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October 5, 2007

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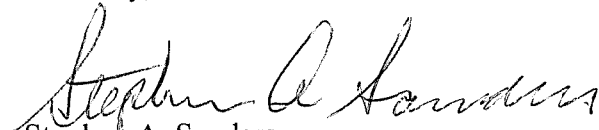
Beth A. O'Donnell, Executive Director
Kentucky Public Service Commission
P.O. Box 615, 211 Sower Boulevard
Frankfort, Kentucky 40602-0615

Re: Case No. 2006-00472

Dear Ms. O'Donnell:

Please find enclosed for filing with the Commission in the above-styled proceeding an original and ten copies of the brief of the Cumberland Chapter of the Sierra Club. A copy of this document has been mailed to all parties listed on the attached Certificate of Service.

Sincerely,


Stephen A. Sanders
Attorney at Law

Enclosures

cc: Hon. Charles A. Lile
Hon. Dennis Howard
Hon. Michael L. Kurtz

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OCT 05 2007

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

PUBLIC SERVICE
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IN THE MATTER OF: GENERAL ADJUSTMENT)
OF ELECTRIC RATES OF EAST KENTUCKY)
POWER COOPERATIVE, INC.)

Case No. 2006-00472

BRIEF OF THE CUMBERLAND
CHAPTER OF THE SIERRA CLUB

Comes now the Cumberland Chapter of the Sierra Club (“Sierra Club”),

Intervenor herein, and submits the following post-hearing brief in the above-captioned proceeding. East Kentucky Power Co-op (“EKPC”) initiated this rate case to seek authority to increase its electric rates. The Sierra Club requested full intervenor status in order to propose innovative yet practical rate structures and other changes to the tariffs designed to encourage improvements in energy end-use efficiency. If the utility’s tariffs, terms and conditions are correct, it should be possible for all parties to gain substantial economic benefits through the operation of an electric system that encourages EKPC’s ultimate customers to reduce energy waste. [Young, direct testimony, page 4, line 22 to page 6, line 2]

I. The traditional rate structure currently in place at EKPC and its member cooperatives discourages programs that save energy and needs to be amended.

The Sierra Club’s witness, Geoffrey Young, described the problem of perverse financial incentives in detail in his direct testimony filed on June 29, 2007. [Page 6, line 19 to page 8, line 13] The absence of a mechanism to decouple revenues from the

1 amount of electricity sold, and the presence of the fuel adjustment clause, gives EKPC
2 and its member cooperatives a very strong financial disincentive to help their customers
3 save energy. Simply put, the more electricity EKPC sells, the more money it makes. In
4 response to a question from EKPC, Mr. Young provided a straightforward quantitative
5 analysis, based on David Moskovitz's 1989 analysis and using data on EKPC's fixed and
6 variable costs obtained from EKPC's application, that showed that EKPC earns 3.1 cents
7 in net revenue when it sells an additional kWh, regardless of whether its costs to generate
8 that kWh were low, average, or high. Conversely, when a customer saves one kWh on
9 the margin, EKPC would suffer a decrease in its net income of 3.1 cents, regardless of
10 what the system load conditions might have been when the reduction in energy use
11 occurred. [David Moskovitz, "Profits and Progress through Least-Cost Planning,"
12 provided in response to the PSC's Question No.1, pp.15-19 of 72; Sierra Club's response
13 to EKPC's Question No.3]

14 One of EKPC's witnesses, Bill Bosta, attempted to challenge Mr. Young's
15 analysis in his rebuttal testimony and at the public hearing on September 5, 2007. His
16 first substantive argument – that "an increase in EKPC electricity sales at peak hours will
17 result in average embedded cost recovery that is less than both long-run marginal cost
18 and short-run marginal cost" – is negated by the operation of the fuel adjustment clause
19 (FAC), as explained in Moskovitz's and Young's analyses. [Bosta, rebuttal testimony,
20 page 7, lines 6-8]

21 His second argument – that "increased peak electricity sales will result in the need
22 for additional generating units or other resources in the long-term, driving up costs and
23 driving down margins" – is an attempt to confuse the issue by bringing considerations of

1 the long-term capital expansion plan into what is a short-term marginal cost analysis.
2 [Ibid., lines 8-10] The Moskowitz-Young short-term analysis holds whether EKPC's total
3 peak demand is increasing, decreasing, or remaining constant. The addition of generating
4 units will drive down margins only in the unlikely event that the Commission does not
5 allow EKPC to recover some or all of the costs of new generating units in a future rate
6 case. Mr. Bosta is confirming a point made by the Sierra Club – that new generation
7 resources are expensive – but has failed to show how that fact casts doubt on Moskowitz's
8 and Young's thesis that in the short term, the more electricity the utility sells, the more
9 money it makes.

10 Mr. Bosta's third argument – that increased peak electricity sales “will result in
11 the peak hour costs increasing by more than peak hour revenues thus reducing EKPC's
12 net margins” – is simply a restatement of his first argument, which has been shown above
13 to be invalid because of the normal operation of the FAC. [Ibid., lines 10-11]

14 Mr. Bosta's fourth argument is not written in a way that is understandable. [Ibid.,
15 lines 12-14]

16 Under cross-examination at the 9/5/07 hearing, Mr. Bosta stated that under the
17 FAC, EKPC will not recover the added cost of high-priced fuel until several months later.
18 [Transcript of Evidence, page 82, line 13 to page 83, line 6] That is precisely
19 Moskowitz's point: that even though there may be a delay of a couple of months, the
20 utility is virtually guaranteed to recover the added costs resulting from generating and
21 selling an additional kWh, even during peak load conditions.

1 Finally, Mr. Bosta stated at the hearing that if there is a forced outage lasting
2 longer than six hours, EKPC does not recover the extra fuel costs via the FAC. [Ibid.]
3 That fact is irrelevant to Moskowitz's and Young's analysis.

4 Mr. Bosta failed to rebut the Sierra Club's point that under traditional ratemaking,
5 utilities have a strong financial incentive to boost sales of electricity and a strong
6 disincentive to help customers reduce energy use. None of his arguments have any
7 logical validity.

8 There is no reason EKPC should be unfamiliar with David Moskowitz's analysis
9 of short-term marginal costs and revenues. In Case No. 2000-044, "A Review Pursuant
10 to 807 KAR 5:058 of the 2000 Integrated Resource Plan of East Kentucky Power
11 Cooperative, Inc.," Mr. Young, then an employee of the Kentucky Division of Energy
12 (KDOE), included the following comment in the Division's assessment of EKPC's
13 integrated resource plan: "KDOE believes that the present structure rewards utilities for
14 selling more electricity and penalizes them financially for helping their customers
15 become more energy-efficient. The fuel adjustment clause has a particularly pernicious
16 effect in this regard, as has been noted for years by industry analysts. Moskowitz, David,
17 *Profits and Progress Through Least-Cost Planning*, NARUC, November, 1989." [KDOE
18 comments, 1/11/01, page 26 of 29] EKPC's staff people have had at least six and a half
19 years to become familiar with the implications of the analysis in Moskowitz's report.

20 The consultant EKPC hired to prepare rebuttal testimony of the Sierra Club's
21 proposals, Dr. Laurence Kirsch, understood the financial incentives and disincentives
22 created as a side effect of the traditional rate structure. At the beginning of his discussion
23 of decoupling, Dr. Kirsch wrote, "Decoupling mitigates utility disincentives to promote

1 conservation programs and incentives to grow load by increasing customer-level usage.”
2 [Kirsch, rebuttal testimony, page 16, lines 3-4] The testimony of Dr. Kirsch and Mr.
3 Bosta were not consistent with each other.

4 **II. Implementation of decoupling would not be inconsistent with Judge**
5 **Phillip J. Shepherd’s decision of 8/1/07.**

6 One of the questions EKPC asked Mr. Young at the 9/5/07 hearing was whether
7 the Sierra Club’s cost recovery proposal would be implemented via a “surcharge” on the
8 customer’s bill. [Transcript, page 115, lines 19-24] The legality of certain types of
9 surcharges has recently been brought into question by the 8/1/07 Opinion and Order of
10 the Franklin Circuit Court in *Commonwealth of Kentucky, ex rel. Gregory D. Stumbo,*
11 *Attorney General v. Kentucky Public Service Commission and Union Light, Heat and*
12 *Power Company*, No. 06-CI-269.

13 The type of surcharge that was disallowed by the Court, however, was one that
14 was not specifically authorized by statute. [Opinion & Order, pages 5-8] The type of
15 “surcharge” being proposed by the Sierra Club, however, has a solid legislative
16 foundation in KRS 278.285, Section 2, which reads as follows:

- 17 (2) A proposed demand-side management mechanism including:
- 18 (a) Recover the full costs of commission-approved demand-side
19 management programs and revenues lost by implementing these
20 programs;
21
- 22 (b) Obtain incentives designed to provide financial rewards to the utility
23 for implementing cost-effective demand-side management programs; or
24
- 25 (c) Both of the actions specified may be reviewed and approved by the
26 commission as part of a proceeding for approval of new rate schedules
27 initiated pursuant to KRS 278.190 or in a separate proceeding initiated
28 pursuant to this section which shall be limited to a review of demand-

1 side management issues and related rate-recovery issues as set forth in
2 subsection (1) of this section and in this subsection.

3
4 The primary purpose of the statistical recoupling mechanism proposed by the
5 Sierra Club is to enable EKPC and its member cooperatives to recover the revenues lost
6 when they implement cost-effective, Commission-approved demand-side management
7 (DSM) programs. The Sierra Club has also proposed a DSM program cost recovery
8 element as provided in Section 2(a) above and a financial incentive element as provided
9 in Section 2(b) above. [Young, direct testimony, page 24, lines 12-23]

10 No entity has challenged the Commission's authority to implement surcharges
11 that are specifically authorized by a statute enacted by the General Assembly. Regardless
12 of whether the above-cited Franklin Circuit Court decision is eventually upheld or
13 overturned, therefore, the legal foundation for the Sierra Club's DSM cost recovery
14 proposal, including the statistical recoupling element that addresses the lost revenue
15 problem, is solid.

16 **III. The variety of decoupling known as statistical recoupling should be**
17 **implemented throughout the EKPC system.**

18 The Sierra Club has testified that the most promising way to decouple the utility's
19 revenue from the amount of electricity it sells appears to be statistical recoupling (SR),
20 which was developed by Dr. Eric Hirst in the early 1990s. [Young, direct testimony,
21 pages 19-25 and Attachment B; Responses to PSC Questions Number 4h, 5, 6, 9, and 10;
22 Response to EKPC Question Number 11] SR achieves its primary goal of decoupling
23 revenue from sales, without causing large fluctuations in electric prices. [Young, direct
24 testimony, page 21, line 14 to page 22, line 5]

1 In his rebuttal testimony, Dr. Kirsch attempted to find major problems with SR.
2 His first criticism of SR was that it is susceptible to the type of gaming in which the
3 utility artificially inflates the count of the number of its customers, “which could be
4 accomplished (for example) by encouraging apartment buildings to move from aggregate
5 to apartment-level metering.” [Kirsch, rebuttal testimony, page 18, lines 17-23] If EKPC
6 were to attempt this maneuver and it was not detected by the Commission or any other
7 party, any financial advantage it might gain thereby would be small in magnitude, one-
8 time, and temporary. A utility can only submeter apartment buildings once, after which
9 its ability to use this method of gaming the formula would disappear.

10 In his rebuttal testimony comprising the top half of page 19, Dr. Kirsch conflated
11 SR with other types of decoupling such as revenue per customer decoupling (RPC).
12 While it is correct that RPC is somewhat susceptible to gaming, as the Attorney
13 General’s Office of Rate Intervention (“AG”) found out when RPC was in effect at
14 LG&E during the mid- to late-1990s, Eric Hirst analyzed the potential for gaming in his
15 original paper, and concluded that “It is very difficult – absent reliable information on
16 future changes in the number of customers, the weather, and the economy – to select a
17 model that will achieve a desired outcome. Thus, manipulation is not a problem with
18 SR.” [Sierra Club response to PSC Question Number 5, page 31 of 55] Dr. Kirsch failed
19 to present any evidence or argument that would call Hirst’s analysis of this issue into
20 question.

21 Dr. Kirsch discussed the SR formula and concluded that “If the statistical analysis
22 is successful, then SR will be free of the unstable and somewhat arbitrary price changes
23 that plague other decoupling mechanisms. If the statistical analysis is unsuccessful, then

1 SR will share these problems.” [Kirsch, rebuttal testimony, page 21, lines 18-22]
2 However, the situation is not as black and white as Dr. Kirsch implies. Under cross-
3 examination, Dr. Kirsch answered in the affirmative to the question, “Is it possible that
4 even an SR formula that is not perfect could help to solve the problem of price
5 fluctuations?” [Transcript, page ~~462~~, ~~lines 4-18~~ | ^{page} 158, ^{lines} 17-20]

6 Dr. Kirsch cited the preceding page of the Hirst report to try to make the
7 arguments that the SR results are highly sensitive to the model specifications, and that
8 this is a serious problem. He ignored Eric Hirst’s conclusion, however, that directly
9 contradicted his own: “The range in estimates across these models is quite small, which
10 suggests that SR results are robust.” [Sierra Club response to PSC Question Number 5,
11 page 31 of 55] Similarly, Dr. Kirsch omitted Hirst’s conclusions from Chapter 5 of the
12 report, which were that the errors produced by Hirst’s simple SR model were small;
13 showed no pattern, which “is encouraging because it suggests that the errors associated
14 with SR are largely random, and that, on average, the price changes caused by SR will
15 approach zero;” that “These analyses of data from five utilities showed great similarity in
16 results;” and that “This regularity suggests that SR is likely to yield consistent results
17 from year to year and from utility to utility.” [Young, direct testimony, Attachment B,
18 page 9 of 17]

19 Hirst’s report is consistent with Mr. Young’s testimony at the 9/5/07 hearing,
20 where he stated that the precise form of the SR equation is not critical to the performance
21 of the SR mechanism. According to Mr. Young, the key characteristics that an SR model
22 should have are that it should decouple revenue from sales of electricity; include
23 variables for heating degree days, cooling degree days, economic activity, electricity

1 price, and the number of customers; and be as simple as possible so as to make it easy to
2 explain to people. [Transcript, page 117, line 18 to page 119, line 14]

3 The primary reason why the errors emphasized by Dr. Kirsch are of trivial
4 importance can be found in Chapter 3 of Eric Hirst's report. In his discussion of the
5 decoupling mechanism used in California, Hirst first noted that general rate cases are
6 scheduled every three years there, and then concluded:

7 These results show that the amounts of money flowing through the
8 ERAM accounts are small. It is important to note that ERAM and
9 attrition affect primarily the *timing* of price changes, rather than the
10 *amounts* of price changes. That is, the factors that affect utility costs
11 would be treated in the three-year general rate cases, if they were not
12 already included in ERAM and attrition. [Sierra Club response to PSC
13 Question Number 5, page 21 of 55]
14

15 Furthermore, Hirst's footnote on the same page read, "Eto, Stoft, and Belden
16 (1993) provide additional details on the historic impacts of ERAM in California. They
17 show that ERAM 'has had a negligible effect on rate levels and has, for PG&E, actually
18 reduced rate volatility.'" [*The Theory and Practice of Decoupling*, draft, LBL-34555,
19 Lawrence Berkeley Laboratory] It should be noted that ERAM is a form of decoupling
20 that does not correct for price changes that are caused by extreme weather or economic
21 recessions. If the price fluctuations are "negligible" for ERAM, then they would be
22 entirely insignificant for SR, which is designed specifically to reduce price fluctuations
23 due to weather and recessions. What Dr. Kirsch has done in his rebuttal testimony, pages
24 21-24, is to quote very selectively from Eric Hirst's report in order to portray minor
25 errors in the SR model results as major flaws in the concept of SR. Dr. Kirsch's dire-
26 sounding warnings about the serious predictive errors that SR might yield are completely
27 unfounded.

1 Dr. Kirsch tried to portray the need to re-estimate the coefficients of the SR model
2 every three years as another flaw in the concept of SR itself. [Kirsch, rebuttal testimony,
3 page 22, lines 9-14] The Sierra Club asked Dr. Kirsch at the 9/5/07 hearing whether
4 there was anything wrong with the idea of re-estimating the model periodically, and he
5 answered only that such re-estimation would “be a requirement.” Cross-examination
6 revealed that Dr. Kirsch is assuming that each time the SR model is to be re-estimated, all
7 of its terms and its functional form could be subject to contentious disputes. [Transcript,
8 page 158, line 21 to page 159, line 12] His assumption is unfounded: The functional
9 form and the set of variables included in the SR formula could remain unchanged for
10 many years, while only the historical data would need to be updated and the model re-
11 estimated every three years or so. The latter type of re-estimation would solve the
12 problem noted by Hirst when he wrote that, unsurprisingly, “the accuracy of the models’
13 estimates decreases as one moves further away from the historical estimation period.”
14 [Sierra Club response to PSC Question Number 5, page 39 of 55] To portray this simple
15 issue and its equally straightforward solution as a flaw in the concept of SR is
16 unsupported and misleading.

17 Dr. Kirsch testified at length about the fact that SR does not fully reward the
18 utility for DSM programs that reduce demand to a greater extent than energy use. He
19 wrote: “The danger that statistical recoupling will underestimate lost revenues is real;”
20 “This is a major oversight and weakness of the SR approach;” “This oversight is
21 particularly important in Kentucky;” and “SR would penalize E.ON for its success with
22 this program.” [Kirsch, rebuttal testimony, page 22, line 15 to page 24, line 7] All of
23 these claims are unfounded, and all are based on Dr. Kirsch’s highly selective reading of

1 Eric Hirst's report and on his lack of familiarity with utility companies in Kentucky,
2 including EKPC.

3 In his analysis of this problem, more properly termed a phenomenon, Eric Hirst
4 posited a set of DSM programs that cuts a utility's energy use by 0.5% and its demand by
5 1.0%, i.e., the conservation load factor (CLF) is half as large as the system load factor.
6 When there is no ratchet on the demand charge, SR yields an allowed revenue that is
7 0.1% lower than the utility's actual lost revenue, whereas if there is a demand ratchet, the
8 error is a negative 0.01%. [Sierra Club response to PSC Question Number 5, page 46 of
9 55] For a hypothetical commercial customer with an average monthly bill of \$1,000, this
10 feature of SR would cause the bill to be ten cents to one dollar a month lower than what it
11 "should" have been to ensure that the utility would fully recover its lost revenues. Hirst's
12 analysis continued, "Because the amount of revenue lost is quite small for programs that
13 save little energy per kW saved, these percentages are quite small. Even for DSM
14 programs with a CLF of 0.1 and a 12-month ratchet, the SR-induced error is less than
15 0.2% of revenues." [Ibid., page 47 of 55] This error would represent a reduction of \$2
16 off a customer's bill of \$1,000. Far from being "a major oversight and weakness of the
17 SR approach," the magnitude of this phenomenon is trivial.

18 More important, Kentucky's cooperative and investor-owned utilities already
19 have all the incentive they need to implement DSM programs that reduce or shift peak
20 loads. The primary reason to implement DSM programs that shift the system peak
21 without reducing energy use significantly is to improve the utility's load factor and defer
22 or eliminate the need to build gas-fired peaking plants. Bill Bosta testified at the 9/5/07
23 hearing that improving the system load factor is a very high priority for EKPC, has been

1 a priority for a number of years, and is a well-established part of EKPC's corporate
2 philosophy. [Transcript, page 81, line 19 to page 82, line 12] E.ON has consistently
3 invested a large amount of effort and money in promoting its direct load control DSM
4 program, whether the lost revenue recovery mechanism in place was decoupling or the
5 formula that replaced decoupling in 1999. The lost revenue recovery formula now in
6 effect at E.ON is based entirely on energy and does not compensate E.ON for lost
7 demand charges. [Demand-Side Management Cost Recovery Mechanism, LG&R
8 Original Sheet No. 71, effective 7/1/2004] If the absence of this feature were as
9 damaging to the utility company's economic interests as Dr. Kirsch implies on pages 23-
10 24 of his rebuttal testimony, one would have reasonably expected E.ON to have cancelled
11 its direct load control program rather than consistently seeking to expand it.

12 If the Sierra Club were to amend its SR proposal along the lines urged by Dr.
13 Kirsch, with the goal of enabling EKPC to recover lost demand charges, EKPC's
14 customers would pay slightly higher rates in order to encourage EKPC to do something it
15 has already been doing enthusiastically for many years: shifting peak demand to off-peak
16 periods. With regard to SR's supposed underestimation of lost revenues when demand
17 charges are present, Dr. Kirsch has failed to show either that a problem exists, or, if it
18 does exist, that it is of more than trivial importance.

19 The Sierra Club has testified that EKPC's member distribution cooperatives need
20 to have the same set of financial incentives and the same general rate structure in place as
21 does EKPC itself, in order to avoid setting up a complex web of competing incentives
22 and reducing the degree of cooperation between the two levels of the EKPC system.
23 [Sierra Club response to PSC Question Number 10a] EKPC's consultant apparently

1 agrees, having stated that “If member cooperatives do not adopt decoupling mechanisms,
2 no purpose would be served by EKPC adopting such a mechanism.” [Kirsch, rebuttal
3 testimony, page 30, lines 1-2] Fortunately, the member coops now have general rate
4 cases before the Commission, which would enable the Commission to institute SR for
5 each member co-op as well as for EKPC. [Sierra Club responses to PSC Questions
6 Number 10c and 10d] The Sierra Club has expressed its willingness to help educate the
7 staff of the member co-ops about the need to decouple revenues from sales of electricity.
8 An educational process of this type could help minimize any “political” problems that
9 might result from the imposition of SR on the member coops. [Transcript, page 162, lines
10 9-11]

11 At the 9/5/07 hearing, EKPC suggested that the implementation of SR could
12 increase the amount of financial risk the company faces. [Transcript, page 101, line 16 to
13 page 105, line 12] EKPC is already depending to a rather alarming extent on “Mother
14 Nature” to help keep it from going into default with respect to its creditors. [Transcript,
15 David Eames, page 29, line 17 to page 30, line 3] When EKPC asked Dr. Kirsch whether
16 SR would increase EKPC’s financial risk, however, he answered that it was “not
17 obvious” to him that it would. [Transcript, page 162, lines 5-18] It is clear from the
18 testimony presented in this proceeding that long periods of warm weather during the
19 coming winter or cool weather during the coming summer pose substantially more
20 financial risk to EKPC than does the Sierra Club’s SR proposal, if the latter poses any
21 risk at all. If EKPC were interested in minimizing the risks it faces from as many sources
22 as possible, it would embrace a revenue-per-customer decoupling formula without an

1 adjustment factor for the weather. [Sierra Club's response to PSC Question Number 5,
2 pages 25-26 of 55]

3 To summarize, EKPC and its consultant have not identified any serious problems
4 with the concept of statistical recoupling or the Sierra Club's proposal to implement it in
5 the immediate future for EKPC and its member coops. If there exist any logical or valid
6 reasons why SR should not be implemented, they have not been identified by any Party to
7 this proceeding.

8 **IV. Although the financial incentives of a cooperative are not identical to an**
9 **IOU, when it comes to energy-saving DSM programs, EKPC has behaved as though**
10 **they were.**

11 Dr. Kirsch correctly pointed out that the financial incentives of a cooperative such
12 as EKPC are not exactly the same as those of a profit-seeking investor-owned utility
13 (IOU). [Kirsch, rebuttal testimony, page 26, line 16 to page 29, line 17] However, over
14 the past 15 years or more, EKPC has carefully designed and operated its marketing and
15 DSM programs so as to avoid reducing energy consumption when all their programs are
16 considered in the aggregate. Mr. Young noted in his direct testimony that "When we
17 look at EKPC's marketing programs and DSM programs together, the energy savings are
18 zero. There is some shifting of demand from peak load periods to off-peak periods."
19 [Young, direct testimony, page 14, line 23 to page 15, line 2; and Attachment A] EKPC
20 has not disputed this data.

21 In Case No. 2000-044, which was referred to in the Sierra Club's direct testimony
22 [page 4 of 41, line 5], KDOE noted that since at least 1993, EKPC staff have been
23 interested in maintaining high levels of electricity sales. After discussing the 1993

1 deliberations of EKPC’s Strategic Marketing Planning Steering Committee, which
2 endorsed a set of marketing and DSM programs with a net energy impact of zero kWh
3 saved, KDOE concluded: “In general, EKPC appears to be responding in an
4 economically rational manner to the existing regulatory framework, which rewards
5 increased sales of electricity with increased revenue and net income for the utility. Even
6 though EKPC does not have a legal obligation to maximize profits for the benefit of its
7 stockholders, it has an economic incentive to cover its costs and keep its rates low.”

8 [KDOE Comments on EKPC’s 2000 IRP, 1/11/01, pages 10-11 of 29]

9 Unfortunately for EKPC’s ultimate customers, it appears that the strategy
10 endorsed by its Strategic Marketing Planning Steering Committee in 1993 has not
11 changed significantly in the last 14 years. EKPC remains as committed as ever to
12 continuing its electric thermal storage programs [Bosta rebuttal testimony, page 7, line 20
13 to page 8, line 5], even though these programs boost energy consumption and are
14 extremely inefficient from the perspective of the Second Law of Thermodynamics. A
15 definition of “Second Law efficiency,” was provided in the Sierra Club’s response to
16 PSC Question No.2, page 7 of 31. As Amory Lovins explained in his technical paper,
17 “Energy Efficiency, Taxonomic Overview:”

18 But end-use analysis can be valuable because matching energy supplies
19 in quality and scale, as well as in quantity, to end-use needs can save a
20 great deal of energy and money. Supplying energy of superfluous
21 quality, not just quantity, for the task is wasteful and expensive. For
22 example, the United States now provides about twice as much electricity
23 as the fraction of end uses that economically justify this special, costly,
24 high-quality form of energy, yet from 1975 to 2000, 45% of the total
25 growth in primary energy consumption came from increased conversion
26 and grid losses in the expanding, very costly, and heavily-subsidized
27 electricity system. Much of the electric growth, in turn, provided low-
28 temperature heat, a physically and economically wasteful use of
29 electricity. [Sierra Club’s response to PSC Question No.2, page 9 of 31]

1
2 Removing the disincentive described by David Moskovitz and Mr. Young is one
3 important factor that could enable EKPC to give more serious consideration to alternative
4 strategies that entail significant reductions in the amount of energy that is now being
5 wasted in the businesses, homes and workplaces of its ultimate customers.

6 **V. Building new power plants entails significant upward impacts on rates.**

7 In response to cross-examination by the Sierra Club at the 9/5/07 hearing, EKPC
8 witness Frank Oliva testified that starting around March 2005, the addition of the \$400
9 million E.A. Gilbert coal-burning power plant to EKPC's rate base began adding \$40
10 million to \$50 million a year to its revenue requirement. [Transcript, page 60, line 9 to
11 page 62, line 1] The financial impact of that single power plant is equal to or somewhat
12 larger than the total amount of rate relief EKPC is requesting in this proceeding. One
13 could conclude that this rate case, as well as a certain proportion of EKPC's present
14 financial difficulties, primarily result from its decision not to request a rate increase in
15 early 2005 when the Gilbert plant came on-line.

16 When asked whether EKPC would be requesting another rate increase in April
17 2009 when the Spurlock Unit 4 coal-burning power plant is scheduled to come on-line,
18 Mr. Oliva admitted that that was "a possibility." He estimated that Spurlock Unit 4, with
19 a capital cost of \$522 million, would add \$50 million to \$60 million to EKPC's annual
20 revenue requirement. He was unwilling to give an estimate of the future rate impact of
21 the \$660 million Smith Unit 1 coal-burning power plant, now scheduled to come on-line
22 in May 2012, because that date is five years in the future. [Transcript, page 62, line 11 to
23 page 63, line 14] If the pattern shown by the two preceding power plants is any

1 indication, however, one might reasonably expect the rate impact of Smith Unit 1 to be at
2 least \$70 million a year, starting in mid-2012.

3 Once all three of these large power plants have come on-line, assuming they do,
4 the total expected impact on EKPC's revenue requirement would be approximately \$170
5 million a year. This figure represents approximately 25% of the actual test year revenue
6 requirement of \$667.8 million. [Application, Exhibit F Summary, page 1 of 4] If
7 electricity demand were to grow at a slower rate between now and 2012 than EKPC
8 projects, the construction of these three power plants could boost the rates of EKPC's
9 member co-ops and ultimate customers by as much as 25%.

10 **VI. An alternative strategy based on improving energy efficiency is likely to**
11 **cause bills and rates to increase less.**

12 Throughout this proceeding, the Sierra Club has maintained in its testimony and
13 responses to information requests that improving end-use energy efficiency through well-
14 designed DSM programs and cogeneration can meet customers' needs for energy services
15 in a less costly way than building new power plants. [Sierra Club responses to PSC
16 Questions Number 2a and 3a; responses to EKPC Questions Number 5 and 6] Evidence
17 cited in support of this statement has included relevant parts of the 2006 report of the
18 National Action Plan for Energy Efficiency; Amory Lovins' technical article, "Energy
19 Efficiency, Taxonomic Overview," including the references contained therein under the
20 heading, "Further Reading;" Lovins' essay about the experience of Dow Chemical's
21 Louisiana Division during the 1980s and 1990s; a firsthand report from Cam Metcalf and
22 Sieglinde Kinne of the Kentucky Pollution Prevention Center; an E Source Strategic
23 Issues Paper titled, "Energy-Efficient Buildings: Institutional Barriers and

1 Opportunities;” and a report by the Lawrence Berkeley National Laboratory titled,
2 “Creating High-Performance Commercial Buildings.”

3 In response to the empirical information contained in these detailed reports,
4 EKPC and its consultant have provided only blanket denials and free-market theology.

5 In his rebuttal testimony, Bill Bosta wrote that EKPC “is compelled to take a very
6 strong exception to Mr. Young’s criticism of EKPC’s capacity expansion plans and base
7 rate management.” [Bosta, page 10, lines 4-5] This comment was in reaction to Mr.
8 Young’s statement on page 14 of his testimony to the effect that one or more of the coal-
9 fired power plants listed above “may not have been needed if more DSM programs had
10 been instituted during the past 13 years;” and in reaction to Mr. Young’s answer to
11 EKPC’s Question Number 6. The logic of Mr. Young’s argument, however, is not
12 obscure. His point has been that if energy efficiency resources have consistently been
13 cheaper to harvest per kWh than the energy generated from new power plants, it is simply
14 a matter of deduction to conclude that a utility could have produced lower average bills
15 for its customers by investing more in energy efficiency and less in building new power
16 plants. Mr. Bosta and EKPC are free to take a very strong exception to this logic, but
17 they have not produced any evidence that calls into question the conclusions of the
18 technical sources and references cited in the Sierra Club’s testimony and responses to
19 information requests.

20 Dr. Kirsch’s rebuttal testimony included the following argument, in response to
21 the prepared question, “What are the problems with Mr. Young’s reasoning?”:

22 First, regardless of whatever environmental benefits might have been
23 created by the missing industrial class DSM programs, these programs
24 are extremely likely to have required a positive net out-of-pocket
25 expense. We know that because the industrial class has elected not to

1 undertake these DSM programs without subsidies. On the reasonable
2 assumption that industrial customers are rational and fairly savvy, it must
3 be the case that industrial customers have figured out that the out-of-
4 pocket expenses of these programs exceed the savings that they will gain
5 from these programs, or that the savings are so small that it is not worth
6 the transaction costs of undertaking these DSM measures. [Kirsch, page
7 12, lines 5-13]
8

9 Under cross-examination, Dr. Kirsch was asked if he had any empirical evidence
10 for his statement about net out-of-pocket expenses. Instead of citing any empirical
11 studies, however, he answered, “The evidence is that they haven’t undertaken these DSM
12 programs on their own initiative.” [Transcript, page 158, line 8 to page 152, line 11] This
13 reasoning is circular.

14 Dr. Kirsch was referring to industrial DSM programs that, in general, do not yet
15 exist in Kentucky. That is why he used the word “missing” to describe them. His
16 statement that if they were to be developed and offered, such programs “are extremely
17 likely to have required a positive net out-of-pocket expense” is pure speculation. For
18 Kentucky’s industrial customers to have made a cost-benefit analysis of a set of industrial
19 DSM programs that do not exist, and for them to have concluded that the out-of-pocket
20 expenses of these hypothetical programs – factoring in their transaction costs – would
21 exceed any savings they would gain, they must have been extremely savvy indeed. It
22 should be noted that neither the Sierra Club nor Mr. Young has made any statements
23 disparaging the intelligence of Kentucky’s industrial customers. In particular, Mr. Young
24 has not stated or implied that industrial customers “do a poor job of managing their
25 businesses” or that they “are just not smart enough to grab those efficiencies,” nor has he
26 proposed that the Commission “share this belief and force industrial customers to change

1 how they operate.” [Kirsch, rebuttal testimony, page 13, lines 1-2 and page 14, lines 12-
2 15]

3 Dr. Kirsch’s argument reduces to the claim, which apparently is still being made
4 by theoretical economists in the year 2007, that if large, cost-effective energy-saving
5 opportunities existed in the industrial and commercial sectors, they would already have
6 been harvested by the functioning of the market. Amory Lovins discussed this argument
7 in his 2004 technical paper:

8 This mental model – “don't bother to bend over and pick up that
9 banknote lying on the ground, because if it were real, someone would
10 have picked it up already” – often dominates government policy. It
11 seems ever less defensible as more is learned about the reality of
12 pervasive market failures (see Section 5) and the astonishing size and
13 cheapness of the energy savings empirically achieved by diverse
14 enterprises (see Section 3). But by now, the debate is theological – about
15 whether existing markets are essentially perfect, as most economic
16 modelers assume for comfort and convenience, or whether market
17 failures are at least as important as market function and lie at the heart of
18 business and policy opportunity. [Sierra Club’s response to PSC
19 Question No.2, page 13 of 31]
20

21 In an effort to find ways to label the Sierra Club’s positions illogical, Dr. Kirsch
22 felt the need to misrepresent one of Mr. Young’s positions as follows: “Mr. Young is
23 saying that if industrial customers were forced to participate in DSM programs, they
24 would have an ‘opportunity to participate in utility-sponsored DSM programs’...” Under
25 cross-examination, however, he admitted that he didn’t recall Mr. Young saying that
26 industrial customers should be forced to participate in any DSM program. Mr. Young
27 reiterated under cross-examination that the Sierra Club has never stated that any
28 industrial customer should be forced to participate in any DSM program, which programs
29 tend to be voluntary by their nature. [Transcript, page 114, lines 6-10] What Mr. Young
30 has stated is that the opt-out provision for certain industrial customers contained in

1 Section 3 of KRS 278.285 should be defined more clearly so as to prevent it from being
2 abused, and so as to enable utility companies in Kentucky to develop and offer a
3 comprehensive set of industrial DSM programs. [Young, direct testimony, page 11, line 6
4 to page 13, line 16]

5 The fact that EKPC has not yet received acceptable bids for DSM programs when
6 it has issued all-source requests for proposals [Bosta, rebuttal testimony, page 9, lines 20-
7 23] means only that the market for saved energy in Kentucky has not yet become fully
8 developed. There are many actions the utility could take to help this market develop,
9 including establishing cooperative efforts with energy service companies, some of which
10 currently operate in Kentucky. Alternatively, EKPC could develop and offer more
11 energy-saving DSM programs itself.

12 **VII. The revenue requirement that the Commission sets should enable**
13 **EKPC to expand its energy efficiency programs significantly.**

14 At the 9/5/07 hearing, Mr. Young stated that the Sierra Club does not agree with
15 EKPC's most recent proposal for an annual revenue requirement increase of \$38.5
16 million. Under cross-examination by PSC staff, he clarified that \$1.5 million should be
17 added to whatever revenue requirement the Commission determines to be necessary to
18 ensure EKPC's financial stability. The purpose of this additional increase would be to
19 enable EKPC to expand the size and scope of its DSM programs designed to reduce
20 energy waste. [Transcript, page 130, line 19 to page 131, line 16] Approximately no net
21 energy is presently being saved by the set of EKPC's marketing and DSM programs.
22 [Young, direct testimony, page 14, line 23 to page 15, line 18; Attachment A; Sierra

1 Club's response to EKPC's Question Number 7] EKPC has not challenged the accuracy
2 of this assessment.

3 The Sierra Club has testified to the effect that EKPC's revenue requirements, total
4 resource costs, and rates could be lower during the next decade if it were able to reduce
5 the growth in its demand enough to defer or eliminate the need to build one or more
6 baseload power plants. [Sierra Club's response to EKPC's Questions Number 5 and 6;
7 Response to PSC Question Number 3] No Party to this proceeding has presented
8 evidence that would call into question the Sierra Club's conclusion to the effect that
9 EKPC's least-cost plan should increase investment in improving energy end-use
10 efficiency and reduce investment in building new power plants. [Young, direct testimony,
11 page 15, line 19 to page 16, line 2]

12 Adding \$1.5 million to EKPC's revenue requirement will have a minimal impact
13 on rates, but will enable EKPC to develop a range of new energy-saving DSM programs
14 to propose in a subsequent filing for consideration by the Commission. Although the
15 Sierra Club believes that in the long run, EKPC's least-cost plan will require an even
16 larger annual budget for energy-saving programs, the proposed annual increase of \$1.5
17 represents a good start.

18 **VIII. EKPC's tariffs for Qualifying Facilities need to be amended.**

19 EKPC's tariffs for qualifying facilities (QFs) may properly be considered and
20 amended in this proceeding. [Commission's Order of 6/18/07, pages 2-3] According to
21 807 KAR 5:054, Section 7, the rates that a utility shall pay for the electricity generated by
22 a QF and offered for sale "shall be just and reasonable to the electric customer of the
23 utility, in the public interest and nondiscriminatory." The Sierra Club has testified that

1 the existing QF tariffs discriminate unduly against potential developers of
2 environmentally beneficial cogeneration and small power production projects and are
3 therefore not in the public interest. [Young, direct testimony, page 26, line 21 to page 33,
4 line 11]

5 EKPC's QF tariffs currently pay the same rates regardless of whether the
6 electricity is generated by polluting or nonpolluting fuels and technologies. The mere
7 existence of EKPC's Wholesale Renewable Resource Power Service, however, proves
8 that the existing QF tariff is discriminatory. Electricity generated from renewable
9 sources is worth more to EKPC than electricity generated from fossil fuels. Specifically,
10 renewable electricity is worth 2.375 cents more per kWh than fossil-fuel generated
11 electricity. [EKPC Tariff, Section H, Monthly Rate] For EKPC to refuse to differentiate
12 between renewable and non-renewable electricity generation is to implicitly assign a
13 value of zero to the relative environmental and economic benefits of renewable energy.
14 This is contrary to the public interest, contrary to the intent of the Public Utility
15 Regulatory Policies Act of 1978 (PURPA), and unduly discriminatory against renewable
16 QFs. The Sierra Club has broadened the concept of renewables somewhat to include
17 generating technologies that are significantly less polluting than EKPC's average fleet of
18 power plants. [Young, direct testimony, page 36, line 7 to page 37, line 8] The only way
19 for the Commission to avoid discrimination in the context of 807 KAR 5:054 would be to
20 establish QF tariffs that pay higher rates for clean, relatively "green" electricity than for
21 electricity generated by more highly-polluting fuels and technologies.

22 In his rebuttal testimony, Bill Bosta made the argument that EKPC's existing QF
23 tariffs have been approved by the Commission and are consistent with the above-cited

1 regulation. [Bosta, page 10, line 9 to page 12, line 16] The Sierra Club acknowledges
2 that these tariffs were approved by the Commission, but holds that the interpretation of
3 807 KAR 5:054 that would consider these tariffs proper is an incorrect interpretation.
4 The Sierra Club has provided reasons why the energy component of the QF tariff should
5 increase over time rather than increase and then decrease. [Young, direct testimony, page
6 29, lines 8-18] EKPC has not presented any testimony or information challenging that
7 argument.

8 The Sierra Club has provided reasons why the capacity payment is grossly
9 deficient. [Young, direct testimony, page 29, line 19 to page 30, line 9] Mr. Bosta's
10 response merely restated EKPC's flawed methodology for calculating the avoided cost of
11 QF capacity. EKPC's methodology does not consider the possibility that the need to
12 build a combustion turbine (CT) could be entirely eliminated if a sufficient number of
13 QFs were connected to the system. [Bosta, page 11, line 18 to page 12, line 16] In view
14 of the experience of E.ON in Kentucky, there is no valid reason to assume that a future
15 CT could not be cancelled. [Sierra Club's response to EKPC Question Number 4] The
16 resulting avoided cost for capacity would be significantly higher if EKPC were to
17 acknowledge that one or more planned CTs could potentially be cancelled entirely.

18 Mr. Bosta stated that "EKPC should not pay a capacity credit for a generation
19 facility whose availability is uncertain." [Rebuttal testimony, page 12, lines 8-9] As Mr.
20 Young stated at the hearing on 9/5/07, however, all generating units have some
21 probability that they will be unavailable when needed; the likelihood of a unit's being
22 available is a continuous function rather than a binary on/off function; and the utility can
23 enter into contractual arrangements with a QF that can increase the likelihood that the

1 unit will be generating power at the times it is most needed. Most or all QFs should
2 therefore receive a capacity payment, which would vary with the degree of likelihood of
3 its availability during peak load conditions. [Transcript, page 123, line 21 to page 126,
4 line 7]

5 **IX. The Sierra Club's proposed QF tariffs are consistent with 807 KAR**
6 **5:054.**

7 In response to the PSC's Question 15d, the Sierra Club provided a proposed
8 Cogeneration and Small Power Production Power Purchase Rate Schedule for the
9 Commission's consideration.

10 The establishment of low purchase power rates for electricity from polluting
11 technologies and higher rates for environmentally sound technologies is consistent with
12 the section of 807 KAR 5:054 titled, "Necessity, Function, and Conformity," in particular
13 the references to PURPA and encouraging cogeneration and small power production.
14 The idea of giving net metering rates to relatively clean electricity has the advantage of
15 being very simple to meter and administer, although even higher rates might be
16 appropriate if the analyses contained in the book, *Small Is Profitable*, are correct.
17 [Young, direct testimony, page 39, line 4 to page 40, line 5; Attachment D] Neither
18 EKPC nor its consultant has introduced any evidence challenging the book's conclusion
19 that small-scale generating resources provide numerous, significant economic benefits to
20 the utility and its non-QF customers.

21 The first five Terms and Conditions in the Sierra Club's proposed QF tariff are
22 based generally on Kentucky's net metering statute, KRS 278.465 to 278.468.

1 The sixth Term and Condition is based on the first sentence of 807 KAR 5:054,
2 Section 6(a), which reads, “An electric utility is required to make any interconnection
3 with a qualifying facility that is necessary for purchase and sale.” This subsection makes
4 it clear that the default condition is for the utility to pay the interconnection costs, as it
5 would do if the utility had built the generating unit itself. Bill Bosta’s assertion that for
6 EKPC to absorb the interconnection costs would not “comport with the written
7 requirements set forth in 807 KAR 5:054” is incorrect. [Rebuttal testimony, page 10, line
8 20 to page 11, line 1]

9 The intent of the seventh Term and Condition is to prevent the utility from
10 burdening the QF with an unreasonably long contract term. The Sierra Club holds that
11 the 20-year initial contract term in EKPC’s current tariff is unreasonably long.

12 The intent of the eighth Term and Condition is to prevent large, energy-intensive
13 industrial customers from cherry-picking certain DSM programs they wish to participate
14 in, e.g., interruptible rates or cogeneration, while avoiding their responsibility to
15 contribute to the funding of EKPC’s other industrial DSM programs as well.

16 **X. Substantially all of the Sierra Club’s proposals were suggested seven**
17 **years ago in Case No. 2000-044 by the Kentucky Division of Energy.**

18 None of the Sierra Club’s proposed tariff reforms should have come as a surprise
19 to EKPC. In its comments on EKPC’s 2000 integrated resource plan (IRP), the Kentucky
20 Division of Energy (KDOE) made the following points:

21 - The potential for improved energy efficiency in EKPC’s service area is
22 extremely large.

1 - EKPC has not assessed demand-side resources on an equal basis with supply-
2 side resources.

3 - EKPC should take account of environmental externalities when assessing future
4 resource options, as do utilities in several other states.

5 - EKPC's existing DSM and marketing programs, analyzed as a whole, save no
6 net energy.

7 - The electric thermal storage programs are very inefficient from the perspective
8 of the Second Law of Thermodynamics.

9 - Distributed generation resources can provide economic benefits to the utility's
10 system.

11 - EKPC should actively promote more cogeneration by customers in its system.

12 - The existing regulatory framework penalizes utilities by reducing net income
13 when a utility helps its customers save energy.

14 - Statistical recoupling represents a promising way to solve this problem of
15 perverse incentives.

16 KDOE's comments on EKPC's 2003 IRP reiterated many of the suggestions
17 made about the 2000 IRP. Although KDOE's comments in these two cases are on file at
18 the PSC, for ease of reference we are providing copies along with this brief. KDOE's
19 Comments on EKPC's 2000 IRP are included as Attachment 1 herein, and KDOE's
20 Comments on EKPC's 2003 IRP are included as Attachment 2 herein.

21 The Sierra Club urges that the Commission take action in the context of this
22 proceeding to induce EKPC increase its efforts to help its ultimate customers reduce
23 energy waste. Repeated polite requests over the past seven years have yielded

1 insufficient improvements in EKPC's policies and programs in this area. EKPC's
2 resource expansion plan continues to diverge significantly from what the Sierra Club
3 believes to be the least-cost plan for all of its customers. This proceeding represents an
4 opportunity for the Commission to initiate several changes that will provide a sound
5 foundation for the financial stability of EKPC and its member co-ops, as well as the
6 future prosperity of their ultimate customers.

7

8 WHEREFORE,

9 The Cumberland Chapter of the Sierra Club respectfully requests that the Commission
10 implement statistical recoupling, amend the tariffs for qualifying facilities, and establish
11 an adequate revenue requirement as recommended in the Sierra Club's written and oral
12 testimony that is included in the record of this proceeding.

13 Respectfully submitted,

14 

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19 ATTORNEY FOR THE SIERRA CLUB

Attachment 1

Kentucky Division of Energy's Comments
Related to the 2000 Resource Plan of
East Kentucky Power Cooperative, Inc.

Case No. 2000-044

RECEIVED

COMMONWEALTH OF KENTUCKY

JAN 11 2001

BEFORE THE PUBLIC SERVICE COMMISSION

PUBLIC SERVICE COMMISSION

In the Matter of:

A REVIEW PURSUANT TO 807 KAR 5:058)
OF THE 2000 INTEGRATED RESOURCE)
PLAN OF EAST KENTUCKY POWER)
COOPERATIVE, INC.)

CASE NO. 2000-044

KENTUCKY DIVISION OF ENERGY'S COMMENTS
RELATED TO THE 2000 RESOURCE PLAN OF
EAST KENTUCKY POWER COOPERATIVE, INC.

Comes the Natural Resources and Environmental Protection Cabinet, Division of Energy, Intervenor herein, and offers the following comments on the 2000 Resource Plan of East Kentucky Power Cooperative, Inc. (EKPC):

I. The Kentucky Division of Energy (KDOE) notes the following positive elements in EKPC's Resource Plan:

A. The plan discusses a relatively wide range of potential new supply-side resource options, including cogeneration, hydropower, fuel cells, and a range of policy options to support renewable energy. Resource Plan at 111-120.

B. EKPC is making use of interruptible loads and responsive pricing, which are relatively low-cost ways to meet peak load requirements. Resource Plan at 55-58. KDOE believes that a shift toward greater use of real-time pricing will increase system efficiency by transferring the utility's price information to customers, thus giving customers an economic incentive to reduce electric demand at times when the system is most stressed.

C. The existing Button-Up and Tune-Up DSM programs appear to be providing economic benefits both to customers and EKPC.

D. Envision Energy Services is providing an impressive set of valuable services to customers, especially in light of the entity's small staff of two people. EKPC Response to KDOE Request #12.

II. Notwithstanding the positive elements noted above, KDOE holds that EKPC's 2000 Resource Plan is severely deficient in the area of demand-side management (DSM) planning.

A. In developing the plan, EKPC did not perform a study to estimate the quantity of demand-side energy efficiency and load-shifting measures that would be available within its service area (i.e., a Technical Potential study), the cost of implementing such measures, and the revenue requirements that would be needed to acquire various portions of these potential resources through demand-side management (DSM) programs. EKPC Response to KDOE Request #3. EKPC did not estimate the square footage of residential, commercial, and industrial floor space that is being newly constructed each year in its service area [or if it did so for residential customers, it did not make use of the information in its DSM planning]. EKPC Response to KDOE Request #4 and discussion at the informal conference on 12/7/00. EKPC did not survey the energy efficiency of the range of types of new buildings being constructed in its service area, which would be important information to use when developing DSM programs to improve the energy efficiency of buildings being newly-constructed. EKPC Response to KDOE Request #5. In addition, EKPC does not seem particularly well informed about sources of up-to-date information on demand-side technologies, design methods, and programs. EKPC Response to KDOE Request #2 and discussion at the 12/7/00 conference.

B. EKPC did not include an analysis of major additional new DSM program options in its 2000 Resource Plan. Resource Plan at 124-125 and EKPC Response to KDOE Request #9c. It is not clear when, if ever, EKPC has performed such an analysis. In responding to KDOE's Request #9b, EKPC referred only to Appendix II of its 1993 Resource Plan. KDOE reviewed that document and found an analysis of EKPC's existing DSM programs and a limited number of potential new ones, but was unable to find an analysis of a wide range of potential new DSM technologies, applications, and programs. EKPC claims that it "reviews new DSM programs periodically rather than as a part of each power supply study." EKPC Response to KDOE Request #9c. It is unclear, however, what this means in practice.

In responding to KDOE's Request #9c about why an analysis of major new DSM program options was not included in the 2000 Resource Plan, EKPC listed the following reasons:

1. Current programs are continuing to meet their load shape objectives.
2. EKPC has been channeling its efforts into a better understanding of existing programs.
3. EKPC is continuing to develop market based pricing that have the result of managing peak demands in an effective manner.

In addition, recent changes related to wholesale power markets and the trend toward restructuring and customer choice cannot be ignored. EKPC is concerned that costs of traditional DSM programs could become stranded or non-recoverable in a competitive market.

The first two answers above have no logical connection to the question. EKPC is facing a future capacity shortfall. Answers 1 and 2 have the same logical validity as a statement to the effect that EKPC is not considering new electric generation or purchased power options to meet

the shortfall because its existing power plants are operating in a satisfactory manner, and because EKPC has been channeling its efforts into a better understanding of the combustion processes within its existing power plants. The third answer above represents one valid strategy, which KDOE endorses. However, load-shifting is only one type of DSM program, and there is no logical reason to exclude consideration of the much larger class of DSM programs that save energy as well as reduce or shift peak demand.

EKPC representatives noted at the 12/7/00 conference that analyzing, developing and implementing new DSM programs require significant resources in the form of staff time. Building new generating plants and operating them over their lifetimes also require a very large commitment of staff time, however, and may exceed the amount required to operate demand-side programs when compared on the basis of staff time per kilowatt or per kWh. Staff time is only one type of input among several; moreover, a lack of existing staff is not a valid reason to avoid developing a long-range plan that minimizes total costs.

KDOE addressed the issue of potential future "stranded costs" during the 12/7/00 conference. The likelihood that EKPC will be left with net stranded costs in the event of future industry restructuring in Kentucky is virtually nil. Any regulatory costs resulting from increased DSM investments over the next several years would almost certainly be dwarfed by the large "negative stranded costs," or stranded benefits, that EKPC would stand to gain through industry restructuring. A recent study estimated stranded benefits to EKPC of approximately \$220 million in the Base Case scenario. Resource Data International (RDI), "Stranded Costs and Electricity Exports in a Restructured Electric Industry," Interim Report No.2 for the Kentucky Special Task Force on Electricity Restructuring, August, 1999, Appendix A-1. EKPC therefore has little reason to fear that large-scale DSM programs will cause the cooperative's prospects to

shift from a net stranded benefit to a net stranded cost scenario. In addition, as the Attorney General's representative noted, the likelihood of electric industry restructuring in Kentucky is low for the foreseeable future.

KDOE and EKPC representatives at the 12/7/00 conference agreed that there are ways to structure DSM programs that reduce the risk of potential future "stranded costs." Moreover, against the possibility of incurring future "stranded costs" must be weighed the potential increase in customer loyalty that may result from effective DSM programs that help participating customers reduce their energy bills. Such customers, as well as those hoping to benefit from DSM programs in the future, may be less likely to choose another energy supplier and leave EKPC "stranded." It should also be noted that if EKPC can sell the electricity freed up by a departing customer elsewhere in the market at a comparable price, the associated costs would not be "stranded."

C. The total quantity of DSM resource proposed over the planning period is token, if interruptible rate/load-shifting DSM programs are not included. EKPC Table 3-4 shows the impact of the geothermal heat pump programs on the winter peak to be -14 MW in 1997, increasing gradually to -40 MW in 2018. The estimated impacts for the Electric Thermal Storage (ETS) program are -5 MW in 1997, increasing to -13 MW in 2018. The estimated impacts for "Other Programs" increases from -15 MW in 1997 to -70 MW in 2018. Resource Plan at 26-27. At the 12/7/00 conference, EKPC staff explained that the category of "Other Programs" includes the Button-Up Program, the Tune-Up Program, and unspecified small DSM programs, but does not include load-shifting programs. Upon questioning, they also acknowledged that the small programs were not being accepted by customers as readily as hoped, and that the impact estimates for "Other Programs" in the years 2001-2018 are likely to

be too high. Even using the original high estimates from Table 3-4, the total impacts of all the DSM programs together represent only 3.2 percent of the winter peak load in 2018, 0.4 percent of the summer peak load, and 0.1 percent of the total annual energy requirements. The main reason why the energy impacts are so small is that the ETS Program actually increases energy consumption (“valley filling”) while shaving the peak. If instead we assume, more realistically, that the impacts of the “Other Programs” category will come to mirror those of the Geothermal programs, the total impacts of all the planned DSM programs in 2018 would represent 2.4 percent of the winter peak load, 0.3 percent of the summer peak load, and 0.0 percent of the total annual energy requirements.

In comparison, for the country’s 508 large electric utilities in 1999, energy savings resulting from DSM programs averaged 1.5% of electric sales to ultimate consumers, and the reduction in peak load was 3.9%. This follows a several-year period during which many utilities cut back their DSM programs somewhat. Energy Information Administration (USDOE), “Electric Utility Demand Side Management 1999.” Some of these utilities operate DSM programs significantly larger than the average, and even those programs could be cost-effectively enhanced and expanded. Lovins, Amory, “Apples, Oranges, and Horned Toads: Is the Joskow & Marron Critique of Electric Efficiency Costs Valid?” *Electricity Journal*, May, 1994, p.40. The potential for expanded DSM programs in EKPC’s service area over the planning period is very large, even if we use as a baseline the (sub-optimal) industry average. See Section VIII below.

III. EKPC's 2000 Resource Plan is not an integrated plan because it does not assess potential new supply-side and demand-side resources on an equivalent basis.

As KDOE pointed out at the 12/7/00 conference, the definition of integrated resource planning is very clear.

“The term ‘integrated resource planning’ means, in the case of an electric utility, a planning and selection process for new energy resources that evaluates the full range of alternatives, including new generating capacity, power purchases, energy conservation and efficiency, cogeneration and district heating and cooling applications, and renewable energy resources, in order to provide adequate and reliable service to its electric customers at the lowest system cost. The process shall take into account necessary features for system operation, such as diversity, reliability, dispatchability, and other factors of risk; shall take into account the ability to verify energy savings achieved through energy conservation and efficiency and the projected durability of such savings measured over time; *and shall treat demand and supply resources on a consistent and integrated basis.*” [emphasis added] Energy Policy Act of 1992, Subtitle B, Section 111(d), 16 USC 2602.

In response to KDOE's question about whether EKPC's plan is an integrated one, EKPC noted that “market based pricing programs are tending to impact its load shape,” that DSM “is growing to include the use of market-based pricing,” and that “Pricing therefore integrates demand side actions into EKPC's load shape and represents the link to resource planning.” EKPC Response to KDOE Request #9e. One might also say that the weather affects EKPC's load shape, that DSM programs increasingly factor in the effects of the weather, and that the weather therefore integrates demand-side actions into EKPC's load shape and represents the link to resource planning. Any number of such “links” could be adduced given sufficient imagination. While it may be true that certain planned actions being taken by EKPC will affect the utility's load shape, none of this alters the following facts:

a) In its 2000 resource plan, EKPC gathered detailed cost information about potential new supply-side resources using EPRI's Technical Assessment Guide: Supply-Side Technologies Software (TAG-Supply), as well as informal and formal quotes from major manufacturers. EKPC Resource Plan at 99.

b) EKPC conducted a detailed analysis of the operating costs of certain supply-side options using a production-cost model called PowrSym3. EKPC Resource Plan at 99-101.

c) EKPC analyzed a range of supply-side options to meet future capacity needs, including specific estimates of capital costs for various sources of peaking, intermediate, and baseload capacity. EKPC Resource Plan at 107-111.

d) However, as noted in Sections II.A and II.B above, EKPC did not analyze a range of potential new DSM technologies, applications, and programs. Without the data provided by such an analysis, it follows logically that EKPC would be unable to analyze and assess demand-side and supply-side options on a consistent and integrated basis. EKPC in fact did not do so in its 2000 Resource Plan. Resource Plan at 124-125 and EKPC Response to KDOE Request #9c. Instead of comparing demand-side with supply-side options on a consistent and integrated basis, and combining the most cost-effective options into a least-cost plan whether they arise from the supply side or the demand side, EKPC simply projected the future load impacts of its existing DSM programs and "netted out" those impacts from the overall load forecast. "Therefore, the remaining shortages was assumed to be met with supply side resources." EKPC Response to KDOE Request #7. It follows that the Resource Plan submitted by EKPC is not an integrated one under the commonly understood definition of the term.

IV. The costs and benefits for EKPC's DSM programs were not expressed in terms of the Standard California cost effectiveness tests.

It is not clear from the information provided, for example, whether the Water Heater Program and the Geothermal Heat Pump programs would pass the Participant Cost test. KDOE recommends that EKPC calculate and include these cost effectiveness test ratios in future analyses, so that the DSM programs may be more easily compared with each other, with supply-side options, and with programs offered by other utilities.

V. The 2000 Resource Plan does not incorporate estimates of environmental externalities into the resource planning and acquisition process (although the costs of complying with existing and expected environmental regulations are included).

At the 12/7/00 conference, KDOE noted that the operation of conventional coal-fired power plants imposes significant "external" environmental costs on the public. In the context of all-source bidding (KDOE Request #8), KDOE asked at the informal conference whether EKPC would award a price bonus to energy-conserving (DSM) resources because they produce fewer environmental externalities than burning fossil fuels. Mr. Ron Brown of EKPC answered, "We probably would take it into account if we could quantify the effects."

Methods have been developed to quantify environmental externality effects. Several other states have developed policies that assign monetary values to the environmental effects of various resource options and incorporate these values in their utilities' IRP or all-source bidding processes. The Northwest Power Planning Council, for example, gives a 10% credit for energy efficiency programs in its least-cost planning process; Massachusetts specifies monetary values for listed environmental effects; Vermont applies a 5% penalty to all supply-side costs and a 10% credit to DSM costs. Gellings, Clark W. and John H. Chamberlin, *Demand-Side*

Management Planning, 1993, Fairmont Press, pp.135-152; also, Haites, Eric and Melanie Mauldin, *Incorporating Environmental and Other Societal Costs into Utility Planning*, 1991, Barakat & Chamberlin; and NARUC, *Environmental Externalities and Electric Regulation*, September 1993. KDOE recommends that EKPC survey the methods used by other states to arrive at monetary values for environmental externalities and propose numbers for use in future integrated resource plans and in evaluating future all-source electricity bids.

VI. EKPC staff seems to be concerned about maintaining high levels of electricity sales.

DSM programs must be reviewed and approved by a Strategic Marketing Planning Steering Committee. Resource Plan at 71. Existing DSM programs are analyzed for their impact on the utility's revenue. Resource Plan at 72. The Electric Thermal Storage (ETS) Program, which boosts off-peak and overall electric consumption, is viewed very favorably and is slated for expansion. Resource Plan at 74-75 and discussion at the 12/7/00 conference. The Water Heater Program, which promotes electric water heaters, is considered to be a DSM program although it might more accurately be considered an electric marketing program. Resource Plan at 71.

In reviewing the DSM section of EKPC's 1993 Resource Plan, KDOE noted that one consideration in planning had been to balance energy efficiency programs with peak-shifting and interruptible load programs. The report noted, with apparent approval, that "As a result, the net effect of the system's marketing strategy on forecasted energy sales is zero." EKPC 1993 Resource Plan at 126. This led KDOE to ask during the 12/7/00 conference whether the Strategic Marketing Planning Steering Committee would have an objection if DSM programs were to reduce electricity sales and revenues by a large amount in the future. EKPC staff

answered that it would not be a problem, and KDOE hopes that the committee's philosophy has in fact changed between 1993 and today.

In general, EKPC appears to be responding in an economically rational manner to the existing regulatory framework, which rewards increased sales of electricity with increased revenue and net income for the utility. Even though EKPC does not have a legal obligation to maximize profits for the benefit of its stockholders, it has an economic incentive to cover its costs and keep its rates low.

This brings us back to the Electric Thermal Storage (ETS) Program. Viewed from a systems perspective, the program entails burning coal to produce high-temperature heat in large central power plants, converting approximately one-third of this heat to electricity while wasting the rest, transmitting the electricity over long distances to thousands of homes, and running it through resistance wires inside stacks of bricks to convert the electricity back into heat, which is used to raise the air temperature of a room by a few degrees. Discussion at 12/7/00 conference. The technology has an extremely low efficiency from the perspective of the Second Law of Thermodynamics and is really quite primitive. From a financial perspective, however, it is cost-effective for the utility. It evens out consumption between daytime (on-peak) and nighttime (off-peak) hours, and also boosts electricity consumption overall.

Kentucky Power/AEP operates a load-shifting and load-building program with an even lower Second Law efficiency called "Deep Heating," whereby commercial and industrial customers are given a very low rate if they bury a network of electric resistance wires under their entire new facility during construction and thereafter heat the floor slab above (as well as the earth below) using off-peak power. Personal conversation with AEP marketing representative, 5/4/00.

The major reason this type of program makes economic sense is that the existing regulatory framework rewards increased sales of electricity and flat load shapes. More technologically sophisticated DSM strategies and alternative rate-setting frameworks are possible, however, and will be considered in more detail below.

VII. It may be possible to reduce the costs of the EKPC transmission system and the member cooperatives' distribution systems by using local integrated resource planning (LIRP) and coordinating distribution system planning to a greater degree.

In its Request #18, KDOE suggested that LIRP might enable EKPC and its member cooperatives to reduce long-range costs by deferring transmission and distribution upgrades through the use of geographically-focused demand-side programs. EKPC stated that it has not used LIRP per se and has no defined plans to use LIRP in the future, but that it is considering the localized benefits that distributed generation could provide. EKPC Response to KDOE Request #18. KDOE suggests that in future analyses, EKPC consider the potential localized benefits of focused demand-side programs as well as distributed generation.

Section 8(2)(a) of 807 KAR 5:058 states, "The utility shall describe and discuss all options considered for inclusion in the plan including: (a) Improvements to and more efficient utilization of existing utility generation, transmission, and distribution facilities; ..." In its Request #17, KDOE asked about plans to improve the efficiency of the transmission and distribution systems. EKPC provided data on planned transmission system improvements, but stated that the distribution systems are owned by the member cooperatives, which do their own routine and long-range planning. EKPC Response to KDOE Request #17.

KDOE believes that the intent of Section 8(2)(a) is to ensure that all reasonable options to reduce long-term system costs are assessed, whether they are located within the generation,

transmission, or distribution sector. The combined service areas of the member cooperatives served by EKPC have been treated as a single system for generation and transmission planning purposes. It may be possible to reduce distribution system costs by encouraging the individual cooperatives to coordinate their plans to a greater extent. EKPC would be the logical entity to facilitate such coordination.

VIII. Based on the research and experience of energy efficiency practitioners over a period of many years, KDOE believes that the technical potential to achieve cost-effective energy savings and demand reductions in all customer classes is very large.

Over the planning period, this quantity could be roughly equal to, or perhaps even larger than, EKPC's total projected increases in demand and consumption.

Focusing on the present-day reality in one large sector of the economy (buildings), a Strategic Issues Paper produced by E Source concludes that "Well over half of the energy used to cool and ventilate buildings in countries like the United States can be saved by improvements that typically repay their cost within a few years." Other analyses have found comparable potential savings in lighting, drivepower, office equipment and other end-uses. The report continues, "To a theoretical economist, these are astounding statements: it is inconceivable that in a market economy, such large and profitable savings would remain untapped. But to a practitioner who knows how buildings are created and run, it is not only conceivable but obvious." Energy-Efficient Buildings: Institutional Barriers and Opportunities, E Source, Inc., 1992, Boulder, Colorado, p.6. The rest of the report provides a detailed examination of the process by which commercial buildings are designed, built and operated, and how inefficiencies are introduced at every stage through practices which are typical of the construction market. Most of the market barriers to energy efficiency result from split incentives, perverse incentives,

lack of information, and lack of communication between the numerous parties involved. Although each market participant may be behaving rationally within his or her narrow area of responsibility, the overall result is a system that chronically undervalues energy efficiency.

Given the large number of market barriers in the new commercial construction market cited in the E Source Strategic Issues Paper, it should not be surprising when analysts reach the conclusion that huge gains in energy efficiency are technically feasible at very reasonable cost. The Environmental Energy Technologies Division of the Lawrence Berkeley National Laboratory estimates that "If only tune-ups and performance monitoring of existing buildings were performed, average energy use could be reduced by about 20%. If proven efficiency measures were applied when a building is retrofitted (usually about every 15 years), about 50% reduction could be attained. The full range of efficiency measures that can be designed and incorporated into new buildings could bring about an energy reduction of as much as 75%." Lawrence Berkeley National Laboratory, "Creating High-Performance Commercial Buildings," *EETD News*, Fall 1999, pp. 1-2. Other estimates (for example, by E Source) are even higher. The fact that a long list of market barriers exists does not mean that they could not be overcome through carefully designed programs and policies, with active cooperation from the utility company.

Indirect but very real economic benefits resulting from improved daylighting designs such as increased retail sales or improvement in the performance of students or workers can make Total Resource Cost (TRC) benefit/cost ratios extremely high. Heschong Mahone Group, "Skylighting and Retail Sales," submitted to Pacific Gas and Electric Company on behalf of the California Board for Energy Efficiency Third Party Program, 1999; Romm, Joseph J. and William D. Browning, "Greening the Building and the Bottom Line: Increasing Productivity

Through Energy-Efficient Design,” Rocky Mountain Institute, Boulder, Colorado, 1994, p. 11; Heschong Mahone Group, “Daylighting in Schools: An Investigation into the Relationship Between Daylighting and Human Performance,” submitted to Pacific Gas and Electric Company on behalf of the California Board for Energy Efficiency Third Party Program, 1999. While the energy savings generated by the daylight-oriented whole-building design of Lockheed’s 600,000 square foot office building in Sunnyvale, California paid back the initial extra costs in four years, absenteeism among a known population of workers dropped by 15%, which represents annual cost savings equal to the entire incremental cost of the improved design. To this could be added productivity gains estimated at another 15%, bringing the simple payback period down to a matter of weeks. Romm and Browning, op. cit., pp. 8-9.

Savings of a similar magnitude are obtainable in the residential sector. The U.S. Department of Energy’s *Building America* program is applying whole-building principles to new home construction and reducing energy use by approximately 50%, at little or no additional cost to production builders in a range of climate zones. See the program’s web site at http://www.eren.doe.gov/buildings/building_america/system.shtml

The Rocky Mountain Institute describes a case study of what can be done in the residential sector by a utility company that is seriously interested in exploring the potential energy savings resulting from whole-system design. The Pacific Gas and Electric Company, as part of its Advanced Customer Technology Test (ACT²) program, hired the Davis Energy Group to improve an initial design for a house that already met California's strict Title 24 energy code, which is supposed to include all efficiency measures that are worth buying from a societal perspective. The first step was to eliminate unnecessary corners that had added 23 feet (11%) of length to the outside walls. The designers then put the windows in the right places, used window

frames that would transmit less heat, and invented an engineered wall that saved about 74% of the wood, reduced construction costs, and nearly doubled the insulation. A number of small improvements to the building envelope, windows, lights, major appliances, and hot-water system raised the total energy saving to 60% and increased the cost by approximately \$1,900. At the same time, however, the thicker insulation and better windows eliminated any need for the \$2,050 furnace and its associated ducts and equipment. Instead, on the coldest nights, a small amount of hot water from the 94%-efficient gas-fired water heater could be run through a radiant coil cast into the floor-slab. Finally, the designers eliminated the air conditioner by adding several more efficiency measures that had not previously appeared to have been cost-effective based on a conventional (measure-by-measure) analysis. The report concludes as follows:

“Factoring out small electrical appliances (one-third of initial electricity usage), which offered many savings opportunities but would be brought along by the buyer rather than installed by the builder, the resulting final design would save about 80% of total energy or 79% for electricity alone: 78% for space heating, 79% for water heating, 80% for refrigeration, 66% for lighting, 100% for space cooling, and 92% for space cooling plus ventilation. If such construction techniques became generally practiced – so-called "mature-market cost" – then those savings would make the house, in a mature market, cost about \$1,800 less to build and \$1,600 less to maintain.

“The measured savings, adjusted for some last-minute design changes requested by the homebuyer, agreed well with these predictions. The house proved very comfortable even in a severe hot spell. Since by law the Title 24 code is supposed to include all cost-effective measures, the Davis house may mean that this influential state standard has to be rewritten from scratch.”

Rocky Mountain Institute, “Designing For Zero Cooling Equipment in a Hot Climate,” 1999, www.naturalcapitalism.org/sitepages/pid27.asp .

If EKPC were interested in applying this approach in Kentucky, it should be possible to develop, or to contract with expert consultants to develop, marketable house designs that replace the central furnace by a water-heater based system – as home builder Perry Bigelow has done in the Chicago area – and downsize or eliminate the conventional air conditioning system. Andrews, Steve, “Perry Bigelow: Energy Efficiency Maestro,” *Home Energy*, March/April 1994, pp. 13-18.

Similar examples can be cited in the industrial sector. A major use of electricity in industry is to operate pumps for moving liquids around. The carpet company, Interface, was planning to build a new factory. One of the factory’s processes required 14 pumps. A leading firm specializing in factory design sized the pumps to total 95 horsepower. An Interface engineer, Jan Schilham, however, took a fresh look and was able to come up with a design that was not only more efficient but cost *less* to build. The first change used larger pipes and smaller pumps, greatly reducing frictional losses. Second, Schilham laid out the pipes first and then the equipment, in the reverse order from standard practice, enabling him to use shorter and straighter pipe runs. The combination of these two approaches allowed for a system with only 7 horsepower of pumping capacity – a 92% decrease. The lower capital cost of the smaller pumps, motors, inverters, and associated electrical system more than compensated for the additional cost of larger diameter pipes. The payback period for the higher-efficiency design was instantaneous and its return on investment was infinite because it was cheaper to build than the inefficient design. However, “optimization” techniques in use throughout the industrial sector routinely ignore systemic effects such as these, focusing only on single-component or partial-system optimization. Hawken, Paul, Amory Lovins, and L. Hunter Lovins, *Natural Capitalism*, Rocky Mountain Institute, Snowmass, Colorado, 1999, pp.116-117.

These examples illustrate an important point about whole-system design: It is frequently more cost-effective to save large amounts of energy than small amounts. It can make sense from a whole-system perspective to make certain components *more* efficient than a component-by-component “optimization” approach would suggest. This surprising phenomenon, called “tunneling through the cost barrier,” results from capital cost reductions (e.g., smaller or no HVAC systems, smaller pumps) that can be added to the energy savings. “Optimizing components in isolation tends to pessimize the whole system.” *Ibid.*, p.117.

In conclusion, there are very large opportunities over the planning period to improve energy efficiency in all sectors of the economy – residential, commercial, and industrial. The market barriers to energy-efficient design, construction, and system operation are large and long-standing. KDOE believes that they can be addressed and overcome, however, through well-focused programs that transform energy markets by involving a range of participants including the utility company. A number of such “market transformation” concepts will be outlined in Section X below.

IX. In order to minimize the chance of overlooking major opportunities for increased energy efficiency, KDOE suggests that EKPC use the following general approach when analyzing a range of potential demand-side options.

A. The first step would be to examine a number of major energy-using functions such as space cooling, lighting, shaft power, etc. EKPC could use information sources such as E Source to obtain performance data about the most efficient technologies and design methods currently on the market within each functional area.

B. EKPC could then outline DSM program ideas and strategies aimed at addressing the market barriers in each area that are preventing customers from adopting the most efficient

available technologies and methods. If EKPC were to consider and analyze combinations of complementary technologies through a whole-system perspective, such an approach would mirror that taken by E Source in its *Technology Atlas* series and other publications. References: *Commercial Space Cooling and Air Handling; Lighting; Drivepower; Space Heating; and Residential Appliances*; E Source, various dates.

C. The primary criteria for narrowing down the options to a manageable number would be (a) the Total Resource Cost Test, (b) the size of the potential impact within EKPC's service area, and (c) the objective of developing a set of DSM "programs which are available, affordable, and useful to all customers" [Reference KRS 278.285 (1)(g)].

D. Once a number of DSM program options were developed and screened for cost effectiveness, the demand-side options could be compared to the supply-side options on a consistent and integrated basis.

KDOE is available to work with EKPC in the process of developing its future integrated resource plans.

X. Market Transformation – A New Approach to DSM

In anticipation of electric industry restructuring, many utility companies (including companies operating in Kentucky) have scaled back their traditional DSM programs, which often depended on paying rebates to customers to install more energy-efficient devices. At the same time, the concept of market transformation has been developed to provide an alternative to rebate-centered programs.

In this section, we will suggest an alternative approach to meeting customers' needs for energy services that EKPC and its member cooperatives may wish to consider. KDOE believes

that this approach will offer significant long-term opportunities for the utility as well as tangible economic benefits for its customers.

A. Support Statewide and Regional Market Transformation Initiatives.

The term “market transformation” refers to a set of planned interventions in the market that lead to longer-lasting impacts than traditional utility-sponsored DSM programs that depend on ongoing rebates for their effectiveness. Meyers, Edward M., Stephen M. Hastie, and Grace M. Hu, “Using Market Transformation to Achieve Energy Efficiency: The Next Steps,” *Electricity Journal*, May, 1997, pp. 34-41; Hall, Nick and John Reed, “Market Transformation: Expectations vs. Reality,” *Home Energy*, July/August, 1999, pp. 16-20. The participation of EKPC in market transformation activities could help the cooperative establish its image in the market as experts in energy efficiency, and as being dedicated to maximizing the value that customers receive from the energy they purchase.

Regional market transformation alliances have been established in California, the Northwest, the Northeast, and the Midwest. Efforts typically involve a wide range of participants, and may include utilities, energy users, manufacturers, vendors, engineers, architects, construction firms, developers, building code officials, building owner associations, real estate professionals, lending institutions, federal agencies such as the U.S. Department of Energy and U.S. Environmental Protection Agency, state energy offices, and other parties. Meyers et al., op. cit., p. 40.

Kentucky companies and other interested organizations may be eligible to join the Midwest Energy Efficiency Alliance (MEEA). The mission of MEEA is “to work as a regional network of organizations to develop, design and implement energy efficiency and renewable energy resources in the rapidly-changing Midwest energy markets. The goals are to increase

public value, improve environmental quality, lower energy costs, and promote sustainable economic development.” Midwest Energy Efficiency Alliance web page, updated 2/23/00.

The Northwest Energy Efficiency Alliance, founded in 1997, has already reduced regional demand by 16 MW through market transformation initiatives related to compact fluorescent light bulbs, residential clothes washers, and semiconductor manufacturing process improvements. Northwest Energy Efficiency Alliance, “Northwest Utilities to Invest \$100 Million in Energy Efficiency through a Regional Alliance,” press release, March 17, 2000. The California Board for Energy Efficiency administers a variety of market transformation programs, including increasing the use of performance contracting with energy service companies, work with lighting manufacturers and distributors to bring energy-efficient lighting products to the market, home duct system improvements, and design tools for commercial architects and engineers. California Board for Energy Efficiency, “About the CBEE,” web page updated 9/15/99. Northeast Energy Efficiency Partnerships, Inc., has started market transformation programs in diverse areas including residential appliances, energy codes, high-efficiency motors, and commercial lighting design. Northeast Energy Efficiency Partnerships Initiatives web page.

B. Initiate a Comprehensive Market Transformation Program in the New Commercial Construction Sector.

To overcome the litany of chronic market barriers to energy-efficient new construction described in the E Source Strategic Issues Paper cited above, a multi-pronged approach is advisable. One element would be to initiate a program providing training, design incentives, and awards for energy-efficient architects, engineers, and HVAC system designers. Another might be a cooperative effort with one or more manufacturers of energy-efficient modular or mobile homes. EKPC could work with building code officials to “raise the floor” of allowable

performance, thus complementing an awards program that would affect the high-performance end of the market. The utility could help promote the use of energy lease agreements to reduce the problem of split incentives between commercial landlords and tenants. Alliance to Save Energy, "Guidelines for Energy Efficient Commercial Leasing Practices," Washington, DC, 1992.

Another way to impact the low-efficiency end of the market would be to invert the hookup fee policy that is now in effect so that energy-efficient new buildings would be charged a low fee, or even would receive a rebate for hooking up to the grid, while energy sieves would be charged a much higher fee to cover some of the additional costs of distributing power to an inefficient building over its lifetime. If the fee differential were set high enough, such a policy would affect a building's initial costs, which would get the immediate attention of a segment of the market that might not otherwise respond to information about energy efficiency.

An instructive example of what other investor-owned utilities are doing is the Pacific Gas & Electric Energy Center (PEC), established by PG&E in December, 1991. The PEC provides educational programs, consulting services and building performance tools to architects, HVAC engineers, electrical engineers, lighting designers, building owners, facility managers, and facility engineers. Its goal is to train professionals and create a sustainable market demand for energy-efficient design and products. It applies a whole-building approach aimed at optimizing owner value, user comfort, and energy efficiency. A recent study concluded that the PEC is effectively reaching its intended audience and is causing long-lasting behavioral changes that lead to the construction of more energy-efficient buildings. Reed, John H. and Nicholas P. Hall, "PG&E Energy Center Market Effects Study," TecMRKT Works, Arlington, Virginia, May, 1998.

C. Promote Cogeneration to Reduce Total Resource Costs.

EKPC is aware of only one industrial customer, Cox Interior, that operates a cogeneration system in its service territory. Beyond providing rates to customers interested in developing cogeneration applications, EKPC does not actively promote cogeneration systems. EKPC Response to KDOE Request #10. Conventional central power plants are on the order of 33% efficient, with the remaining two-thirds or so of the fuel energy converted to waste heat. As noted by Thomas Casten of Trigen Energy Corporation, however, combined heat and power systems can make beneficial use of approximately 90% of the energy content of the fuel. Casten, Thomas R. and Mark C. Hall, "Barriers to Deploying More Efficient Electrical Generation and Combined Heat and Power Plants," Trigen Energy Corp., revised March, 2000, Section 2.2. A cooperative utility seeking to optimize the efficiency of the energy sector as a whole would develop programs to enable industrial, institutional and commercial customers with sizeable thermal loads to put this vast amount of wasted energy to use, and would develop shared savings arrangements to enable both parties to benefit from the increase in system efficiency.

D. Promote Distributed Generation to Improve System Efficiency and Performance.

Some analysts believe that the electric industry of the future will make much greater use of small-scale, distributed generation units, and that such a trend would fit well with the needs of a more competitive industry. Moore, Taylor, "Emerging Markets for Distributed Resources," *EPRI Journal*, March/April, 1998, pp. 8-17. Distributed resources "could be applied at or near customer sites to manage multiple energy needs and to meet increasingly rigorous requirements for power quality and reliability. Distributed generators could also be deployed at utility sites – for example, at substations for transmission and distribution grid support. Some experts predict

that 20% or more of all new generating capacity built in the United States over the next 10 to 12 years could be for distributed applications...”

In an effort to promote cost-effective distributed generation and renewable energy technologies, approximately thirty states have instituted “net metering.” Starrs, Thomas J., “Summary of State Net Metering Programs (Current),” updated July, 2000. Net metering laws (enacted by legislatures) or orders (instituted by public utility commissions) require electric utilities to purchase excess power from small-scale, renewable sources at the same retail rate they charge those customers. In effect, the owner of a small photovoltaic system can “run the meter backwards” when the system is producing more power than needed. Net metering policies usually set an upper limit on the size of the systems that are covered, and usually prohibit the utility from erecting other barriers such as unreasonably burdensome interconnection and safety requirements.

Net metering would make small-scale, environmentally sound, distributed generation by customers more economically feasible. Because power is generated on-site, distributed generation would reduce transmission and distribution losses and improve the efficiency of the electricity grid. Certain renewable energy technologies such as photovoltaics can reduce costs system-wide by producing at their peak output on hot, sunny, summer days when the system may be facing its peak annual load.

The Rocky Mountain Institute has performed detailed research on the question of the value of distributed generation to utility companies. They conclude that “Properly counting approximately 75 documented and measurable diseconomies of scale, not just the few well-known economies of scale, will typically make decentralized ways to make, store, or save electricity around ten times more valuable than conventionally scale-blind comparisons had long

shown.” Rocky Mountain Institute, “Scale in Power Systems,” 1999, www.naturalcapitalism.org/sitepages/pid27.asp . If their analysis is even close to correct, it suggests that EKPC and its member cooperatives may be able to garner substantial economic benefits from distributed generation technologies that may now be overlooked because of outmoded analytical methods.

XI. Toward a More Cooperative Future

It has long been a truism that customers do not need or desire energy or electricity per se, but rather the services – warmth, light, hot water, cooling, drive power – that it provides for them. An economically rational customer will seek to maximize the net value of energy services purchased (i.e., the value added by the energy services minus the energy bill). An energy cooperative that helps its customers maximize this value should enjoy a large market demand for its services and should enjoy increased customer loyalty.

A number of forward-looking companies have changed their strategy from selling a commodity to helping their customers maximize value, even when it might result in less of the commodity being sold. Some of these are utility companies that sell torque services or warmth services rather than electricity or fuel. Hawken et al., *Natural Capitalism*, Rocky Mountain Institute, Snowmass, Colorado, 1999, pp.135-141. The key advantage of this approach is that it aligns the economic interest of the company with those of its customers. Rather than trying to sell more electricity while the customer tries to buy less, the company can work cooperatively with customers to increase the productivity with which resources (e.g., coal, natural gas) are converted into useful services. Both parties can benefit when resource productivity improves.

The comprehensive approach being proposed by KDOE includes the programs EKPC is now implementing to make greater use of time-of-day pricing; a comprehensive analysis of DSM

options leading to greatly expanded, cost-effective DSM programs aimed at transforming markets; the active promotion of cogeneration in order to make use of the tremendous amount of fuel energy that is presently being expelled to the environment in the form of waste heat; and the active promotion of distributed generation to reduce system losses, reduce environmental impacts, and diversify energy sources.

In theory, a cooperative should have fewer objections to this type of strategy than an investor-owned utility (IOU). In an IOU, the stockholders and customers are two different groups with divergent or opposing interests, but in a cooperative the owners and customers are one in the same. There should be no structural or legal reasons that would cause a cooperative utility to pursue a long-range plan that runs counter to the best interests of its customers/owners. In fact, such a strategy would be a concrete manifestation of the Cooperative Advantage. See EKPC Response to KDOE Request #6. This gives KDOE cause for optimism that EKPC may quickly move to implement the type of least-cost strategy we are proposing, once the utility comes to recognize its numerous advantages.

An important factor that would make the implementation of such a strategy more feasible is a change in the rate-setting structure from cost-based to performance-based. KDOE believes that the present structure rewards utilities for selling more electricity and penalizes them financially for helping their customers become more energy-efficient. The fuel adjustment clause has a particularly pernicious effect in this regard, as has been noted for years by industry analysts. Moskowitz, David, *Profits and Progress Through Least-Cost Planning*, NARUC, November, 1989. There are ways to decouple revenues from sales, however, that eliminate these perverse incentives and enable utilities to implement least-cost plans without reducing their revenues. Hirst, Eric, "Statistical Recoupling: A New Way to Break the Link Between Electric-

Utility Sales and Revenues,” September, 1993, Oak Ridge National Laboratory, Oak Ridge, Tennessee, ORNL/CON-372. The savings from energy efficiency improvements are shared between customers and the utility. Von Weizsacker, Ernst, Amory B. Lovins, and L. Hunter Lovins, *Factor Four: Doubling Wealth, Halving Resource Use*, Earthscan Publications, 1998, pp. 158-161. KDOE plans to bring this issue to the attention of the Commission, and welcomes the involvement in this issue of utility companies that are interested in minimizing long-term system costs for all customers.

XII. Summary and Recommendations

1. KDOE commends EKPC for certain programs it now conducts to improve the overall efficiency of the energy system in its service territory (see Section I above).

2. Unfortunately, in developing its 2000 Resource Plan, EKPC did not assess a range of potential new demand-side resources or compare future DSM options to supply-side options on a consistent and integrated basis. Section 8(2)(b) of 807 KAR 5:058 requires the utility to “describe and discuss all options considered for inclusion in the plan including: ... (b) Conservation and load management or other demand-side programs not already in place.” KDOE believes that the failure to analyze potential new DSM options and integrate them with supply-side options makes it impossible for the Resource Plan to conform to the intent of the regulation, which is to provide an adequate and reliable supply of electricity to meet forecasted electricity requirements at the lowest possible cost. In addition to this legal consideration, KDOE is concerned that EKPC may be guided by a sub-optimal resource plan over the next three years before the normal schedule would require a new IRP to be developed. We therefore recommend that the Commission require EKPC’s 2000 Resource Plan to be modified to include a comprehensive analysis of demand-side options and a comparison of these options with

supply-side options on a consistent and integrated basis, and resubmitted within six months; or, in the alternative, that the Commission require EKPC to submit its next scheduled IRP in approximately twelve months.

3. KDOE recommends that the costs and benefits for EKPC's DSM programs be expressed in terms of the Standard California cost effectiveness tests in future analyses, so that the DSM programs may be more easily compared with each other, with supply-side options, and with programs offered by other utilities.

4. KDOE recommends that EKPC survey the methods used by other states to arrive at monetary values for environmental externalities and propose values for use in future integrated resource plans and in evaluating future all-source electricity bids.

5. KDOE suggests that in future analyses, EKPC use the method of local integrated resource planning (LIRP) and consider the potential localized benefits of focused demand-side programs.

6. KDOE suggests that EKPC encourage its member cooperatives to coordinate their distribution system planning to capture potential savings from synergistic effects.

7. KDOE has proposed a method to estimate the technical potential for demand-side savings, to develop DSM program ideas to harvest this potential, and to compare demand-side and supply-side options on a consistent and integrated basis (see Section IX above).

8. KDOE recommends that EKPC use primarily a market transformation approach to achieve efficiency improvements in all sectors – residential, commercial, and industrial – and that EKPC de-emphasize or discontinue thermodynamically inefficient programs such as ETS.

9. KDOE recommends that EKPC actively promote cogeneration and distributed generation to improve overall system efficiency and performance.

10. KDOE recommends that EKPC consider alternative ratemaking structures that remove the existing disincentives to improved energy efficiency and propose a performance-based tariff to the Commission that better aligns the economic interests of the utility with those of its customers.

VERIFICATION

I, Geoffrey M. Young, state that I have written the above document and that to the best of my knowledge and belief all statements and allegations contained therein are true and correct.

Geoffrey M. Young

Geoffrey M. Young, Assistant Director
Division of Energy
Department for Natural Resources

Subscribed and sworn to before me by Geoffrey M. Young, this the 11th day of January, 2001.

Jean A. Cook

NOTARY PUBLIC

My Commission Expires: 1/10/2002

Respectfully submitted,

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COUNSEL FOR NATURAL RESOURCES
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Attachment 2

Kentucky Division of Energy's Comments
Related to the 2003 Integrated Resource Plan of
East Kentucky Power Cooperative, Inc.

Case No. 2003-00051

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

SEP 29 2003

PUBLIC SERVICE
COMMISSION

In the Matter of:

THE 2003 INTEGRATED RESOURCE)
PLAN OF EAST KENTUCKY POWER)
COOPERATIVE, INC.)

CASE NO. 2003-00051

KENTUCKY DIVISION OF ENERGY'S COMMENTS
RELATED TO THE 2003 INTEGRATED RESOURCE PLAN
OF EAST KENTUCKY POWER COOPERATIVE, INC.

Comes the Natural Resources and Environmental Protection Cabinet, Division of Energy (hereinafter "KDOE"), Intervenor herein, and offers the following comments on the 2003 Integrated Resource Plan (IRP) of East Kentucky Power Cooperative, Inc. (EKPC):

In its section on load forecasts, EKPC projects that firm peak demands will increase from 2,109 MW in 2002 to 4,434 MW in 2022, an annual average increase of 3.2 percent. Annual energy use is projected to increase from 11,158 GWh in 2002 to 20,483 GWh in 2022, an annual average increase of 3.2 percent. IRP Executive Summary, pages 3-4. These growth projections are not significantly different from the projections made in 2000. IRP, page 180.

In its comments on EKPC's 2000 Resource Plan, KDOE noted that the cooperative did not perform a study to estimate the quantity of demand-side energy efficiency and load-shifting measures that would be available within its service area (i.e., a Technical Potential study), the cost of implementing such measures, and the revenue requirements that would be needed to acquire various portions of these potential resources through demand-side management (DSM) programs. KDOE Comments on EKPC's 2000 Resource Plan, 1/11/01, pages 2-3; also, Commission Staff Report on the Integrated Resource Plan of East Kentucky Power Cooperative,

Case No. 2000-044, page 7, last paragraph. Unfortunately, EKPC did not perform such a study as part of its 2003 IRP either.

In its Report on EKPC's 2000 IRP, the Commission Staff stated that "With input from these parties [i.e., from KDOE and the Attorney General's Office, if it so desires], Staff fully expects that East Kentucky's next IRP will provide a rigorous, updated, and thoroughly documented assessment of all reasonable DSM alternatives as required by 807 KAR 5:058, including potential new DSM technologies, applications and programs." Case No. 2000-044, Commission Staff Report, page 10. In KDOE's Question 11a to EKPC, it asked, "Does EKPC consider its analysis of these six programs plus the existing DSM programs to constitute the "new DSM study" recommended by the Commission Staff at the conclusion of EKPC's previous IRP case, Case No. 2000-044?" The cooperative responded, "EKPC believes that Appendix II of the IRP filing, which contains DSMANAGER analysis of existing and potentially new programs is an appropriate response to the 2000 [Staff] recommendation." EKPC response to KDOE Question 11a, page 2.

KDOE's Question 11b asked, "Did EKPC analyze the potential energy impacts of major new DSM programs in the sectors of commercial new construction, residential new construction (other than manufactured homes), industrial drivepower systems, and combined heat and power?" The response was that EKPC is currently analyzing a residential new construction program, but has not analyzed commercial new construction, industrial drivepower systems, or combined heat and power. EKPC response to KDOE Question 11b.

When KDOE asked why analyses of these major energy-using sectors were not done, EKPC answered that limited resources precluded them from analyzing all of these potential programs. EKPC response to KDOE Question 11c. KDOE followed up with a question about

industrial energy efficiency programs [Question 15]. The cooperative responded by referring to the services provided by its EnVision subsidiary, and stated: "EKPC believes it would be difficult to come up with a one size fits all for this group of customers. EKPC believes that the current method of case-by-case service is appropriate for this segment." However, no one was proposing a "one size fits all" for the industrial sector. The question is whether the two people who constitute EnVision represent an adequate allocation of resources to harvest the huge opportunities for improved energy efficiency that exist in the industrial and large-scale commercial sectors. At the informal conference on 8/19/03, EKPC representatives stated that they have visited "every industrial facility that would let us in the door," but it might be easier to induce companies to open their doors if there were a DSM program for the industrial customer class that offered financial incentives for implementing energy-saving technologies and methods.

In Case No. 2000-044, KDOE presented detailed quantitative information to indicate that the technical potential to achieve cost-effective energy savings and demand reductions in all customer classes is very large. KDOE Comments on EKPC's 2000 Resource Plan, 1/11/01, pages 13-18. For example, KDOE cited the estimate of the Environmental Energy Technologies Division of the Lawrence Berkeley National Laboratory: "If only tune-ups and performance monitoring of existing buildings were performed, average energy use could be reduced by about 20%. If proven efficiency measures were applied when a building is retrofitted (usually about every 15 years), about 50% reduction could be attained. The full range of efficiency measures that can be designed and incorporated into new buildings could bring about an energy reduction of as much as 75%." Lawrence Berkeley National Laboratory, "Creating High-Performance Commercial Buildings," *EETD News*, Fall 1999, pages 1-2. Other estimates of the potential for cost-effective savings (for example, by the Rocky Mountain Institute) are even higher.

EKPC's 2003 IRP, however, still treats energy efficiency not as a major potential resource but as a minor factor that is quantitatively negligible and is treated as a token example of "customer service." EKPC response to KDOE Question 15, page 2 of 2. When the Attorney General's Office (AG) asked about ways to reduce carbon emissions, EKPC responded, "Currently in Kentucky significant reductions of carbon emissions can be achieved by switching from coal to natural gas, sequestration of carbon or doing both switching to natural gas and sequestration of carbon." EKPC response to AG Supplemental Question 4a. The idea that large-scale energy efficiency programs could yield significant reductions in carbon emissions apparently never crossed the EKPC's mind.

The total annual energy savings from EKPC's existing DSM programs are projected to be 18.4 GWh in 2017, and the total annual projected savings from its proposed new DSM programs are 22.8 GWh in the same year. IRP, page 83, Table 6-8; EKPC response to KDOE Question 2c. The total energy requirements in the year 2017 are projected to be 17,837 GWh. IRP, page 21, Table 3-3. The sum of the energy savings from all the existing and all the new DSM programs, 41.2 GWh, thus represents only 0.23 percent of EKPC's projected energy requirements in 2017. By any standard, this is a token impact.

In its comments on EKPC's 2000 Resource Plan, KDOE outlined a comprehensive, market-focused approach that EKPC could take to estimate the technical potential for improved energy efficiency for all of its customer classes. KDOE proposed that EKPC examine energy-using functions such as space cooling, lighting, shaft power, etc.; use information sources such as E Source to identify the most efficient ways of performing these functions; and develop DSM programs that overcome market barriers to the adoption of the most energy-efficient available

design methods and technologies. KDOE Comments on EKPC's 2000 Resource Plan, 1/11/01, pages 18-19. EKPC's response to that proposal was as follows:

“While it is always helpful and informative to review how other states are conducting analyses, it is not prudent to think that those techniques can be applied without customization to the specific systems being studied. The Kentucky Public Service Commission, through its regulatory process, has helped to ensure that the ratepayers of Kentucky have some of the lowest electric costs in the United States. EKPC should implement specialized programs that make economic and environmental sense for its members based on the EKPC system's structure and Kentucky's regulatory requirements.” Response of East Kentucky Power Cooperative to Intervenors' Written Comments, 2/6/01, Case No. 2000-044.

However, no one proposed that EKPC apply techniques from other states without customizing them to local conditions. While it is true that Kentucky's electric *rates* have been low for a long time, customers' total *bills* have not. KDOE believes that EKPC's ultimate customers' bills, as well as the utility's future revenue requirements and the impacts of its operations on the environment, could be lowered significantly by greatly improving the efficiency with which the services of heating, cooling, lighting, etc. are delivered.

Although EKPC developed some new DSM programs that focus on peak shifting and light bulbs, overall EKPC did not attempt to implement KDOE's previous suggestions in its 2003 IRP. IRP, pages 85-87. KDOE does not consider the partial analysis of a limited number of new DSM options contained in the 2003 IRP to constitute either a Technical Potential Study or a “rigorous, updated, and thoroughly documented assessment of all reasonable DSM alternatives,” as required by 807 KAR 5:058 and as recommended by the Commission Staff. EKPC has not yet invested the effort and time necessary to seriously analyze the potential

benefits that greatly expanded DSM programs could provide to EKPC, its member cooperatives and its member cooperatives' retail customers.

KDOE highly recommends a report recently published by the American Council for an Energy-Efficient Economy titled, *America's Best: Profiles of America's Leading Energy Efficiency Programs*, by Dan York and Martin Kushler, March 2003. This report describes a number of exemplary programs in enough detail to provide sound ideas and data that can be used when designing a wide range of new DSM programs. The names, phone numbers, and e-mail addresses of program managers are also provided for those seeking further information.

Despite a projected capacity shortfall, EKPC and its member cooperatives are still promoting increased electricity use. Several of the distribution cooperatives in EKPC's system use declining block rates, in which customers pay lower prices per kWh as their usage increases. None have inclining block rate structures. "All else equal, declining block charges encourage additional demand and/or consumption since average cost declines with increases in usage. ...whatever the reasons for adopting it, a declining block rate has a promotional effect." Stutz, John, Gretchen McCain, Richard Rosen, and Deanne Samuels, *Aligning Rate Design Policies with Integrated Resource Planning: A Report to the National Association of Regulatory Utility Commissioners*, January 1994, page 55. The practice is "familiar in the marketing of commodities at retail, the practice of quantity discounts." Bonbright, James C., *Principles of Public Utility Rates*, New York: Columbia University Press, 1961, page 307. Conversely, inclining block rates would provide an economic incentive for customers to reduce their energy use. Changing the existing tariff structure could help motivate customers to reduce their bills, help the utility reduce demand growth and defer the need for new generation.

EKPC and its distribution cooperatives are still promoting the installation of electric water heaters in order to boost electricity sales, despite the fact that other energy sources such as natural gas provide this service at a lower operating cost. The input data provided by EKPC in Appendix II illustrates this. A natural gas water heater uses 23 million Btu per year, a standard efficiency electric water heater 4,818 kWh/year, and a high-efficiency electric water heater 4,433 kWh/year. The initial capital cost for water heaters is \$400, \$410 and \$525, respectively. IRP Appendix II, Tabs 6 and 7. If we assume that the retail natural gas price averages \$7.50 per million Btu, which was the 2002 average for Kentucky, and the retail price of electricity averages 5.5 cents/kWh, the following table can be constructed:

<u>Water Heater Type</u>	<u>Capital Cost</u>	<u>Annual Energy Cost</u>
Natural Gas	\$400	\$173
Electric (std efficiency)	\$410	\$265
Electric (high efficiency)	\$525	\$244

A glance at this table shows that the natural gas water heater is lower in both capital and operating cost. All else being equal, it is clear that from the perspective of the ultimate consumer, gas is the most economically beneficial choice of the three options shown. Even if the retail price of natural gas were \$10.00 per million Btu, the annual energy cost of the gas water heater would be \$230, which is still less than that of either the standard or the high-efficiency electric water heater. Even accounting for the \$100 rebate the utility pays a customer to install a high-efficiency electric water heater, the capital cost and annual energy cost are still both higher than natural gas.

In its responses to KDOE's questions on this subject, EKPC did its best to obscure this clear conclusion. In response to KDOE Question 1b, EKPC stated that its most recent appliance saturation survey "shows that of the homes built in the last 5 years, 6 percent have natural gas

heat and electric water heating. Consumers do not always choose to have all natural gas appliances even when it is available.” This information is irrelevant to the question asked. In response to KDOE Question 13a, EKPC provided a detailed discussion of DSMANAGER and the use of retail versus wholesale natural gas prices. In its response to Informal Conference Request 2, EKPC stated that if the Participant test “were to be computed using today’s retail price of natural gas, it would have a benefit cost ratio greater than 1.0.” EKPC Response to the Information Requests Made at the August 19, 2003 Informal Conference. In view of the calculation shown above, KDOE does not see how this statement can be true.

In response to KDOE Question 1d, EKPC stated, “We believe that most, if not all, of the current marketing efforts are very beneficial to the end consumer.” But the simple calculation shown above demonstrates that there is at least one existing DSM program, the Electric Water Heater Retrofit program, that harms the economic interests of participating customers in order to boost electricity sales. EKPC has shown a disturbing degree of unwillingness even to consider the possibility of canceling this uneconomic program, or replacing it with a program that encourages customers to use natural gas for water heating instead of electricity in places where natural gas is available.

Conversely, certain DSM programs with very favorable benefit/cost ratios are slated to be implemented on only a limited scale. According to Appendix II, the estimated benefit/cost ratios for the Button-Up weatherization program are highly positive: Participant test: 2.46; TRC test: 2.84; Societal Cost test: 3.30; Distribution Utility Cost test: 3.82; Power Supply Utility Cost test: 4.90; and even the combined RIM ratio: 1.05, which passes the RIM test and is therefore atypical for an energy efficiency type of DSM program. Yet the program projects the number of new participants remaining constant at approximately 500 new participants each year from now until

2017. IRP, page 80, Table 6-6. The EKPC system serves approximately 360,000 households. IRP, page 2. When the KDOE representative asked at the Informal Conference on August 19, 2003 why the Button-Up program is not slated for a major expansion in size, the response was that it is sometimes difficult to get member distribution co-ops to implement DSM programs. KDOE believes that the set of incentives facing distribution co-ops should be designed so that their preferred strategy is also the strategy that maximizes the benefits for all customers and the EKPC system as a whole. This may require a reexamination of the structure of the rates EKPC charges its member cooperatives.

KDOE's comments on EKPC's 2000 Resource Plan included the following statement:

The Rocky Mountain Institute has performed detailed research on the question of the value of distributed generation to utility companies. They conclude that "Properly counting approximately 75 documented and measurable diseconomies of scale, not just the few well-known economies of scale, will typically make decentralized ways to make, store, or save electricity around ten times more valuable than conventionally scale-blind comparisons had long shown." Rocky Mountain Institute, "Scale in Power Systems," 1999, www.naturalcapitalism.org/sitepages/pid27.asp. If their analysis is even close to correct, it suggests that EKPC and its member cooperatives may be able to garner substantial economic benefits from distributed generation technologies that may now be overlooked because of outmoded analytical methods.

KDOE Comments on EKPC's 2000 Resource Plan, Case No. 2000-044, 1/11/01, pages 24-25.

EKPC made no response to this point in the context of Case No. 2000-044, and did not take this perspective into account when developing its 2003 IRP. EKPC's response to KDOE Question 3a.

Since KDOE made its comments in 1999, the Rocky Mountain Institute has elaborated and documented these ideas in the form of a full-length book titled, *Small Is Profitable: The Hidden Economic Benefits of Making Electrical Resources the Right Size*, by Amory Lovins et

al., Snowmass, Colorado, 2002. The book describes over 200 ways in which the size of electrical resources affects their economic value. It finds that properly considering the many economic benefits of small-scale distributed resources typically raises their value by a large factor, often approximately tenfold, by improving the utility's system planning, construction, operation, and service quality, and by avoiding societal costs. The book's main findings may be summarized as follows:

- The most valuable distributed benefits typically flow from financial economics – the lower risk of smaller modules with shorter lead times, portability, and low or no fuel-price volatility. These benefits often raise value by most of an order of magnitude (factor of ten) for renewables, and by about 3-5-fold for nonrenewables.
- Electrical engineering benefits – lower grid costs and losses, better fault management, reactive support, etc. – usually provide another ~2-3-fold value gain, but more if the distribution grid is congested or if premium power quality or reliability are required.
- Many miscellaneous benefits may together increase value by another ~2-fold – more where waste heat can be reused.
- Externalities, though hard to quantify, may be politically decisive, and some are monetized.
- Capturing distributed benefits requires astute business strategy and reformed public policy.

Id., Executive Summary, page xv.

If this analysis is correct, it would have important implications for the supply-side options considered by EKPC in its 2003 IRP and in the future. The value of centralized generating options would need to be derated considerably in relation to small-scale distributed resources. KDOE recommends that EKPC's resource planning team become thoroughly familiar with the analyses provided in this book and take them into account when assessing the relative economic value of resource options.

KDOE recognizes that EKPC has taken a number of initiatives in recent years to improve its system. Using landfill gas to produce "green" power, studying the potential for wind

generation in Southeastern Kentucky, proposing new small-scale DSM programs, and continuing to offer energy services through EnVision are all steps in the right direction. There is much more that can and should be done, however, and the 2003 IRP misses many large opportunities for cost-effective enhancements that would benefit the ratepayers, EKPC itself, its member cooperatives and the general public. KDOE's recommendations in this case are the same as those the division gave at the conclusion of Case No. 2001-053 [Application of East Kentucky Power Cooperative, Inc. for a Certificate of Public Convenience and Necessity, and a Certificate of Environmental Compatibility, for the Construction of a 250 MW Coal-Fired Generating Unit (With a Circulating Fluid Bed Boiler) at the Hugh L. Spurlock Power Station and Related Transmission Facilities, Located in Mason County, Kentucky], as follows:

- EKPC should complete a full and comprehensive study of the technical potential of demand-side resources and distributed generation in its service territory.
- EKPC should develop and implement programs to acquire that portion of the DSM and distributed generation resources that are more cost-effective than the lowest-cost supply-side option.
- EKPC and its member cooperatives should reverse those policies that promote the increased use of electricity, especially in cases where such policies are not in the best interests of their ultimate retail customers.
- After completing the above steps, EKPC should conduct an integrated analysis to determine whether or not additional centralized power plants will still be needed in the foreseeable future.

KDOE also recommends that EKPC develop and propose a net metering tariff to the Commission to accommodate customers that want to install small-scale, environmentally benign generating technologies to reduce their electric bills. KDOE would be willing to work with EKPC and the AG, if desired, to suggest provisions that would be included in such a tariff.

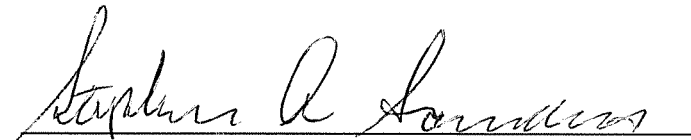
CERTIFICATE OF SERVICE

I hereby certify that an original and ten copies of the foregoing brief were delivered to the office of Beth A. O'Donnell, Executive Director of the Kentucky Public Service Commission, 211 Sower Boulevard, Frankfort, KY 40601, for filing in the above-styled proceeding and that copies were mailed to the following Parties of Record on this, the 5th day of October, 2007.

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