

CASE NO. 14-0546-E-PC

**APPALACHIAN POWER
COMPANY
WHEELING POWER COMPANY**

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WEST VIRGINIA PUBLIC SERVICE
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RECEIVED

DIRECT TESTIMONY

OF

J. RICHARD HORNBY

On behalf of the
Consumer Advocate Division
Of the
Public Service Commission
Of West Virginia

Dated: August 29, 2014

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1 I. INTRODUCTION AND QUALIFICATIONS

2 Q Please state your name, business address, and position.

3 A My name is J. Richard Hornby. I am a Senior Consultant at Synapse Energy Economics,
4 485 Massachusetts Avenue, Cambridge, MA 02139.

5 Q Please describe Synapse Energy Economics.

6 A Synapse Energy Economics (“Synapse”) is a research and consulting firm specializing in
7 energy and environmental issues. Its primary focus is on electricity resource planning
8 and regulation including computer modeling, service reliability, resource portfolios,
9 financial and economic risks, transmission planning, renewable energy portfolio
10 standards, energy efficiency, and ratemaking. Synapse works for a wide range of clients
11 including attorneys general, offices of consumer advocates, public utility commissions,
12 and environmental groups, U.S. Environmental Protection Agency, Department of
13 Energy, Department of Justice, Federal Trade Commission and National Association of
14 Regulatory Utility Commissioners. Synapse has over twenty professional staff with
15 extensive experience in the electricity

16 Q Please summarize your work experience and educational background.

17 A I have over thirty years of experience in the energy industry, primarily in utility
18 regulation and energy policy. Since 1986, as a regulatory consultant I have provided
19 expert testimony and litigation support on natural gas and electric utility resource
20 planning, cost allocation and rate design issues in over 120 proceedings in the United
21 States and Canada. During that period my clients have included utility regulators,
22 consumer advocates, environmental groups, energy marketers, gas producers, and
23 utilities. Prior to 1986, I served as Assistant Deputy Minister of Energy for Nova Scotia
24 where I helped prepare the province’s first comprehensive energy plan and served on a
25 federal-provincial board responsible for regulating exploration and development of
26 offshore oil and gas reserves.

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1 I was the lead author of reports projecting long-term avoided energy supply costs in New
2 England prepared in 2007, 2009, 2011 and 2013. I was co-author of *Portfolio*
3 *Management: How to Procure Electricity Resources to Provide Reliable, Low-Cost, and*
4 *Efficient Electricity Services to All Retail Customers*, a 2006 report prepared for the
5 National Association of Regulatory Utility Commissioners (NARUC). In the past five
6 years, I have filed testimony in electric resource planning cases in Arkansas, Kentucky,
7 Michigan and West Virginia.

8 I have a Bachelor of Industrial Engineering from the Technical University of Nova
9 Scotia, now the School of Engineering at Dalhousie University, and a Master of Science
10 in Energy Technology and Policy from the Massachusetts Institute of Technology (MIT).

11 **Q On whose behalf are you testifying in this case?**

12 A I am testifying on behalf of the Consumer Advocate Division of the Public Service
13 Commission of West Virginia.

14 **Q Have you testified previously before the West Virginia Public Service Commission?**

15 A Yes. In 1988, I submitted testimony on gas transportation rate design in Case No. 240-G.
16 In 1990, I submitted testimony regarding fuel adjustments to rates for Monongahela
17 Power Company (Case No. 90-196-E-GI) and Potomac Edison Company (Case No. 90-
18 197-E-GI). In May 2013, I submitted testimony regarding the application by
19 Monongahela Power Company and The Potomac Edison Company to acquire additional
20 ownership interest in the Harrison plant (Case No. 12-1571-E-). In June and July 2013, I
21 submitted testimony regarding both the application by Appalachian Power Company
22 (APCo) for approval of the acquisition of capacity from the Mitchell and Amos plants, in
23 Case No. 12-1655-E-PC, and the application for a merger between APCO and Wheeling
24 Power Company (WPCO), in Case No. 11-1775-E-P.

25 **Q What is the purpose of your testimony?**

26 A Appalachian Power Company and Wheeling Power Company (collectively, “the
27 Companies”) have applied to transfer 50% of the Mitchell Plant (780 MW coal-fired

1 generating capacity) from AEP Generation Resources, Inc. to WPCO at its net book
2 value as of the date of the transfer. The testimony of the Companies' witnesses in this
3 proceeding builds upon, and updates, the testimony they filed in Case Nos. 11-1775-E-P
4 and 12-1655-E-PC. The CAD retained Synapse to assist in its review of the Companies'
5 application in this proceeding. My testimony describes an analysis of whether the
6 proposed acquisition of capacity from Mitchell is reasonable.

7 **Q What data sources did you rely upon to prepare your review of the Companies'**
8 **request?**

9 A My review relies primarily upon the Data Responses, Direct Testimony and Exhibits of
10 the Companies in this Case 14-0546-E-PC and filings in Case Nos. 11-1775-E-P and 12-
11 1655-E-PC.

12 **Q Are you sponsoring any exhibits?**

13 A Yes, I am sponsoring the following exhibits:

14	Exhibit (JRH-1)	Resume of James Richard Hornby
15	Exhibit __ (JRH-2)	WPCO proposal – Acquire 780 MW of Mitchell, Participate in
16		PJM as FRR entity
17	Exhibit __ (JRH-3)	Sources of Uncertainty affecting Projections of Annual Average
18		Cost of Supplying WPCO
19	Exhibit __ (JRH-4)	Annual Average Cost of Supplying WPCO with Mitchell Asset –
20		Companies' forecast and lower market price projections
21	Exhibit __ (JRH-5)	Alternative strategy 1 – Acquire 390 MW of Mitchell and Enter
22		Power Purchase Agreements
23	Exhibit __ (JRH-6)	Alternative strategy 2 – Acquire 390 MW of Mitchell plus 390
24		MW of NGCC
25	Exhibit __ (JRH-6)	Cumulative Present Worth of Supply Costs under alternative
26		Strategies - Companies' forecast and lower market price
27		projections
28	Exhibit __ (JRH-8)	Responses to Selected Data Requests

1 **II. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

2 **Q Please summarize the proposed acquisition.**

3 **A The Companies propose that WPCO acquire 780 MW of existing coal-fired capacity**
4 **from Mitchell Units 1 and 2 (“the Mitchell Asset”) from AEP Generation Resources**
5 **(AEP GenCo), its unregulated merchant power affiliate. Under the acquisition, WPCO**
6 **would acquire a 50% interest in the Mitchell plant at its net book value as of the date of**
7 **the transfer. The Companies estimate that amount would be approximately \$578 million**
8 **as of August 31, 2014.¹ The Companies propose that, after the acquisition, WPCO would**
9 **participate in PJM as a Fixed Resource Requirement (“FRR”) entity. Under this approach**
10 **WPCO would meet its capacity obligation using Mitchell, i.e., by self-supplying.**

11 **Q Please summarize the Companies’ rationale for this acquisition.**

12 **A WPCo currently has a contract with AEP GenCo for capacity and energy to meet its peak**
13 **load and energy requirement, respectively. This contract can be cancelled with one-year**
14 **advance notice.² Companies’ witness Patton, on pages 5 through 7 of his testimony,**
15 **presents the reasons underlying his position that acquisition of the Mitchell Asset is the**
16 **best option to serve the WPCO load. He indicates that the Mitchell Asset is a long-term**
17 **solution that is readily available, that it would enable the Companies to reduce the net**
18 **level of wholesale power purchases to serve their West Virginia customers, that it would**
19 **provide the possibility of earning a margin from off system sales and that it would**
20 **mitigate the impact of volatility in wholesale market prices on their West Virginia**
21 **customers. Based on those reasons he concludes that acquisition of the Mitchell Asset**

¹ Direct Testimony of James F. Martin, page 3, line 14. This amount represents the Companies’ estimated additional rate base from acquiring Mitchell as of August 31, 2014. The net book value of \$578 million is \$42 million higher than proposed in the previous cases.

² Direct Testimony of Charles R. Patton, page 5, line 11.

1 “would provide significant benefits to Companies’ West Virginia customers as a long-
2 term power supply for the WPCo load.”³

3 **Q Please summarize the major findings from your review of the Companies’ proposal.**

4 **A** The major findings from my review of the Companies’ proposal are as follows:

5 First, if WPCO acquires 780 MW it will own more capacity than it needs to meet its
6 reserve requirements every year through 2040. The Companies’ projections of peak load
7 indicate that in 2040, with the acquisition of the Mitchell asset, WPCO will have 140
8 MW of excess UCAP capacity. Because of this excess, WPCO will have much less
9 ability to reduce its supply-costs over that 25 year period by acquiring lower cost supply-
10 side and demand-side resources that become available to it over that time.

11 Second, WPCO is not proposing to acquire the Mitchell Asset on the grounds that it
12 requires that specific resource to ensure the reliability of its electricity supply. Moreover,
13 acquisition of the Mitchell Asset was not the result of negotiations. According to Mt.
14 Patton’s testimony in the previous case, the price and terms of the acquisition were the
15 topic of “deliberations”⁴ which included whether the price was “fair” to other AEP
16 affiliates.⁵

17 Third, WPCO is proposing to acquire the Mitchell Asset on the grounds that it is the best
18 strategy for meeting the capacity and energy requirements of WPCO customers at
19 reasonable cost through 2040. Its position is based primarily on the Companies’
20 projections of WPCO’s future load and of future prices in PJM’s wholesale markets for
21 capacity and energy over the period 2015 to 2040. If WPCO’s projections prove to be
22 incorrectly high, WPCO will have locked its customers into paying for a high fixed cost
23 resource over that 25 year period.

³ Direct Testimony of Charles R. Patton, page 10, lines 17-18.

⁴ Appalachian Power Company, dba American Electric Power, 12-1655-P-C; Appalachian Power Company and Wheeling Power Company, both dba American Electric Power. 11-1775-E-PC, Tr. July 16, 2014 at 111 (Patton).

⁵ Id. at 60: “the idea of purchasing --- of them selling the asset to us at below net book value doesn’t appear to be very fair.” (Patton).

1 Fourth, WPCO does not need to acquire all of the capacity it may require for the next 25
2 years right now by acquiring this one resource. The Companies' have not thoroughly
3 evaluated the mix of resource strategies available under a range of possible future
4 scenarios of wholesale capacity prices and energy prices. A more flexible, and hence
5 preferable, strategy would be for WPCO to acquire a lesser quantity of Mitchell capacity,
6 for example 390 MW, and to acquire its remaining capacity and energy under a portfolio
7 of full-requirements power purchase agreements (PPAs) with staggered terms and pricing
8 tied to PJM market prices. That strategy is preferable because it would provide WPCO
9 the flexibility to take advantage of other resources in the future, would yield a similar
10 annual cost of electricity as the Mitchell Asset acquisition if the Companies' projections
11 prove correct but would yield a lower annual cost of electricity than the Mitchell Asset
12 acquisition if the Companies' projections of wholesale capacity and energy prices prove
13 to be incorrectly high. (My 2013 testimony, which examined capacity acquisition options
14 for a merged APCO/WPCO, recommended that APCO/WPCO not acquire Mitchell
15 capacity but instead diversify their capacity mix by acquiring capacity through purchases
16 new gas capacity).

17 If the Commission determines that it is reasonable for WPCO to acquire 780 MW of
18 capacity to replace the WPCO contract, a better strategy would be for WPCO to acquire
19 390 MW of Mitchell capacity and 390 MW of natural gas combined cycle ('NGCC')
20 capacity. That mix of coal-fired and gas-fired capacity is preferable because it would
21 yield a similar annual cost of electricity as the Mitchell Asset acquisition strategy if the
22 Companies' projections prove correct but would yield a lower annual cost of electricity
23 than the Mitchell Asset acquisition strategy if the Companies' projections of capacity and
24 energy prices prove to be incorrectly high.

25 **Q Please summarize your major conclusion and recommendation regarding the**
26 **proposed acquisition of the Mitchell asset.**

27 My major conclusion is that the proposed acquisition of 780 MW of Mitchell capacity
28 will not result in reasonable rates for WPCO ratepayers. WPCO could ensure reliable
29 service at reasonable rates through 2040 by acquiring 390 MW of Mitchell capacity and

1 acquiring its remaining capacity and energy under a portfolio of full-requirements
2 contracts with staggered terms and pricing tied to PJM market prices.

3 My major recommendation is that the Commission not approve acquisition of 780 MW
4 of Mitchell capacity. The Commission should require WPCO to limit its acquisition to
5 no more than 390 MW of Mitchell capacity and to acquire the remainder of its capacity
6 through a strategy that will result in a diversified portfolio of generation at a reasonable
7 cost to ratepayers under a range of possible future scenarios of capacity and energy
8 prices.

9
10 **III. WPCO PROPOSED ACQUISITION OF MITCHELL ASSET**

11 **Q What is the basis for the Companies' position that WPCO needs a new resource**
12 **strategy to meet its future capacity and energy requirements?**

13 **A** WPCo currently meets all its capacity and energy obligations through a full-requirements
14 contract (the "WPCO Contract") with its unregulated merchant power affiliate AEP
15 GenCo. AEPGenCo has the ability to terminate that contract with one year's notice. In
16 its December 13, 2013 Order in Case Nos. 12-1655-E-PC and 11-1775-E-P, at page 34,
17 the Commission stated that it did not consider the WPCO contract to be a long-term
18 source of capacity and energy and that it requires "...a longer-term, achievable, and
19 economic plan to serve the WPCO load before the merger is consummated".

20 **Q Are the Companies proposing that WPCO acquire the Mitchell Asset on the**
21 **grounds of reliability?**

22 **A** No. The Companies' are not proposing that WPCO acquire the Mitchell Asset on the
23 grounds that WPCO requires that specific resource to ensure the reliability of its
24 electricity. Instead WPCO is proposing to acquire the Mitchell Asset on the grounds that
25 it is the best strategy for meeting the capacity and energy requirements of WPCo
26 customers at reasonable cost through 2040.

1 Q Please compare the quantity of capacity WPCO proposes to acquire from the
2 Mitchell Asset to WPCO's projected capacity obligations.

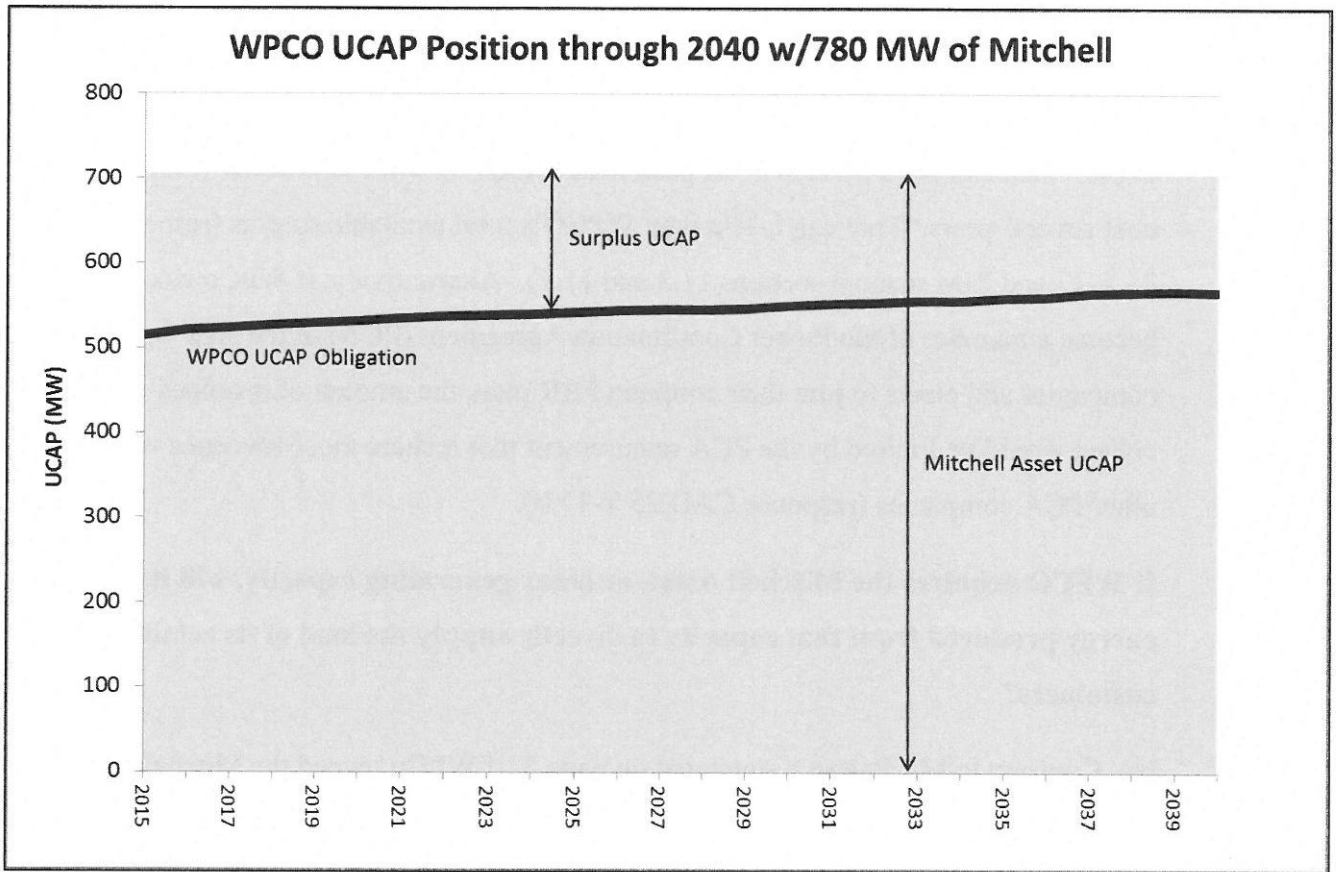
3 A WPCO's annual capacity obligation, as set by PJM, is expressed as MW of unforced
4 capacity ("UCAP"). The capacity of resources WPCO might use to meet that obligation
5 is also expressed as MW of UCAP. The UCAP of a resource is its installed capacity,
6 "ICAP" reduced by an adjustment for its down-time. For example, the Mitchell Asset has
7 an ICAP of 780 MW but a UCAP of 706 MW (Attachment 1, CAD 10 W-03).

8 Figure 1, from Exhibit ___ (JRH-2), compares the Mitchell Asset UCAP to WPCO's
9 projected capacity obligations through 2040. The projected WPCO capacity obligations
10 in each year equal the Companies' projection of WPCO peak load Mr. Torpey used in his
11 modeling multiplied by a PJM Diversity Factor of 96 percent and by a PJM Reliability
12 Requirement of approximately 109 percent (Attachment 1, CAD 10 W-03).⁶This
13 comparison indicates that, with its proposed acquisition, WPCO would have excess
14 UCAP capacity of 192 MW (44 percent more than its requirement) in 2015 and an excess
15 of 140 MW (25 percent more than its requirement) in 2040.

⁶ The projection of WPCO peak load Mr. Torpey used in his modeling is slightly different from the projection of peak load in Attachment 1 of CAD 10 W-03.

1

Figure 1



2

3 **Q Does the Companies' petition state that WPCO would benefit from that excess**
4 **capacity by receiving revenues from bidding it into the PJM wholesale capacity**
5 **market?**

6 **A** No. The Companies' petition does not discuss whether WPCO would bid that surplus
7 capacity into the PJM wholesale capacity market nor whether WPCO would receive all,
8 or only a portion of the revenues from bidding the surplus capacity into that market. In
9 his evaluation of acquiring the Mitchell Asset versus acquiring a NGCC, Mr. Torpey
10 does not assume revenues from bidding any surplus capacity into the PJM wholesale
11 market.

12 In responses to CAD data requests the Companies have indicated that the amount of
13 revenue that WPCO might receive from bidding its surplus capacity into that market may
14 be limited. If WPCO participates in PJM as a stand-alone company on a Fixed Resource

1 Requirement basis, the amount of revenues it could collect would be limited in two
2 respects. First, PJM requires a FRR entity to withhold an additional threshold quantity
3 equal to 3 percent of its peak load, when determining its quantity of excess capacity.
4 Second, PJM imposes a cap on the quantity of surplus capacity an FRR entity is allowed
5 to bid. That cap is 25 percent of its peak load, which for WPCO is about 128 MW for the
6 next several years. That cap is less than WPCO's total available surplus (response CAD
7 25 T-17 and PJM manual sections 11.3 and 11.7). Alternatively, if WPCo elects to
8 become a member of the *Power Coordination Agreement (PCA)* of the AEP operating
9 companies and elects to join their common FRR plan, the amount of revenues it could
10 collect would be limited by the PCA requirement that it share those revenues with the
11 other PCA companies (response CAD 25 T-17 b).

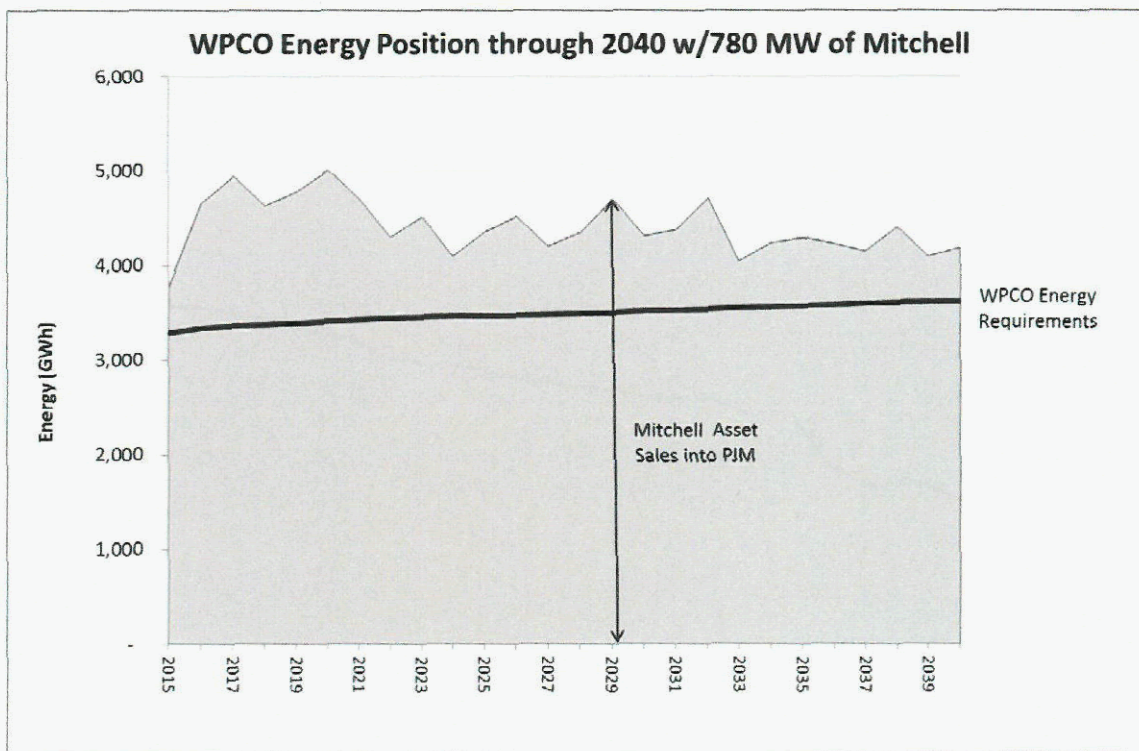
12 **Q If WPCO acquires the Mitchell Asset, or other generating capacity, will it use the**
13 **energy produced from that capacity to directly supply the load of its retail**
14 **customers?**

15 **A** No. Contrary to Mr. Patton's statement on page 5, if WPCo owned the Mitchell Asset or
16 any other generating capacity, it would not use the energy produced from that capacity to
17 directly supply its retail load. Instead, as Mr. Torpey notes on page 11 line 7, WPCo
18 would buy the energy it requires to supply its retail load from the PJM wholesale energy
19 market and would sell the energy from its generating units into the PJM wholesale energy
20 market. Thus, if WPCo does acquire generating resources it is not acquiring a long-term
21 physical supply of energy for its retail load, instead it must bid the energy from that
22 resource into the PJM energy market. Therefore, by acquiring the Mitchell Asset WPCo
23 is acquiring a long-term financial hedge to offset its cost of buying energy from the PJM
24 market.

1 **Q Please compare the quantity of annual energy the Companies project to produce**
2 **from the Mitchell Asset to WPCO’s projected annual energy purchases from the**
3 **PJM market.**

4 **A** Figure 2, from Exhibit__(JRH-2), compares the annual energy the Companies project
5 the Mitchell Asset will produce, and sell into the PJM energy market, to WPCO’s
6 projected annual energy purchases from that market. Both sets of projections are from
7 the Companies’ estimates.

8 **FIGURE 2**



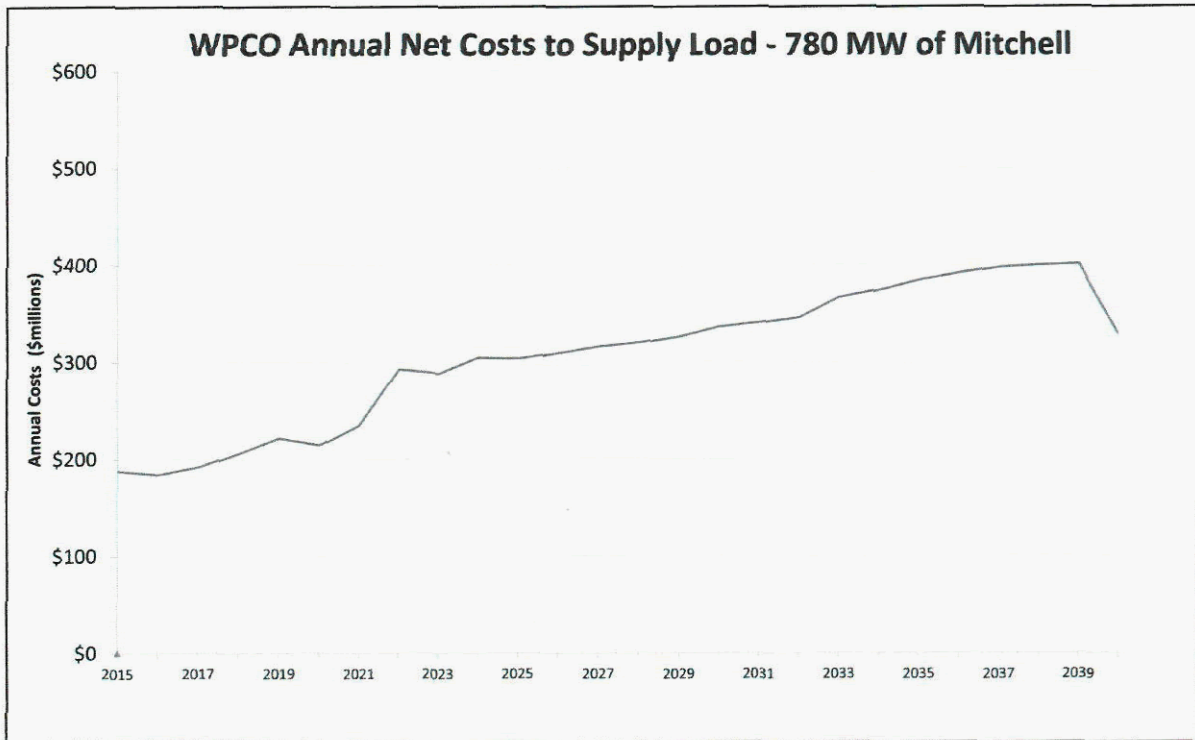
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10 **Q Please summarize the Companies’ projection of the annual net cost to ratepayers if**
11 **WPCO meets its capacity and energy requirements from the Mitchell Asset.**

12 **A** Figure 3, from Exhibit__(JRH-2), presents the Companies’ projection of the annual net
13 cost to ratepayers if WPCO meets its capacity and energy requirements from the Mitchell
14 Asset. This annual net cost equals WPCO’s projected cost of buying energy from the
15 PJM market to serve its retail load, plus the fixed costs of owning the Mitchell Asset, plus

1 the cost of producing energy from the Mitchell Asset, minus the projected revenues from
2 selling that production into the PJM energy market and minus the projected revenues
3 from the portion of its excess capacity it is allowed to sell into the PJM energy market as
4 an FRR entity . The Companies' projections of the cost of buying energy from the PJM
5 market, the cost of producing energy from the Mitchell Asset and the projected revenues
6 from selling Mitchell production into the PJM energy market are based on its own
7 forecast of the prices in the PJM energy market through 2040. Those projections are
8 driven primarily by its projections of natural gas prices and of carbon compliance costs.

9 **Figure 3**



10

11

1 **V. ASSESSMENT OF WPCO PROPOSED ACQUISITION OF MITCHELL ASSET**

2
3 **Financial Risk to ratepayers of Mitchell Asset acquisition**

4 **Q Will ratepayers bear the majority of the financial risk under any resource strategy**
5 **that WPCo ultimately implements?**

6 A Yes. Ratepayers bear the majority of the financial risk under any resource strategy the
7 Companies ultimately implement because their rates are based upon the revenue
8 requirements that result from that strategy. In particular they bear the risk of paying the
9 fixed costs of each new resource WPCo acquires because the Companies will recover
10 those fixed costs in base rates regardless of whether that resource ultimately proves to be
11 part of a least cost solution in the long-term.

12 **Q. What are the major sources of cost risk to ratepayers of WPCO's proposed**
13 **acquisition of the Mitchell Asset that the Companies have failed to consider?**

14 A. There are several sources of cost risk to ratepayers associated with WPCO's proposed
15 acquisition of the Mitchell Asset, none of which the Companies have considered in this
16 proceeding.

17 First, WPCO will not have the ability to reduce its capacity costs by taking advantage of
18 lower cost capacity resource options that may become available through 2040 because
19 the 780 MW of Mitchell Asset capacity exceeds its projected capacity requirements
20 through that year. For example, the Companies' position that acquiring the Mitchell
21 Asset is reasonable rests in part on its forecast that by 2018 market prices of capacity
22 will begin increasing dramatically relative to recent levels, and will continue to increase
23 through 2040. If that forecast is incorrectly high, acquiring the Mitchell Asset will
24 prevent the Companies from acquiring some capacity at lower costs through PPAs or
25 other sources over time.

1 Second, WPCO will earn less margins from its sale of Mitchell Asset energy than it is
2 expecting if the Companies' projections of energy market prices prove to be incorrectly
3 high. If so, the net energy costs it bills its ratepayers will be higher than it is projecting.

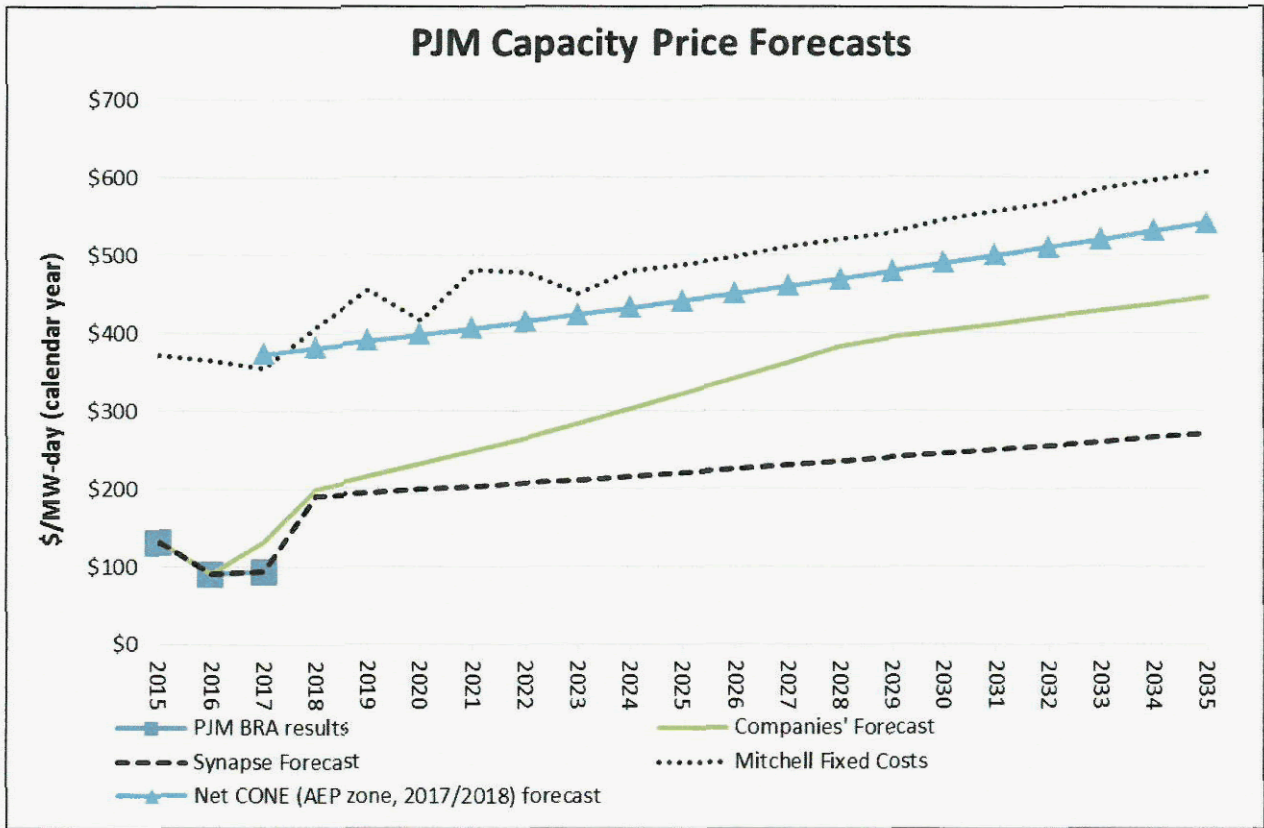
4 In summary, if WPCO's projections prove to be incorrect, WPCO will have locked its
5 customers into paying for a high fixed cost resource over that 25 year period.

6 **Q. Why might prices of capacity for other resources be lower than the Companies are**
7 **projecting?**

8 **A** Prices of capacity for resources other than the Mitchell Asset, such as PPAs, may be
9 lower than the Companies are projecting because it is reasonable to expect the capacity
10 prices of those resources will be tied to PJM capacity prices. As I stated in my Direct
11 Testimony in last year's proceeding, the Companies' long-term forecast of PJM capacity
12 prices from 2017 onward are substantially higher than either of the two projections that
13 FirstEnergy used in the analyses it presented in the Harrison acquisition case. In
14 addition, the Companies' projections are not consistent with the fact that PJM Capacity
15 market prices have averaged 50% of the net cost of new entry ("net CONE") over the
16 past eight Base Residual Auctions and with the analysis of market fundamentals driving
17 those prices which I presented in Exhibit ___ (JRH-14) to my testimony in last year's
18 proceeding

19 Figure 4, drawn from Exhibit ___ (JRH-3), presents the Companies' forecast from 2015
20 onward as a solid line, actual capacity prices set in in the Base Residual Auctions held for
21 years through 2017 as squares, and my projections of capacity prices as a dashed line. My
22 projection assumes capacity prices from June 2018 onward will average 50% of the net
23 cost of new entry ("net CONE") from the 2016/2017 BRA escalating at the Companies'
24 assumed rate of inflation.

Figure 4



2

3 Note that the effective cost of capacity that WPCO will be paying through the acquisition
 4 of the Mitchell Asset is higher than the Companies' projections of the wholesale market
 5 clearing price and about two times higher than my projections of the market clearing
 6 price.

7 **Q. Why might WPCO's annual margin from sales of Mitchell energy be lower than the**
 8 **Companies are projecting?**

9 A. WPCO's annual margin from sales of Mitchell energy may be lower than the Companies
 10 are projecting because its underlying projections of natural gas prices may be too high
 11 and its projection of underlying carbon compliance costs may be too low.

12 The Companies are justifying the acquisition of the Mitchell Asset in part on their
 13 projections that WPCo will earn a margin from selling the Mitchell Asset generation into
 14 the PJM energy market. However, the amount of margin WPCO will actually receive will

1 be less than it has forecast if the Companies' projections of energy market prices prove to
2 be incorrectly high and the Companies' projections of its carbon compliance costs prove
3 to be incorrectly low. The Companies developed those projections from their modeling
4 of one scenario of future regulatory and market conditions, drawn from their 2013 Long
5 Term Fundamentals (LTF) forecast. Witness Bletzacker explains the changes in
6 commodity prices from the forecast used in last year's proceeding.⁷

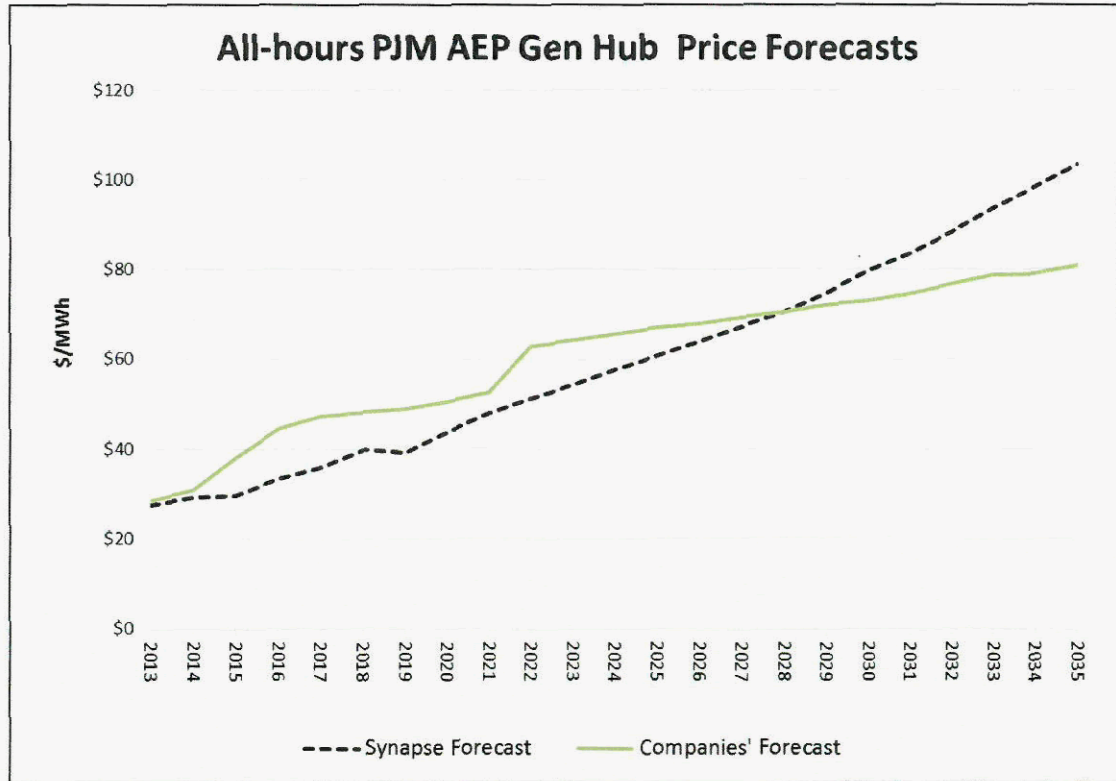
7 I have developed an alternative set of projections for a different scenario of future
8 regulatory and market conditions. Under my scenario future gas prices are lower than the
9 Companies' projections and future carbon compliance costs are higher. The natural gas
10 prices are based upon Energy Information Administration (EIA) Annual Energy Outlook
11 (AEO) 2014 Reference Case forecast of Henry Hub prices and the carbon prices are
12 drawn from a Synapse low carbon price forecast. I developed a projection of PJM energy
13 market prices for this scenario using those inputs and the coefficients for those inputs
14 implicit in the Companies' forecast of PJM energy prices. These projections are
15 presented on pages 2 to 4 of Exhibit __ (JRH-4).

16 As indicated in Figure 5, under my scenario, PJM energy prices would be less than the
17 Companies' projections through 2028, and its annual energy margins would be lower
18 accordingly.

⁷ Direct Testimony of , page 6, lines 12-20.

1

Figure 5



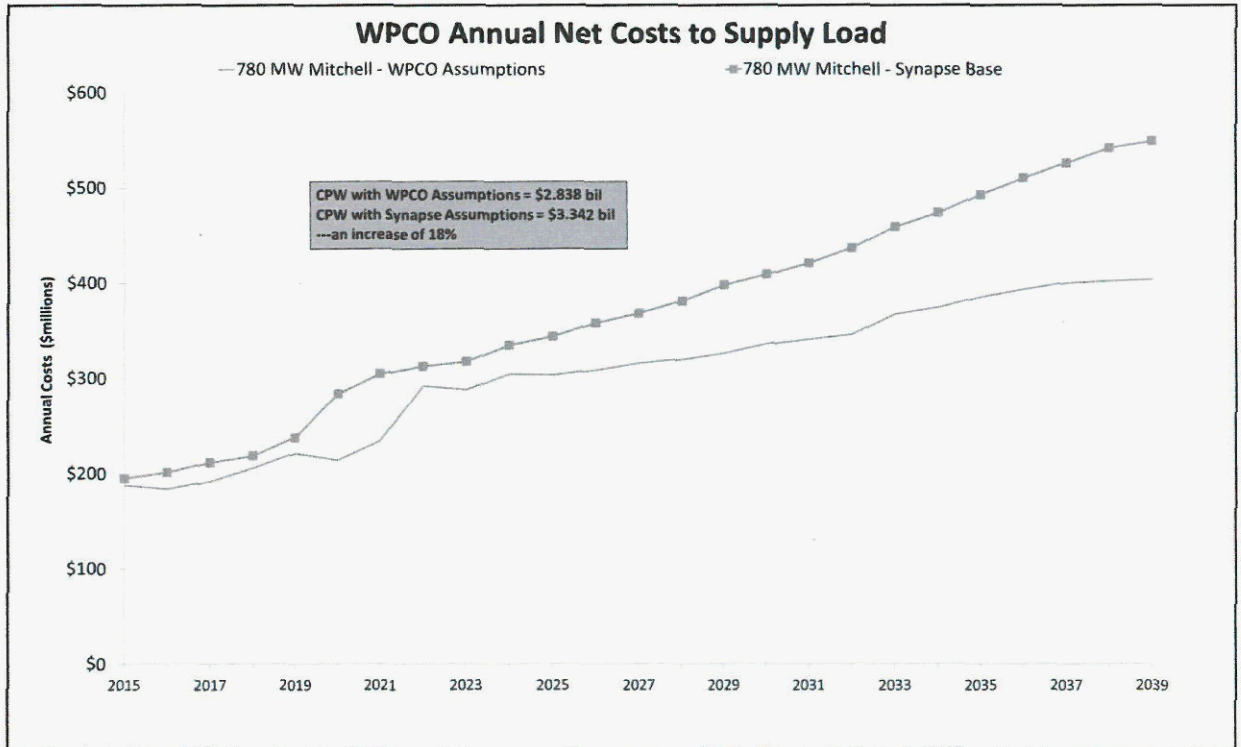
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3 **Q How would the annual cost to ratepayers from the Mitchell Asset change if PJM**
 4 **energy market prices prove to be lower than the Companies' are projecting, and**
 5 **carbon compliance costs prove to be higher?**

6 **A** The annual cost to ratepayers from the Mitchell Asset would be approximately 17 percent
 7 higher over the 2015 to 2040 period if energy market prices prove to be lower than the
 8 Companies' are projecting, and carbon compliance costs prove to be higher. The
 9 differences in supply cost year by year are plotted in Figure 6, from Exhibit __ (JRH-4).
 10 The differences in cumulative present worth (CPW) are presented in Exhibit __ (JRH-7).

1

Figure 6



2

3

4 **Resource Strategies other than Acquisition of Mitchell Asset**

5 **Q Please summarize the major categories of resource strategies the Commission**
6 **indicated that WPCO could use to develop a long-term economic plan to meet its**
7 **future capacity and energy requirements.**

8 **A** The Commission, in its December 13, 2013 Order at page 35, indicated that WPCO could
9 propose ownership of generating capacity, a unit contract or long-term full-requirements
10 contracts or some combination of those resource strategies.

11 **Q Have the Companies' presented evaluations of those various resource strategies in**
12 **their Updated Plan and testimony?**

13 **A** No. In this proceeding the Companies' witness Torpey evaluated two, "all or nothing"
14 resource strategies. Mr. Torpey evaluated a strategy of acquiring 706 MW of coal-fired

1 Mitchell UCAP capacity, although WPCO is projected to require only 566 MW of
2 UCAP capacity by 2040, and he evaluated a strategy of acquiring 706 MW of NGCC
3 UCAP capacity, also more than WPCO requires. The Companies' have evaluated those
4 two extreme strategies under one future scenario of market prices and regulatory
5 conditions.

6 **Q. What do you mean when you say that Mr. Torpey evaluated a strategy to acquire**
7 **more NGCC capacity than WPCo requires through 2040?**

8 A. Mr. Torpey explained at page 8 of his testimony that he evaluated the cost of constructing
9 780 MW of NGCC capacity. As I noted above, the 780 MW related to acquiring 50%
10 ownership of Mitchell is far in excess of WPCo's need for capacity through 2040. If
11 WPCo was building NGCC capacity, it is highly unlikely that it would size the plant in
12 excess of its needs over the next 25 years, and it is even more doubtful that this
13 Commission would approve such action.

14 **Q. Have the Companies' thoroughly evaluated the range of resource strategies**
15 **available to WPCO under a range of possible future scenarios of wholesale capacity**
16 **prices and energy prices.**

17 A No. In its December 13, 2013 Order the Commission states that it does not consider
18 strategies such as market purchases, increased energy efficiency or demand response to
19 be sufficient long-term resources. If one accepts that those options have been ruled out,
20 the fact remains that the Companies' have not evaluated the full range of resource
21 strategies that the Commission referred to in its December 2013 Order. In addition, it did
22 not evaluate those alternative resource strategies under a range of possible future
23 scenarios of wholesale capacity prices and energy prices.

24 **Q. What other resource strategies have you evaluated and under what other future**
25 **scenarios?**

26 A I have evaluated two other resource strategies. The first alternative is a more flexible
27 strategy under which WPCO acquires a lesser quantity of Mitchell capacity, for example
28 390 MW Mitchell, plus a portfolio of full-requirements contracts (PPAs) with staggered

1 terms and with pricing tied to PJM market prices. The second alternative is a strategy
2 under which WPCO would acquire 390 MW of Mitchell capacity and 390 MW of NGCC
3 capacity.

4 I have evaluated those alternatives under the Companies' future scenario and under a
5 future scenario with lower PJM capacity prices, lower PJM energy market prices and
6 higher carbon compliance costs.

7
8 **Alternative resource strategy - 390 MW Mitchell plus PPAs**

9 **Q What are the advantages to WPCO of acquiring 390 MW of Mitchell plus PPAs?**

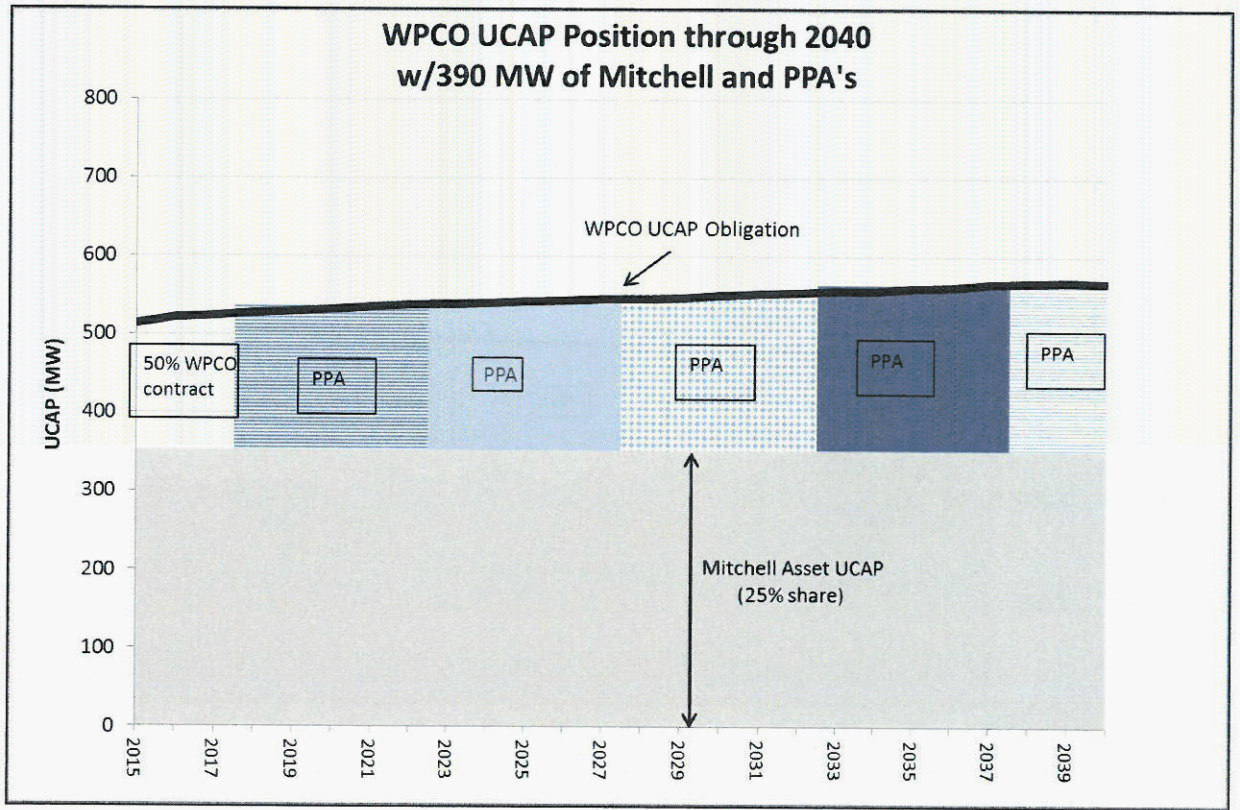
10 A. This strategy offers WPCo several advantages. By acquiring 390 MW of Mitchell
11 capacity and acquiring its remaining capacity and energy from PPAs, WPCO would have
12 the flexibility to take advantage of other resources in the future. Second, that strategy
13 would yield a similar annual cost of electricity as the Mitchell Asset acquisition strategy
14 under the Companies' projections of capacity and energy market prices. Third, that
15 strategy would yield a lower annual cost of electricity than the Mitchell Asset acquisition
16 strategy if the Companies' projections of capacity and energy prices prove to be
17 incorrectly high. Finally, ratepayers would not be required to pay for more capacity than
18 required to meet their needs over the next 25 years.

19 **Q Please compare the capacity from this strategy to WPCO's capacity requirements.**

20 A Figure 7, from Exhibit ___(JRH-5), indicates how WPCO could meet its capacity
21 obligations through 2040 using 390 MW from Mitchell and a series of PPAs. Under this
22 approach it would not be holding, and paying the fixed cost of, surplus capacity

1

Figure 7



2

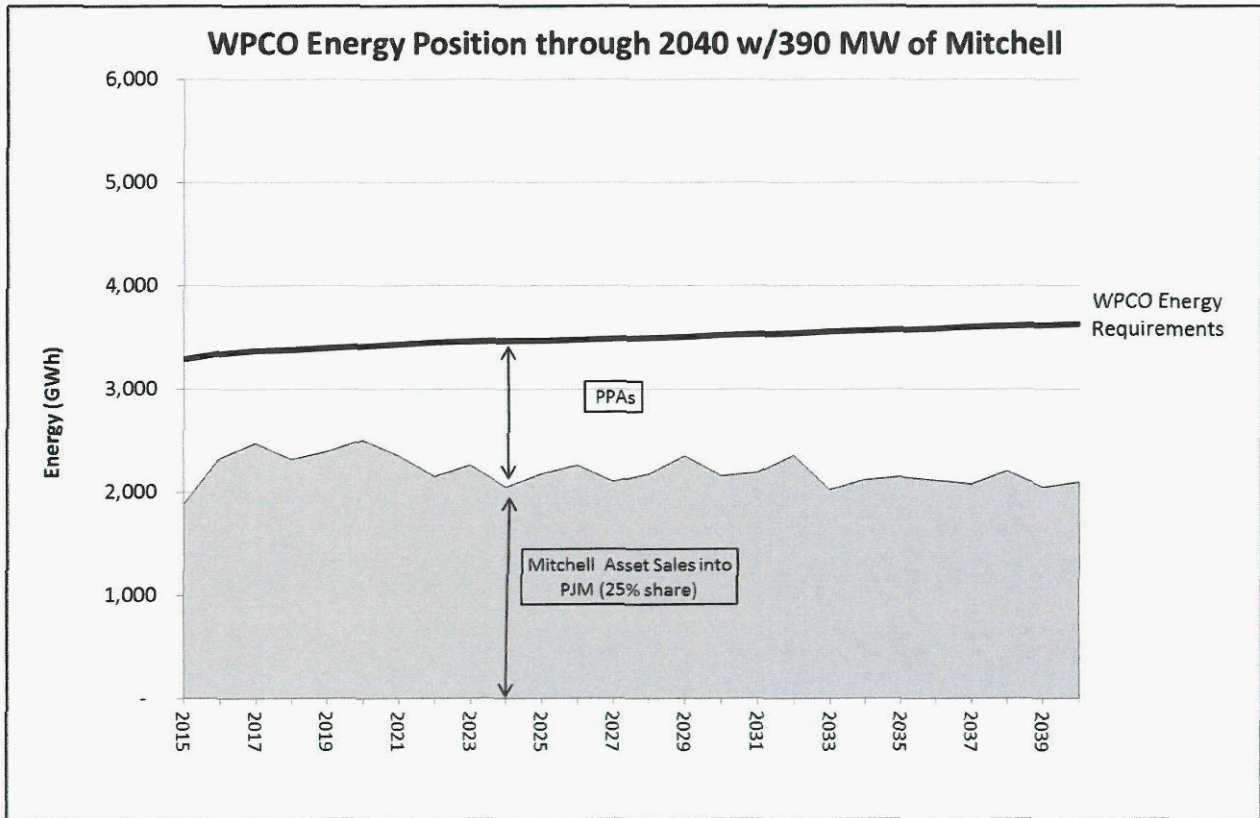
3 **Q Please compare the energy from this strategy to WPCO's energy requirements**

4 **A** Figure 8, from Exhibit __ (JRH-5), indicates how WPCO could hedge its energy
5 purchases through 2040 using 390 MW from Mitchell and a series of PPAs.

6

1

Figure 8

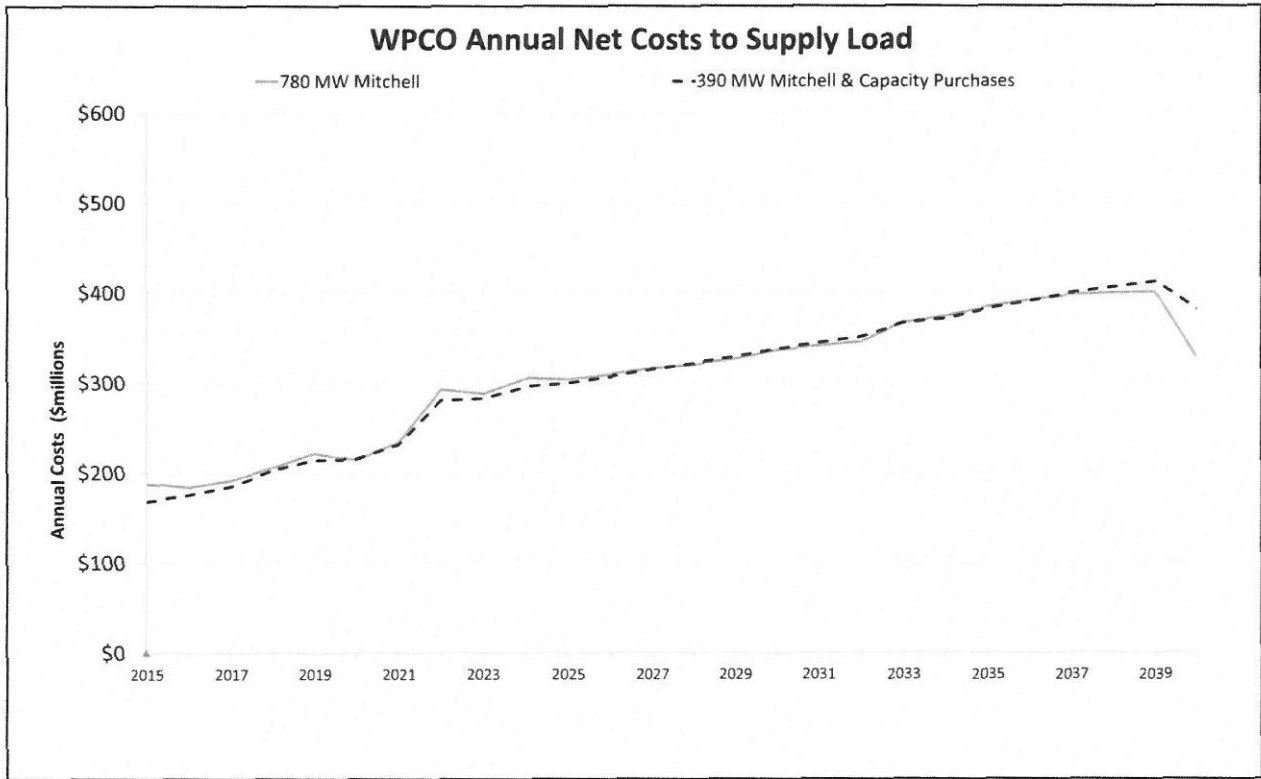


2

3 **Q Please summarize your projection of the annual cost to ratepayers under this**
4 **strategy, assuming the Companies future scenario projections are correct.**

5 **A** Under the Companies' future scenario of commodity prices, Figure 9 from
6 Exhibit__ (JRH-5) indicates that WPCO's annual cost of energy under a strategy of
7 acquiring 390 MW from Mitchell and a series of PPAs would be essentially the same as
8 under its proposed acquisition of the Mitchell Asset. However, this strategy is preferable
9 to acquisition of the Mitchell Asset for two main reasons. First, it would provide WPCO
10 the flexibility to take advantage of other resources in the future. Second, as I discuss
11 below, it would yield a lower annual cost of electricity than the Mitchell Asset
12 acquisition if the Companies' projections of wholesale capacity and energy prices prove
13 to be incorrectly high.

Figure 9



2

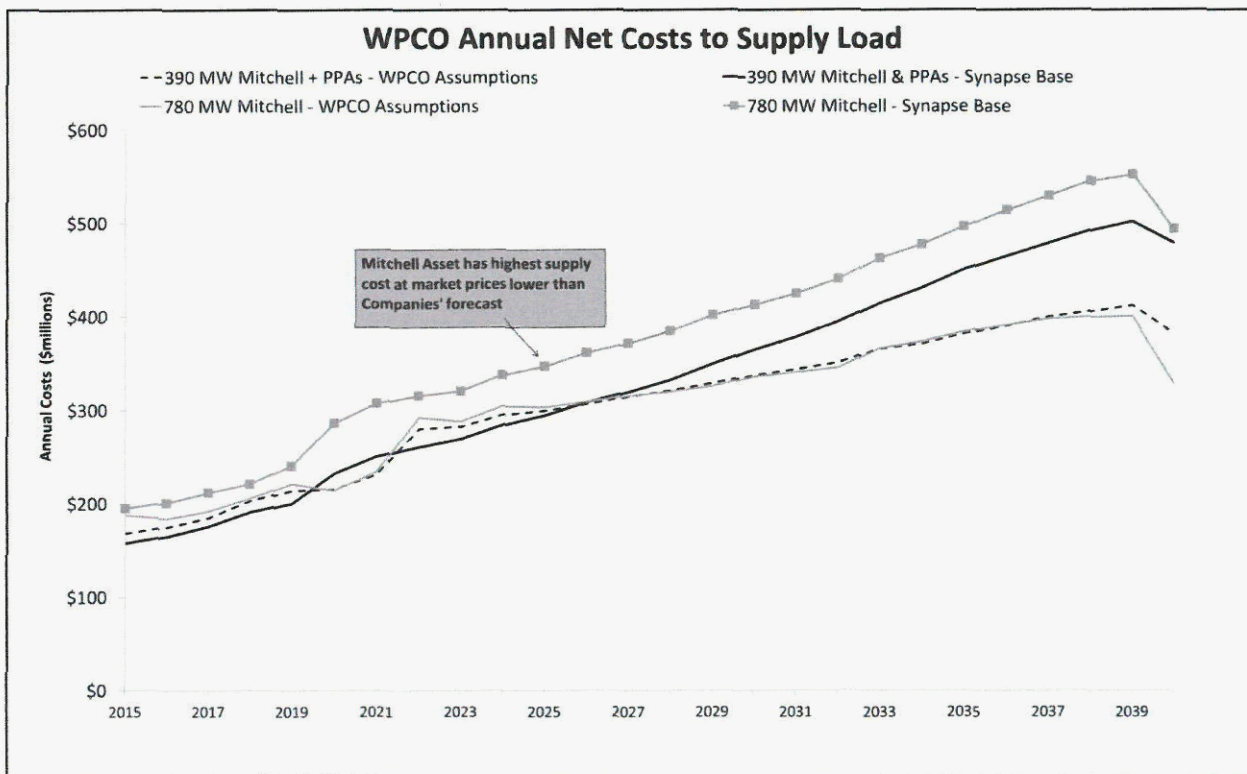
3 **Q How would the annual cost to ratepayers change under this strategy if PJM energy**
 4 **market prices prove to be lower than the Companies’ are projecting, and carbon**
 5 **compliance costs prove to be higher?**

6 **A** Figure 10 indicates that the annual cost to ratepayers under this strategy would be
 7 essentially the same through 2030 under both the Companies’ projections of future
 8 market conditions and under a future scenario with lower energy market prices and
 9 higher carbon costs⁸. After 2030 under the lower energy market price / higher carbon
 10 cost scenario the cost to ratepayers would be higher, but still less than the costs under the
 11 Mitchell Asset strategy.

⁸ Page 4 of Exhibit ___(JRH) plots the projections of carbon prices underlying the Companies and my projections of future energy prices.

1

Figure 10



2

3

4 **Alternative resource strategy - 390 MW Mitchell plus 390 MW NGCC**

5

6 **Q What are the advantages to WPCO of acquiring 390 MW of Mitchell plus 390 MW**
7 **of NGCC.**

8

9

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14

A. As I have previously noted, WPCO does not need to acquire 780 MW of capacity in order to meet the needs of its customers over the next 25 years. However, if it is determined that WPCO should acquire 780 MW of capacity, a strategy of acquiring 390 MW of Mitchell capacity and 390 MW of NGCC capacity has several advantages over the Mitchell Asset. This Mitchell/NGCC mix strategy yields a similar annual cost of electricity as the Mitchell Asset acquisition strategy if the Companies' projections prove correct. However, this Mitchell/NGCC mix strategy yields a lower annual cost of

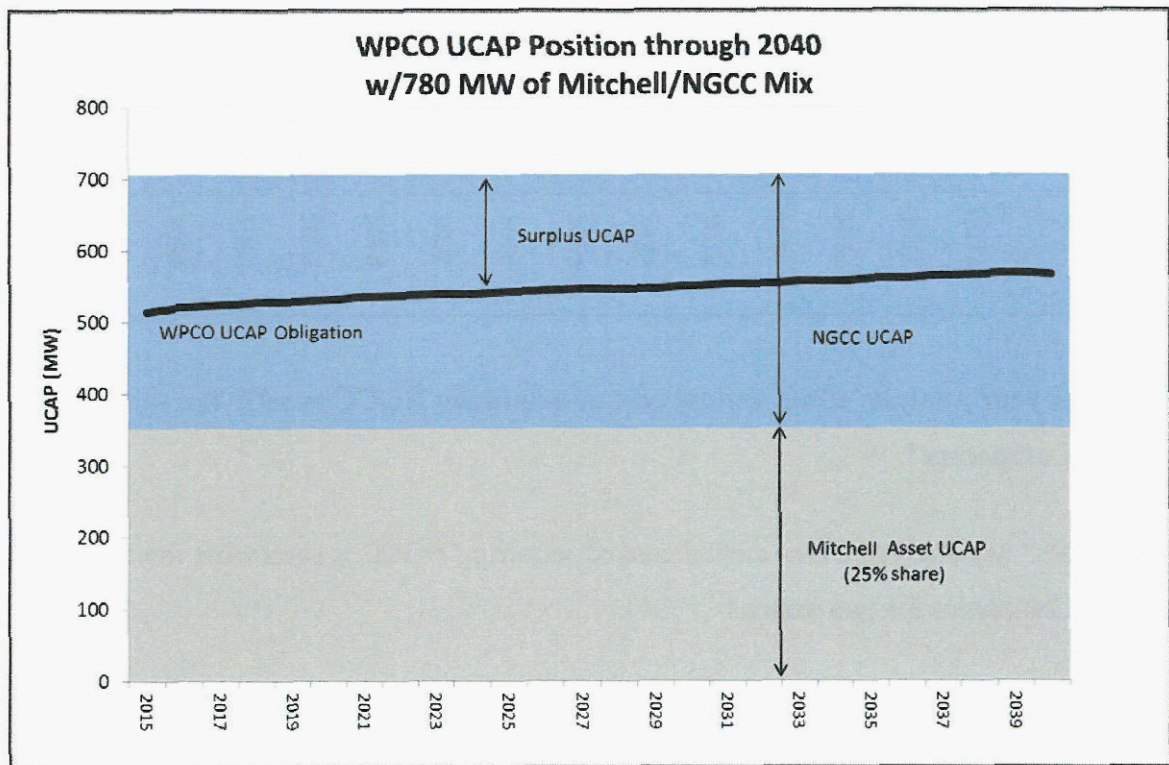
1 electricity than the Mitchell Asset acquisition strategy if the Companies' projections of
2 capacity and energy prices prove to be incorrectly high.

3 **Q Please compare the capacity from this strategy to WPCO's capacity requirements.**

4 A Figure 11, from Exhibit___(JRH-6), indicates how WPCO could meet its capacity
5 obligations through 2040 using 390 MW from Mitchell and 390 MW of NGCC. This
6 approach is similar to the Mitchell Asset acquisition strategy in that WPCo ratepayers
7 would still be paying the fixed cost of surplus capacity. However it is a more diverse mix
8 of surplus capacity.

9

Figure 11



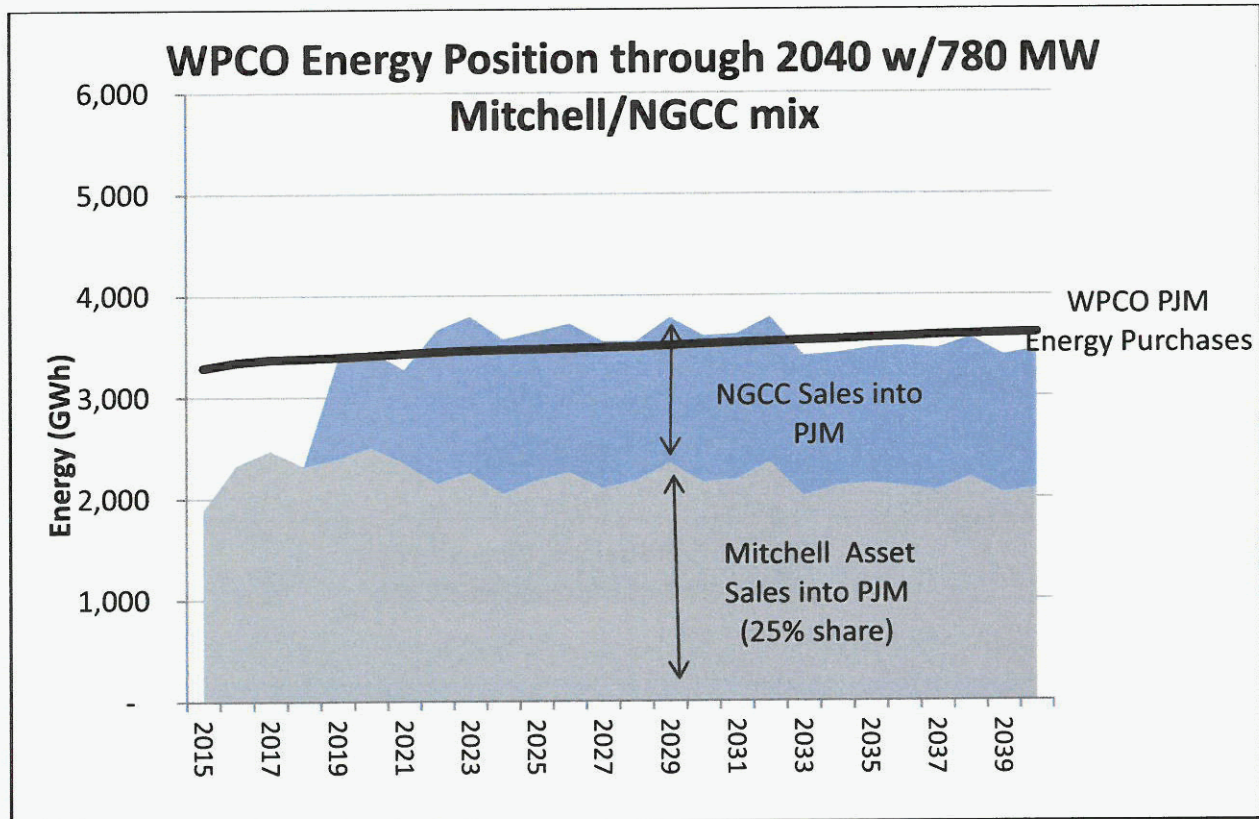
10 A

11 **Q Please compare the energy from this strategy to WPCO's energy requirements**

12 A Figure 12, from Exhibit___(JRH-6), indicates how WPCO could hedge its energy
13 purchases through 2040 using 390 MW from Mitchell and 390 MW of NGCC they would
14 acquire in 2018.

1

Figure 12



2

3 **Q** Is your analysis of the annual cost of acquiring NGCC exactly the same as the
 4 **Companies?**

5 **A** No. My analysis of the annual cost of acquiring NGCC is somewhat lower than the
 6 **Companies** for two reasons.

7 First, my analysis is based on a lower capital cost for a new NGCC. the Companies
 8 assume the capital cost of \$1590/kW, with financing. This assumption is substantially –
 9 33% - higher than the most recent estimate for PJM by Brattle Group and Sargent &
 10 Lundy of \$1193/kW, with financing. My analysis is based on their capital cost of
 11 \$1193/kW.

12

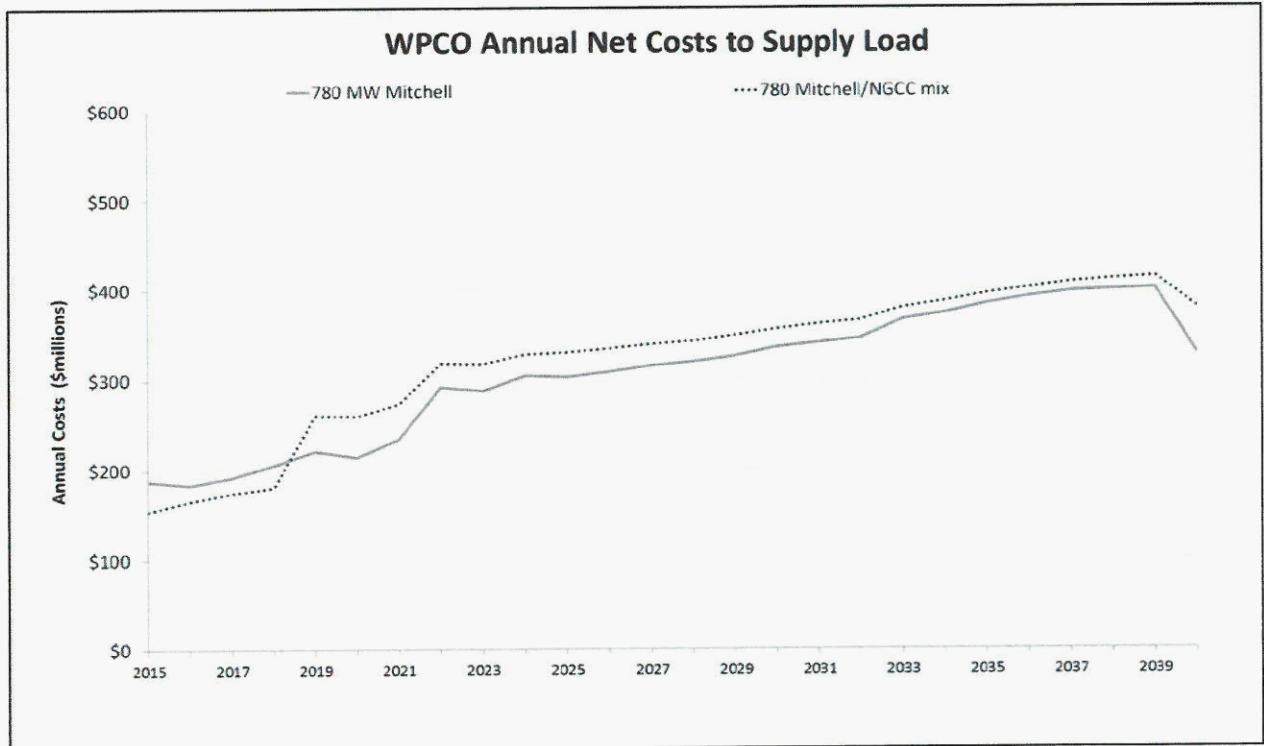
1 Second, my analysis excludes “end effects” costs the Companies assumed for the capital
2 recovery of the new NGCC from 2041 through 2048. End effects represent costs that the
3 Companies would incur after the end of their analysis period, i.e., from 2041 through
4 2048. In their analysis the Companies’ included the recovery of capital costs of the new
5 NGCC from 2019 through 2048 since the plant operates for 30 years. However, the
6 Mitchell plant is assumed to retire in 2040 and, if that were to occur, would need to be
7 replaced with another resource (such as a new NGCC) in 2041. To make the analyses of
8 acquiring Mitchell and a new NGCC, the Companies’ analysis should include the capital
9 cost of the capacity WPCO would have to acquire to replace Mitchell in 2040. However,
10 Mr. Torpey does not include those post-2040 capital costs in his analyses. As a result his
11 analysis does not provide an accurate, “apples to apples” comparison.

12 **Q Please summarize your projection of the annual cost to ratepayers under this**
13 **Mitchell/NGCC mix strategy, assuming the Companies future scenario projections**
14 **are correct.**

15 **A** Under the Companies’ future scenario of commodity prices, Figure 13 from
16 Exhibit___(JRH-6), indicates that WPCO’s annual cost of energy under a strategy of
17 acquiring 390 MW from Mitchell and 390 MW of NGCC would be somewhat lower than
18 its proposed acquisition of 780 MW of the Mitchell Asset – and when Mitchell retires in
19 2040, WPCO would still have a viable 390 MW of NGCC generation.

1

Figure 13



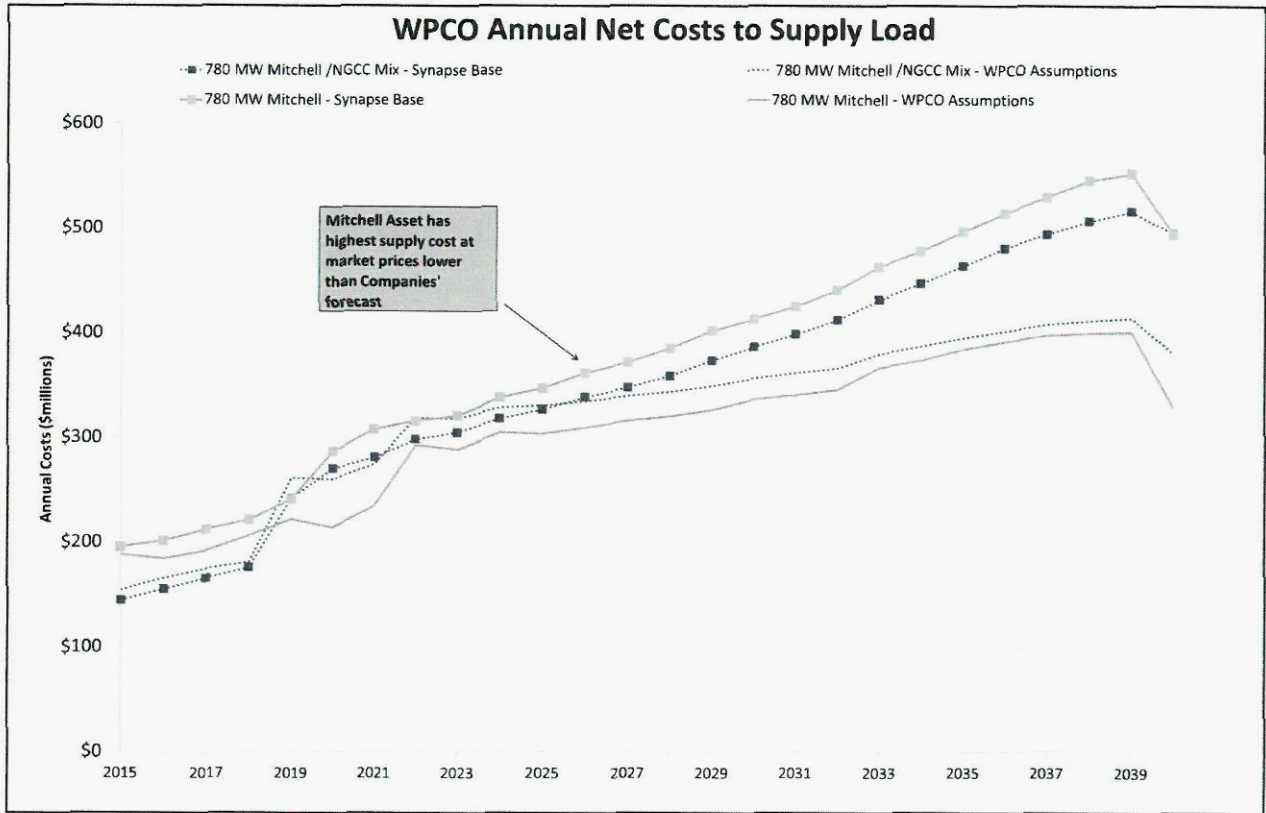
2

3 **Q How would the annual cost to ratepayers change under this mix strategy if PJM**
4 **energy market prices prove to be lower than the Companies' are projecting, and**
5 **carbon compliance costs prove to be higher?**

6 **A** Figure 14 indicates that the annual cost to ratepayers under this strategy would be higher
7 through 2030 under the Companies' projections, but lower under the lower energy market
8 price / higher carbon cost scenario.

1

Figure 14



2

3

4 **Cumulative Present Worth of Proposed and Alternative Resource Strategies**

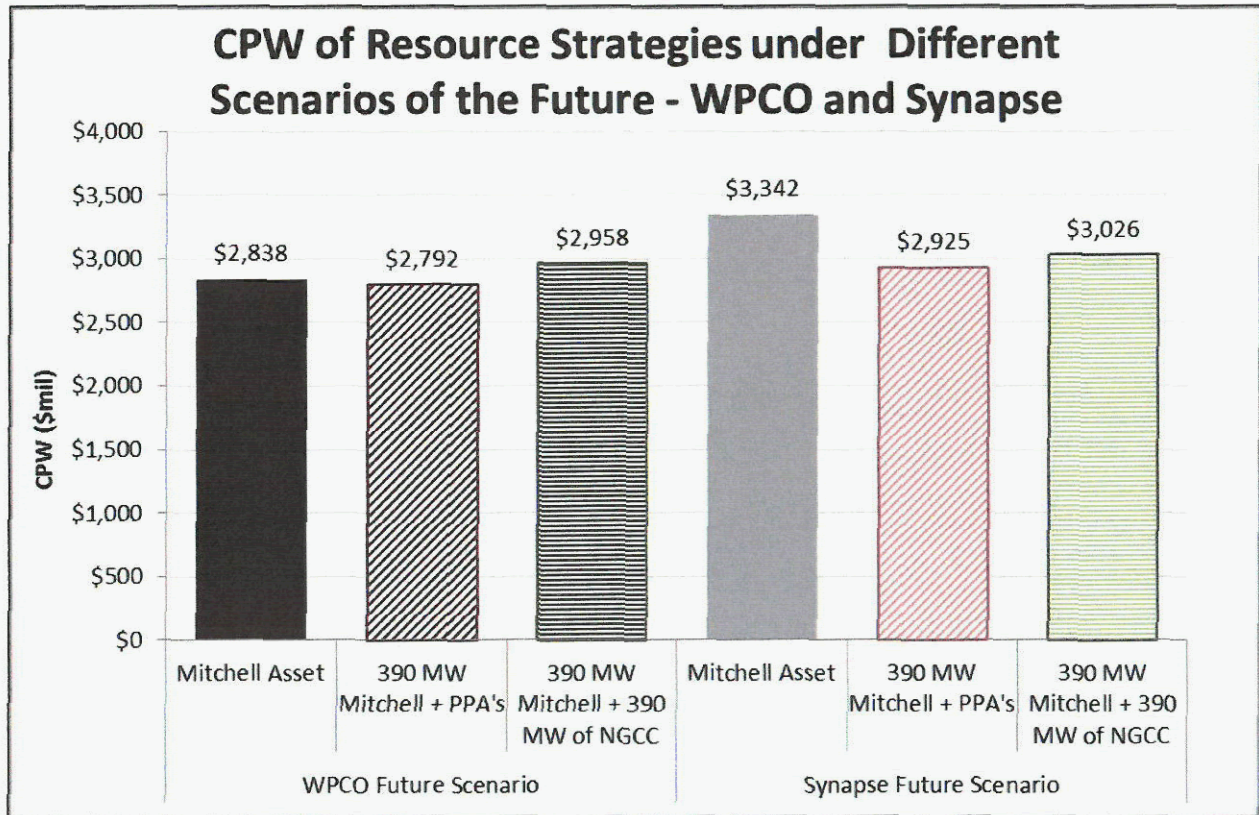
5 **Q Please compare the results of the Companies' economic analysis of acquiring the**
6 **Mitchell Asset to the results of your economic analysis of two alternative resource**
7 **strategies under the market projections of the Companies and of Synapse.**

8 **A** Figure 15, drawn from Exhibit___(JRH-7), presents the revenue requirement CPW
9 results of the Companies' economic analysis of acquiring the Mitchell Asset and my
10 economic analysis of two alternative resource strategies under the market projections of
11 the Companies' and under my alternative scenario.

12 This Figure indicates that the two alternative strategies are more robust than acquiring the
13 Mitchell Asset. Those two alternative strategies perform better than the Mitchell Asset
14 when you consider more than one future scenario. They are less costly under a future

1 scenario with energy market prices lower than the Companies' projections and carbon
2 compliance costs higher.

3 **Figure 15**



4
5 **Q. What are the implications of your economic analyses of alternative resource**
6 **strategies for WPCo?**

7 The Companies are requesting approval for the acquisition of Mitchell on the grounds
8 that it is the least-cost solution according to the results of its economic analyses.
9 However, the Companies' projections for key inputs such as costs of new resource
10 alternatives, natural gas prices, PJM wholesale energy market prices and regulation of
11 carbon emissions are all subject to considerable uncertainty through 2040. That
12 uncertainty increases the further one projects into the future. In the face of that
13 uncertainty, my analysis indicates that WPCo has at least two preferable resource

1 strategies to acquiring the Mitchell Asset – acquire 390 MW of Mitchell plus PPAs or
2 acquire 390 MW of Mitchell and 390 MW of NGCC.

3 **Q. What is the key advantage of the two alternative strategies you have analyzed?**

4 A The key advantage of these two alternative strategies is that they provide WPCo
5 ratepayers greater protection from future cost risks and uncertainty for carbon costs, other
6 environmental compliance costs, and lower fixed cost risk than procurement of the
7 Mitchell Asset. Those risks are real and will result in additional costs to ratepayers.

8 It is not reasonable for the Companies to choose an alternative to meet their projected
9 requirements through 2040 if that alternative leaves them with little or no flexibility to
10 take advantage of new resource options that will inevitably become available between
11 2015 and 2040. An alternative with some flexibility is preferable to a strategy that locks-
12 in a large investment for surplus capacity through 2040.

13 In particular, procuring a smaller portion of Mitchell and entering a series of PPAs will
14 give WPCo the option of pursuing other alternatives in the future and possibly a clearer
15 view of movement in commodity prices. The Companies should have ample time to issue
16 a RFP for PPAs since AEPGenCo should be willing to continue the WPCo contract
17 through May 2018.

18 **Q Does this complete your Direct Testimony?**

19 A Yes.

List of Exhibits

- Exhibit (JRH-1) Resume of James Richard Hornby
- Exhibit __ (JRH-2) WPCO proposal – Acquire 780 MW of Mitchell, Participate in PJM as FRR entity
- Exhibit __ (JRH-3) Sources of Uncertainty affecting Projections of Annual Average Cost of Supplying WPCo
- Exhibit __ (JRH-4) Annual Average Cost of Supplying WPCo with Mitchell Asset – Companies’ forecast and lower market price projections
- Exhibit __ (JRH-5) Alternative strategy 1 – Acquire 390 MW of Mitchell and Enter Power Purchase Agreements
- Exhibit __ (JRH-6) Alternative strategy 2 – Acquire 390 MW of Mitchell plus 390 MW of NGCC
- Exhibit __ (JRH-6) Cumulative Present Worth of Supply Costs under alternative Strategies - Companies’ forecast and lower market price projections
- Exhibit __ (JRH-8) Responses to Selected Data Requests

James Richard Hornby, Senior Consultant

PROFESSIONAL EXPERIENCE

Synapse Energy Economics, Inc., Cambridge, MA. *Senior Consultant*, 2006 – present.

Provides analysis and expert testimony regarding planning, market structure, ratemaking and supply contracting issues in the electricity and natural gas industries. Planning cases include evaluation of resource options for meeting tighter air emission standards (e.g. retrofit vs. retire coal units) in Kentucky, West Virginia and U.S. Midwest as well as development of long-term projections of avoided costs of electricity and natural gas in New England. Ratemaking cases include electric utility load retention rate in NS, various gas utility rate cases and evaluation of proposals for advanced metering infrastructure (smart grid or AMI) and dynamic pricing in MD, PA, NJ, AR, ME, NV, DC and IL.

Charles River Associates (formerly Tabors Caramanis & Associates), Cambridge, MA. *Principal*, 2004 – 2006, *Senior Consultant*, 1998 – 2004.

Expert testimony and litigation support in energy contract price arbitration proceedings and various ratemaking proceedings. Productivity improvement project for electric distribution companies in Abu Dhabi. Analyzed market structure and contracting issues in wholesale electricity markets.

Tellus Institute, Boston, MA. *Vice President and Director of Energy Group*, 1997 – 1998. *Manager of Natural Gas Program*, 1986 – 1997.

Presented expert testimony on rates for unbundled retail services, analyzed the options for purchasing electricity and gas in deregulated markets, prepared testimony and reports on a range of gas industry issues including market structure, strategic planning, market analyses, and supply planning.

Nova Scotia Department of Mines and Energy, Halifax, Canada.

Member, Canada-Nova Scotia Offshore Oil and Gas Board, 1983–1986.

Assistant Deputy Minister of Energy, 1983–1986.

Director of Energy Resources, 1982-1983.

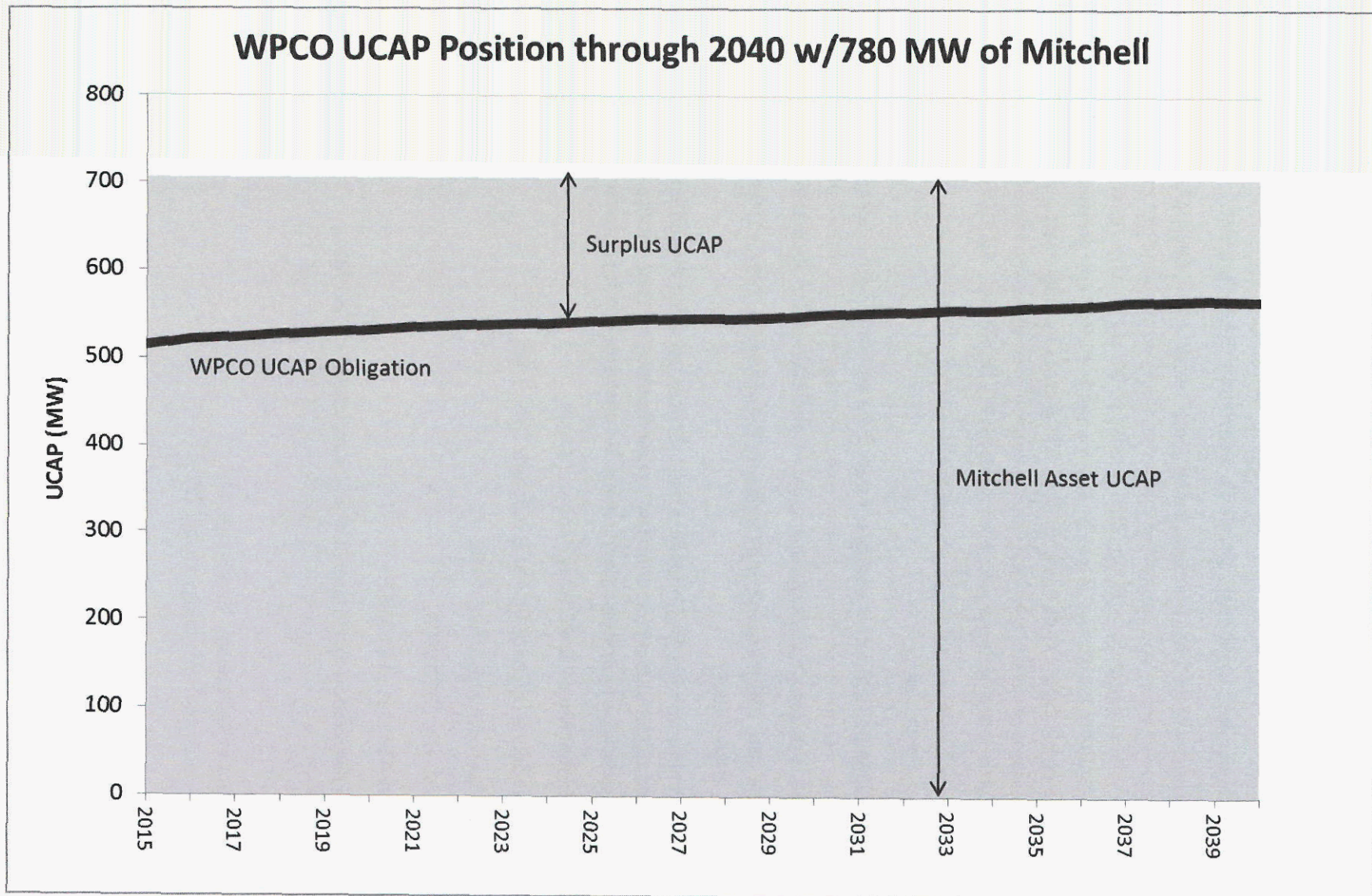
Assistant to the Deputy Minister, 1981-1982.

Nova Scotia Research Foundation, Dartmouth, Canada. *Consultant*, 1978–1981.

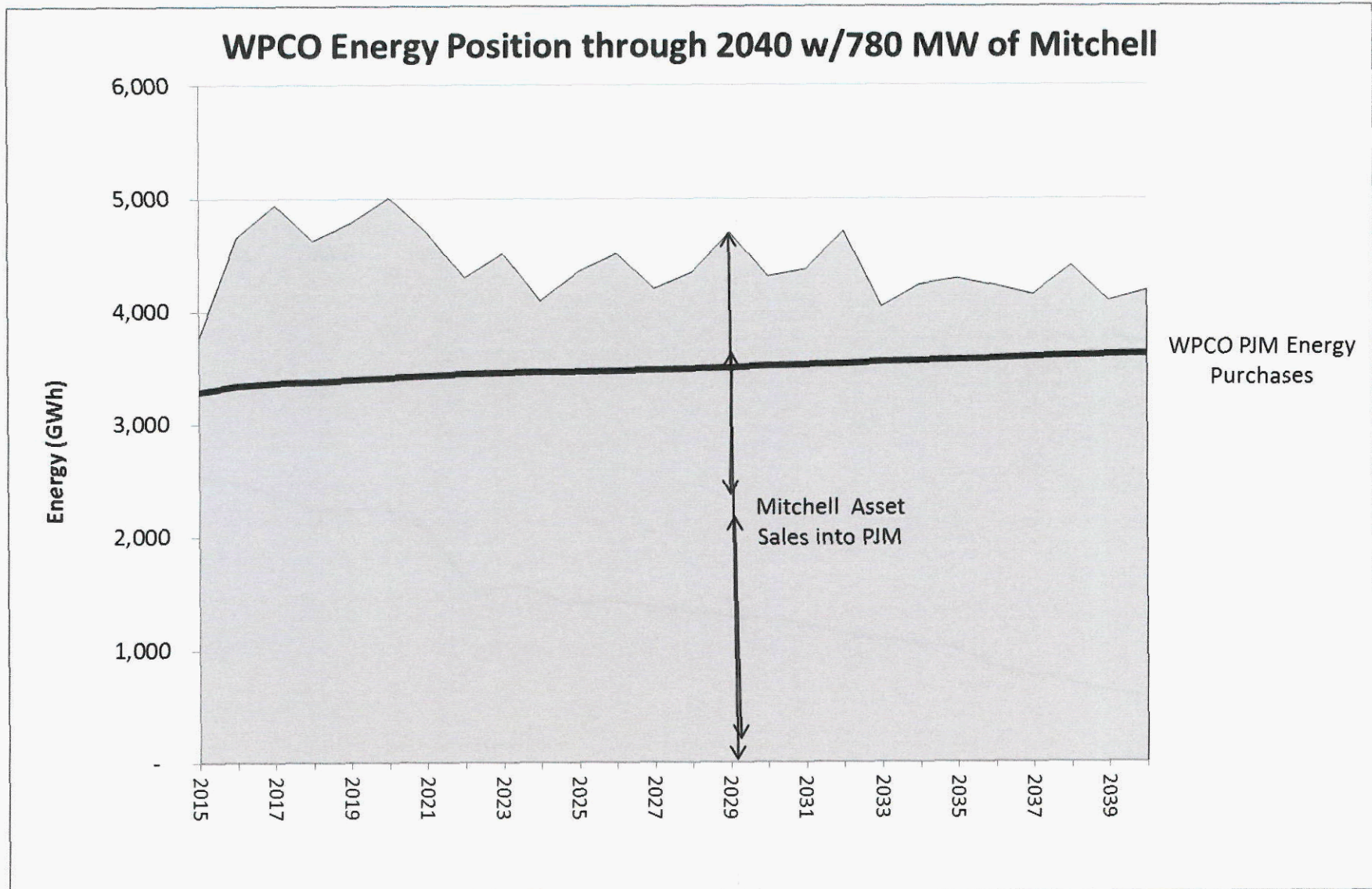
EDUCATION

Massachusetts Institute of Technology, Cambridge, MA
Master of Science in Energy and Technology Policy, 1979

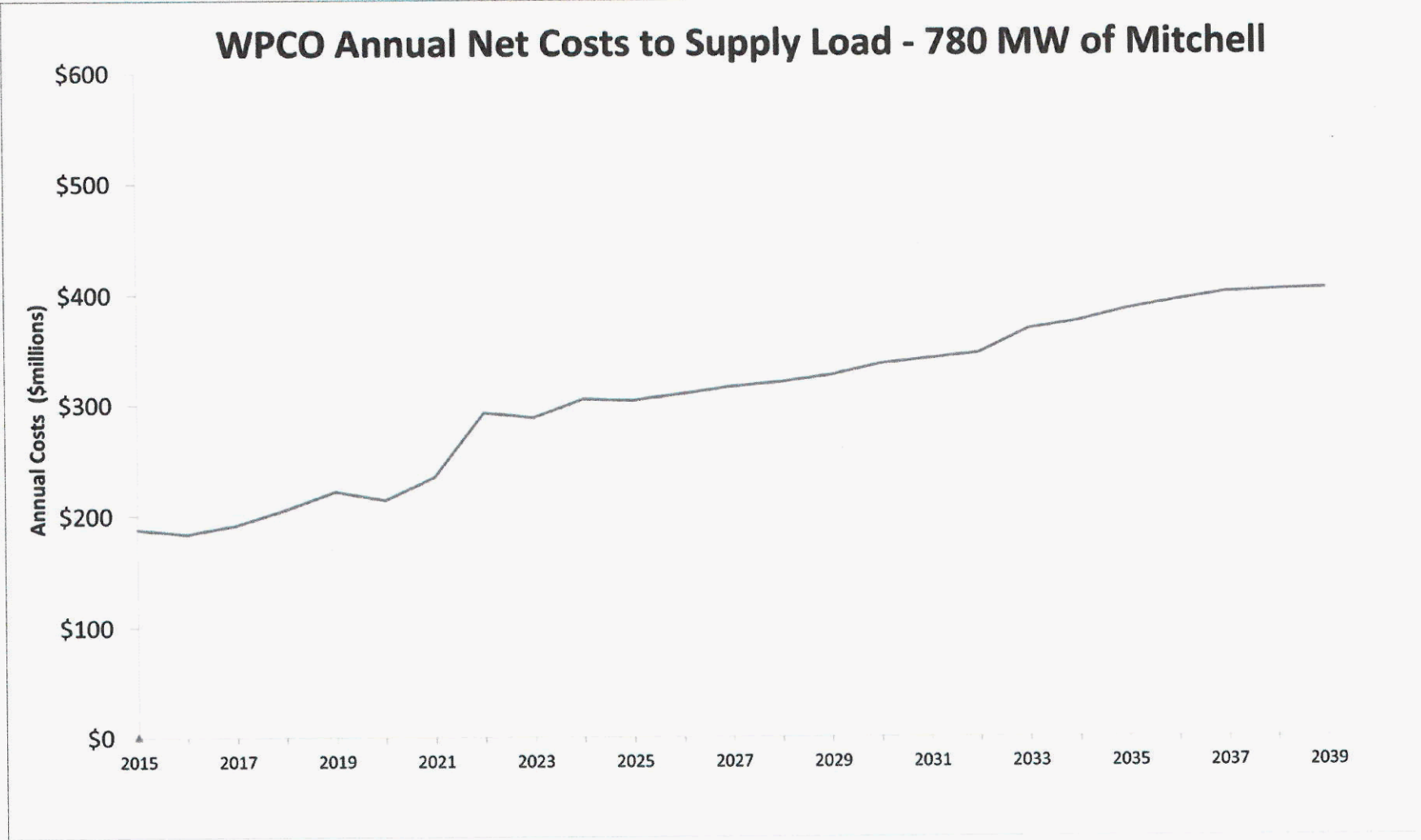
Dalhousie University, Nova Scotia, Canada
Bachelor of Engineering, Industrial Engineering, 1973. Distinction.



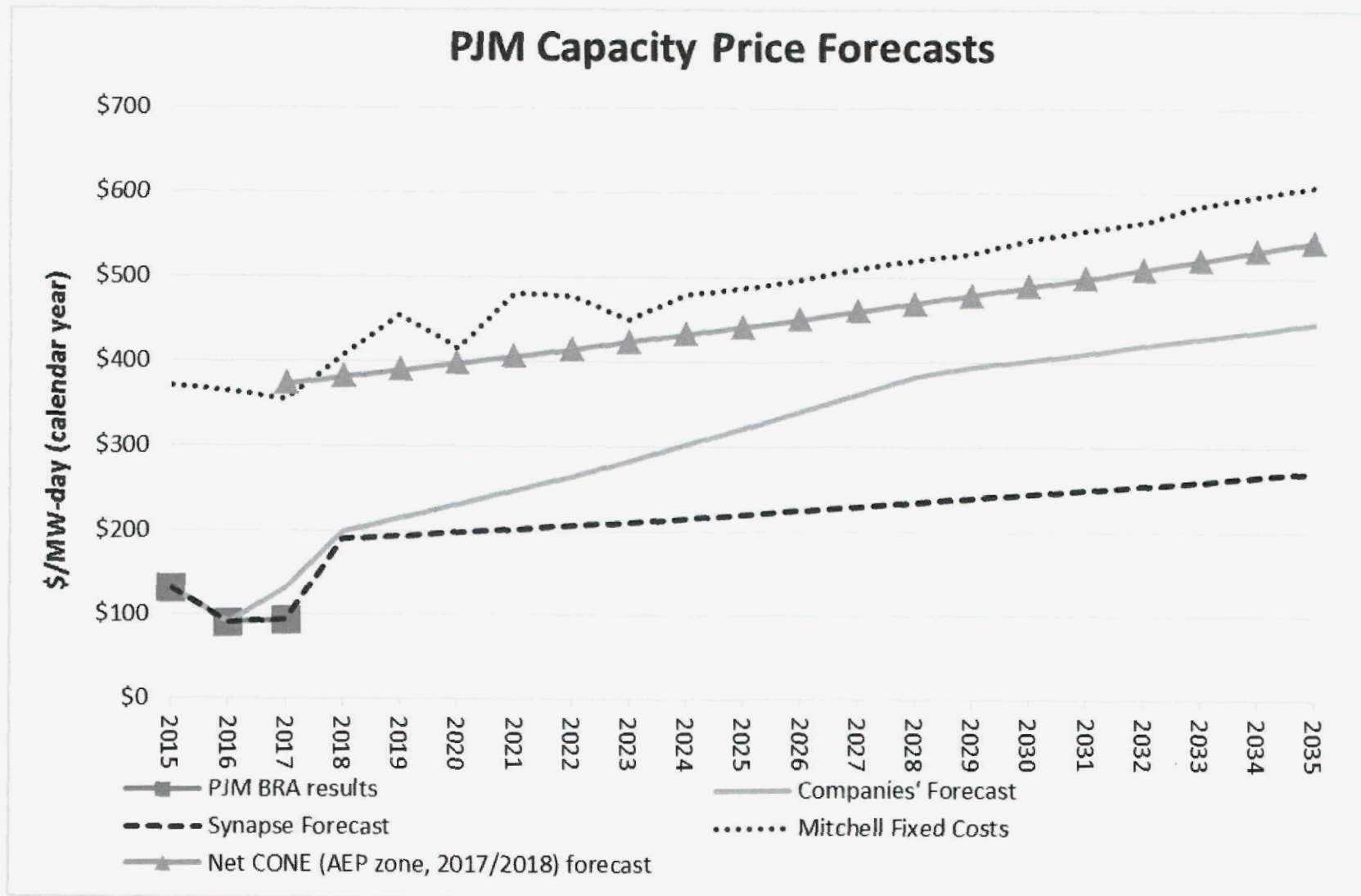
Source: Data Responses WVCAD A-087 Attachments 2 and 3; WVCAD W-03, p.2 and W-05, p.1; WVCAG 1- 7 Attachment 1



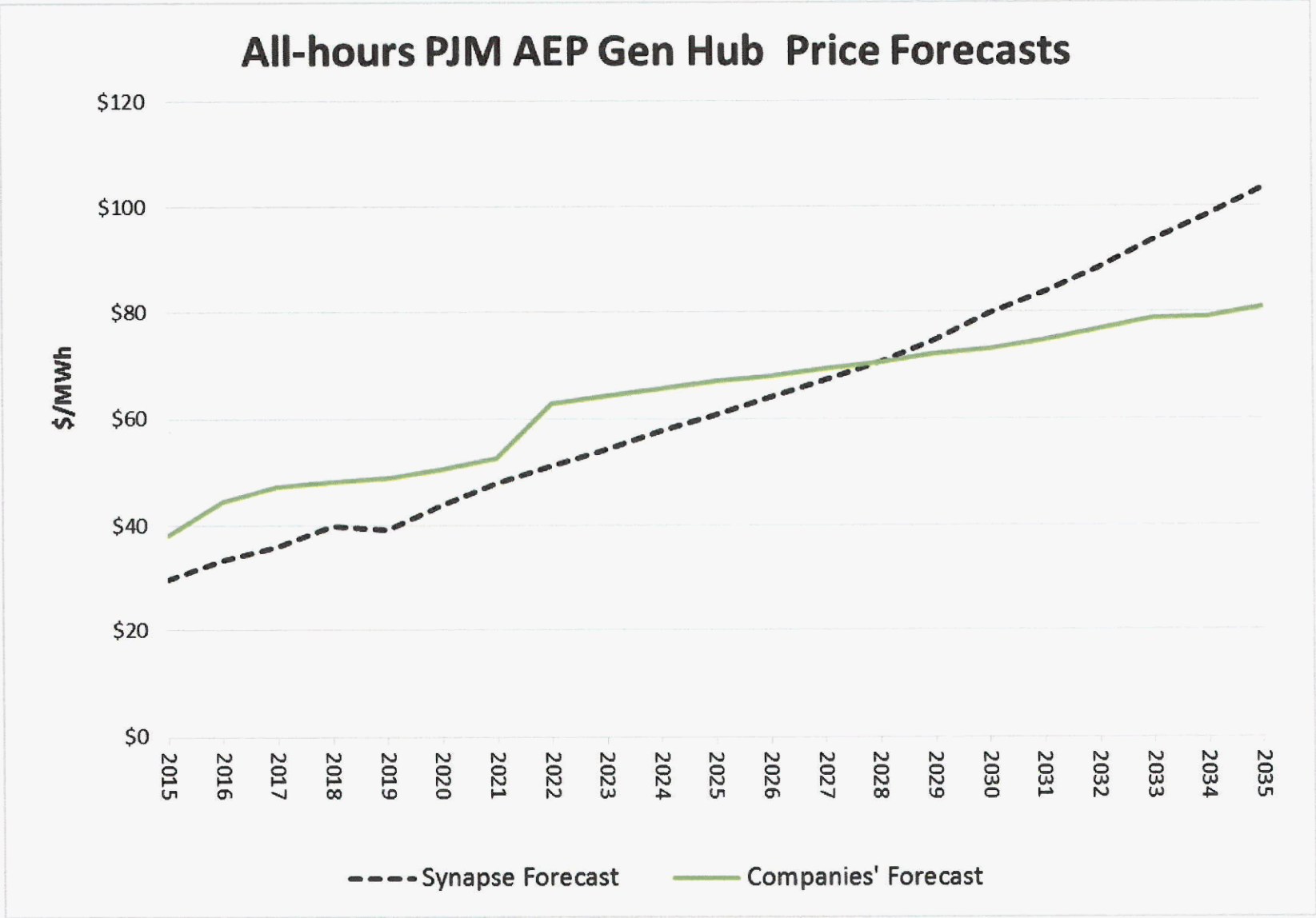
Source: Data Responses WVCAD A-087 Attachments 2 and 3; WVCAD W-03, p.2 and W-05, p.1; WVCAG 1- 7 Attachment 1



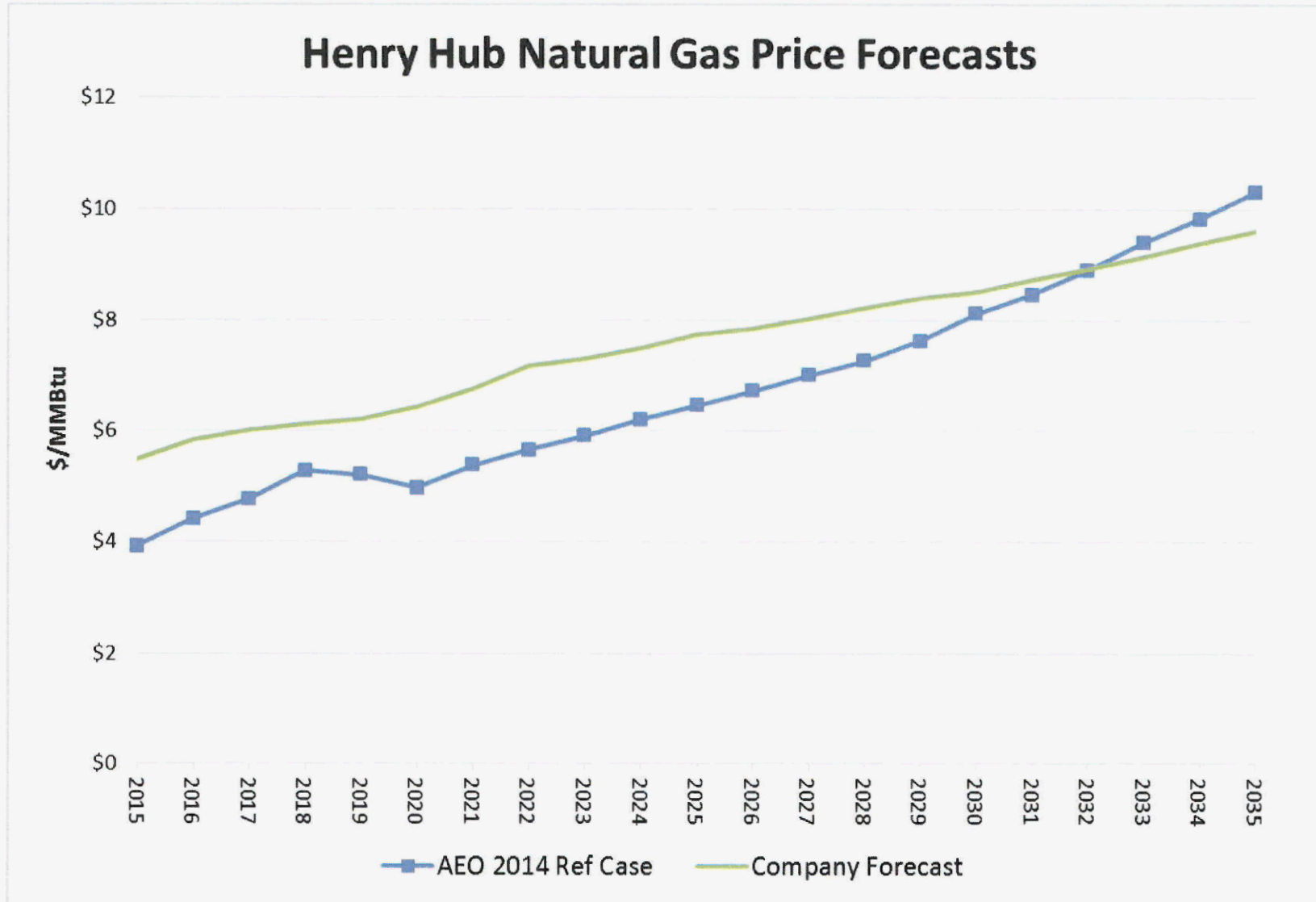
Source: WVCAG Set 1 Question 7 Attachment 1-Synapse Alternatives.xlsx



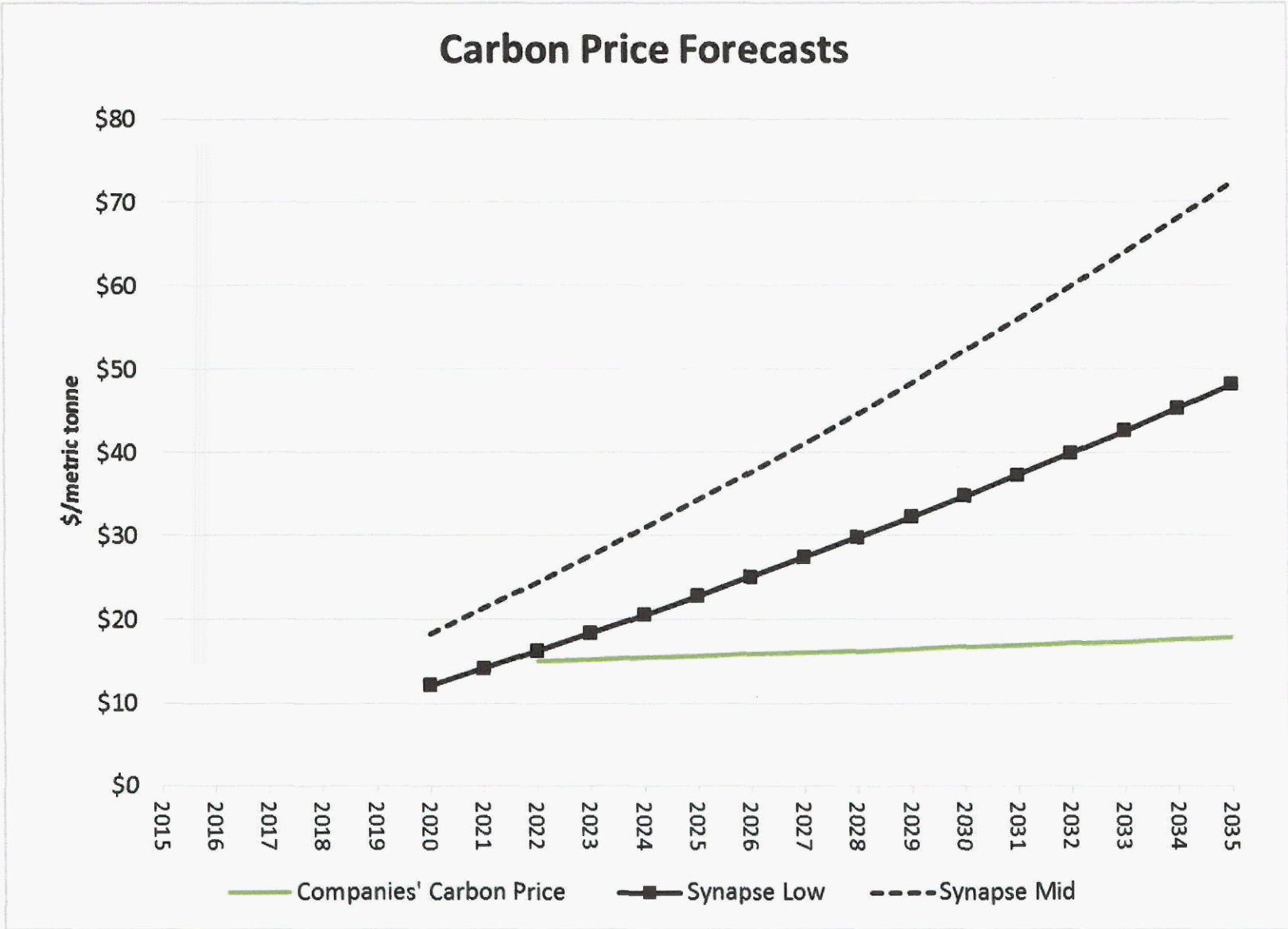
Source: WVCAG 1-2 Attachment 1-Synapse Price Forecasts.xlsx, PJM



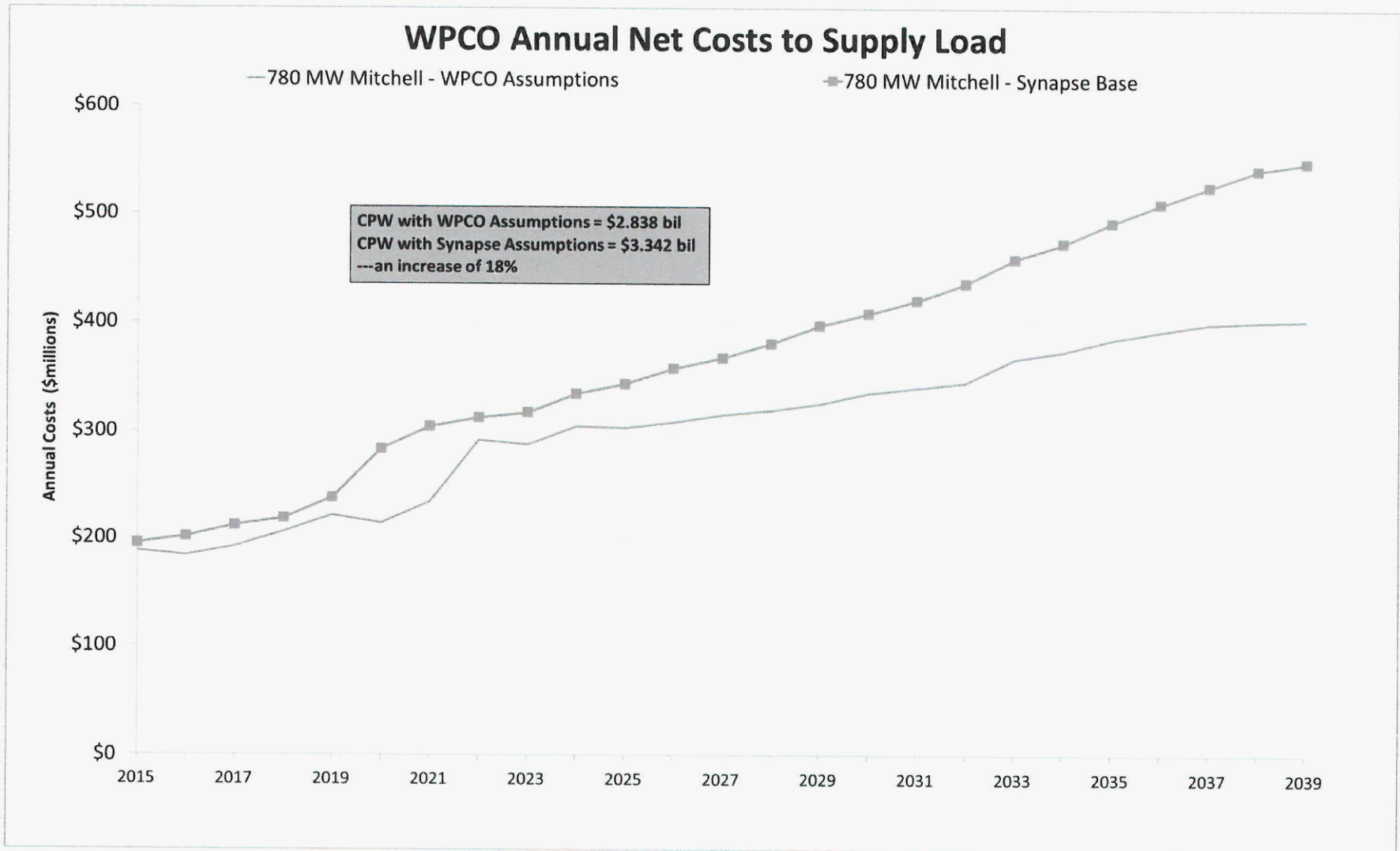
Source: WVCAG 1-2 Attachment 1-Synapse Price Forecasts.xlsx



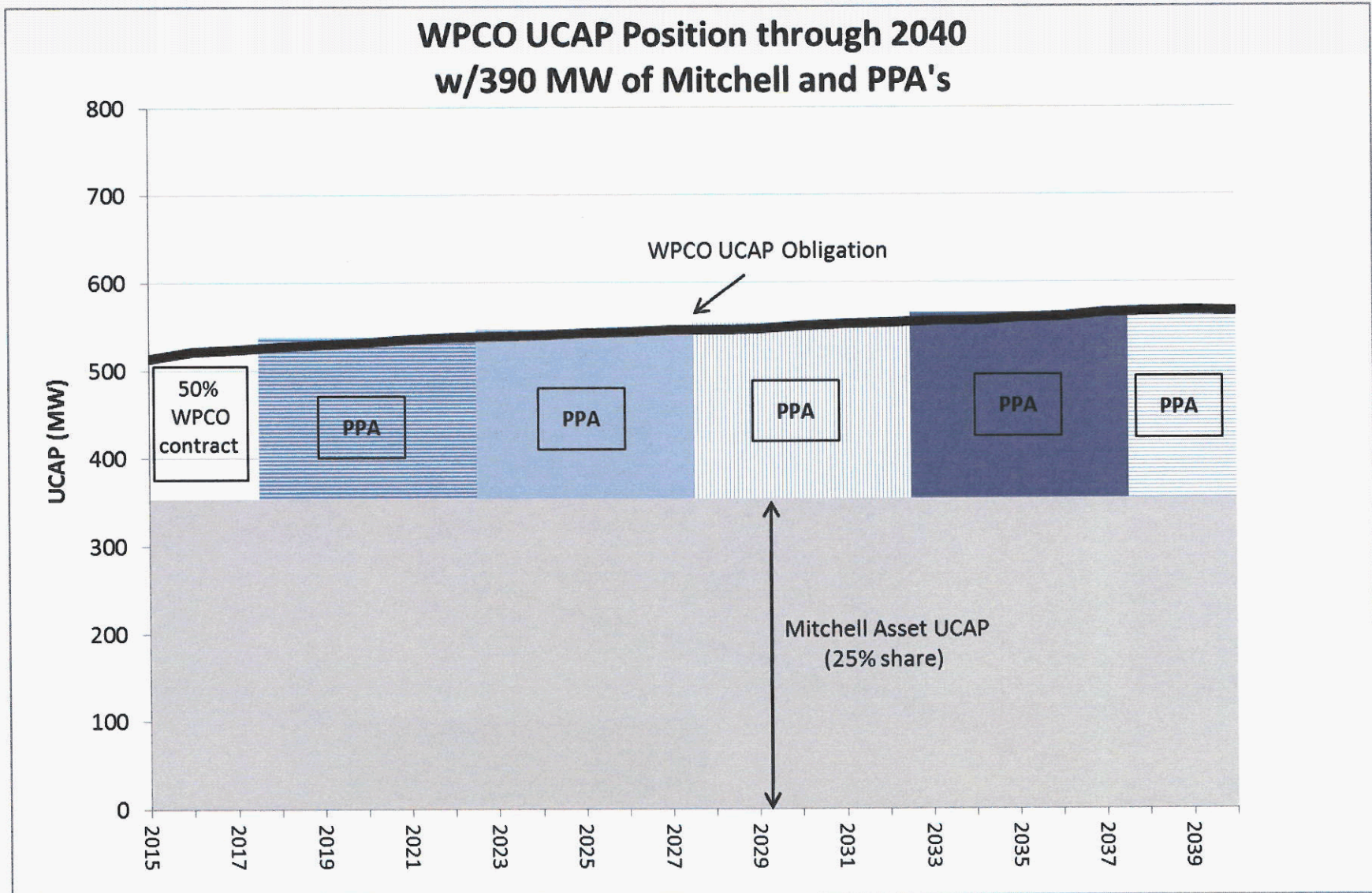
Source: WVCAG 1-2 Attachment 1; EIA Annual Energy Outlook 2014 Reference Case



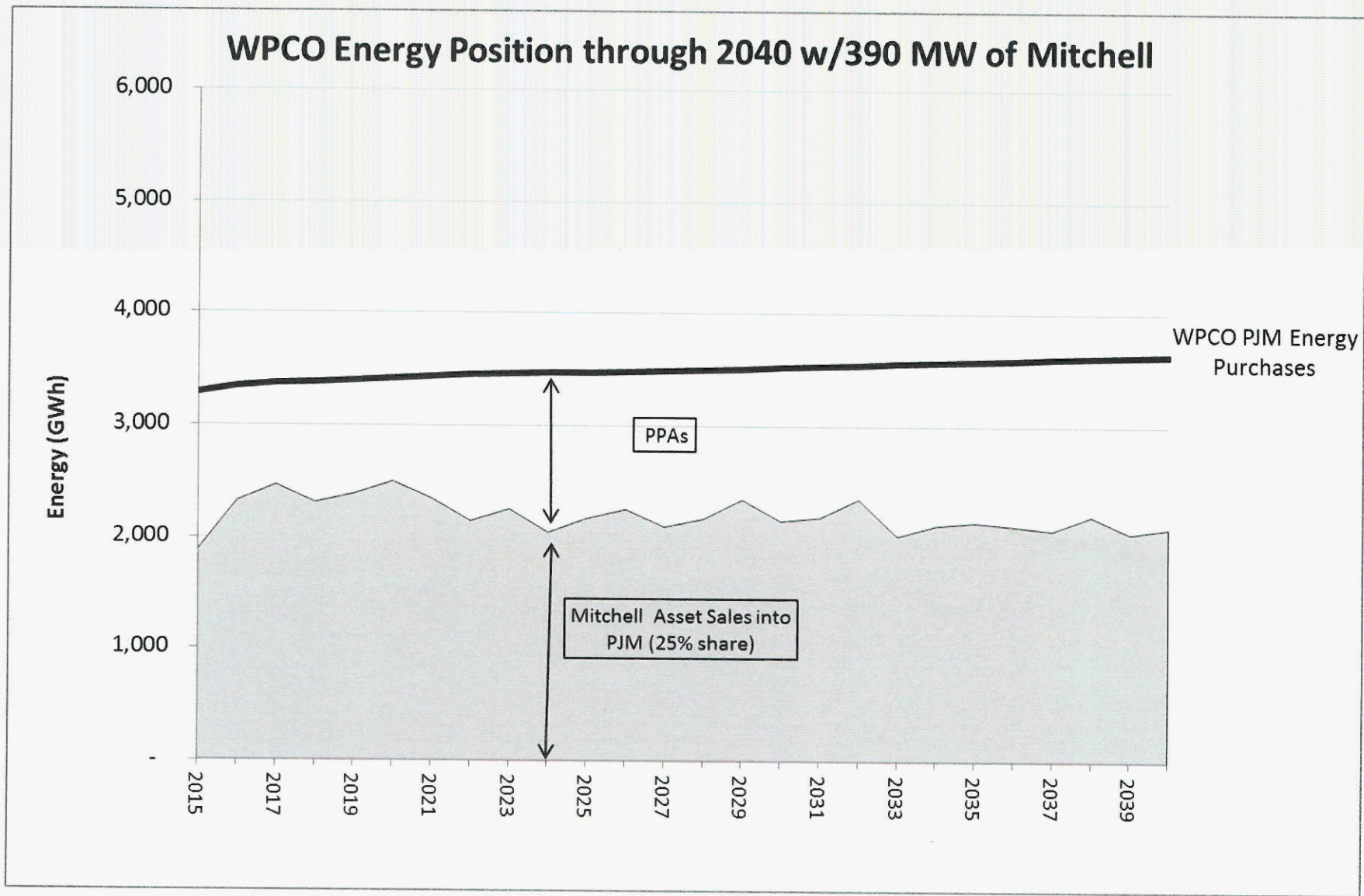
Source: Data Response WVCAG 1-2 Attachment 1; Synapse CO2 Price Report, Spring 2014



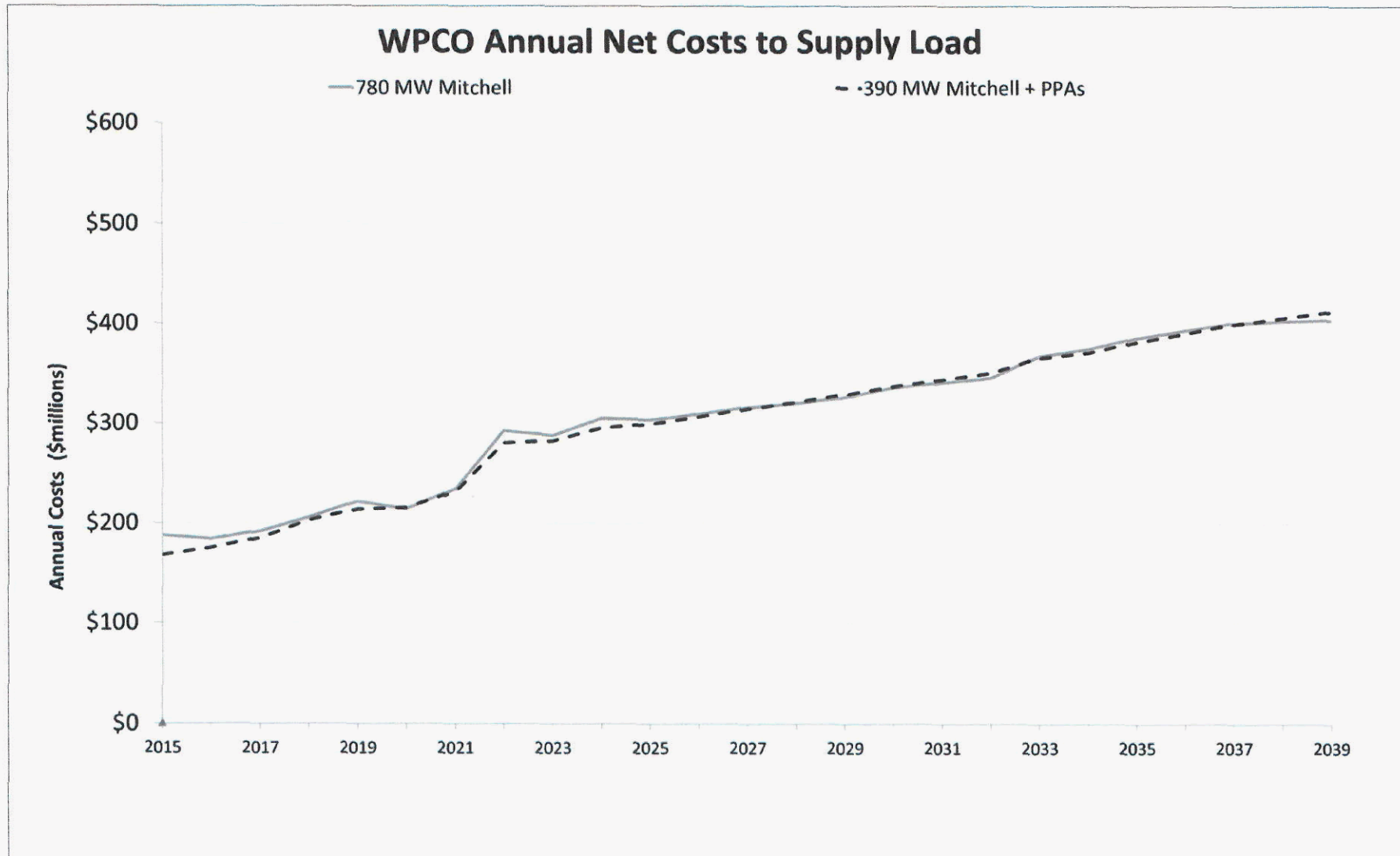
Source: WVCAG Set 1 Question 7 Attachment 1-Synapse Alternatives.xlsx



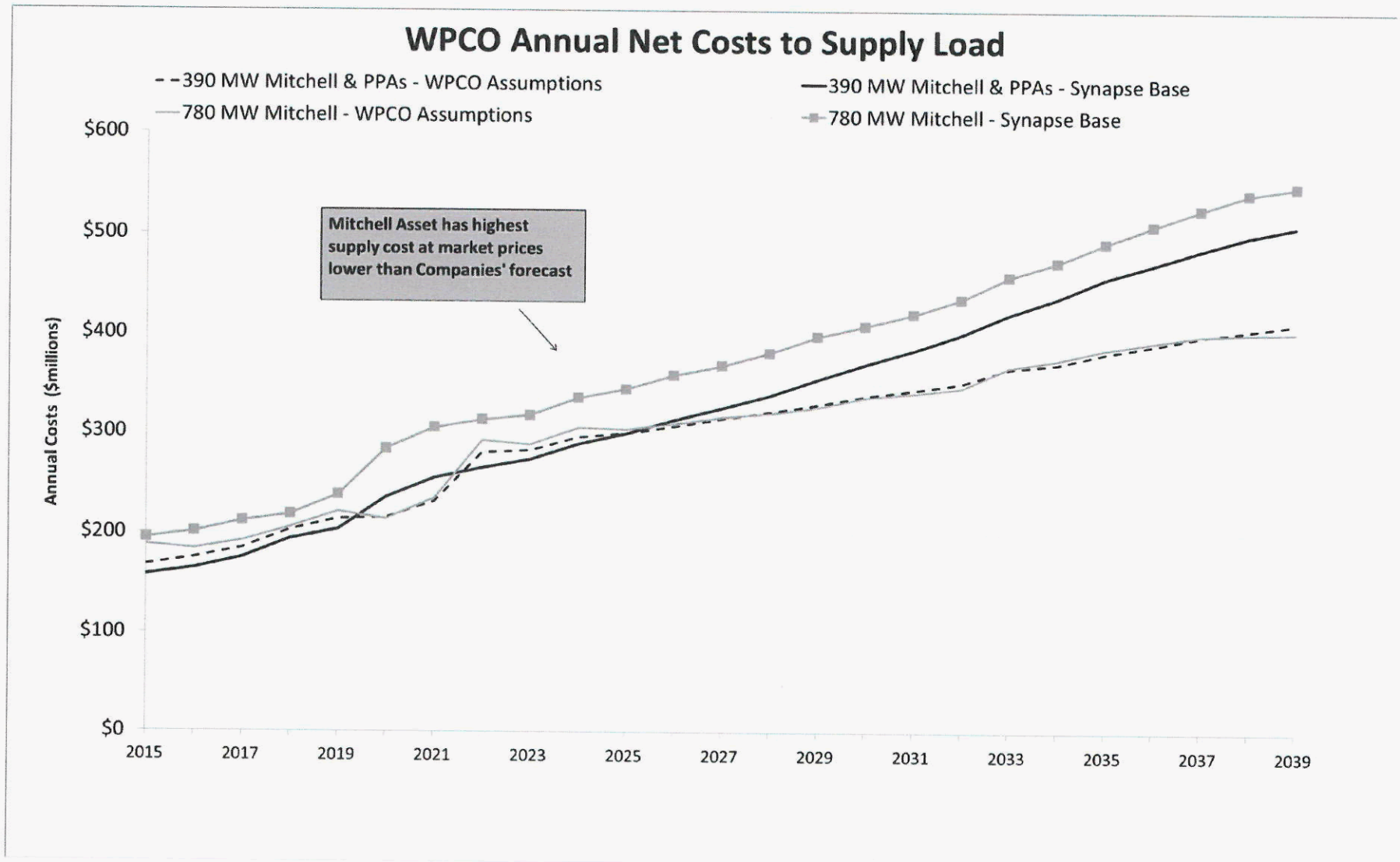
Source: Data Responses WVCAD A-087 Attachments 2 and 3; WVCAD W-03, p.2 and W-05, p.1; WVCAG 1- 7 Attachment 1



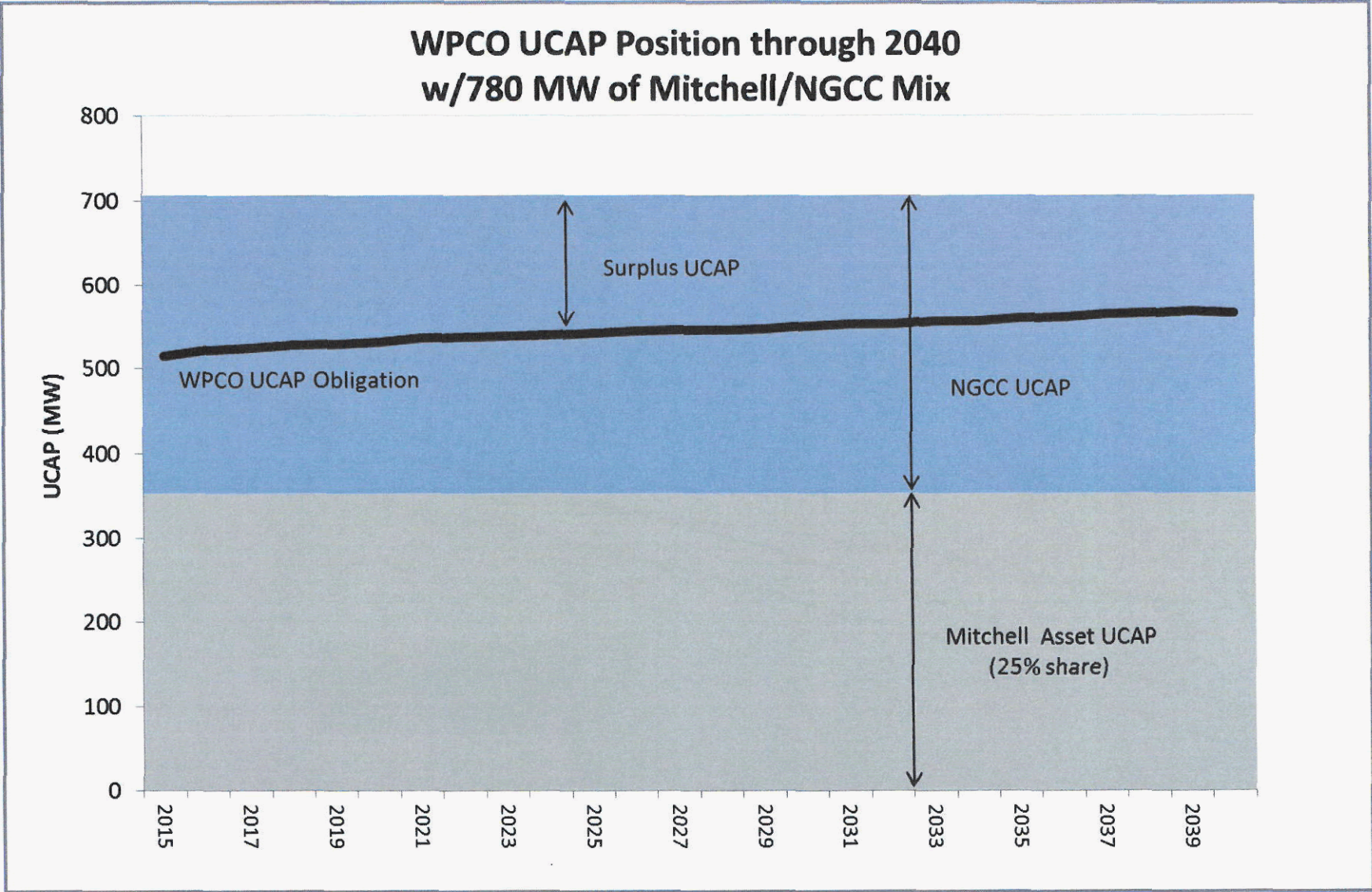
Source: Data Responses WVCAD A-087 Attachments 2 and 3; WVCAD W-03, p.2 and W-05, p.1; WVCAG 1- 7 Attachment 1



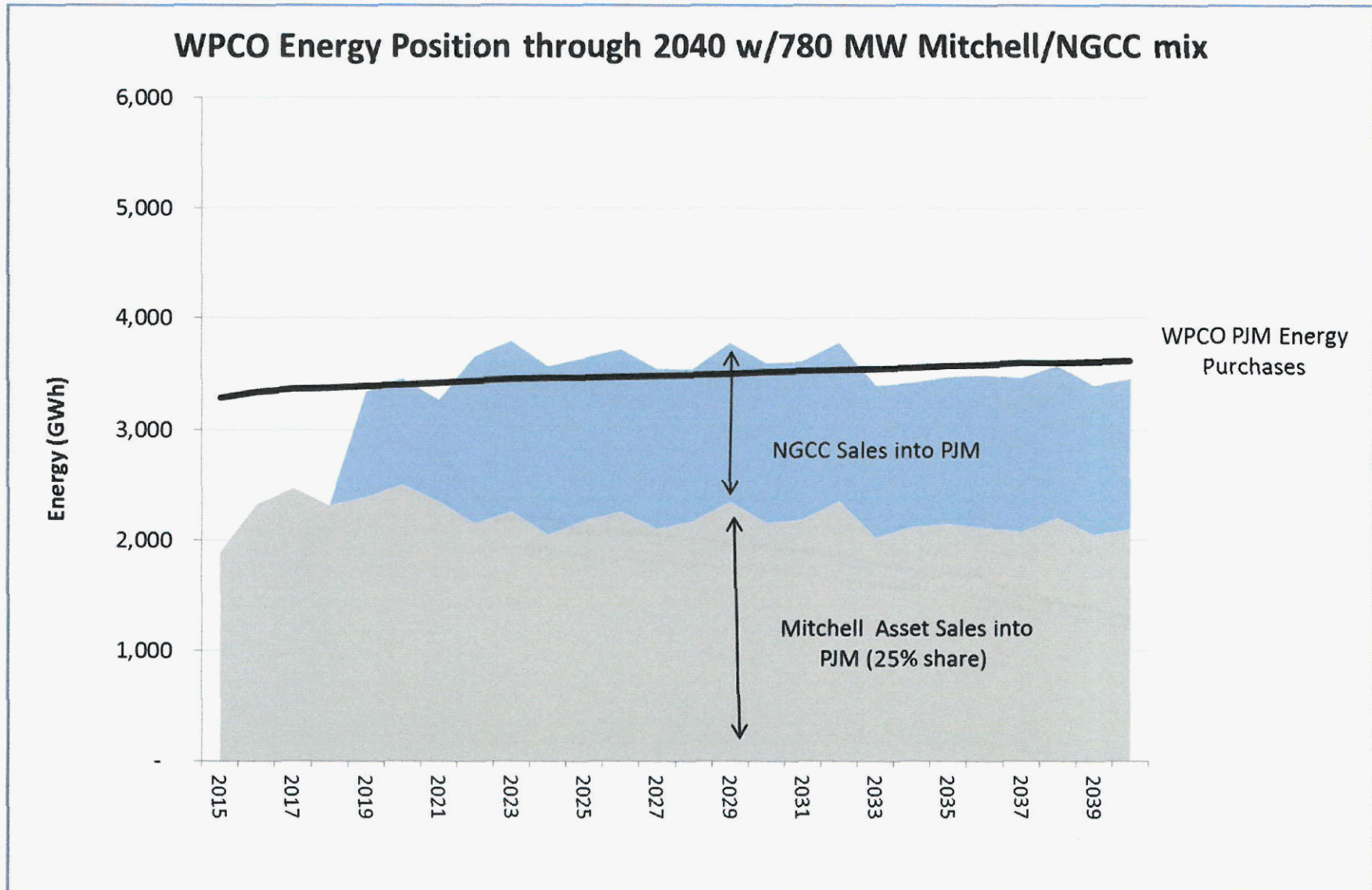
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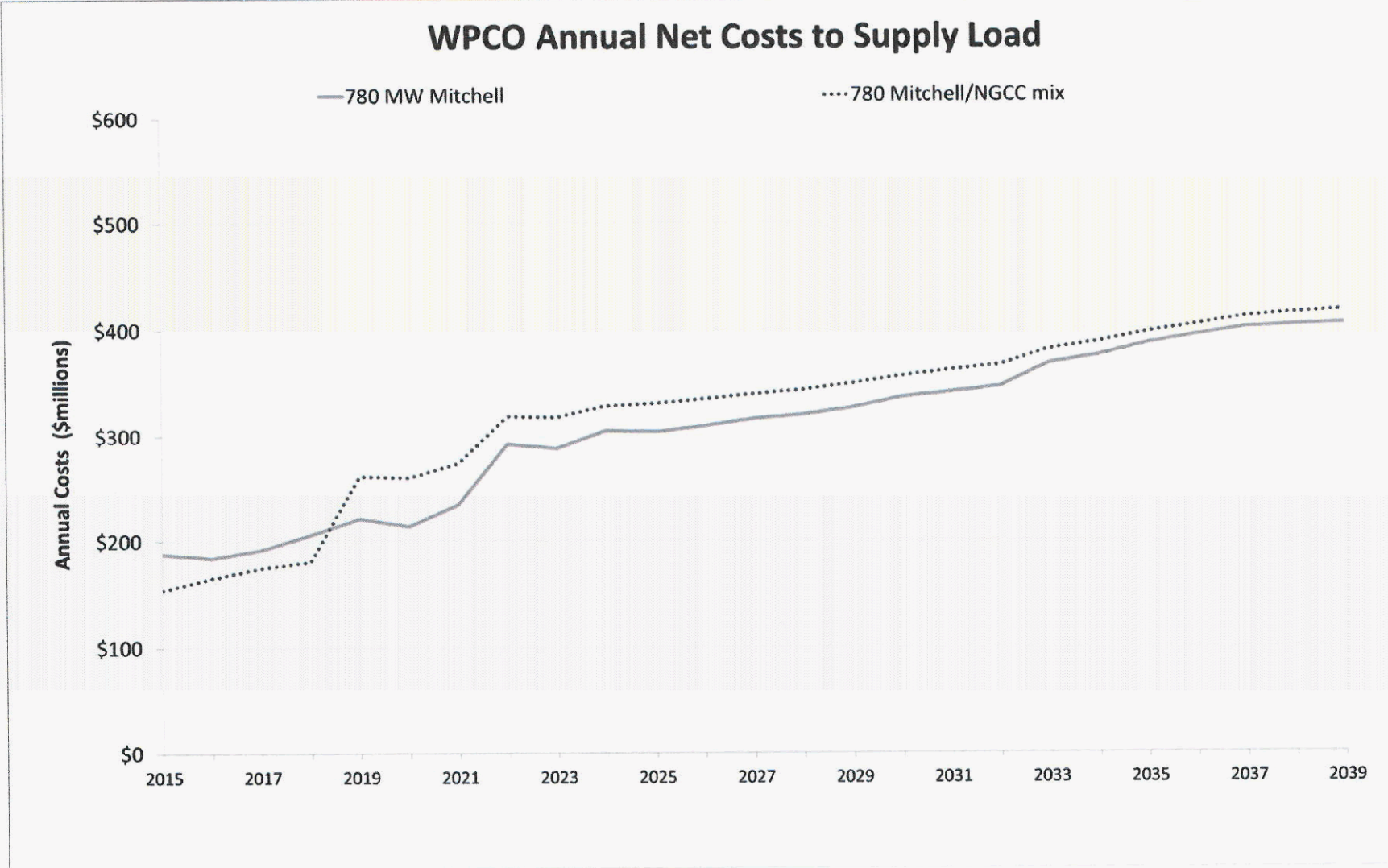
Source: WVCAG Set 1 Question 7 Attachment 1-Synapse Alternatives.xlsx



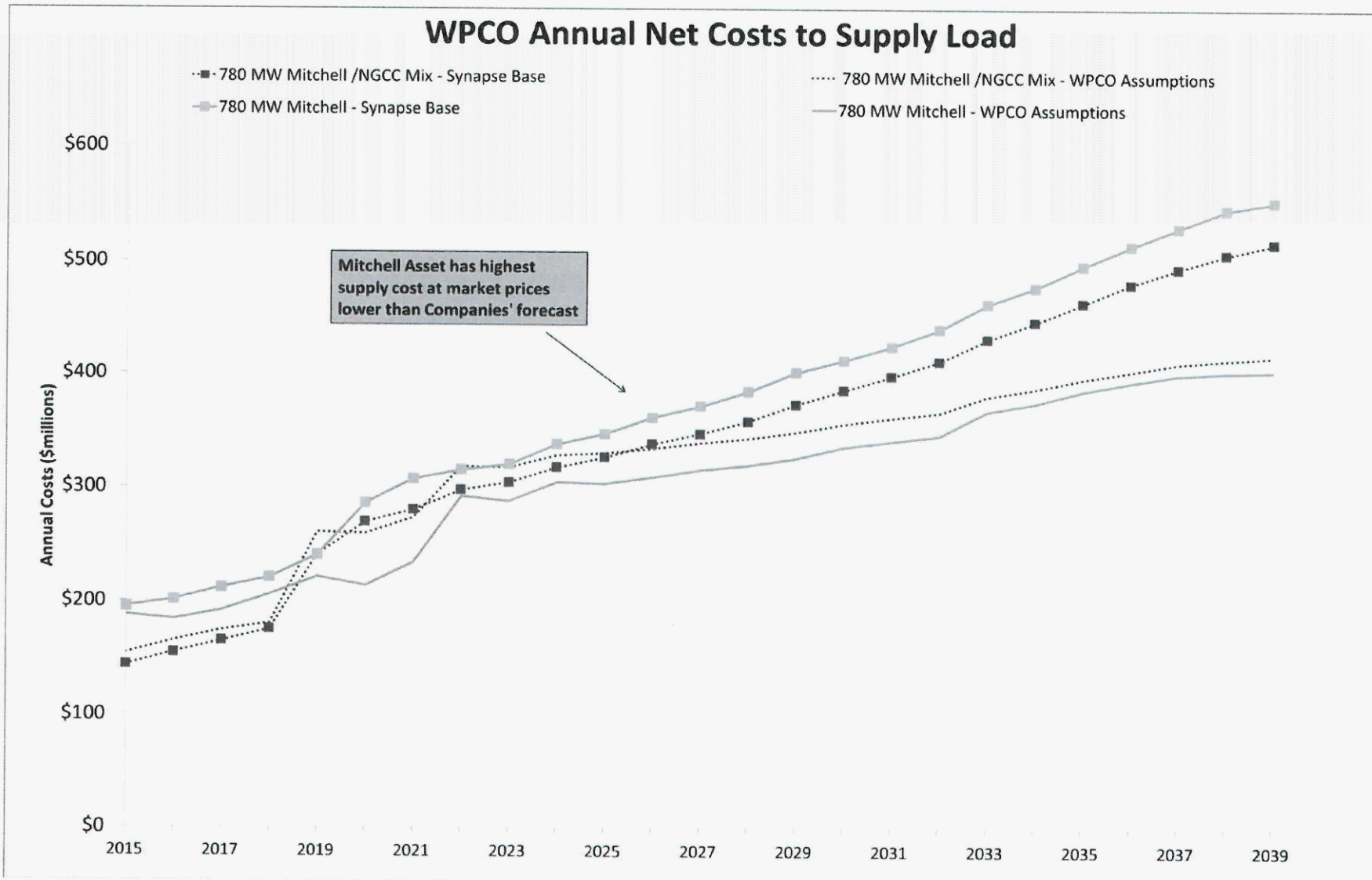
Source: Data Responses WVCAD A-087 Attachments 2 and 3; WVCAD W-03, p.2 and W-05, p.1; WVCAG 1-7 Attachment 1



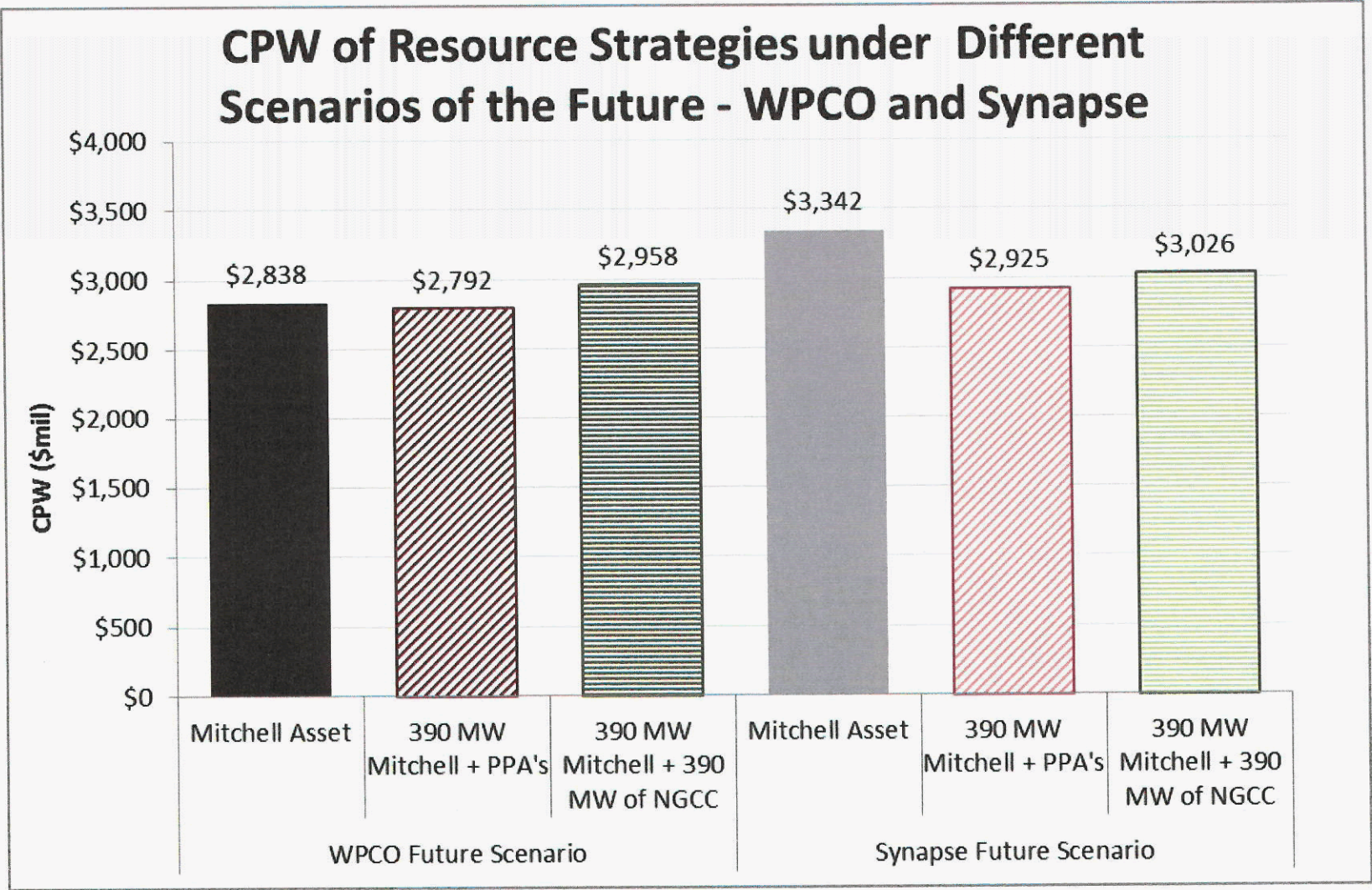
Source: Data Responses WVCAD A-087 Attachments 2 and 3; WVCAD W-03, p.2 and W-05, p.1; WVCAG 1- 7 Attachment 1



Source: WVCAG Set 1 Question 7 Attachment 1-Synapse Alternatives.xlsx



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Source: WVCAG Set 1 Question 7 Attachment 1-Synapse Alternatives.xlsx

DATA RESPONSES

Case No. 14-0546-E-PC
Attachment 1, CAD 10th Set W03 Page 2 of 3

Wheeling Power Company
Annual Internal Load
2014-2021

	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>
<u>Internal Peak Demand (MW)</u>								
Summer	497	508	515	518	520	522	525	528
Preceding Winter	468	478	482	490	490	492	489	495
PJM Diversity Factor (APCo's)	0.958	0.958	0.958	0.958	0.958	0.958	0.958	0.958
Forecast Pool Requirement	1.0889	1.084858	1.090224	1.090224	1.090224	1.090224	1.090224	1.090224
UCAP Obligation	518	528	538	541	543	545	548	552
Mitchell UCAP	706	706	706	706	706	706	706	706
Net Position	188	178	168	165	163	161	158	154

**APPALACHIAN POWER COMPANY &
WHEELING POWER COMPANY
WEST VIRGINIA CASE NO. 14-0546-E-PC
TWENTY-FIFTH REQUEST FOR INFORMATION - CAD**

Request T-17

Please refer to Mr. Torpey's testimony page 11 lines 1 to 3 and assume the Commission approves the proposed acquisition effective January 2015

a. Would WPCO have the option of participating in the PJM capacity market in any manner other than as an FRR entity? If yes, please describe each of the other participation option(s) WPCO could elect and the earliest PJM delivery year in which it could begin its participation under each other option.

b. Please confirm that, as an FRR entity, WPCO would have the ability to bid a limited quantity of capacity excess to its requirements for a given year into the Base Residual Auction of the PJM wholesale capacity for that year. The limits on the quantity WPCO could bid in would be specified in the PJM tariffs applicable to FRR entities, with the minimum quantity equal to the WPCO capacity in excess of its PJM specified FRR reserve requirement and threshold quantity and the maximum quantity equal to the PJM specified ceiling quantity. If you cannot confirm, please explain why not.

c. Please indicate the quantity of capacity WPCO could bid in to the BRA for each PJM delivery year starting June 2015 based on the WPCO load forecast in this proceeding and the PJM currently effective tariffs. Please include the workpapers used to develop this response.

d. Please indicate the annual revenue WPCO would receive from PJM for the capacity WPCO could bid in to the BRA for each PJM delivery year starting June 2015 based on the capacity prices established in the BRA's conducted for the power years through 2017/2018 and on AEP's current forecast of BRA prices beyond the 2017/2018 power year. Please include the workpapers used to develop this response.

e. Would WPCO credit one hundred percent of the revenues it would receive from PJM for the capacity WPCO bid in to each BRA to its retail ratepayers, or would WPCO be required to allocate some percentage of those revenues to one or more other AEP operating companies? If the latter, please describe the allocation and the basis for that allocation.

Response T-17

a. WPCo could elect either FRR or RPM status beginning in the delivery year starting June 2018.

b. The Company confirms this description per its own interpretation of the current PJM rules if WPCo is a stand alone FRR entity. If WPCo becomes a member of the Power Coordination Agreement (PCA) and elects to join a common FRR plan with other PCA companies, any BRA capacity sales will be allocated under the terms of the PCA.

**APPALACHIAN POWER COMPANY &
WHEELING POWER COMPANY
WEST VIRGINIA CASE NO. 14-0546-E-PC
TWENTY-FIFTH REQUEST FOR INFORMATION - CAD**

c./d. The Base Residual Auctions occur 3 years in advance of the delivery year. For example, the BRA for the 2015/2016 delivery year already occurred in 2012. See the Companies' response to CAD 24 T-11 for information on the Mitchell capacity (MW of UCAP) which has been bid into PJM Base Residual Auctions held up through the 2017/2018 planning year and estimated revenues. See CAD 25 T-17 Attachment 1 for the estimates of capacity available for sale in the BRA and revenues if WPCo were to become a stand-alone FRR entity beyond the 2017/2018 planning year. Each of the elements of that forecast is subject to change.

e. If 50% of Mitchell is transferred to WPCo and reflected in rates to West Virginia customers; WPCo elects FRR or RPM status as a stand alone company, and WPCo is able to sell any capacity into PJM auctions, then all of those proceeds will get credited to ratepayers. In addition, see the responses to WVCAG 5-13 and CAD 25 T-20 which describes how WPCo could participate in a common FRR plan under the PCA at some future date.

WPCo PJM Base Residual Auction Revenue Estimates - \$/MW-Day UCAP

	2018	2019	2020	2021	2022	2023	2024	2025
<u>WPCo Internal Peak Demand (MW)</u>								
Summer	520	522	525	528	531	532	533	535
PJM Diversity Factor (APCo's)	0.958	0.958	0.958	0.958	0.958	0.958	0.958	0.958
PJM Forecast Pool Requirement	1.090224	1.090224	1.090224	1.090224	1.090224	1.090224	1.090224	1.090224
UCAP Obligation	543	545	548	552	555	556	557	559
Mitchell UCAP forecast	706	706	706	706	706	706	706	706
Net Long Position	163	161	158	154	151	150	149	147
PJM Holdback - 3% of UCAP Obligation (1)	-16	-16	-16	-17	-17	-17	-17	-17
Capacity Available for Sale	147	144	142	138	135	134	133	130
RPM Auction Price Forecast (2)	\$172.77	\$215.54	\$231.74	\$248.55	\$265.99	\$284.08	\$302.83	\$321.95
Capacity Revenue (\$ Millions)	\$9.3	\$11.3	\$12.0	\$12.5	\$13.1	\$13.9	\$14.7	\$15.3

Notes:

1. PJM requires FRR entities to holdback a threshold quantity prior to making capacity sales.
2. Amounts represent calendar year forecasts, which are a blend of the two PJM planning years which run June through May. For example, 2018 represents a blend of the base residual auction for the 2017/2018 planning year, which cleared at \$120/MW-Day, and the forecast of the 2018/2019 planning year auction price.