S T A T E O F M I C H I G A N

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the application of **CONSUMERS ENERGY COMPANY** for a financing order approving the securitization of qualified costs and related approvals. _____/	Case No. U-18250

DIRECT TESTIMONY OF

MARC H. VATTER

MICHIGAN PUBLIC SERVICE COMMISSION

QUALIFICATIONS OF MARC H. VATTER
CASE NUMBER U-18250
PART I

Q. Please provide your name, title, business address, and profession.

A. My name is Marc H. Vatter; I am a consulting economist. My business address is 9 Underhill Street, Nashua, New Hampshire, 03060. I specialize in energy economics.

Q. On whose behalf are you submitting this testimony?

A. I am submitting this testimony on behalf of the Michigan Public Service Commission Staff.

Q. Please summarize your educational background.

A. I received a B.A. degree in economics at the University of Oregon, and M.A. and Ph.D. degrees in economics at Brown University.

Q. Please summarize your professional background.

A. I affiliate with Birch Energy Economics in Post Falls, Idaho. For the last two years , I have been building a database and modeling the restructuring wholesale electric market in Mexico. This has involved gathering and organizing data, estimating concentration of market power in generation, and forecasting prices and profitability of generating plants using the production cost and capacity expansion modeling software AURORAxmp® (xmp). Detailed descriptions of its logic and accompanying database are available through its vendor: EPIS, Inc., http://epis.com.

I previously affiliated with Economic Insight, Inc., with whom I testified in two proceedings before the Mississippi Public Service

Commission, the latter involving extensive production cost modeling using xmp. I also used xmp to examine the possible closure of a nuclear power plant in Washington. I have worked on a variety of projects including an analysis of shale gas production in the Barnett gas field, analysis of the impact of Environmental Protection Agency regulations concerning emissions from coal-fired power plants, and the regulatory response to the 2000-2001 California energy crisis. From 1988 to 1997, I was an Industry Economist with the Bonneville Power Association (BPA), where I analyzed wholesale costs, rates, and power marketing and testified for BPA in its 1996 rate case. While at BPA, I developed a methodology for quantifying the agency's marginal costs adapted to the cost structure of a hydroelectric generating system and authored the Marginal Cost Analysis for the 1996 case. From 1997 through 2006, I was a graduate student, researcher, and teaching assistant at Brown University in Providence, Rhode Island. I was also a Research Associate at Synapse Energy Economics in 1998-99, where I examined stranded cost issues in the PJM ISO. From 2006 to 2007, I was an Associate Economist with the New York State Department of Public Service. I have taught economics at Eastern Connecticut State University, Pacific University, and Universidad del Pacifico in Lima, Peru. I have presented my research at conferences on energy and public utility economics and recently

published an article on OPEC in *Energy Economics*. My curriculum vita is attached as an appendix.

QUALIFICATIONS OF MARC H. VATTER
CASE NUMBER U-18250
PART II

1. Introduction

Q. What is the purpose of your testimony?

A. My purpose is to comment on, question, and present alternative market forecast projections to those made by Consumers Energy (the Company) associated with its proposal to buy out a purchased power agreement (PPA) with Entergy for the output of the Palisades nuclear power plant (the Plant).

Q. Do you sponsor any exhibits in this matter?

A. Yes. I sponsor the following exhibits:

Exhibit	Description
Exhibit S-2.1	Consumers Energy's Answer to Staff's Third Discovery Request, 18250-ST-CE-07.
Exhibit S-2.2	Email from Dana Van Wagener at the Energy Information Administration.
Exhibit S-2.3	Base case additions and retirements of generating capacity in Local Resource Zone 7;
Exhibit S-2.4	Base case projection of the market value of replacement power for the PPA;
Exhibit S-2.5	High fuel price case projection otherwise similar to S2.4;
Exhibit S-2.6	Low fuel price case projection otherwise similar to S2.4;

Q. Were these exhibits created by you or at your direction?

A. Yes, with the exceptions of Exhibits S-2.1 and S-2.2.

2. An Alternative Forecast

a. Wholesale power prices

Q. Do you assume in your analysis that the Company intends to replace the power from the Palisades PPA by purchasing power on the market through the Midcontinent Independent System Operator?

A. Yes. I use the projected market value of the power from the PPA as a measure of the cost of replacing it, assuming that the market is workably competitive and that, therefore, it prices power at cost. My analysis does not, therefore, examine the Company's capacity expansion proposal.

Q. On what variable(s) would the benefits of the buyout depend?

A. The buyout creates a need to replace the energy and capacity from the PPA, so its benefits would depend on wholesale market prices for energy and capacity in the area served by the Company. I forecast these prices using xmp for the buyout period of the PPA. The buyout period runs from June 1, 2018 through April 12, 2022, and I assume that the Plant will cease to operate October 1, 2018, as announced. "Energy" is megawatt hours delivered over time, and "capacity", as I have modeled it here, is the ability to meet annual peak load, in megawatts. These wholesale prices measure the per-unit cost of replacing the power from the PPA. The higher the forecasted market prices for energy and capacity, the lower the benefits of the buyout, because those benefits reflect the difference between the prices specified in the PPA and those prevailing in the market.

Q. What is the area served by the Company in your model?

A. Most of western Michigan. I model the buyout period in two stages. In the first stage, I forecast the price of capacity, and I forecast the price of energy in the second stage. In the first stage, I combine the service territories of Consumers Energy and DTE Energy in order to form an area roughly equivalent to the Midcontinent Independent System Operator's (MISO) Local Resource Zone (LRZ) 7, for which MISO defines a capacity product and a single price for capacity in its planning resource auction. In the second stage, I separate the service territories of the two utilities because the transfer capability of the transmission lines linking them is limited.

The production cost model, xmp, defines loads and the costs of serving them on a geographic, rather than an institutional, basis. Therefore, I divided the state into areas roughly corresponding to the service territories of load-serving entities (LSEs).

Q. Why did you not explicitly model all utilities with service territory in Zone 7?

A: Just as xmp defines loads on a geographic basis, it also defines generation on a geographic basis. Thus, most of the other utilities' generation assets are included in Consumers Energy's or DTE's service territories, because they are located within the confines of those LSEs' service territories. The remaining generation assets are included in a zone called "MISO Central."

Q: Does the exclusion of these additional utilities from Zone 7 cause your model to be inaccurate?

A. No. The market balances loads and generation at cost as I have modeled it, and it is thought to be workably competitive in practice.

Q. What other areas did you model in order to forecast prices in Michigan?

A. Most of the Eastern Interconnect, including all of MISO, PJM, southeastern Canada, New York, New England, and part of the southern states outside of MISO. I did this because each regional market has an effect on the prices prevailing in adjacent markets with which trade occurs.

Q. How do your estimates compare to those made by the Company?

A. I have reviewed the Blumenstock and Clark testimonies, and I have forecasted the market using xmp to 2022 under base case, high, and low fuel prices. My base case forecast of the market value of the power exchanged under the PPA is somewhat higher than the Company's forecast.

Q. Did you identify any deficiencies in the Company's analysis?

Yes. I find the Blumenstock testimony to be deficient in that it assumes that the PPA does not provide capacity to the Company during Planning Year 2021-22 because it does not provide capacity for quite the entire year, and MISO requires an entire year of capacity to meet its planning requirements. In discovery, I asked Blumenstock the following question:

> Could the Company combine the capacity provided under the PPA from June to April with another resource that provides capacity in May to meet MISO's Planning Resource Margin Requirements? If yes, please explain and identify the resource. If not, why not?

He gave the following answer:

> Yes. The Company would need to secure capacity through a bilateral agreement or resource purchase covering the period April 12 to May 31. Such an agreement or resource purchase has not been identified. [See Exhibit S.1.]

Since he answered "yes", I assume that the PPA continues to provide 780.1 MW per month, or 780.1 zonal resource credits (ZRC), of capacity from June 2021 through March 2022, and 312 ZRC in April 2022. (See Exhibit RTB-4.) Failing to count the capacity provided under the PPA during this time, as Blumenstock has done, would improperly lower the estimated cost of replacing it and raise the estimated savings from the buyout and the securitized sum to be recovered from ratepayers.

I also find Blumenstock's testimony deficient in that it does not examine scenarios across which fuel prices differ. When the last resource dispatched to meet energy load is fueled by natural gas or fuel oil, the prices of these fuels have a powerful effect on wholesale electricity prices. On page 9 of his testimony, Blumenstock gives the following answer to a question about scenarios (or "sensitivities"):

> Q. Were sensitives performed on the energy or capacity price projections used in determining the Market Value?
>
> A. No. The Market Value was determined in a negotiation setting and, in good faith, the Company presented its most

current outlook on prices. The termination period at the center of the negotiations was of limited duration (four years) and occurring in the near future, which gave the Company confidence that there was reduced probability of disruptions that could affect the accuracy of our price forecasts.

Q. How did you determine that this approach was deficient?

A. A simple way to determine whether four years is too little for risk to matter to the bottom line is to examine scenarios using credible alternative cases. In my high and low fuel price scenarios, I adjusted natural gas and fuel oil prices based on the Energy Information Administration's (EIA) low and high, respectively, oil and gas resource and technology cases from its Annual Energy Outlook (AEO). To clarify, the EIA's low oil and gas resource and technology case corresponds to my high fuel price case.

Natural gas is most frequently "on the margin," and I have also adjusted prices for fuel oils to reflect their correlations with gas prices. I did not adjust coal prices, as they are less volatile and not strongly correlated with prices for natural gas. Using quarterly EIA data[1] for the first quarter of 2008 through the third quarter of 2016, the coefficient of variation for the real, inflation-adjusted price for coal delivered to the electric power sector in Michigan is 0.12, while that for the spot price of natural gas at Henry Hub is 0.52. The correlation between the two sets of prices is actually negative,

[1] U.S. Energy Information Administration, *Coal Data Browser – Coal Shipments to the Electric Power Sector*, <https://www.eia.gov/beta/coal/data/browser/#/topic/45?agg=1, accessed May 10, 2017 and U.S. Energy Information Administration, *Henry Hub Natural Gas Spot Price*, <https://www.eia.gov/dnav/ng/hist/rngwhhdm.htm>, accessed May 10, 2017.

meaning that when the coal prices increase, typically the gas prices decrease, and vice-versa.

If fuel prices rise, customers are at risk of paying both securitization of the PPA and an adjustment to rates charged under the Power Supply Cost Recovery Mechanism (PSCR). The same is true if fuel prices fall, but fuel prices have been relatively low in recent times, and, therefore, there is greater likely upward deviation in electricity prices due to high fuel prices than likely downward deviation from the base case due to low fuel prices. Higher than expected fuel prices imply lower savings associated with the buyout of the PPA because they narrow the difference between the prices specified in the PPA and those prevailing in the wholesale power market. Given the asymmetric risk, then, the lack of scenarios regarding fuel prices is a significant omission, and I have endeavored to correct it.

Q: What were the results of your analysis?

A: Table 1 summarizes the results of my analysis in comparison to those of the Company.

Table 1: Risk-Adjusted Savings from Buyout of Palisades PPA

A	Market value from RTB-4	$995,941,472
B	Base case market value	$1,087,060,709
C	High fuel price market value	$1,150,513,886
D	Low fuel price market value	$1,069,719,207
E	Net risk from higher fuel prices; (C - B) + (D - B)	$46,111,675
F	Risk-adjusted market value; B + E	$1,133,172,384
G	Contract value from RTB-3	$1,426,640,300
H	Total[2] pool of savings; G – F	$293,467,916
I	50% of savings[3]; H / 2	$146,733,958

Line B, from my base case, exceeds Line A, from the Company's case, by about $91 million, and about half the difference is explained by my counting the capacity provided under the PPA during Planning Year 2021-22. Line C, from the high fuel price case, exceeds the base case value by about $63 million, while Line D, from the low fuel price case, falls short of the base case value by only about $17 million. This is the asymmetric effect of fuel price risk, given the recent low levels of fuel prices.

I calculate net risk in Line E. Note that this value would be zero if the effects of risk were symmetric; in other words, if fuel prices would likely fall by exactly the same measure as they would likely rise. Thus, this adjustment only accounts for risk to the extent that the risk is asymmetric. According to Dana Van Wagener, analyst at the EIA, they "do not estimate the likelihood

[2] I have not reduced savings by energy (price effect) and congestion costs as on page 2 of RTB-4 because the Palisades plant is retired in my simulations, so those effects are reflected in the energy prices.
[3] Compare to $172,000,000 on page 2 of RTB-4.

of the resource assumptions."[4] I assume, then, that the high fuel price case and the low fuel price case are equally likely, though the effect of the high fuel price case on electricity prices is greater. Blumenstock's implicit assumption, either that the different EIA cases have zero probability, or that upward deviations in fuel prices are less likely than downward deviations, is not reasonable.

I show the risk-adjusted market value of the amount of output that would have been provided by the Plant in Line F, equal to the base case market value plus the value of net risk.

Line G shows the contract value of the output of the Palisades plant from RTB-3.

Total risk-adjusted savings are the contract value less the risk-adjusted market value, shown in Line H. I have not reduced this number by the energy (price effect) and congestion costs shown on page 2 of RTB-4, as Blumenstock did, because, without the Palisades plant running in my simulations, those effects are already reflected in the power prices in the Consumers Energy zone[5], and there is no reason to tie the PPA or its buyout to closure of the Plant. The Plant will operate if and only if the market value of its output exceeds its operating costs. If the market value exceeds

[4] Email from Van Wagener, February 23, 2017. See Exhibit S2.2.
[5] The xmp model was run in zonal mode, and transmission limits, which may be binding, are modeled between zones.

operating costs, Entergy can operate the Plant profitably without the PPA. If its operating costs exceed the market value, even if the contract value exceeds the operating costs, the two firms can agree that Entergy can shut down the Plant and buy power on the open market for less than the operating costs and sell it to the Company for less than the contract value, with prices set so that this is an improvement over the PPA for both firms.

Line I divides the total savings in half so that the number is comparable to the Company's number, which reflects 50% of the projected savings from the buyout. Net savings to the Company are about $147 million, somewhat less than the Company's $172 million claim.

Q. Did you estimate the effect on the market in LRZ 7 of shutting the Palisades plant down?

A. Yes. Removing the Palisades plant raises energy prices in LRZ 7 by $0.40/MWh and capacity prices by the equivalent of $0.11/MWh, for a total impact of $0.51/MWh on a levelized basis between October 1, 2018 and April 12, 2022. The Company did not estimate the effect on capacity prices. Congestion impacts are reflected in my estimates to the extent that I have modeled transmission limits. Multiplying $0.51/MWh by the Company's estimate of its purchases (See Blumenstock's testimony, p. 13, line 16, prorated over October 1, 2018 to April 12, 2022) indicates that shutting the plant down raises the Company's costs by about $13,000,000.

b. Methodology

Q. How did you use xmp to estimate wholesale market prices in Michigan?

A. I simulated expansion, retirement, and operation of generating resources and demand-side management (DSM) programs throughout much of the central and eastern United States and Canada, along with wholesale transactions of non-firm energy. EPIS' North American database defines many "areas" in the Eastern Interconnection Grid that may be grouped into "zones" which, in turn, may be joined together to form "operating pools." When two areas are in the same zone, there is assumed to be unlimited transfer capability between them. When I put two zones in the same operating pool, generators in each zone are available at cost for commitment and dispatch to serve loads in the other zone, looking up to a week forward, and subject to physical flow limits and transmission fees between the two zones. Operations include dispatch of existing resources at the zonal level and wholesale transactions of non-firm energy between areas in different zones, which may also be in different operating pools.

Generation and DSM are acquired and retired to meet planning reserve requirements of 15.80 percent for MISO as a whole, its required reserve margin, 15.47 percent for the area comprised of the service territories of Consumers Energy and DTE Energy (LRZ 7), 15.34 percent for MISO Central (LRZs 4,5, and 6), 15.15 percent for MISO North (LRZs 1,2, and 3),

and 14.46 percent for MISO South (LRZs 8, 9, and 10), based on average coincidence factors between 2010 and 2015 of 0.98, 0.97, 0.96, and 0.92, respectively. I did not allow xmp to "build" any new generation before 2020, I did not allow it to build any IGCC coal before 2021, and I did not allow it to build any nuclear generation before 2022. xmp does not build any generation endogenously in any of the three cases in Local Resource Zone 7, but Exhibit S2.3 shows the additions and retirements that occur in the base case:

Q. Why did you not allow xmp to build any new generation before 2020 or nuclear generation before 2022?

A. I did not allow xmp to build any new generation before 2020 because as a practical matter new generation cannot be ready in 2018 or 2019 due to the required regulatory approvals, permitting, siting, generation interconnection agreements, MTEP queue processes, and actual construction time. This process takes longer for new nuclear generation, so I did not allow xmp to build any new nuclear units until 2022.

Q. How does the model limit transfer of power between zones?

A. Transfers between zones are subject to limits that, somewhat roughly, reflect the functional capacity of transmission facilities. No such limits are imposed on transactions between areas in the same zone.

3. The "Base Case" and its Variants

Q. Under what conditions do you forecast wholesale prices for capacity and energy in Michigan?

A. I forecast capacity and energy prices under base case, high, and low fuel prices. In the base case, I assume that fuel prices will follow a trajectory based on the New York Mercantile Exchange (NYMEX) futures strip for Henry Hub natural gas through 2018, and based on the EIA's AEO reference case thereafter.

Exhibit S2.4 is arranged similarly to Blumenstock's RTB-4, but I have added a column showing the Michcon citygate natural gas price, and I have substituted my corresponding forecast of the market energy price, the market capacity price, and the resulting calculated values for the cost of the power needed to replace the PPA. I have also extended the positive capacity values from the PPA through Planning Year 2021-22. The resulting present market value over the course of the buyout period is $1,087,060,709, 9.1 percent higher than Blumenstock's.

Exhibit S2.5 shows the calculation of the market value of the power needed to replace the PPA under fuel prices based on the EIA's low oil and gas resource and technology case, in which fuel prices are higher than in the base case. Michcon citygate natural gas prices are again shown in the second column and can be compared to those in Exhibit S2.4. Associated market energy and capacity prices and resulting calculated market values support a

net present value of replacement power of $1,150,513,886 which is $63,453,177, or 5.8 percent, higher than in the base case. High fuel prices have the potential to increase the cost of replacing the power from the PPA and, therefore, to reduce the savings associated with its cancellation.

If one is to consider the possible impact of high fuel prices, one must also consider the possible impact of low fuel prices. Exhibit S2.6 shows the market value calculation under low fuel prices, based on the EIA's high oil and gas resource and technology case. The net present market value of the power needed to replace the power from the PPA is $17,341,502, or 1.6 percent, less than in the base case. Assuming the low fuel price case is as likely as the high fuel price case, low fuel prices have less potential impact on power prices going forward than do high fuel prices. I attribute this asymmetry to the recent, already historically low levels of fuel prices.

The net impact of these variants to the base case on the value of savings from cancellation of the PPA is discussed in Section 2a, above, with reference to Table 1.

Q. How did you model regulation of emissions?

A. The xmp database categorizes generators by plant type and assigns emissions rates per megawatt hour generated. It then applies forecasted prices for emissions allowances under the Regional Greenhouse Gas Initiative for CO_2 and the Cross State Air Pollution Rule for SO_2 and NOx. I

also modeled the Clean Power Plan, but I have it beginning implementation in 2022, so it has little effect on my results.

Q. Is there a chance that actual market outcomes will differ from your forecast?

A. Of course. Both my forecast and the Company's forecast are made under uncertainty. Like any forecast, my forecast is based on assumptions about the future. If any of the input assumptions the Company or I have made turn out to differ from realized values, actual market outcomes will also differ from the forecast. Unlike the Company, however, I have taken into account the possibility that the actual price of fuel will differ from its expected price, and doing so has lowered the projected benefits of the buyout.

Q. Do you conclude that the proposed buyout is reasonable?

A. My testimony is not intended to answer that question, but rather to provide analysis of the Company's market forecast and an alternate forecast of the market. The question whether the buyout is reasonable cannot be answered on the basis of a market forecast alone, without consideration of other factors that my testimony does not address.

Q. Does this conclude your direct testimony?

A. Yes.

Appendix: Curriculum Vita
Marc H. Vatter

9 Underhill Street, Nashua, New Hampshire 03060-4060, USA
marc@appliedecon.net; 603.402.3433

EDUCATION

Ph.D. in Economics, Brown University, Providence, RI, 2006
M.A. in Economics, Brown University, Providence, RI, 1999
B.A. in Economics with departmental honors, University of Oregon, Eugene, OR, 1986

CONSULTING EXPERIENCE

Economist, affiliated with Economic Insight, Inc., Oregon, Birch Energy Economics, Idaho, and now based in Nashua, New Hampshire, February 2010 – present

- Recent Work in Newly Restructured Wholesale Power Market in Mexico
    - Used xmp to model expansion and operation of wholesale power grid for independent generators
    - Estimated Herfindahl-Hirschman indices of market concentration
    - Forecasted hourly loads and prices for power
    - Developed methodology and forecasted prices for clean energy certificates,
    - Developed methodology and forecasted prices for ancillary services
    - Adapted methodology and forecasted costs of congestion in a "zonal" model
- Used xmp to model electric resource planning in the Pacific Northwest
- Used xmp to estimate trade benefits of Entergy and South Mississippi Electric Power Association joining regional transmission organizations, sponsored testimony before the Mississippi Public Service Commission (MPSC)
- Assessed application to install pollution controls on a coal plant and testified before the MPSC
- Analyzed issues regarding pricing and royalties in geothermal and natural gas leases in California and Texas;
- Analyzed pricing and alleged use of market power in California power crisis
- Edited several scholarly articles written by non-native speakers of English
- Estimated lost earnings in a wrongful death lawsuit and testified to report

Assistant consulting economist to personal injury and wrongful death litigants, Allan M. Feldman, Providence, RI, 2002-2003

- Worklife evaluation for litigation related to personal injury or wrongful death

Research Associate, Synapse Energy Economics, Cambridge, MA, July 1998 - February 1999

- Evaluated forecasts of electricity prices submitted in "stranded-cost" claim by four Maryland utilities

Associate Economist, Economic Insight, Portland, OR, May 1988 - September 1988

- Surveyed forecasts of electricity prices and estimates of demand elasticities related to litigation over Washington Public Power Supply System bond defaults

Technical Assistant, ECO Northwest, Eugene, OR, July 1986 - August 1987

- Worklife evaluation for litigation related to personal injury and wrongful death; wrote company training manual on the subject

GOVERNMENTAL EXPERIENCE

Associate Economist, New York Department of Public Service, Albany, NY, August 2006 - December 2007

- Projects in energy conservation and pollution control

Industry Economist, Bonneville Power Administration, Portland, OR, May 1994 - June 1997

- Authored and testified to marginal cost analysis in 1996 rate case
    - Helped prepare inputs to and interpreted and applied results of Power Marketing Decision Analysis Model (PMDAM) to rate design and to planning and evaluation of generation and conservation resources
    - Prepared and conducted public meetings on analysis and its implications for rate design
    - Fielded and incorporated comments from a variety of participants
    - Authored rate case study, documentation, and testimony

Public Utilities Specialist, Bonneville Power Administration, Portland, OR, September 1988 - May 1994

- Conducted research on marginal costs of generating and marketing hydropower on the West Coast
- Prepared workshop briefing material, rate case studies, and documentation supporting Marginal Cost Analysis and other rate-related issues as assigned
- Evaluated contracts for disposition of wholesale power

ACADEMIC EXPERIENCE

Visiting Assistant Professor of Economics, Universidad del Pacifico, Jesús María, Lima, Peru, September 2014

- Taught topical graduate course in Energy Economics

Academic Editor in Economics, part-time, web-based, April 2013 - present

- Editing scholarly research written by non-native speakers of English

Visiting Assistant Professor of Economics, Pacific University, Forest Grove, OR, August 2008 - May 2009

- Taught principles of microeconomics, environmental economics, and international trade

Lecturer in Economics, Eastern Connecticut State University, Willimantic, CT, August 2005 - May 2006

- Taught principles of microeconomics

Teaching Assistant to Harl Ryder and others, Brown University, Providence, RI, September 1999 - May 2002

- Teaching Assistant for Principles of Micro- and Macroeconomics

Teacher, English as a Second Language, Changsha Normal University of Water Resources and Electric Power, Changsha, Hunan, PRC, August 1987 - January 1988, Brown University, Providence, RI, Summer 2001

RESEARCH

Title	Status	Availability
OPEC's Kinked Demand Curve	*Energy Economics* 63, March 2017, pp. 272–287	http://www.sciencedirect.com/science/article/pii/S0140988317300646
Macroeconomic Risk and Residential Rate Design	IAEE Working Paper No. 15-208; under review	http://ssrn.com/abstract=2596258
Social Discounting with Diminishing Returns on Investment	Under review	http://ssrn.com/abstract=1078502
The Impact of International Trade on Electric Loads in Mexico	IAEE Working Paper No. 17-301 Scheduled for presentation at 40th Annual IAEE International Conference, Singapore, June, 2017; under review	http://ssrn.com/abstract=2928817
Stockpiling to Contain OPEC	Dissertation chapter; presented at 12/08 conference of International Association for Energy Economics	http://ssrn.com/abstract=912311
OPEC's Demand Curve	Dissertation chapter; reviewed at http://knowledgeproblem.com/2008/05/14/	http://ssrn.com/abstract=1127642
The Cause and Effect of Exclusionary Zoning in Central Cities	Dissertation chapter; under review	http://ssrn.com/abstract=636962

Research Assistant to Allan M. Feldman, valuation of individual earning capacity, Brown University, 2000
Research Assistant to J. Vernon Henderson, industrial location in Indonesia, Brown University, Summer 1999

AWARDS

- Twelve monetary awards for job performance at Bonneville Power Administration
- Award for best undergraduate research project in economics at University of Oregon; examined deregulation of U.S. airline industry

OTHER ACTIVITIES

Peer Reviewer for *Land Economics*: effects of endowments of petroleum resources on corruption, 2008; hedging in coal contracts under the acid rain program, 2010-11; suburban agriculture as an amenity, 2012; prorationing versus unitization in the U.S. petroleum industry in the 20th century
Founded and Managed "Micro Lunch" seminar, Brown University, 2001-2002
Role of Expert Witness in Lewis & Clark Law School's mock personal-injury litigation, 1996
Peer Advisor, Department of Economics, University of Oregon, 1984-1986

MEMBERSHIPS

American Economic Association; Association for Christian Economists; International and United States Associations for Energy Economics; Northeast Energy and Commerce Association; National Association of Forensic Economics; Editorial Freelancers Association

Staff Exhibit S-2.1

Founded in 1852
by Sidney Davy Miller

MILLER CANFIELD

MICHIGAN: Ann Arbor
Detroit • Grand Rapids
Kalamazoo • Lansing • Troy

FLORIDA: Tampa
ILLINOIS: Chicago
NEW YORK: New York
CANADA: Windsor
CHINA: Shanghai
MEXICO: Monterrey
POLAND: Gdynia
Warsaw • Wrocław

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March 30, 2017

Lauren D. Donofrio
Michigan Public Service Commission
7109 W. Saginaw Highway, 3rd Floor
Lansing, MI 48917

Re: Consumers Energy Company
MPSC Case No. U-18250

Dear Ms. Donofrio:

Enclosed please find Consumers Energy Company's Partial Responses to Staff's Third Set of Discovery Requests in the above-mentioned case.

If you should have any questions, please kindly advise.

Very truly yours,

Miller, Canfield, Paddock and Stone, P.L.C.

By: _____
Paul Michael Collins

PMC/cla
cc: Shaun M. Johnson
Bret A. Totoraitis
Robert W. Beach
Timothy J. Sparks
Michael A. Torrey
Venkat D Rao

28792306.1\018544-00096

18250-ST-CE-07:

The following requests refer to the testimony of Richard T. Blumenstock, at page 4, lines through 13:

a. Please confirm that in RTB-4, you have assumed that the cost of replacing capacity provided under the PPA during the 2021-22 planning year is zero because 1) the PPA stipulates that capacity must satisfy the resource adequacy requirements in Module E of the MISO Tariff, 2) MISO requires that capacity used to meet Planning Resource Margin Requirements be offered into the energy and ancillary service markets for each hour of each day for the entire planning year, and 3) the PPA does not provide capacity in May of 2022. If not, why not?

b. Does the MISO requirement allow for planned maintenance and forced outages?

c. Please confirm that the PPA provides 780.1 ZRC of capacity from June 2021 through April of 2022. If not, why not?

d. Please confirm that MISO load peaks in July or August, and Consumers Energy load peaks in July. If not, why not?

e. Could the Company combine the capacity provided under the PPA from June to April with another resource that provides capacity in May to meet MISO's Planning Resource Margin Requirements? If yes, please explain and identify the resource. If not, why not?

f. Can the Company obtain replacement capacity that is available June through April at a price of zero?

Response:

a. Exhibit A-4 does not assume the cost of replacing capacity during the 2021/22 Planning Year is zero. It does assume that Consumers Energy ("the Company") will not receive capacity from Entergy Nuclear Power Marketing, LLC from the Palisades Nuclear Plant because the Palisades Power Purchase Agreement does not provide for capacity from April 12, 2022 through May 31, 2022 and Midcontinent Independent System Operator, Inc. ("MISO") requires capacity resources to be available for the entire Planning Year.

b. Yes.

c. This statement is not confirmed. See part a of this discovery response.

d. This statement is not confirmed. The Company has experienced peak load events in June, July, and August.

e. Yes. The Company would need to secure capacity through a bilateral agreement or resource purchase covering the period April 12 to May 31. Such an agreement or resource purchase has not been identified.

f. Yes, provided there is a willing seller that is amenable to accepting no payment for its capacity, which the Company believes is highly unlikely.

Richard T. Blumenstock

Richard T. Blumenstock
March 30, 2017

Marc Vatter

From: "Van-Wagener, Dana" <Dana.Van-Wagener@eia.gov>
Date: Thursday, February 23, 2017 7:56 AM
To: "Marc Vatter" <marc@appliedecon.net>
Cc: "Skelly, Daniel" <Daniel.Skelly@eia.gov>
Subject: RE: LIkelihoods of Side Cases

Marc,

Dan is correct—we do not estimate the likelihood of the resource assumptions. Estimates of technically recoverable tight/shale crude oil and natural gas resources are particularly uncertain and change over time as new information is gained through drilling, production, and technology experimentation. The resource cases show the sensitivity of the AEO2017 projections to changes in assumptions regarding domestic crude oil and natural gas resources and technological progress. These cases do not represent a confidence interval for future domestic oil and natural gas supply, but rather provide a framework to examine the effects of higher and lower domestic supply on energy demand, imports, and prices.

Dana

From: Skelly, Daniel
Sent: Thursday, February 23, 2017 7:41 AM
To: Marc Vatter <marc@appliedecon.net>
Cc: Van-Wagener, Dana <Dana.Van-Wagener@eia.gov>
Subject: RE: LIkelihoods of Side Cases

Marc,

We do not assess probabilities of our AEO scenarios, and I am unaware of any estimates of the likelihoods of the resource assumptions in those cases. I will copy this message to our analyst, Dana Van-Wagener, who was responsible for implementing those cases, for possible further comment.

Dan

From: Marc Vatter [mailto:marc@appliedecon.net]
Sent: Wednesday, February 22, 2017 9:43 PM
To: Skelly, Daniel <Daniel.Skelly@eia.gov>
Subject: LIkelihoods of Side Cases

Hi Daniel,

In the AEO, what are the likelihoods of the high and low oil and gas resource and technology cases relative to the reference case?

Thank you,
Marc Vatter
603.402.3433 (land)
503.227.1994 (cell)
appliedecon.net

Exhibit S-2.3: Base Case Additions and Retirements in Local Resource Zone 7

Name	Utility	Heat Rate	Heat Rate at Minimum	Capacity	Fuel	Begin Date	End Date
		Btu/kWh	Btu/kWh	MW			
(Exogenously-Specified) Additions							
CE New Wind 1	Consumers Energy			44	Wind	7/1/2017	
DTE New Solar 1	Detroit Edison			45	Sun	7/1/2017	
DTE New Solar 2	Detroit Edison			5	Sun	7/1/2017	
DTE New Wind	Detroit Edison			161.3	Wind	7/1/2018	
CE New Wind 2	Consumers Energy			73	Wind	7/1/2019	
Exogenously-Specified Retirements							
Palisades #1	Consumers Energy	10,367		803	Uranium	12/31/1971	9/30/2018
Eckert Station #1	Lansing City of	11,961	13,877	41.8	Coal	6/1/1954	7/1/2020
Eckert Station #3	Lansing City of	9,335	13,099	43.2	Coal	6/1/1960	7/1/2020
Eckert Station #4	Lansing City of	11,422	12,600	74.2	Coal	12/1/1964	7/1/2020
Eckert Station #5	Lansing City of	11,283	12,900	79.3	Coal	6/1/1968	7/1/2020
Eckert Station #6	Lansing City of	12,540	12,700	75.1	Coal	8/1/1970	7/1/2020
River Rouge #3	Detroit Edison Co	9,085	10,700	280	Coal	10/1/1958	7/1/2020
St Clair #1	Detroit Edison Co	9,413	11,500	158	Coal	8/1/1953	7/1/2022
St Clair #2	Detroit Edison Co	8,912	11,900	162	Coal	11/1/1953	7/1/2022
St Clair #3	Detroit Edison Co	9,649	11,800	171	Coal	6/1/1954	7/1/2022
St Clair #4	Detroit Edison Co	9,129	11,500	158	Coal	10/1/1954	7/1/2022
Wyandotte #5	Wyandotte Municipal Serv Comm	12,000	14,400	24	Coal	1/1/1958	7/1/2022
Endogenous Retirements							
Wyandotte #4	Wyandotte Municipal Serv Comm	14,200	17,040	11.5	Coal	1/1/1948	12/31/2018
Wyandotte #6	Wyandotte Municipal Serv Comm	14,200	17,040	7.5	Coal	1/1/1969	12/31/2019
Wyandotte #7	Wyandotte Municipal Serv Comm	10,665	12,798	32	Coal	7/1/1986	12/31/2022

Exhibit S-2.4: Base Case Market Value Calculation

Month	Michcon Citygate NG Price	Palisades Plant Generation	Market Energy Price	Market Energy Value	Palisades Plant Capacity	Market Capacity Price	Market Capacity Value	Market Value
(yy-mmm)	$/mmBTU	(MWh)	($/MWh)	($)	(ZRC)	($/ZRC-Month)	($)	($)
18-Jun	3.03	543,960	$35.23	$19,165,580	780.1	$3,988	$3,111,074	$22,276,654
18-Jul	3.07	558,372	$42.27	$23,605,077	780.1	$3,988	$3,111,074	$26,716,151
18-Aug	3.06	556,140	$38.34	$21,322,221	780.1	$3,988	$3,111,074	$24,433,295
18-Sep	3.07	552,024	$33.67	$18,584,889	780.1	$3,988	$3,111,074	$21,695,962
18-Oct	3.04	583,147	$33.54	$19,558,842	780.1	$3,988	$3,111,074	$22,669,916
18-Nov	3.12	570,744	$34.21	$19,524,041	780.1	$3,988	$3,111,074	$22,635,115
18-Dec	3.26	600,631	$34.59	$20,776,841	780.1	$3,988	$3,111,074	$23,887,915
19-Jan	4.07	602,863	$38.61	$23,277,155	780.1	$3,870	$3,018,977	$26,296,132
19-Feb	5.68	543,178	$40.62	$22,066,397	780.1	$3,870	$3,018,977	$25,085,374
19-Mar	5.16	589,769	$38.29	$22,580,105	780.1	$3,870	$3,018,977	$25,599,082
19-Apr	3.29	564,984	$35.19	$19,882,397	780.1	$3,870	$3,018,977	$22,901,374
19-May	3.25	578,683	$35.01	$20,262,369	780.1	$3,870	$3,018,977	$23,281,346
19-Jun	3.21	543,960	$37.08	$20,168,503	780.1	$3,870	$3,018,977	$23,187,480
19-Jul	3.25	558,372	$45.32	$25,305,425	780.1	$3,870	$3,018,977	$28,324,402
19-Aug	3.30	556,140	$40.38	$22,454,212	780.1	$3,870	$3,018,977	$25,473,189
19-Sep	3.35	552,024	$35.69	$19,703,895	780.1	$3,870	$3,018,977	$22,722,872
19-Oct	3.34	583,147	$35.39	$20,637,456	780.1	$3,870	$3,018,977	$23,656,433
19-Nov	3.46	570,744	$35.54	$20,283,165	780.1	$3,870	$3,018,977	$23,302,142
19-Dec	3.65	600,631	$36.24	$21,765,054	780.1	$3,870	$3,018,977	$24,784,031
20-Jan	4.57	602,863	$40.24	$24,256,527	780.1	$4,247	$3,312,811	$27,569,338
20-Feb	6.23	562,577	$41.61	$23,411,079	780.1	$4,247	$3,312,811	$26,723,890
20-Mar	5.69	589,769	$39.79	$23,467,858	780.1	$4,247	$3,312,811	$26,780,669
20-Apr	3.80	564,984	$37.17	$20,999,777	780.1	$4,247	$3,312,811	$24,312,588
20-May	3.79	578,683	$36.74	$21,258,389	780.1	$4,247	$3,312,811	$24,571,200
20-Jun	3.76	543,960	$38.76	$21,085,090	780.1	$4,247	$3,312,811	$24,397,901
20-Jul	3.81	558,372	$46.63	$26,039,251	780.1	$4,247	$3,312,811	$29,352,062
20-Aug	3.91	556,140	$41.14	$22,879,238	780.1	$4,247	$3,312,811	$26,192,049
20-Sep	3.95	552,024	$37.17	$20,520,864	780.1	$4,247	$3,312,811	$23,833,675
20-Oct	3.92	583,147	$36.65	$21,372,883	780.1	$4,247	$3,312,811	$24,685,694
20-Nov	4.05	570,744	$37.41	$21,350,490	780.1	$4,247	$3,312,811	$24,663,301
20-Dec	4.25	600,631	$37.84	$22,729,868	780.1	$4,247	$3,312,811	$26,042,679
21-Jan	4.88	602,863	$41.21	$24,843,990	780.1	$4,497	$3,508,227	$28,352,217
21-Feb	6.54	543,178	$42.94	$23,324,960	780.1	$4,497	$3,508,227	$26,833,187
21-Mar	5.96	589,769	$40.96	$24,154,546	780.1	$4,497	$3,508,227	$27,662,773
21-Apr	3.91	564,984	$38.00	$21,471,722	780.1	$4,497	$3,508,227	$24,979,949
21-May	3.86	578,683	$37.96	$21,965,577	780.1	$4,497	$3,508,227	$25,473,804
21-Jun	3.81	543,960	$39.55	$21,512,881	780.1	$4,497	$3,508,227	$25,021,108
21-Jul	3.83	558,372	$46.08	$25,727,693	780.1	$4,497	$3,508,227	$29,235,921
21-Aug	3.90	556,140	$41.13	$22,875,358	780.1	$4,497	$3,508,227	$26,383,585
21-Sep	3.93	552,024	$37.71	$20,815,426	780.1	$4,497	$3,508,227	$24,323,653
21-Oct	3.91	583,147	$37.58	$21,917,178	780.1	$4,497	$3,508,227	$25,425,405
21-Nov	4.03	570,744	$38.27	$21,840,840	780.1	$4,497	$3,508,227	$25,349,067
21-Dec	4.25	600,631	$38.62	$23,197,546	780.1	$4,497	$3,508,227	$26,705,774
22-Jan	4.89	602,863	$42.03	$25,341,292	780.1	$4,597	$3,586,099	$28,927,391
22-Feb	6.59	543,178	$43.35	$23,546,268	780.1	$4,597	$3,586,099	$27,132,367
22-Mar	5.99	589,769	$41.32	$24,370,028	780.1	$4,597	$3,586,099	$27,956,126
22-Apr	3.89	207,161	$38.08	$7,887,918	312.04	$4,597	$1,434,440	$9,322,357
Net Present Value (4% annual discount rate)								$1,087,060,709

Exhibit S-2.5: High Fuel Price Market Value Calculation

Month	Michcon Citygate NG Price	Palisades Plant Generation	Market Energy Price	Market Energy Value	Palisades Plant Capacity	Market Capacity Price	Market Capacity Value	Market Value
(yy-mmm)	$/mmBTU	(MWh)	($/MWh)	($)	(ZRC)	($/ZRC-Month)	($)	($)
18-Jun	3.20	543,960	$35.62	$19,378,382	780.1	$4,440	$3,464,005	$22,842,387
18-Jul	3.25	558,372	$42.96	$23,988,372	780.1	$4,440	$3,464,005	$27,452,377
18-Aug	3.24	556,140	$38.82	$21,591,164	780.1	$4,440	$3,464,005	$25,055,169
18-Sep	3.25	552,024	$34.06	$18,800,414	780.1	$4,440	$3,464,005	$22,264,418
18-Oct	3.21	583,147	$34.08	$19,873,953	780.1	$4,440	$3,464,005	$23,337,958
18-Nov	3.29	570,744	$34.52	$19,702,431	780.1	$4,440	$3,464,005	$23,166,436
18-Dec	3.44	600,631	$34.83	$20,918,110	780.1	$4,440	$3,464,005	$24,382,114
19-Jan	4.39	602,863	$39.63	$23,889,221	780.1	$4,547	$3,547,062	$27,436,283
19-Feb	5.99	543,178	$41.75	$22,677,130	780.1	$4,547	$3,547,062	$26,224,192
19-Mar	5.47	589,769	$38.89	$22,935,979	780.1	$4,547	$3,547,062	$26,483,040
19-Apr	3.57	564,984	$35.63	$20,128,612	780.1	$4,547	$3,547,062	$23,675,673
19-May	3.52	578,683	$35.58	$20,589,223	780.1	$4,547	$3,547,062	$24,136,284
19-Jun	3.48	543,960	$37.64	$20,472,569	780.1	$4,547	$3,547,062	$24,019,630
19-Jul	3.53	558,372	$46.37	$25,891,245	780.1	$4,547	$3,547,062	$29,438,306
19-Aug	3.59	556,140	$41.26	$22,948,238	780.1	$4,547	$3,547,062	$26,495,300
19-Sep	3.64	552,024	$36.24	$20,005,357	780.1	$4,547	$3,547,062	$23,552,419
19-Oct	3.63	583,147	$36.01	$21,000,522	780.1	$4,547	$3,547,062	$24,547,583
19-Nov	3.76	570,744	$36.10	$20,605,277	780.1	$4,547	$3,547,062	$24,152,339
19-Dec	3.96	600,631	$36.77	$22,087,136	780.1	$4,547	$3,547,062	$25,634,198
20-Jan	5.13	602,863	$42.62	$25,694,556	780.1	$4,639	$3,619,193	$29,313,750
20-Feb	6.77	562,577	$43.98	$24,741,473	780.1	$4,639	$3,619,193	$28,360,666
20-Mar	6.24	589,769	$41.27	$24,336,847	780.1	$4,639	$3,619,193	$27,956,041
20-Apr	4.29	564,984	$38.31	$21,643,258	780.1	$4,639	$3,619,193	$25,262,451
20-May	4.29	578,683	$37.76	$21,850,028	780.1	$4,639	$3,619,193	$25,469,222
20-Jun	4.26	543,960	$40.16	$21,845,593	780.1	$4,639	$3,619,193	$25,464,787
20-Jul	4.33	558,372	$49.59	$27,691,231	780.1	$4,639	$3,619,193	$31,310,424
20-Aug	4.43	556,140	$43.45	$24,163,760	780.1	$4,639	$3,619,193	$27,782,954
20-Sep	4.47	552,024	$38.42	$21,207,706	780.1	$4,639	$3,619,193	$24,826,899
20-Oct	4.45	583,147	$38.02	$22,170,584	780.1	$4,639	$3,619,193	$25,789,778
20-Nov	4.58	570,744	$39.11	$22,322,804	780.1	$4,639	$3,619,193	$25,941,997
20-Dec	4.81	600,631	$39.69	$23,837,160	780.1	$4,639	$3,619,193	$27,456,354
21-Jan	5.76	602,863	$45.73	$27,566,262	780.1	$4,878	$3,805,678	$31,371,940
21-Feb	7.41	543,178	$47.53	$25,817,013	780.1	$4,878	$3,805,678	$29,622,692
21-Mar	6.79	589,769	$44.07	$25,993,570	780.1	$4,878	$3,805,678	$29,799,248
21-Apr	4.65	564,984	$40.16	$22,687,988	780.1	$4,878	$3,805,678	$26,493,666
21-May	4.60	578,683	$39.73	$22,990,954	780.1	$4,878	$3,805,678	$26,796,632
21-Jun	4.56	543,960	$42.08	$22,887,894	780.1	$4,878	$3,805,678	$26,693,572
21-Jul	4.58	558,372	$50.81	$28,368,831	780.1	$4,878	$3,805,678	$32,174,509
21-Aug	4.66	556,140	$44.85	$24,940,294	780.1	$4,878	$3,805,678	$28,745,973
21-Sep	4.70	552,024	$39.86	$22,002,812	780.1	$4,878	$3,805,678	$25,808,490
21-Oct	4.67	583,147	$40.17	$23,425,796	780.1	$4,878	$3,805,678	$27,231,475
21-Nov	4.81	570,744	$40.71	$23,232,271	780.1	$4,878	$3,805,678	$27,037,950
21-Dec	5.07	600,631	$40.99	$24,616,871	780.1	$4,878	$3,805,678	$28,422,549
22-Jan	6.30	602,863	$49.89	$30,076,037	780.1	$5,051	$3,940,047	$34,016,084
22-Feb	7.97	543,178	$51.40	$27,921,014	780.1	$5,051	$3,940,047	$31,861,061
22-Mar	7.35	589,769	$46.84	$27,624,782	780.1	$5,051	$3,940,047	$31,564,830
22-Apr	5.08	207,161	$42.53	$8,810,445	312.04	$5,051	$1,576,019	$10,386,464
Net Present Value (4% annual discount rate)								$1,150,513,886

Exhibit S-2.6: Low Fuel Price Market Value Calculation

Month	Michcon Citygate NG Price	Palisades Plant Generation	Market Energy Price	Market Energy Value	Palisades Plant Capacity	Market Capacity Price	Market Capacity Value	Market Value
(yy-mmm)	$/mmBTU	(MWh)	($/MWh)	($)	(ZRC)	(S/ZRC-Month)	($)	($)
18-Jun	2.85	543,960	$34.80	$18,931,554	780.1	$4,201	$3,276,958	$22,208,512
18-Jul	2.90	558,372	$41.67	$23,266,706	780.1	$4,201	$3,276,958	$26,543,665
18-Aug	2.89	556,140	$37.84	$21,043,845	780.1	$4,201	$3,276,958	$24,320,804
18-Sep	2.90	552,024	$33.35	$18,411,739	780.1	$4,201	$3,276,958	$21,688,698
18-Oct	2.86	583,147	$33.01	$19,247,035	780.1	$4,201	$3,276,958	$22,523,993
18-Nov	2.95	570,744	$33.90	$19,346,154	780.1	$4,201	$3,276,958	$22,623,112
18-Dec	3.07	600,631	$34.28	$20,590,544	780.1	$4,201	$3,276,958	$23,867,502
19-Jan	3.74	602,863	$37.76	$22,761,181	780.1	$4,344	$3,388,557	$26,149,737
19-Feb	5.36	543,178	$39.60	$21,509,686	780.1	$4,344	$3,388,557	$24,898,242
19-Mar	4.85	589,769	$37.64	$22,196,888	780.1	$4,344	$3,388,557	$25,585,445
19-Apr	3.02	564,984	$34.69	$19,600,206	780.1	$4,344	$3,388,557	$22,988,762
19-May	2.97	578,683	$34.44	$19,929,168	780.1	$4,344	$3,388,557	$23,317,725
19-Jun	2.92	543,960	$36.42	$19,809,815	780.1	$4,344	$3,388,557	$23,198,371
19-Jul	2.96	558,372	$44.33	$24,750,118	780.1	$4,344	$3,388,557	$28,138,675
19-Aug	3.02	556,140	$39.59	$22,017,282	780.1	$4,344	$3,388,557	$25,405,839
19-Sep	3.07	552,024	$35.13	$19,393,214	780.1	$4,344	$3,388,557	$22,781,771
19-Oct	3.04	583,147	$34.64	$20,200,534	780.1	$4,344	$3,388,557	$23,589,091
19-Nov	3.16	570,744	$35.10	$20,032,702	780.1	$4,344	$3,388,557	$23,421,259
19-Dec	3.33	600,631	$35.78	$21,491,672	780.1	$4,344	$3,388,557	$24,880,228
20-Jan	3.94	602,863	$38.83	$23,407,352	780.1	$4,423	$3,450,178	$26,857,531
20-Feb	5.59	562,577	$40.19	$22,611,091	780.1	$4,423	$3,450,178	$26,061,270
20-Mar	5.07	589,769	$38.40	$22,645,191	780.1	$4,423	$3,450,178	$26,095,370
20-Apr	3.24	564,984	$36.00	$20,340,903	780.1	$4,423	$3,450,178	$23,791,081
20-May	3.22	578,683	$35.56	$20,579,669	780.1	$4,423	$3,450,178	$24,029,847
20-Jun	3.19	543,960	$37.59	$20,448,743	780.1	$4,423	$3,450,178	$23,898,922
20-Jul	3.23	558,372	$44.56	$24,880,403	780.1	$4,423	$3,450,178	$28,330,582
20-Aug	3.31	556,140	$39.32	$21,864,839	780.1	$4,423	$3,450,178	$25,315,017
20-Sep	3.35	552,024	$35.96	$19,851,162	780.1	$4,423	$3,450,178	$23,301,340
20-Oct	3.33	583,147	$35.13	$20,486,271	780.1	$4,423	$3,450,178	$23,936,449
20-Nov	3.42	570,744	$36.05	$20,577,483	780.1	$4,423	$3,450,178	$24,027,661
20-Dec	3.61	600,631	$36.80	$22,106,000	780.1	$4,423	$3,450,178	$25,556,178
21-Jan	4.03	602,863	$39.49	$23,806,638	780.1	$4,746	$3,702,372	$27,509,010
21-Feb	5.71	543,178	$41.33	$22,449,533	780.1	$4,746	$3,702,372	$26,151,905
21-Mar	5.13	589,769	$39.46	$23,273,057	780.1	$4,746	$3,702,372	$26,975,429
21-Apr	3.18	564,984	$36.62	$20,687,997	780.1	$4,746	$3,702,372	$24,390,369
21-May	3.13	578,683	$36.59	$21,171,783	780.1	$4,746	$3,702,372	$24,874,155
21-Jun	3.08	543,960	$38.27	$20,815,146	780.1	$4,746	$3,702,372	$24,517,518
21-Jul	3.10	558,372	$43.90	$24,511,918	780.1	$4,746	$3,702,372	$28,214,290
21-Aug	3.16	556,140	$39.45	$21,937,969	780.1	$4,746	$3,702,372	$25,640,341
21-Sep	3.20	552,024	$36.24	$20,006,448	780.1	$4,746	$3,702,372	$23,708,820
21-Oct	3.16	583,147	$36.00	$20,991,535	780.1	$4,746	$3,702,372	$24,693,907
21-Nov	3.27	570,744	$36.53	$20,851,392	780.1	$4,746	$3,702,372	$24,553,764
21-Dec	3.45	600,631	$37.15	$22,315,935	780.1	$4,746	$3,702,372	$26,018,308
22-Jan	3.97	602,863	$40.39	$24,352,007	780.1	$4,902	$3,824,305	$28,176,312
22-Feb	5.68	543,178	$42.06	$22,843,695	780.1	$4,902	$3,824,305	$26,668,000
22-Mar	5.09	589,769	$39.85	$23,505,038	780.1	$4,902	$3,824,305	$27,329,343
22-Apr	3.11	207,161	$36.57	$7,575,106	312.04	$4,902	$1,529,722	$9,104,828
Net Present Value (4% annual discount rate)								$1,069,719,207

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the application of
CONSUMERS ENERGY COMPANY
for a financing order approving the
securitization of qualified costs and related
approvals.
_____/

Case No. **U-18250**
(e-file paperless)

PROOF OF SERVICE

STATE OF MICHIGAN)
) ss
COUNTY OF EATON)

CORINNA C. SWAFFORD, being first duly sworn, deposes and says that on **May 16, 2017,** she served a true copy of the **Qualifications and Direct Testimony of Marc H. Vatter on behalf of the MPSC Staff** upon the following parties **via e-mail only:**

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Corinna C. Swafford

CORINNA C. SWAFFORD

Subscribed and sworn to before me
this **16th** day of **May, 2017.**

Tina L. Bibbs, Notary Public
State of Michigan, County of Clinton
Acting in the County of Eaton
My Commission Expires: 11-13-2021