions at the Agency.

E3 is a San Francisco-based consultancy specializing in the analysis of electricity sector economics. Founded in 1989, E3 advises utilities, regulators, government agencies, independent power producers, energy technology companies and investors on a wide range of critical issues in the electricity industry. This broad range of clients across all sectors of the industry is unique among consulting firms of E3's size and speaks to the fact that E3 has earned the respect and trust of clients and stakeholders for the objectivity of the firm's work and its grounding in the realities of the electricity marketplace. The insights gained through this diverse range of projects and clients uniquely position E3 to combine our robust analytics practice with our intimate knowledge of policy and potential future regulatory outcomes to support analysis of generation asset valuation, electricity supply portfolios and related contractual issues.

[4] 2015 nFront Evaluation Report, p. 5
[5] 2016 nFront Evaluation Report, p. 12

B. **Methodology**

To carry out our analysis, E3 reviewed the following documents and data:

- Interlocal Agreement
- AR Contract
- Agreement for the Purchase and Sale of Firm Capacity and Energy Between Big Rivers Electric Corporation and the Kentucky Municipal Energy Agency (BREC PPA)
- Agreement for the Purchase and Sale of Facility Firm Capacity and Facility Firm Energy Between Illinois Power Marketing Company and the Kentucky Municipal Energy Agency (Joppa PPA)
- Agreement for the Purchase and Sale of Peaking Capacity and Energy Between the Electric Plant Board of the City of Paducah, Kentucky DBA Paducah Power System and the Kentucky Municipal Energy Agency (Paducah PPA)
- Amended Agreement Among Certain Intervenors and LG&E and KU (Applicants) Regarding Applicants' Withdrawal from the Midwest ISO
- Second Amended and Restated Contract for Electric Service for Frankfort Electric and Water Plant Board Rate Schedule FERC No. 190
- Memorandum of Agreement among the US Department of the Army, Southeastern Power Administration and Sponsors for Cumberland River Hydropower Plant Equipment Projects
- FERC Order of Chief Judge Granting Motion For Interim Rate Relief
- (Draft) Kentucky Municipal Energy Agency Contract for Integration of Member-owned Resource
- Southeastern Power Administration and Frankfort Electric & Water Plant Board City of the City of Frankfort, Kentucky
- nFront Consulting Evaluation of the Proposals Received in Response to the September 2015 RFP (nFront 2015 Evaluation)
- nFront Consulting Evaluation of the Peaking Capacity and Energy Proposals Received in Response to the April 2016 RFP (nFront 2016 Evaluation)
- Owensboro Municipal Utilities 2016 Integrated Resource Plan
- 2016 hourly loads of KyMEA Members

E3 also created an economic model projecting the costs of KyMEA and Kentucky Utilities (KU) service through 2029. In addition to the data obtained from the documents listed above, this model utilized FPB 15-minute load data for 2016, MISO day-ahead power price data for 2016 for relevant pricing nodes, publicly available data on future MISO market price projections, KU historical rate case data, FPB hourly loads, and FPB KU power bills for 2016.

C. **Summary of Findings & Recommendations**

E3 was engaged to provide commercial, contractual and economic analysis from an industry best practices perspective. E3 does not employ legal counsel and did not employ legal subcontractors for this project so our findings have not been reviewed by an attorney.

Based on our analysis as described herein, if FPB chooses to remain in KyMEA, E3 makes the following key recommendations which are summarized below. An extensive list of our findings is provided in Section 3 of this report.

1. Examine ways to improve communication and increase the levels of responsibility and accountability the Agency has to Members. One way to do so is to second employee(s) of Member utilities to the Agency to oversee Agency activities including activities performed by consultants. Agency rate design is an upcoming activity that could benefit from Member involvement.
2. Modify the Interlocal Agreement to enable a Member to decline participation in a PPA that the majority of Members vote to approve.
3. Revise the AR Contract and Interlocal Agreement to clearly state that Members may participate individually or with a subset of Members in PPAs as well as in Generation Resource Projects or Projects as defined in the Interlocal Agreement. Clarify that such PPAs can include fossil, renewable and/or storage technologies. This may require modifying the Interlocal Agreement to prevent a Member that does not receive an allocation of power from a proposed PPA from voting for or against KyMEA's entering into the PPA on behalf of a Member or subset of Members.
4. Ensure that critical issues are codified in Agency contracts rather than implemented via policies that may be easily changed or left to interpretation in the future.
5. Direct KyMEA to carry out an IRP with a term of at least 10 years and preferably 20 years, from 2019. The IRP should be performed per industry best practices. Members should be consulted extensively to incorporate the procurement desires of all Members, including any future renewable energy projects and Member load characteristics including the impacts of any future distributed resource programs. IRP results should inform future Agency procurement activities.
6. Regarding the SEPA Contract, FPB should ensure that:
    a. SEPA contract Attributes directly serve FPB load and offset capacity procurement. While this will occur pursuant to Section 3 (d), because the SEPA contract reduced Agency procurement, the impact is similar to a transfer pursuant to AR Contract Section 3 (e).
    b. Attributes will be used to serve only FPB's load.
    c. FPB retains all environmental Attributes, and
    d. Attributes revert to FPB immediately if FPB is no longer a Member of KyMEA or is no longer a party to the AR Contract.
7. Modify the AR Contract to clearly state that NEM and DR program coordination with the Agency shall not be unreasonably constrained, that all members are not required to implement identical programs, that an individual Member's program implementation will not be impeded by other

Members, and to clarify that a Member's metered load is not adjusted for (i.e., is net of) output related to energy efficiency, DR, and NEM.

8. Modify the Interlocal Agreement and AR Contract to compel KyMEA and/or consultants acting on its behalf to procure and schedule resources in the least-cost manner per the portfolio of attributes desired by Members.
9. Clarify the AR Contract to state that renewable Attributes of Member-Owned Resources (i.e., RECs) are retained by Members when the contract is transferred to KyMEA.
10. To ensure that Agency services are procured at lowest cost, Agency consulting contracts for professional services above a certain dollar threshold should be awarded via competitive procurement and Member utilities should be allowed to compete. Entities engaged should be required to provide adequate insurance including professional liability insurance.
11. Direct KyMEA to conduct future procurement with full transparency to Members. Members should receive real-time information with respect to procurement processes provided appropriate confidentiality provisions have been put in place. Detailed historical bid data should be released to Members.
12. Modify the AR Contract to include an appendix describing the methodology for how Member power rates will be calculated. The methodology should ensure that the rates accurately charge each Member for its consumption and reflect the Attributes of Member-Owned Resources. The issues of how to procure for and allocate costs to Members that join KyMEA in the future and how to bill Members that receive partial requirements service should also be specified.

2. Detailed Analysis and Findings

E3 carried out an extensive analysis of KyMEA contracts currently in place and developed an economic analysis of projected costs under KyMEA and KU service. Detailed analysis and findings are described in this section of the report. These cover a wide range of topics including KyMEA's procurement process, KyMEA supply, and analysis of key benefits and risks of FPB's participation in KyMEA.

A. **KyMEA Procurement Process - IRP**

The industry standard process for determining what resources a utility should procure is an integrated resource plan (IRP). An IRP is "a planning process that identifies least-cost or best-value resources to meet reliability and public policy goals"[6] and typically analyzes an investment horizon 10-20 years into the future. It is especially important to look far into the future to evaluate the prudency of large, long lead-time capital investments such as new generation or transmission projects. Long lead-time capital investments can be owned by a utility directly or the energy from these resources can be purchased from a third party under a power purchase agreement (PPA). The length of a PPA typically depends on whether the asset is new or existing, as well as on regulatory regimes specific to each jurisdiction. New renewable assets typically require a PPA length of 20 or 25 years to obtain financing. New natural gas plants typically have a PPA length of at least 10 years. We found no recent examples of new coal plants that were constructed by independent power producers. Existing power plants can have offtake agreements of any length.

By signing PPAs in the absence of an integrated planning process, KyMEA has not explored all options available to meet its power demand at least cost under the range of potential future scenarios (i.e., future fuel costs, environmental compliance scenarios, renewable generation options, market prices, changes in Member composition and Member load). An integrated planning process would explore the risk of different power portfolios, providing KyMEA with the critical information it needs to evaluate tradeoffs between portfolio risk and cost under a range of potential future scenarios.

The resources selected during an IRP process meet the criteria of the utility performing the IRP. For example, future load projections include the impact of energy efficiency, behind-the-meter resources, and demand response programs. If a utility's customers desire to obtain energy from renewable sources, the IRP must include renewable resources in the recommended procurement portfolios. The IRP should also reflect the utility's appetite for hedging. For example, a utility may desire a portfolio that provides more cost certainty over time, even though it may result in higher costs in some time periods, over a portfolio with relatively more market purchases or unhedged fuel cost risk.

[6] See https://emp.lbl.gov/sites/default/files/lbnl-1006269.pdf, page 1.

Per nFront Consulting's Evaluation Reports, KyMEA conducted two procurement processes, one in September 2015 and the second in April 2016. Neither Evaluation Report mentions that an IRP was conducted prior to the procurement process. The September 2015 procurement yielded 30 responses from 13 entities, however, all of the Peaking Capacity and Energy product responses were rejected at the 16 April 2016 meeting of the KyMEA Board of Directors[7]. The April 2016 RFP yielded 7 bids from 4 proposers, and 4 of these bids were from the same asset (Joppa). KyMEA did not consider new- or self-build renewable generation options.

B. KyMEA Procurement Process – Incorporation of Member Goals

KyMEA does not appear to have considered Member desires and feedback when it conducted the September 2015 and April 2016 procurement solicitations. As KyMEA's purpose includes enabling its Members to "collaborate" to do all things necessary to serve Member power requirements (see recitals to AR Contract), Members including FPB should have been given an opportunity to provide input on IRP issues such as load forecasts and procurement goals prior to KyMEA's solicitation program and subsequent PPA execution.

While the AR Contract does not limit procurement of Generation Resource Projects in which one or more All Requirements Members participate (see Generation Resource Project definition), and while a Member is not prohibited from entering into new contracts for Member-Owned Resources during the Service Term (AR Contract Section 3 (h)), the Interlocal Agreement has no language describing how a Member would direct KyMEA to not have its load served by a given power purchase agreement or project. As a majority vote of Members allows KyMEA to act, there is nothing preventing KyMEA from carrying out procurement that is not supported by every Member if a majority of Members approves this action.

For example, recall that KyMEA's PPAs were executed before FPB became a party to the AR Contract. If FPB became a party to the AR Contract but chose to not have its load served by the BREC, Joppa and/or Paducah PPAs after they were executed, the collective peak demand of the KyMEA Members would have been approximately 267 MW. This has implications for the termination and contract capacity provisions in these contracts.

- With respect to termination, under the BREC PPA KyMEA would have been able to terminate the agreement if KyMEA loads were less than 200 MW, but not if the loads of Members desiring to be served by the BREC PPA are less than 200 MW. FPB had no mechanism to not be served by the BREC facility if it desired to receive power from other resources instead. This is because the PPA language states that KyMEA's load levels, rather than loads of Members desiring to be served by the PPA, provide the basis for termination.
- With respect to contract capacity provisions, [redacted] contracts provided an opportunity for the Agency to reduce contract capacity because of lower than projected Member loads. [redacted]

[7] nFront 2015 Evaluation, pages 4-5

[redacted]. Under the Joppa PPA, contract capacity could have been reduced to 75 MW within 180 days of the 13 July 2016 Effective Date if projected Agency load in 2019 were less than 300 MW. Under the Paducah PPA, within 180 days of the 13 July 2016 Effective Date capacity could have been reduced to 30 MW if the Agency's projected peak load were under 300 MW. Under the Paducah PPA, capacity can also be reduced to 30 MW by 31 May 2019 for deliveries commencing in June 2022. KyMEA has issued no notices to reduce contract capacity under these contracts.

C. KyMEA Supply – PPA Terms

The three PPAs have industry standard and commercially beneficial contract terms. KyMEA has no required minimum energy purchase under [redacted]; Members' metered load can be served by MISO market purchases if market prices are less than the marginal cost of PPA generation. [redacted] The risk of cost increases related to emissions is also mitigated.

a) Cost of Energy

With respect to energy that can be provided under these contracts, [redacted]. KyMEA can purchase energy from the MISO market if it is less expensive than contracted energy. [redacted] The absence of energy take-or-pay minimums mitigates the impact of any future carbon costs [redacted] versus MISO market prices. [redacted]

b) Cost of Capacity

With respect to capacity cost risk, KyMEA can purchase capacity from the MISO market or from other resources (i.e., fossil, hydro). Recent MISO capacity market prices are volatile and have ranged from $3.48 per kW-year to $72 per kW-year, with the cost of new entry estimated at about $260 per kW-year[8]. Capacity market capacity prices are a function of supply and demand, however under supply constraints the cost of new entry (net CONE) is expected to reflect the all-in fixed cost of a new capacity unit, including any emissions-related capital expenditures, and net of expected energy market profits.

The Joppa, BREC and Paducah PPAs are tolling contracts with capacity costs [redacted] These contracted capacity prices offer a hedge versus uncertain future capacity costs, however the contracts

[8] See p. 7, https://www.misoenergy.org/Library/Repository/Report/Resource%20Adequacy/AuctionResults/2016-2017%20PRA%20Summary.pdf

also preclude KyMEA from purchasing capacity at lower cost were the opportunity to arise during the contract term.

c) Regulatory Risk

The cost of any future regulatory risks is [redacted] under the two coal PPAs:

[redacted]

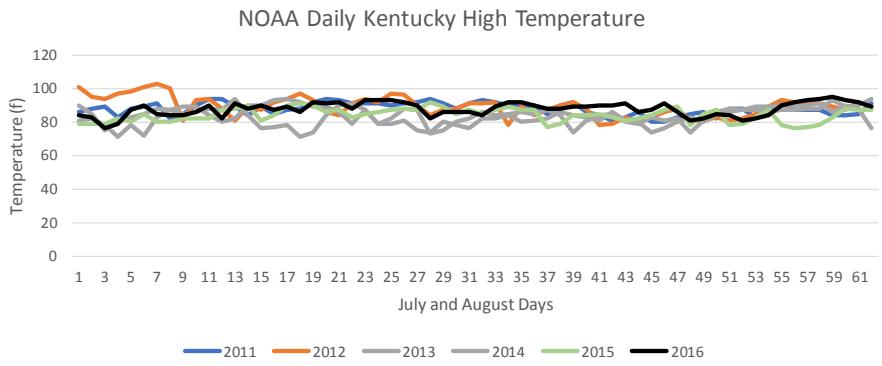
D. **KyMEA Supply - Capacity Procurement**

There is no load commitment or load determination specified in the AR Contract or the Interlocal Agreement. At the time of the 2015 solicitation, KyMEA's loads were expected to be 290 MW and 1,380 GWh[9]. In 2016, KyMEA actual Member loads were 262 MW and 1,326 GWh. In 2019, assuming 0.6% annual load growth, E3 projects Member loads to be approximately 1,350 GWh, with capacity requirements of 267 MW. It is prudent for utilities to plan for load plus a reserve margin when procuring supply to accommodate unforeseen increases in demand due to extreme weather and unexpected outages. Supply requirements are 307 MW if a 15% reserve margin is considered.

E3 did not have access to historical Member load data to examine whether 2016 was an average load year for the purposes of establishing procurement needs. As weather is the main driver of load levels, E3 examined historical Kentucky weather for the past six years. This indicates that 2012 experienced unusually high temperatures and that 2016 peak temperatures were on the high side of normal. As 2016 is also a recent year for the purposes of DER penetration, this result indicates that 2016 is an appropriate load forecast year to utilize for planning.

[9] 2015 nFront Evaluation, p. 1

Figure 2: 2011-2016 National Oceanic and Atmospheric (NOAA) Kentucky Daily High Temperature Readings



Existing Member-Owned Resources comprising the 32 MW SEPA contract and the [redacted] MW Paris diesel generator provide [redacted] MW. The use of these resources is expected to be transferred to KyMEA pursuant to the AR Contract. Currently, including Member-Owned Resources, KyMEA has procured or will receive Member transfers of 332 MW or 348 MW of capacity, depending on whether reserve margin requirements are considered. [redacted]. A detailed capacity breakdown is shown in Table 1 below.

Table 1: KyMEA Contracted Capacity

Resource	Supply (MW) Excluding Reserve Margin	Supply (MW) Including Reserve Margin
BREC	[redacted]	[redacted]
Joppa	[redacted]	[redacted]
Paducah	[redacted]	[redacted]
SEPA	32	32
Paris Diesel	[redacted]	[redacted]
Total	**332**	**348**

For the first year of service in 2019, KyMEA has therefore over-procured 41 MW (= 348 MW – 307 MW) to 65 MW (= 332 MW – 267 MW) of capacity, depending upon whether reserve margin requirements are considered.

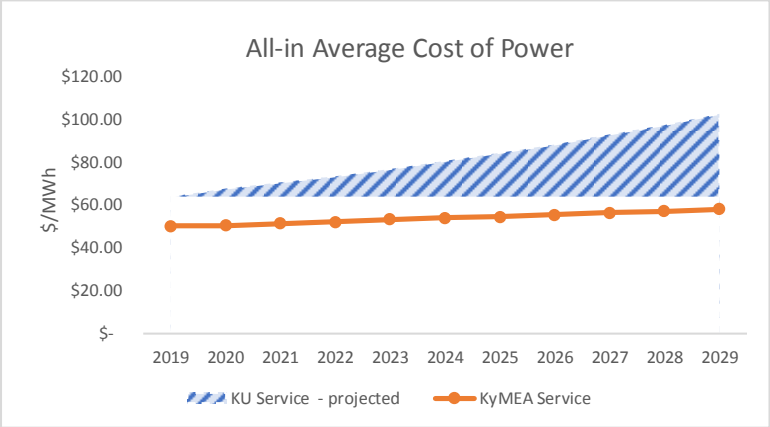
As noted above, KyMEA had the opportunity to reduce [redacted] Joppa contract capacity to 75 MW and Paducah capacity to 30 MW. Had KyMEA exercised the opportunity to reduce contracted capacity by 41 MW, we estimate KyMEA would have saved approximately $4 million annually in the 2019-2022 period. If KyMEA reduced contracted capacity by 65 MW, we estimate savings in the range of $5 million annually. It is possible that KyMEA can resell over-supplied capacity to other entities. If these resales occurred they could help reimburse Members for the lost savings opportunities. At current MISO market capacity prices these sales would not be economic.

In 2022, the Joppa PPA expires, at which time KyMEA will need to procure additional capacity.

E. KyMEA Supply - Cost Comparison

Under the current KyMEA power portfolio, the AR Contract structure provides a lower cost option than FPB's current contract with Kentucky Utilities (KU). Figure 2 below displays KyMEA and KU projected cost trajectories. Even if KU's rates remain flat for 10 years from 2019, E3 projects the cost of KyMEA service to remain lower than the cost of KU service. In the first year, FPB's savings are estimated at approximately $8.5 million. This includes the impact of E3 estimates of KyMEA annual administrative fees.

Figure 1: Comparison of Projected KyMEA and KU Power Costs



It is possible that KyMEA could have procured capacity and energy for less than the costs indicated above. For example, at current market prices, KyMEA could have reduced costs by 30% if it had procured all energy and capacity from the market. However, this would not be prudent. Both utilities and customers prefer stable, predictable rates and current market prices are not necessarily indicative of future costs. Each Member should have the opportunity to provide input on what level of energy should be contracted versus market purchases (i.e., the amount of hedging). FPB should ensure that the AR Contract and Interlocal Agreement provide the appropriate level of latitude in this respect.

Note that the AR Contract does not describe how it will structure power rates that KyMEA will use to allocate KyMEA costs among Members. If FPB uses a different amount of energy on- or off-peak compared to the generation profile of the remaining Agency Members, it is possible that the rates that KyMEA charges may over- or under-charge FPB for its power consumption versus what FPB would pay if it were procuring power only for its own usage, and may be different from the average cost projection displayed in Figure 1 above. Additionally, the issues of how to procure for and allocate costs to Members that join KyMEA in the future and how to bill Members that receive partial requirements service have not been specified. These are important issues that will impact the costs that FPB and other Members' customers ultimately pay for the power they receive. These issues should be clarified in the AR Contract.

Note also that E3 has not tested these results under a sensitivity analysis. Additionally, E3 has not analyzed whether the current KyMEA supply portfolio is the lowest cost option versus other potential KyMEA supply sources or whether FPB could achieve a lower cost of supply if it were to embark on its own procurement program. For example, KyMEA's coal PPAs could be over-priced versus alternative current and/or future capacity resources.

F. **Ability of FPB to Implement Conservation Programs**

E3 examined the ability of FPB under the AR Contract to implement EE, NEM and DER Programs for its customers, and whether the AR Contract creates any disincentives for implementing these programs.

a) Program Implementation

The AR Contract does not limit the implementation of energy efficiency programs. There is no coordination language related to energy efficiency.

AR Contract section 3 (g), NEM and DR programs must be coordinated with the Agency to ensure that there is no cross subsidization among members and to achieve consistency in such programs. Whether a proposed NEM or DR program would be limited would depend on the outcome of the coordination with the Agency. Note that this language does not state that other Members must implement similar programs. Note also that there is no language in the Interlocal Agreement stating that coordination of NEM and DR activities cannot be unreasonably withheld.

The AR Contract is silent about implementation of a direct load control program, which is defined as the ability of a Member to directly reduce load on its system. Direct load control does not include demand response that is not direct load control. (AR Contract Section 3 (g)).

The AR Contract does not limit the implementation of grid-scale renewable energy procurement, which can be procured as a Generation Resource Project in which one or more All Requirements Members participate (see Generation Resource Project definition).

b) Disincentives

The AR Contract does not impose a disincentive for the implementation of energy efficiency.

Whether a logistical disincentive exists for implementation of NEM and DR programs depends on the outcome of coordination with the Agency. NEM and DR are implemented by customers based on customer economic decisions.

A cost disincentive will likely occur if grid-scale renewable energy is pursued because it is typically more expensive than the avoided cost of other resources. Typically, renewable energy is procured for policy reasons rather than cost. Note this disincentive is not imposed by the AR Contract. While grid-scale solar and wind generation can provide some capacity, a grid-scale renewable resource is typically procured to provide energy. Because the grid is used to integrate renewable energy, the profile of the resource does not have to coincide with the utility's load profile and incremental storage is not necessary. Therefore, KyMEA's current PPAs may not be a material hindrance to grid-scale renewable energy procurement.

G. **Cost Implications of FPB Load Reductions**

There is no load commitment or load determination specified in the AR Contract or the Interlocal Agreement. KyMEA is obligated to furnish power to serve metered energy and demand at Point(s) of Delivery (AR Contract Section 5 (a)). Per AR Contract sections 3 (f), 4 (f) and 5 (a), a Member is billed for its load-ratio share of costs that are allocated to all Members, as well as the costs of any other resources and contracts in which it participates. NEM, EE, DR and direct load control will reduce a Member's load. If a Member's load is reduced, the average cost of serving its load will change. Whether this cost is on average higher or lower than the cost prior to the load reduction depends on the avoided costs at the time the load is reduced.

Per AR Contract Section 4 (f), the measured amount of demand and energy for billing purposes is adjusted for (1) losses in accordance with Prudent Utility Practice and (2) to include amounts the Member was required to purchase from the Agency due to output from (a) Member Owned Resources or (b) PURPA contracts or (c) other resources located behind the Member's Point(s) of Delivery. An analysis of whether Member conservation falls into each of these categories is below.

- Conservation measures such as energy efficiency, DR, NEM program resources, and direct load control are not Member-Owned Resources. Member-Owned Resources are "generation resources or other entitlements the Member may have to generation resource Attributes" (see AR Contract section 3 (d) and "Attributes" definition). Of conservation measures, only behind-the-meter generation (i.e., a NEM program resource) could potentially be a Member Owned Resource – this is because energy efficiency, DR and direct load control are not generation resources. AR Contract section 3 (g) stipulates that "any ability by the Member to directly control and reduce load on the Member's electric system shall be addressed through an agreement between the Agency and the Member for compensation as a Member-Owned Resource pursuant to Section 3 (d)." Energy efficiency, demand response and NEM program resources are located behind-the-meter and cannot be directly controlled by the Member. Direct load control can be directly controlled by the Member but is not a generation resource.
- PURPA contracts are clearly not Member load reductions.

- "Other resources" is not a defined term. Energy efficiency and demand response cannot be "other resources" because these resources do not produce "output." It is not clear if "other resources" is intended to capture net energy metering output. Modifying the AR Contract to clarify treatment of net energy metering could be helpful but would not be necessary if no Members pursue net metering programs. If a modification is pursued it should clarify that metered load is not adjusted for output related to net energy metering.

AR Section 3 (g) states that NEM and DR programs must be coordinated with the Agency to ensure no cross subsidization. [redacted] The Agency's capacity costs are allocated to members on a load-share basis that, as described above, is not adjusted for conservation measures. If KyMEA does not provide enough power to serve Member loads, the Member may buy power from other sources (AR Contract Section 3 (h)).

H. **Transfer of FPB SEPA Contract to KyMEA**

Under the AR Contract, a Member must purchase and receive from the Agency all electric power required to serve its loads (Section 3 (a)), and Member-Owned Resources shall not be used to serve the Member's load directly or to reduce the Member's billing demands (Section 3(d)). Because the SEPA contract is a source of low-cost, emissions-free power, FPB will want to ensure that when it transfers the Attributes of this contract to KyMEA it preserves the full allocation of SEPA contract Attributes. FPB must therefore determine the optimal way to transfer the SEPA contract to KyMEA.

There are two ways the SEPA contract can be transferred:

1) Under an assignment of the SEPA contract to KyMEA, KyMEA would assume the benefits and obligations of the contract. The AR Contract is silent about whether the SEPA contract can be assigned to KyMEA. If the SEPA contract were assigned to KyMEA such that the underlying generators were treated as All Requirements Power Supply Resources and sold to KyMEA under an All Requirements Power Sales Contract, the capacity and energy output would serve the load of each Member in proportion to its load (see AR Contract Section 3 (f)), and its cost and Attributes would become part of the Revenue Requirements (See AR Contract Section 5 (c)). Section 3 (f) and Section 5 do not specifically discuss allocation of Attributes to Members, but an All Requirements Power Supply Resource includes related Attributes (See Section 1 Definitions). In the case of assignment, environmental Attributes would therefore likely be allocated to Members on a load-share basis similar to costs. In this case, FPB's cost of power and its CPP compliance cost would both be higher than in a scenario where it received a full share of SEPA output because some of the SEPA Attributes would be allocated to other Members. Because the SEPA contract's cost and zero carbon emission attributes are attractive, this treatment would not be optimal from FPB's perspective. Note that the terms of the SEPA contract state that the written approval of the Secretary of Energy and the Purchaser must be obtained before the contract can be transferred.

2) For a transfer under AR Contract Section 3 (d), FPB and KyMEA would develop an agreement for KyMEA to utilize the Attributes of the SEPA contract. Under this scenario, the SEPA contract would be a Member-Owned Resource. In this case, KyMEA would integrate and schedule the SEPA output and FPB would receive the actual or estimated avoided costs, or actual or estimated revenues, net of KyMEA administration costs. Section 3 (d) does not specifically discuss allocation of Attributes to Members, but it can be argued that under this transfer mechanism, environmental Attributes would be allocated similar to costs, i.e., in full to FPB. Note that in this scenario, the costs of owning and operating the resource remain the responsibility of the Member (i.e., the contract is not assigned to KyMEA). Because KyMEA has already fully contracted for capacity, FPB would likely lose money from the avoided cost or other revenue stream it would receive under this transfer mechanism versus its obligations under the SEPA contract because there would be no avoided capacity unless KyMEA accounted for the existence of the SEPA contracts in its September 2015 and April 2016 solicitations.

The Agency has proposed to transfer use of the SEPA contract for all Members pursuant to method 2. Note that when the Agency conducted the April 2016 solicitation, the Agency procured capacity assuming full availability of the SEPA resource. Agency costs for the Paducah PPA are therefore less than they would have been in absence of the SEPA resource. Because clause 3 (d) states that a Member-Owned Resource cannot be used to directly reduce a Member's load, all AR Members, including those that do not hold SEPA contracts, will reimburse Members with SEPA contracts. Under this accounting mechanism, the Agency is able to define and easily track costs and benefits and Members that hold SEPA contracts receive savings that they can use to pay their obligations under the SEPA contract. Paducah was selected because it is a peaking resource and is utilized from an energy perspective similar to SEPA. In summary, taking all factors into consideration, the Agency's method of transferring use of the SEPA contract is a reasonable mechanism and FPB likely retains a majority of the benefits of this low-cost resource. The transfer contract should be evaluated carefully to ensure that FPB obtains future benefits should a different resource replace Paducah or should Paducah's costs change, for example in the post-2022 period.

I. **FPB SEPA Contract Economics**

The all-in cost of the SEPA Contract is economic versus the BREC and Paducah PPAs and FPB should seek to ensure that it retains the full benefits of the Attributes of this contract. For example, E3 projects SEPA costs including transmission to average $42.27 per MWh in 2019, whereas [redacted] costs are projected to average [redacted] per MWh. [redacted]. Additionally, SEPA is a hydro resource which insulates SEPA energy from any cost impacts of carbon regulation.

There is likely to be a value delta between transferring a Member-Owned resource to KyMEA versus directly/locally controlling the resource. The value delta depends upon the avoided cost in each scenario:

a) Because the SEPA contract is treated as having supplied FPB's load requirements, under this treatment FPB receives a reduced bill (i.e., a payment) sepafor energy and capacity supplied by KyMEA. The SEPA contract is dispatched to avoid energy procurement during high market price hours. If the SEPA contract were not available, loads during SEPA generation periods would be served with [redacted], depending on whether market prices are higher or lower than the marginal cost [redacted]. Because Paducah is utilized very infrequently in our modeling, we approximate the avoided energy cost of the SEPA contract in 2016 at the avoided market price during peak hours ($32 to $36 per MWh in 2016). The avoided capacity value we recommend is [redacted]. FPB should ensure that the rates charged by KyMEA for FPB's energy supply reflect this treatment.

b) Under the KU arrangement, [redacted]

c) If FPB were to purchase its own power portfolio, the avoided cost of a new resource would depend on the resource(s) in FPB's portfolio that were avoided with the SEPA contract.

d) There will also be a difference in incremental administrative costs incurred in each scenario.

J. **Process for Redress Under Interlocal Agreement and AR Contract**

a) Interlocal Agreement

The Interlocal Agreement does not specifically provide a process for redress. Per Interlocal Agreement Article II Section 4, the Board of Directors votes on any action. Each Member is entitled to appoint one Director to the Board of Directors. A majority must be present to vote and a majority of those present approve procurement or an AR Project unless a Weighted Vote is held. Per Article III Section 2, a special meeting of the Board of Directors can be called by the Chairman or any two or more Directors. When a quorum is present, a majority vote can authorize any action.

Member(s) can participate in a Generation Resource Project. Per Interlocal Agreement Article II Section 4, Members participating in each resource determine voting formulas.

b) AR Contract

AR Contract Section 25 discusses dispute resolution. The process is well documented and reasonable.

AR Contract Section 12 discusses Events of Default and cure periods. The cure period for non-payment in the AR Contract is shorter than the cure period under the PPAs. Under the AR Contract, for non-payment, after a 10-day cure period the non-defaulting party may terminate the contract after 5 days notice. A Member must pay within 15 days of receipt of invoice, so a contract termination could occur 30 days after invoice receipt. Under the terms of the [redacted] PPAs, Buyer is invoiced within [redacted] days following the end of the Service Month and must pay within [redacted] days of invoice receipt; unpaid

balances accrue interest at the Default Interest Rate. An Event of Default would occur [redacted] days after Seller issues Buyer written notice, so the earliest date this could occur is [redacted] days from invoice issue. Under the [redacted] PPA, Seller issues invoice by the [redacted] day following the Service Month and Buyer must pay within [redacted] days of receipt. An Event of Default occurs if the Buyer does not pay within [redacted] days so the earliest an Event of Default can occur is [redacted] days from invoice issue. In all cases, Seller must give [redacted]-day notice to terminate so the earliest termination could occur is [redacted] days from invoice date, which is a longer period than that provided in the AR Contract.

K. **Commercial Analysis of FPB Participation in KyMEA**

Based on the economic analysis that we have produced, which reflects the current supply contracts for KyMEA, we project that KyMEA supply will be more economic than KU supply over the period 2019-2029. The question becomes whether FPB should pursue its own procurement avenues outside of KyMEA, as Owensboro Municipal Utilities (OMU) or Berea Municipal Utilities is currently doing. There are four key factors that should be considered in this decision: (1) power cost, (2) freedom to pursue desired customer-side programs, (3) freedom to pursue desired grid-side resources, and (4) Member interaction with KyMEA.

a) Power Cost

Power cost encompasses all factors that may be involved in procurement including energy & capacity, cost of capital, administrative costs, transmission, and any benefits that may result from Agency membership such as reduced coincident peak demand.

E3 did not have access to the bid terms or proposals related to the September 2015 or April 2016 procurement solicitations and did not conduct an IRP so it is difficult to ascertain whether the current KyMEA portfolio achieves the lowest cost.

Regarding power cost, it is unlikely that FPB could obtain energy at a lower cost than the KyMEA portfolio [redacted]. However, FPB could potentially procure capacity at lower cost. The CCGT plant being pursued by OMU to replace their EES coal plant is an example of a resource that is likely to be lower cost and has a lower carbon footprint than the BREC and Joppa resources. The OMU new build CCGT is estimated to cost $186 million[10], or $1300 per kW. Utilizing a municipal utility's cost of capital, this would equate to a capacity charge of approximately $150 per kW-yr, inclusive of fixed operating costs. [redacted]. The impacts of market energy purchases, transmission, and energy from these resources would need to be analyzed to determine which resource would be lowest cost overall.

Based on 2016 load data, there is no benefit of diversity from other KyMEA Members' loads in the hour of FPB's coincident peak demand. This is likely because FPB comprises approximately half of KyMEA's load.

[10] OMU 2016 Integrated Resource Plan Update presentation for utility commission work session dated 2 December 2016, p. 49.

b) Customer-sited Programs

Regarding freedom to pursue customer-sited programs, FPB may be limited in its ability to pursue NEM and DR programs depending on the outcome of coordination with the Agency but would be free to pursue energy efficiency programs. The AR Contract is silent regarding implementation of direct load control programs.

c) Grid-side Resources

Regarding the ability to pursue grid-side resources, the AR Contract enables FPB to pursue a unique mix of resources, either alone or in cooperation with other members. The fact that KyMEA has fully procured capacity may not materially impact the decision to procure renewable energy depending upon the renewable technology desired (wind, solar) and its capacity contribution to supply, and when a renewable resource begins supplying FPB.

L. **Ability of FPB to Terminate Membership in KyMEA**

If FPB desires to depart KyMEA, per Interlocal Agreement Article VI Section 9, a Member can resign from the Agency and remove itself as a Party to the Interlocal Agreement. It must give one year notice (Article VI 9 (a)). The AR Contract is silent about whether a Member that has resigned from the Agency can continue to be a party to the AR Agreement or receive other services from the Agency. This does not explicitly trigger an Event of Default.

Under AR Contract Section 2 (a), a Member can terminate the AR Agreement by providing 5 years' notice, delivered in accordance with AR Section 29. Under this termination mechanism, the earliest the AR Contract can be terminated on 31 May 2024, and notice would need to be issued on 31 May 2019.

Under AR Contract Sections 2 (b and c), the AR Contract will terminate on occurrence of an Event of Default, or when all Bonds have been paid (or provision for payment has been made) and all contractual obligations for purchase of power have been paid (or provision for payment has been made).

a) AR Contract Section 24 (b) states that an Event of Default can result if the Agency demonstrates gross negligence or willful misconduct.

b) Under a non-payment Event of Default, after a 10-day cure period, the non-defaulting party may terminate the contract with 5 days notice. The Agency would need to begin providing service before non-payment could occur.

c) If there are no bond payments outstanding and no remaining commitments for power purchases, the contract may be terminated, however this cannot occur in practice prior to the Section 2 (a) language because the BREC and Paducah PPAs expire after this date.

If obligations extend beyond the termination date then payment must be made for FPB's load-ratio share of capacity and energy obligations incurred prior to FPB's exit until those obligations expire. The Agency has an obligation to utilize or sell the energy and capacity purchased under the contract under a termination situation (AR Contract Section 12 (d)), therefore it is unlikely that no revenues would offset any residual contractual obligations if FPB were to terminate the contract.

If FPB had chosen to not participate in the BREC, Joppa and Paducah PPAs, there would currently be no FPB commitments for power purchased and the AR Contract could be terminated with no ongoing financial implications.

M. **Basis for FPB Termination**

Based on the data we have, it is not possible to determine whether Speigel & McDiarmid, nFront, and NewGen have a conflict of interest based on their participation in drafting the KyMEA AR contract, associated PPAs, transmission agreements, and Interlocal Agreement or in advising FPB on their adoption. It is possible for these firms to have performed their work impartially while representing both KyMEA and FPB. It is also possible that unless OMU signed on to the AR Contract at the time PPA termination was an option, the Agency would not have remained in existence if FPB did not become an AR customer. In this scenario, these firms would not have received ongoing Agency consulting engagements.

Our analysis has uncovered several instances where industry standard best practices do not appear to have been followed:

- An IRP was not performed and procurement does not appear to have incorporated the goals and supply resources of all Members.
- By not reducing contract capacity obligations when it had the opportunity to do so, KyMEA has not acted to minimize costs to members. KyMEA has no contractual obligation to minimize costs to Members.
- KyMEA has no employees, so no staff has responsibility and accountability for Agency decisions, or for decisions of consultants acting on behalf of the Agency.
- Because the AR Contract and Interlocal Agreement do not currently have mechanisms to enable a Member to not participate in a PPA, FPB had no opportunity to not participate in the three PPAs KyMEA currently holds.

E3 is not able to opine on whether these factors may constitute gross negligence or willful misconduct pursuant to AR Contract Section 24 (b).

3. Recommendations

If FPB decides to remain in KyMEA, E3 makes the following recommendations:

1. To improve communication and increase the levels of responsibility and accountability the Agency has to Members, employee(s) of Member utilities could be seconded to the Agency to oversee Agency activities including activities performed by consultants. A description of Agency rate design methodology is an upcoming activity that could benefit from Member involvement.
2. Modify the Interlocal Agreement to enable a Member to decline participation in a PPA that the majority of Members vote to approve.
3. Revise the AR Contract and Interlocal Agreement to clearly state that Members may participate individually or with a subset of Members in PPAs as well as in Generation Resource Projects or Projects as defined in the Interlocal Agreement. Clarify that such PPAs can include fossil, renewable and/or storage technologies. This may require modifying the Interlocal Agreement to prevent a Member that does not receive an allocation of power from a proposed PPA from voting for or against KyMEA's entering into the PPA on behalf of a Member or subset of Members.
4. Ensure that critical issues are codified in Agency contracts rather than implemented via policies that may be easily changed or left to interpretation in the future.
5. Direct KyMEA to carry out an IRP with a term of at least 10 years and preferably 20 years, from 2019. The IRP should be performed per industry best practices. Members should be consulted extensively to incorporate the procurement desires of all Members, including any future renewable energy projects and Member load characteristics including the impacts of any future distributed resource programs. IRP results should inform future Agency procurement activities.
6. Regarding the SEPA Contract, FPB should ensure that:
    a. SEPA contract Attributes directly serve FPB load and offset capacity procurement. While this will occur pursuant to Section 3 (d), because the SEPA contract reduced Agency procurement, the impact is similar to a transfer pursuant to AR Contract Section 3 (e).
    b. Attributes will be used to serve only FPB's load.
    c. FPB retains all environmental Attributes, and
    d. Attributes revert to FPB immediately if FPB is no longer a Member of KyMEA or is no longer a party to the AR Contract.
7. Modify the AR Contract to clearly state that NEM and DR program coordination with the Agency shall not be unreasonably constrained, that all members are not required to implement identical programs, that an individual Member's program implementation will not be impeded by other Members, and to clarify that a Member's metered load is not adjusted for (i.e., is net of) output related to energy efficiency, DR, and NEM.

8. Modify the Interlocal Agreement and AR Contract to compel KyMEA and/or consultants acting on its behalf to procure and schedule resources in the least-cost manner per the portfolio of attributes desired by Members.
9. Clarify the AR Contract to state that renewable Attributes of Member-Owned Resources (i.e., RECs) are retained by Members when the contract is transferred to KyMEA.
10. To ensure that Agency services are procured at lowest cost, Agency consulting contracts for professional services above a certain dollar threshold should be awarded via competitive procurement and Member utilities should be allowed to compete. Entities engaged should be required to provide adequate insurance including professional liability insurance.
11. Direct KyMEA to conduct future procurement with full transparency to Members. Members should receive real-time information with respect to procurement processes provided appropriate confidentiality provisions have been put in place. Detailed historical bid data should be released to Members.
12. Modify the AR Contract to include an appendix describing the methodology for how Member power rates will be calculated. The methodology should ensure that the rates accurately charge each Member for its consumption and reflect the Attributes of Member-Owned Resources. The issues of how to procure for and allocate costs to Members that join KyMEA in the future and how to bill Members that receive partial requirements service should also be specified.
13. Ensure the AR Contract clarifies that no hold harmless obligation results from the inclusion of Member-Owned Resources in the KyMEA portfolio if such resources were known to exist at the time of the September 2015 and subsequent procurement solicitations.
14. Modify AR Contract Section 3 (h) to explicitly state that a Member is not prohibited from entering into new contracts for Member-Owned Resources during the Service Term.
15. Per AR Contract Section 3 (b), clarify that PURPA contract Attributes are allocated to all Members in each scenario.
16. Clarify the AR Contract to explicitly state that All Requirements Power Supply Resource Attributes are allocated Members in proportion to Member loads, with energy-related Attributes such as renewable energy credits (RECs) allocated proportional to member energy usage and capacity Attributes allocated proportional to Member capacity loads.
17. Investigate modifying the AR Contract to state that a Member that is not a party to the Interlocal Agreement cannot be a party to the AR Agreement.
18. Modify AR Contract to explicitly allow implementation of a direct load control program enabling a Member to directly reduce load on its system.
19. FPB should ensure that the AR Contract and Interlocal Agreement provide the appropriate level of latitude with respect to what level of contracted versus market purchases is appropriate.
20. Investigate modifying the Interlocal Agreement to require that key Agency decisions require signoff in writing from all or a majority of Members.