



THE
RUNNING WISE
LAW FIRM

FORD • CONLON • GERBERDING • GRIER

October 28, 2021

Ms. Lisa Felice, Executive Secretary
Michigan Public Service Commission
7109 W. Saginaw Hwy.
Lansing, MI 48917

RE: MPSC Docket No. U-21090

Dear Ms. Felice:

Attached for filing in the above-referenced matter, please find the **Public Version** of the **Direct Testimony and Exhibits of Richard A. Polich, P.E.** on behalf of Cadillac Renewable Energy, LLC; Genesee Power Partners Limited Partnership, Decker Energy-Grayling, LLC, Hillman Power Company, LLC, Tondu Corporation, Viking Energy of Lincoln, Inc., and Viking Energy of McBain, Inc., and Certificate of Service of same.

If you have questions or concerns with the attached, please do not hesitate to contact me.

Very truly yours,

The Running Wise Law Firm

Thomas J. Waters

TJW/ab
Attachments

Kent E. Gerberding
Michael I. Conlon
Catherine D. Jasinski
Thomas A. Grier
Julie A. Gillum
Jeffery R. Wingfield
Kathryn E. Glancy
Thomas J. Waters

Of Counsel:
Richard W. Ford

Harry T. Running
(1911 – 1992)

William L. Wise
(1928 – 2014)

Miles C. Gerberding
(1930 – 2015)

Traverse City
1501 Cass Street, Suite D
PO Box 686
Traverse City, MI
49685-0686
Ph. 231.946.2700
Fax. 231.946.0857

Frankfort*
Frankfort, MI 49635
Ph. 231.946.2700

*By Appointment Only

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the application of)
CONSUMERS ENERGY COMPANY)
for Approval of an Integrated Resource Plan)
under MCL 460.6t, certain accounting)
approvals, and for other relief.)
_____)

Case No. U-21090

DIRECT TESTIMONY

OF

RICHARD A. POLICH, P.E.

ON BEHALF OF

**CADILLAC RENEWABLE ENERGY, LLC, GENESEE POWER PARTNERS LIMITED
PARTNERSHIP, DECKER ENERGY-GRAYLING, LLC, TONDU CORPORATION,
NATIONAL ENERGY OF LINCOLN, LLC, AND NATIONAL ENERGY OF MCBAIN,
LLC**

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	TESTIMONY SUMMARY	6
III.	CONSUMERS IRP OVERVIEW.....	10
IV.	NEW GAS GENERATION PLANTS	14
V.	ASSESSMENT OF IRP AND PCA	17
VI.	BIOMASS ENVIRONMENTAL BENEFITS.....	28
VII.	BIOMASS PLANT BENEFITS.....	33
VIII.	BIOMASS PLANTS' ROLE IN 2021 IRP	42
IX.	CONCLUSIONS.....	44

EXHIBITS:

Exhibit No. BMP-1 (RAP-1)	Richard A. Polich, P.E. Resume
Exhibit No. BMP-2 (RAP-2)	Richard A. Polich List of Testimony Cases
Exhibit No. BMP-3 (RAP-3)	NPV Calculations for Consumers Covert, Dearborn Industrial Generation, Kalamazoo, and Livingston Plants
Exhibit No. BMP-4 (RAP-4)	Consumers Capacity Position Analysis
Exhibit No. BMP-5 (RAP-5)	Biomass Plant Operating History
Exhibit No. BMP-6 (RAP-6)	Historic Capacity factors for Solar Facilities in Consumers territory

1 **I. INTRODUCTION**

2 **Q. Would you state your name, occupation, and business address?**

3 A. My name is Richard A. Polich. I am a Managing Director with GDS Associates, Inc.
4 (GDS). My business address is 1850 Parkway Place, Suite 800, Marietta, Georgia, 30067.

5
6 **Q. For whom are you presenting testimony in this proceeding?**

7 A. I am presenting testimony on behalf of the Cadillac Renewable Energy, LLC, Genesee
8 Power Partners Limited Partnership, Decker Energy-Grayling, LLC, Tondu Corporation,
9 National Energy of Lincoln, LLC, f/k/a Viking Energy of Lincoln, LP and National Energy
10 of McBain, f/k/a Viking Energy of McBain, LLC (“Clients”).

11
12 **Q. What Michigan power generation facilities are owned by your Clients?**

13 A. My Client’s own the following Michigan power generation facilities:

- 14 • Cadillac Renewable Energy, LLC.,
15 • National Energy of Lincoln, LLC, and
16 • National Energy of McBain, LLC.

17 All these projects are biomass fueled projects waste wood as their fuel source.

18
19 **Q. Do your Clients own interests in other Michigan power generation facilities?**

20 A. Yes, as follows:

- 21 • Genesee Power Partners, LP owns a 50% interest in Genesee Power Station,
22 • Decker Energy Grayling, Inc and its parent company Grayling Development
23 Partners, LP own a 50% interest in Grayling Generating station, and

- Tondu Corporation controls a 50% interest in TES Filer City Station.

Genesee Power Station and Grayling Generating Station are also biomass fueled projects which burn waste wood as their fuel. TES Filer City Station uses coal, tires, and biomass to generate electricity and supply process steam to The Packaging Corporation of America paper mill, which results in the plant classified as a cogeneration facility. Collectively, Cadillac Renewable Energy, LLC., Genesee Power Station, Grayling Generating Station LP, National Energy of Lincoln, LLC, and National Energy of McBain, LLC will be referred to as “Biomass Plants” in the remainder of my testimony.

Q. Why didn't the Genesee Power Station, Grayling Generating Station and TES Filer City Station projects intervene in this proceeding themselves like Cadillac, Lincoln and McBain?

A. Because their CMS Energy Corporation, Consumers Energy Company's parent, partner in those projects, through Hydra Co Enterprises, Inc., refused to allow the projects themselves to intervene in this proceeding.

Q. What is your educational and professional background?

A. I received a Bachelor of Science Mechanical Engineering in 1979, a Bachelor of Science Nuclear Engineering in 1979, and a Master of Business Administration in 1990, all from the University of Michigan in Ann Arbor, Michigan. I am a registered Professional Engineer in the State of Michigan. I have over 40 years of experience in the utility industry and energy sector, performing duties and services for myriad companies and organizations, and representing the interests of private and public constituencies throughout the world. In

1 May 1978, I joined Gilbert-Commonwealth Associates, Inc., located in Jackson, Michigan
2 as a Graduate Engineer and worked on several plant modification projects, new nuclear
3 plant construction projects and in the information technology department. In May 1979, I
4 joined Consumers Power Inc., (now called Consumers Energy), located in Jackson,
5 Michigan, as an Associate Engineer in the Plant Engineering Services Department. While
6 in this department, I provided plant engineering design, project oversight and engineering
7 trouble shooting on the company's existing and new construction power generation fleet.
8 In April 1980, I transferred to the Midland Nuclear Project and progressed through various
9 job classifications to Senior Engineer. I also participated in the initial design evaluation of
10 the Midland Cogeneration Plant. Between 1987 and 1998, I worked in Consumers'
11 Marketing and Rates Department, progressing to Manager of Rates.

12 I joined Nordic Energy, an independent power producer and retail/wholesale power
13 marketer, in 1998 as Vice President. In 2003, I began my consulting career when forming
14 Energy Options & Solutions, based in Ann Arbor, Michigan, as a consulting firm focused
15 on providing engineering services and regulatory support. During my consulting career, I
16 have provided a variety of testimony on rates, cost of service, and engineering problems in
17 various state regulatory commissions and the Federal Energy Regulatory Commission. I
18 have provided project development expertise on wind, solar and various fossil generation
19 projects. In 2015, I joined GDS Associates, Inc. ("GDS"). A copy of my resume is
20 provided in Exhibit BMP-1 (RAP-1)

21

1 **Q. What are your duties and responsibilities at GDS?**

2 A. My primary duties are within GDS's Power Supply Planning Department. GDS is a multi-
3 service consulting and engineering firm. While employed by GDS, I have provided
4 consulting services for areas such as:

- 5 • Power Generation Asset Management;
- 6 • Engineering evaluation of waste to energy projects;
- 7 • Energy management consulting services;
- 8 • Integrated Resource Planning services;
- 9 • Nuclear decommissioning cost evaluation;
- 10 • Modular nuclear project cost evaluation;
- 11 • Renewable energy project cost assessment and economic evaluation;
- 12 • Testimony in various regulatory proceedings on rate of return, cost of service,
13 regulatory disallowances, determination of prudence, revenue requirements,
14 reactive energy, plant operations, and plant in service; and
- 15 • Review of generation project design and construction.
- 16

17 **Q. In what proceedings have you previously testified before utility regulatory**
18 **commissions?**

19 A. A list of utility regulatory proceedings in which I have filed testimony is set forth in Exhibit
20 BMP-2 (RAP-2). I have previously presented testimony before the Michigan Public
21 Service Commission ("MPSC") in at least 19 proceedings.

22

1 **Q. What is the purpose of your testimony?**

2 A. My assignment was to review Consumers Energy Company’s (“Consumers”) 2021
3 Integrated Resource Plan (“IRP”) to determine if it is reasonable and prudent or whether it
4 should include my Clients’ generation facilities in the Proposed Course of Action (“PCA”).

5
6 **Q. Are you sponsoring any Exhibits?**

7 A. Yes, I am sponsoring the following Exhibits:

8 Exhibit No. BMP-1 (RAP-1) Richard A. Polich, P.E. Resume

9 Exhibit No. BMP-2 (RAP-2) Richard A. Polich List of Testimony Cases

10 Exhibit No. BMP-3 (RAP-3) NPV Calculations for Consumers Covert, Dearborn
11 Industrial Generation, Kalamazoo, and Livingston
12 Plants

13 Exhibit No. BMP-4 (RAP-4) Consumers Capacity Position Analysis

14 Exhibit No. BMP-5 (RAP-5) Biomass Plant Operating History

15 Exhibit No. BMP-6 (RAP-6) Historic Capacity factors for Solar Facilities in
16 Consumers territory
17

18 **Q. Were these exhibits prepared by you or under your direction?**

19 A. Yes, except for Exhibit BMP-6 (RAP-6) which are the results from the National Renewable
20 Energy Laboratory, a national laboratory of the US Department of Energy, PVWatts solar
21 modeling tool based upon my input parameters .

1 **II. TESTIMONY SUMMARY**

2 **Q. Please summarize your testimony.**

3 A. The Biomass Plants and TES Filer City plant have proven to be reliable and dispatchable
4 electric generation resources for Consumers for over 30 years. Except for Hillman Power
5 which will be retired in 2022, each of the Biomass Plants have a minimum of 20 years of
6 useful life and can continue to be a viable, net-zero carbon electric generation resource in
7 Consumers' future resource plan. My Clients' generation facilities are an economic
8 alternative to Consumers' proposed purchase of four existing gas generation facilities, two
9 of which seldom run according to Consumers' Aurora modeling. The two facilities which
10 seldom run are the Kalamazoo and Livingston Plants, which are natural gas fueled
11 combustion turbine peakers with high fuel consumption. The Commission should require
12 that the Biomass Plants and Filer City be incorporated into Consumers' IRP, replacing the
13 Kalamazoo and Livingston plants. My Clients' generation facilities can provide around
14 the clock, renewable, dispatchable and reliable power generation as that facility.

15 My review of the IRP generation resource option scenarios found that Consumers
16 failed to evaluate the reasonableness and prudence of continuing to purchase power from
17 any of my Clients' generation facilities after the termination of their existing power
18 purchase agreements ("PPAs") in its modeling process. Cadillac, Genesee, Grayling,
19 Lincoln and McBain are all dispatchable, non-intermittent, net-zero carbon generation
20 resources. While Filer City burns coal, it is also burning approximately 300 tons a day of
21 waste wood, which provides a significant environmental benefit as discussed below.
22 Moreover, Filer City could be reconfigured in the future to burn more wood or perhaps all
23 wood, but doing that would reduce its generation output. Consumers has not issued any

1 Request for Proposals (“RFP”), including the RFP issued on January 6, 2021, which would
2 have allowed my Clients’ generation facilities to be eligible to submit proposals.
3 Consumers’ recent RFP for new generation resources was so narrowly defined that my
4 Clients were unable to participate. As indicated in Exhibit No. A-45 (KGT-1), Consumers
5 does not expect to renew my Clients’ PPAs after they terminate. In addition, contrary to
6 Consumers’ testimony in this proceeding, Consumers has not discussed or asked to extend
7 the Biomass Plants’ PPA. My analysis finds that the Biomass Plants provide Consumers’
8 ratepayers higher economic value than Kalamazoo and Livingston natural gas generation
9 resources that Consumers is asking the MPSC to approve in this proceeding. The Biomass
10 Plants will also result in lower carbon emissions than those natural gas generation
11 resources. Last, Consumers did not comply with MCL 460.6t(1)(f)(iii) by not pursuing
12 extension of my Clients’ contracts because these generation facilities are viable supply-
13 side option. Purchasing capacity and energy from my Clients would limit the Consumers’
14 reliance on the Midwest Independent System Operator (“MISO”) Capacity Market, in the
15 same manner as the proposed natural gas generating plants, as discussed by Consumers’
16 Witness Mr. Clark’s testimony. Page 6.

17
18 **Q. What are the risks of Consumers’ solar additions in the 2021 IRP PCA?**

19 A. There are several risks associated with Consumers’ proposed acquisition of over 6,000
20 MW of solar capacity. Among them is the fact that Consumers’ modeling assumed a [REDACTED] %
21 solar capacity factor which is higher than the capacity factor of any solar generation facility
22 currently operating in Consumers’ service area. As will be presented later in my testimony,
23 solar projects in Michigan can expect to attain an average capacity factor over the project

1 life of only 17.5%. Consumers' own testimony admits that there are "significant execution
2 risks to safely interconnect, construct, and commence operation of these [solar] assets."
3 Blumenstock, p 49.

4 In addition, as Mr. Thomas P. Clark indicates on page 15 of his testimony, it is
5 likely the solar capacity MISO Zonal Resource Accreditation ("ZRC") will drop from 50%
6 of nameplate rating to down as low as 30% in the next several years. Consumers'
7 continuation of my Clients' PPAs would mitigate the reduce the impact of MISO's solar
8 ZRC reductions in the same manner as the natural gas fired generating plants, as
9 Consumers' witness Mr. Clark testified, pp 6-7 & 25. Lastly, as with the natural gas plants,
10 the BMP projects can also provide supplemental energy when solar generation production
11 is lower in the winter season and in the late evening summer hours when high load
12 conditions occur. The Biomass Plants can do all of the foregoing just as well as the
13 proposed natural gas plants.

14
15 **Q. What other benefits would Consumers continuation of the Biomass Plant PPAs**
16 **provide?**

17 A. Purchasing capacity and energy from the Biomass Plants is also consistent with
18 Consumers' goal to minimize CO₂ output and to become carbon free by 2040, far more
19 than purchasing the New Gas Generation facilities. Consumers' IRP proposes both to be
20 carbon free by 2040 and to reduce carbon emissions by 30% by 2030. Blumenstock, pp
21 60 & 43. The natural gas generation that Consumers proposes to purchase, however, will
22 produce carbon dioxide, although less than its coal plants. The Biomass Plants are, in fact,
23 both carbon neutral and better than carbon neutral. The Biomass Plants all burn waste

1 wood or residuals which, if not burned in their generating plants, will naturally decompose
2 and produce both CO₂ and methane. Methane's impact on global warming is 21 times
3 worse than CO₂. While Consumers assessed "...carbon emissions from a 2005 baseline,
4 NO_x, SO₂, particulate matter, and mercury....," Blumenstock, p. 37, lines 9-10, that
5 analysis failed to take into account the net increase in CO₂ emissions resulting from the
6 shutdown of the Biomass Plants and replacement with natural gas fired generation.
7 Biomass generation is, in fact, more environmentally beneficial than natural gas
8 generation. Moreover, Consumers is proposing to use non-renewable natural gas
9 generation to supplement solar capacity. By extending the Biomass Plant PPAs,
10 Consumers would be supplementing renewable solar energy with renewable Biomass net-
11 zero carbon energy.

12 Finally, Consumers argues that "since all of the aforementioned generating
13 resources are currently in operation, the Company does not anticipate negative
14 socioeconomic impacts related to the to-be-purchased existing gas resources."
15 Blumenstock p 60. As discussed herein, however, there will be significant socioeconomic
16 impacts to the rural and economically stressed communities in which my Clients' projects
17 are located should their PPAs not be extended and they be shut down.

18 In summary, the Commission should require Consumers to modify its 2021 IRP
19 plan to include my Clients' generation facilities as a net-zero carbon generation resource
20 throughout the entire planning period.

21

1 **III. CONSUMERS IRP OVERVIEW**

2 **Q. Can you summarize the focus of Consumers’ IRP Preferred Course of Action**
3 **(“PCA”) that is pertinent to your testimony?**

4 A. Consumers witness, Mr. Richard T. Blumenstock testimony indicates the PCA represents
5 a reasonable and prudent method of meeting Consumers’ energy and capacity needs over
6 the duration of the IRP study period. He further states the PCA demonstrates Consumers’
7 commitment to accelerating Consumers’ transition to cleaner burning power generation
8 facilities. Part of the transition to cleaner burning power generation facilities is the early
9 retirement of the oil & natural gas burning D.E. Karn Units 3 & 4 and the coal burning J.H.
10 Campbell Units, replacing them with the purchase of the New Covert Generating Facility
11 (“Covert”), the Dearborn Industrial Generation (“DIG Plant”), Livingston Generating
12 Station (“Livingston Plant”), and the Kalamazoo River Generating Station (“Kalamazoo
13 Plant”), collectively to be called “New Gas Generation” in the remainder of my testimony.
14 Consumers is asking the MPSC to approve the purchase of the New Gas Generation
15 facilities in this proceeding.

16 Consumers states it is committed to achieving net-zero carbon emissions by 2040
17 and the PCA is its roadmap toward accomplishing this goal. Included in the PCA’
18 additional generation resources are a significant increase in solar generation resources,
19 growing from approximately 880 MW in 2022 (Exhibit No. A-6 (STW-3)) to over 6,000
20 MW in 2040 (Blumenstock testimony, page 64, lines 10-14). Consumers is also projected
21 to add 475 MW of battery storage by 2040 as part of the effort to reach net-zero carbon
22 future.

1 What has been omitted from the PCA is generation from the Michigan based, net-
2 zero carbon, dispatchable, non-intermittent, renewable Biomass Plants. Consumers' PCA
3 does not include renewing the Biomass Plant PPAs (Exhibit No. A-45 (KGT-1), the last of
4 which expire in 2030. None of Consumers' testimony discusses the renewable generation
5 from the Biomass Plants, their PPAs or the reasons for not renewing their PPA's.

6 The Biomass Plants are valuable Michigan based generation resources that are:

- 7 • Net-zero carbon resources,
- 8 • Highly reliable,
- 9 • Dispatchable within their operational limits,
- 10 • Can provide around the clock generation,
- 11 • Productively dispose of wood biomass residues and urban wood waste that would
12 be left on forest floor, stockpiled at mill sites or landfilled,
- 13 • Provide fuel supply diversity for power generation,
- 14 • Provide good jobs for the local economy, and
- 15 • Have lower economic risk for Consumers' ratepayers than the New Gas Generation
16 plants.
- 17

18 **Q. Why does Consumers need new generation capacity?**

19 A. Consumers capacity needs are driven by its proposed retirement of existing generation
20 facilities, expiring PPAs, and Consumers' decision to not renew those existing PPAs,
21 including the PPAs for the Biomass Plants. Based upon Exhibit A-6 (STW-3), the
22 following events cause Consumers to experience capacity shortfalls assuming no early
23 retirement of existing Consumers' supply-side resource (all MW are based upon supply-
24 side resource zonal resource credits ("ZRC")):

- 1 1. 2022:
 - 2 a. The retirement of Palisades Nuclear Plant (PPA) causes a loss of 772 MW.
 - 3 b. Expiration of Hillman Power Company LLC PPA causes a loss of 18 MW.
- 4 2. 2023
 - 5 a. Retirement of Karn 1 &2 coal plants (end of life) causes a loss of 383 MW.
- 6 3. 2025
 - 7 a. Expiration of TES Filler City Station contract causes a loss of 58 MW.
 - 8 b. Expiration of Ada Cogeneration causes a loss of 29 MW.
- 9 4. 2027
 - 10 a. Expiration of Grayling Generation Station LP PPA causes a loss of 36 MW.
 - 11 b. Expiration of National Energy of McBain, LLC PPA causes a loss of 18 MW.
 - 12 c. Expiration of National Energy of Lincoln, LLC PPA causes a loss of 17 MW.
- 13 5. 2028
 - 14 a. Expiration of Cadillac Renewable Energy, LLC PPA causes a loss of 34 MW.
- 15 6. 2030
 - 16 a. Expiration of Midland Cogeneration Venture LP PPA causes a loss of 1,214
 - 17 MW.
 - 18 b. Expiration of Michigan Power LP 1 & 2 PPA causes a loss of 123 MW.
 - 19 c. Expiration of Genesee Power Station LP PPA causes a loss of 35 MW.
- 20 7. 2031
 - 21 a. Retirement of Karn 3 & 4 natural gas/oil plants (end of life) causes loss of 789
 - 22 MW.
 - 23 b. Retirement of Campbell 1 & 2 coal plants (end of life) causes loss of 587 MW.

- 1 8. 2032
2 a. Expiration of three non-utility generator contracts causes loss of 37 MW.
3 9. 2039
4 a. Retirement of Campbell 3 coal plant (end of life) causes loss 756 MW.

5
6 In this IRP, Consumers is proposing early retirement of Karn 3 & 4 at the end of
7 2022 and Campbell 1-3 at the end of 2024. Based on the proposed early retirement,
8 Consumers is indicating it will have insufficient capacity in 2023 without additional
9 supply-side resources.

10

11 **Q. Which of the Consumers' projected New Gas Generation resources to be added by**
12 **2040 in the IRP PCA is of particular relevance to the testimony you are presenting in**
13 **this case?**

14 A. The focus of my testimony is Consumers' failure to include extension of the Biomass
15 Plants PPAs and other supply side resources in any of the various supply side options that
16 were analyzed in the IRP process. As discussed earlier, the Biomass Plants can produce
17 power when dispatched by Consumers, 24 hours per day, 365 days a year, adjusted for
18 outages. Typical capacity factors for the Biomass Plants over the last few years range from
19 about 45% to over 95%, depending on Consumers dispatch of those facilities and plant
20 availability. The Biomass Plants are a comparable resource to the New Gas Generation
21 plants because they are dispatchable, have the potential to operate at a high-capacity factor,
22 and convert a carbon neutral fuel source into electricity. Unlike the Biomass Plants, the
23 New Gas Generation plants are not carbon neutral electric generation resources. It is the

1 similarity of the Biomass Plants in dispatchability and capacity factor to the New Gas
2 Generation plants and the decided environmental advantages that the Biomass Plants have
3 over the New Gas Generation plants that make them more reasonable and prudent choice
4 than the proposed New Gas Generation plants.

5 The hourly electric generation profile of solar plants is not consistent nor
6 comparable to the Biomass Plants because solar plants only generate electricity when there
7 is sufficient solar radiation, making them mostly non-dispatchable, intermittent supply side
8 resources. Based on information contained in the Aurora model runs and Consumers’
9 exhibits, the Michigan based solar plants are assumed to have a 24.3% capacity factor,
10 which from research of Michigan based solar generation will actually be less than 18.0%.
11 Battery storage facilities are not generators of electricity, they are dependent on electricity
12 generated by other supply-side resources and stored in the batteries. Therefore, they too
13 are not comparable to the Biomass Plants because they cannot independently convert a fuel
14 source, such as biomass, solar radiation, natural gas, etc. into electricity.

16 **IV. NEW GAS GENERATION PLANTS**

17 **Q. Please describe the Covert Plant and estimated plant purchase cost.**

18 A. The Covert Plant is a 1,176 MW combined cycle plant, generating electricity with three
19 Mitsubishi M501G1 combustion turbines and a single steam turbine. Steam generated
20 from each combustion turbine Heat Recovery Steam Generator (“HRSG”) is used to power
21 the steam turbine. Consumers states the heat rate for the facility is around [REDACTED] Btu/kWh.

22 The Covert Plant is currently connected to PJM Interconnection (“PJM”), a regional
23 transmission organization that coordinates the movement of wholesale electricity in all or

1 parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North
2 Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of
3 Columbia. According to Consumers, Covert Plant was previously connected to Michigan
4 Electric Transmission Company (“METC”) and operated in the MISO market. Apparently,
5 the transmission facilities needed to re-connect and operate in MISO still exist. Transfer
6 of Covert Plant interconnection from PJM to MISO will require approval by MISO for
7 interconnection.

8 The stated purchase price for Covert Plant in the Purchase Sale Agreement (“PSA”)
9 is \$ [REDACTED] million but Consumers witness Mr. Jeffery E. Battaglia indicates there are
10 additional costs associated with the transaction that bring up the cost to \$ [REDACTED] million.
11 Consumers NPV analysis for Covert Plant (MEC-CE-003 CONFIDENTIAL Attachment
12 4) used a purchase price of \$ [REDACTED] million. The plant entered commercial operation in 2004.

13
14 **Q. Please describe the DIG Plant and estimated plant purchase cost.**

15 A. The DIG Plant is a 770 MW combined cycle and cogeneration plant, generating electricity
16 with three General Electric (“GE”) 7F combustion turbines and a single steam turbine.
17 Steam is generated for process steam use and/or to power the steam turbine from the
18 combustion turbine HRSGs and three boilers fueled by blast furnace gasses and/or natural
19 gas. The combustion turbines can be operated in either combined cycle or simple cycle
20 modes. Consumers states the heat rate for DIG Plant is approximately [REDACTED] Btu/kWh
21 when operating in the combined cycle mode. The plant entered commercial operation in
22 2001.

1 The PSA for DIG Plant includes Kalamazoo and Livingston Plants. The PSA does
2 not provide separate prices for the three plants. Consumers NPV analysis for DIG Plant
3 (MEC-CE-003 CONFIDENTIAL Attachment 4) used a purchase price of \$■■■ million.
4 The plant entered commercial operation in 1999.

5
6 **Q. Please describe the Kalamazoo Plant and estimated plant purchase cost.**

7 A. The Kalamazoo Plant uses a single GE 7EA combustion turbine, operating in simple cycle
8 mode, to produce 75 MW. Consumers states the heat rate for the facility is around ■■■
9 Btu/kWh. Consumers NPV analysis for Kalamazoo Plant (MEC-CE-003
10 CONFIDENTIAL Attachment 4) used a purchase price of \$■■■ million. The plant entered
11 commercial operation in 1999.

12
13 **Q. Please describe the Livingston Plant and estimated plant purchase cost.**

14 A. The Livingston Plant uses four Pratt & Whitney FT4 combustion turbines, operating in
15 simple cycle mode, to produce 156 MW. Consumers states the heat rate for the facility is
16 around ■■■ Btu/kWh. Consumers NPV analysis for Kalamazoo Plant (MEC-CE-003
17 CONFIDENTIAL Attachment 4) used a purchase price of \$29 million. The plant entered
18 commercial operation in 1999.

19
20 **Q. How did Consumers acquire the right to purchase the New Gas Generation Plants?**

21 A. Consumers issued a Request for Proposal (“RFP”) on January 6, 2021, to acquire up to
22 2,000 MW (ZRC) of existing simple cycle or combined cycle *natural gas-fueled* electric
23 generating facilities which are in service and operational as of the date of the RFP. The

1 RFP required the physical location of such facilities must be in the lower peninsula of the
2 State of Michigan that is serviced by MISO. Five potential bidders submitted pre-
3 qualification applications and one bidder was determined to not meet the qualifying status.
4 The RFP and bid process was administered by an independent third party, Charles River
5 Associates (“CRA”). The bids that were selected were the New Gas Generation plants.

6
7 **Q. Are the Biomass Plants physically located within the area required in the RFP, the**
8 **lower peninsula of Michigan and within the MISO Service territory?**

9 A. Yes.

10
11 **Q. Does the replacement of Consumers existing coal plants with the New Gas generation**
12 **reduce Consumers’ carbon emissions?**

13 A. Yes, the New Gas Generation plants will have lower carbon emissions than Consumers’
14 coal plants, but the New Gas Generation plants are not net-zero carbon electric generation
15 resources like the Biomass Plants. If Consumers is to be a net-zero carbon emitting utility
16 by 2040, it will have to replace the New Gas Generation plants or find a zero-carbon fuel
17 source.

18
19 **V. ASSESSMENT OF IRP AND PCA**

20 **Q. Based on your review of Consumers’ IRP, what is driving the need for Consumers to**
21 **increase generation supply side resources as suggested in the IRP PCA?**

22 A. Consumers’ need for additional supply side generation is driven by the following:

23 1. The retirements of Palisades Nuclear Plant,

- 1 2. The retirement of Karn Units 1 & 2,
- 2 3. The early retirement of Karn Units 3 & 4,
- 3 4. The early retirements of Campbell Units 1-3,
- 4 5. The MCV contract expiration, and
- 5 6. The expiration of the Biomass Plants.

6 With these changes in Consumers’ existing supply side generation portfolio, Consumers
7 will have a capacity shortage of 652 MW (ZRC) in 2023, growing to 3,259 MW by 2040,
8 as shown in Exhibit BMP-4 (RAP-4), line 16.

9 Notwithstanding the foregoing, Consumers excluded all of the Biomass Plants’ potential
10 *supply-side generation* in its IRP modeling after their current contracts expire. This can be
11 seen in the workpapers of associated with Exhibit No. A-14 (STW-11).

12
13 **Q. Consumers’ testimony indicates that it only intends to purchase power from PURPA**
14 **qualify facilities that are less than 5MW or less, which is the recently revised “must**
15 **purchase” threshold under FERC’s PURPA rules. Is that a legitimate reason for**
16 **choosing to exclude the Biomass Plants and TES Filer City from the generation**
17 **resources that were analyzed in the modeling for the IRP and from which Consumers**
18 **will purchase capacity and energy?**

19 A. No. The fact that there may no longer an obligation under federal law to purchase power
20 from qualifying facilities larger than 5 MW does not mean that it is not reasonable and
21 prudent to do so under state law. Indeed, here it is reasonable and prudent to do so and
22 Consumers’ decision to not do so is not reasonable and prudent.

23

1 **Q. Will the Biomass Plants and TES Filer City be a viable supply-side generation**
2 **resource when their existing contracts expire?**

3 A. Yes, with the exception of Hillman which will be decommissioned in 2022, the five other
4 Biomass Plants and TES Filer City will remain a viable supply generation resource upon
5 expiration of their existing PPAs and could provide Consumers an additional 188 MW of
6 MISO ZRC through the end of the IRP study period.

7
8 **Q. Could Midland Cogeneration Venture be a viable supply-side generation resource**
9 **when their existing PPA contract expire?**

10 A. Yes, MCV will remain a viable supply generation resource upon expiration of its existing
11 PPA and could provide Consumers 1,214 MW of accredited capacity through the end of
12 the IRP study period. The Biomass Plants, however, have a decided environmental
13 advantage over the MCV, as I discuss those advantages later in my testimony. Because
14 TES Filer City currently burns 300 tons of wood per day and could be converted to burn
15 more wood, it also has an environmental advantage over MCV.

16
17 **Q. Has Consumers approached or provided the Biomass Plants or TES Filer City an**
18 **opportunity to extend their PPA's?**

19 A. No, Consumers has not approached the Biomass Plants or TES Filer City about the
20 potential to extend their PPAs nor has Consumers issued an RFP that would allow the
21 Biomass Plants or TES Filer City to submit a qualified bid response. The RFP Consumers
22 issued in 2021 that resulted in the purchase agreements for the New Gas Generation

1 contained provisions which excluded the Biomass Plants, TES Filer City and the MCV
2 from bidding.

3

4 **Q. Did Consumers include extension of the Biomass Plant and TES Filer City PPAs in**
5 **any of the IRP studies or modeling efforts?**

6 A. No, Consumers did not include in its IRP analysis and modeling efforts, use of the Biomass
7 Plants as a zero-carbon supply side resource after the expiration of their current PPAs. The
8 exclusion of the Biomass Plants and TES Filer City from any of Consumers' Aurora
9 modeling is a significant mistake because these facilities would help Consumers meet its
10 reduced carbon emission goals, can provide reliable capacity, and are dispatchable. As
11 will be presented later in my testimony, extending the PPAs of the Biomass Plants and TES
12 Filer City is also more economical than the Kalamazoo and Livingston Plants and would
13 have lower financial risk to Consumers' ratepayers.

14

15 **Q. What natural gas price forecast was used in the IRP modeling?**

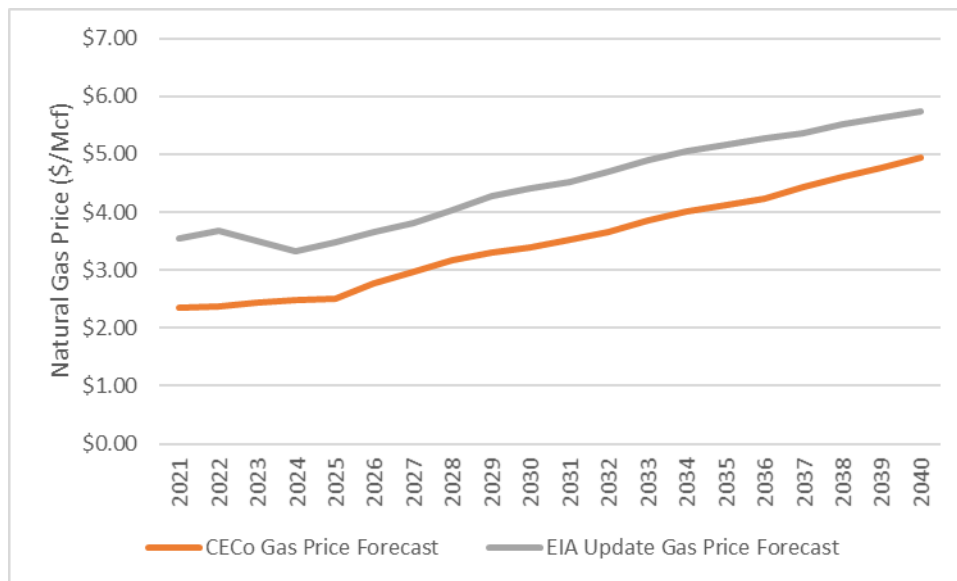
16 A. Consumers used the following natural gas price forecasts in its IRP modeling

- 17 1. U.S. Energy Information Administration's ("EIA") 2020 Annual Energy Outlook,
- 18 2. Consumers Energy's natural gas price projections, including 25% below, 25%
19 above and 50% above Consumers' gas price forecasts,
- 20 3. EIA's 2020 AEO high gas and oil supply case.

21

22 **Q. How does the gas price forecast used in the IRP PCA case compare to current EIA**
23 **gas price forecasts?**

1 A. Natural gas prices have increased considerably since the beginning of 2021. The most
2 recent EIA Energy Price Forecast issued in February 2021, indicates natural gas prices for
3 Henry Hub are 25% higher than the gas price forecast used in the IRP PCA case through
4 2035, peaking at almost 55% higher in 2022, and ending at 16.4% higher in 2024. As seen
5 Figure 1, the most recent EIA gas price forecasts exceed Consumers' gas price forecast
6 used in IRP PCA model range from \$80.9/mmBtu to \$1.302/mmBtu lower.
7



8 **Figure 1 - Natural Gas Price Forecast Comparison**

9 Ms. Walz testimony, page 14, Figure 1 shows the range of natural gas prices
10 Consumers included in its gas price sensitivity analysis. Based on this figure, EIA's
11 updated gas price forecast is closer to the 50% higher Consumers' gas price sensitivity than
12 it is to the Consumers base gas price forecast. This will impact the dispatch of the New
13 Gas Generation plants, the financial impacts on Consumers' ratepayers, and economics of
14 the PCA case.

15

1 **Q. What financial analysis of the New Gas Generation projects was performed by**
2 **Consumers?**

3 A. The only financial analysis of each of the New Gas Generation plants, separate from Aurora
4 modeling, appears to have been provided by CRA as part of the bid evaluation for those
5 facilities. CRA performed a lifecycle cost analysis of the four facilities from a rate payer
6 impact analysis and Consumers' profitability analysis. This information was provided in
7 Attachment 4 to Consumers Discovery Response No. MEC-CE-003 CONF.

8
9 **Q. What is the rate-payer impact of Consumers purchasing the New Gas Generation**
10 **plants?**

11 A. Consumers has provided a variety of parameters on each of the New Gas Generation plants
12 in several different documents, including the bid analysis from CRA and the 2021 IRP
13 PCA Aurora data. I have combined this information into an analysis of the rate impact on
14 Consumers' customers for each of the New Gas generation plants. The analysis is
15 presented in Exhibit Confidential BMP-3 (RAP-3) and is summarized in Table 1. To
16 capture the economics of the projects within the 2021 IRP modeling period, I adjusted the
17 depreciation period and debt service period to complete depreciation and payment of debt
18 by end of 2040.

	Rated Output (MW)	MISO Zonal Resource Credit	Capital Cost	Cost/kWh	Average Capacity Factor	Revenue Requirement Net Present Value	Levelized Cost of Energy (\$/MWh)
Covert							
Dearborn							
Kalamazoo							
Livingston							
Total							

1

2 **Table 1 - Ratepayer Impact of Consumers New Gas Generation Plant Purchases**

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

The financial metrics can provide an indication of plant value in comparison to other generation options. The capital cost/kW for each of New Gas Generation plants are consistent with what would be expected of similar facilities but do not tell the complete story on a plant's value to Consumers' ratepayers. Levelized Cost of Energy (LCOE) is a measure often used in the utility industry as an indication of a generation assets value over the full term of a plant's projected life. The NPV and LCOE calculations shown in Table 1 only include the IRP Study period because Consumers only provided data for that period. The Kalamazoo and Livingston Plant operate so infrequently during the study period, causing the LCOE to be unusually high. It does, however, seriously call into question the reasonableness and prudence of Consumers' decision to purchase those plants.

Q. Will Consumers ratepayers incur costs for the New Gas Generation Plants after 2040 that were not included in the ratepayer impact calculation results shown in Table 1?

A. Yes, Consumers intends to be carbon free by 2040, which will require the New Gas Generation plants to be converted to burning a net-zero carbon fuel or hydrogen after 2040. Consumers' ratepayers will incur the conversion costs and continue to incur the operating costs until Consumers retires the facilities.

1 **Q. What is your interpretation of the economic metrics for the Livingston and**
2 **Kalamazoo Plants?**

3 A. The Kalamazoo and Livingston Plants run extremely infrequently based upon Consumers’
4 Aurora modeling. Consumers’ Discovery Response U21090-SA-CE-075, b.v., third
5 paragraph, states as follows:

6 “It should be noted that the CTs (Kalamazoo and Livingston) are
7 primarily being acquired as capacity resources and produce little, if
8 any, energy in CRA’s wholesale market simulation.”

9 This has been confirmed in Consumers’ Aurora models and can be seen in Exhibit
10 No. A-15 (STW-12), page 5 of 7, which shows these plants would only operate in 2025,
11 2026 and 2027, generating only [REDACTED] MWh. Exhibit BMP-4 (RAP-4), line 7, shows
12 Consumers has sufficient capacity until 2030 without early retirement of the Karn and
13 Campbell Plants. Addition of the Covert and DIG natural gas plant in 2023 and 2025
14 provides Consumers sufficient capacity through 2030. Adding the 2021 IRP new solar and
15 storage capacity ensures Consumers has sufficient capacity through the IRP planning
16 period without Kalamazoo and Livingston Plants, as shown on line 23 of Exhibit BMP-4
17 (RAP-4). Continuation of the PPAs of the Biomass Plants, and perhaps TES Filer City,
18 can reduce the need for 366 – 564 MW of solar capacity because of MISO capacity
19 accreditation and still provide more MWh because the Biomass Plants and TES Filer City
20 will operate at a higher capacity factor. The cost to ratepayers of the purchase and
21 ownership of these Kalamazoo and Livingston Plants over the IRP study period shows an
22 NPV of over \$ [REDACTED] million for generation facilities that are seldom used and whose
23 generation likely is not needed. These two facilities will cost ratepayers over
24 \$ [REDACTED]/MWh for the Consumers’ ownership of this capacity.

1 **Q. If Consumers has sufficient capacity without continuation of the PPAs for the**
2 **Biomass Plants and TES Filer City, why should Consumers be required to seek**
3 **renewal of those contracts.**

4 A. If Consumers truly intends to be zero carbon by 2040, it will be necessary to add net-zero
5 carbon generation resources over the time period between now and 2040. Consumers is
6 already proposing to use this glidepath methodology with its proposal to add 500 MW of
7 new solar in 2025 and growing that to a total of 6,018 MW by 2040. If Consumers chooses
8 not to renew those PPAs, those plants will be retired and will be unavailable in the future
9 to provide Consumers a net-zero carbon, high load factor, reliable and dispatchable
10 generation resource. By renewing the Biomass Plants' PPAs, and TES Filer City, so that
11 their source of power can continue to provide Consumers' ratepayers net-zero carbon
12 generation, results in a long-term net-zero generation resource for Consumers Power with
13 no additional, up-front, capital expenditures. The Biomass Plants become a supplemental
14 zero carbon generation resource to Consumers' solar generation additions and can provide
15 power during the periods solar energy is not available. The dispatchable, around the clock
16 reliability of the Biomass Plants and TES Filer City, coupled with their net-zero carbon
17 electric production make renewal of their PPAs a win-win situation.

18
19 **Q. Are there additional facts that cause you to question the economic metrics for the**
20 **Livingston and Kalamazoo Plants?**

21 A. Yes. In its discovery response U21090-SA-CE-079, Page 2 of 6, Consumers stated that:

22 "Additionally, the Company's retirement analysis selected a set of
23 natural gas units in the Business As Usual scenario (i.e. the most
24 likely scenario) indicating that the Company should explore the

1 addition of natural gas resources. The appeal of existing natural gas
2 fired units was a reduction in execution risk by avoiding
3 construction while procuring proven natural gas generators, the
4 ability to transition to natural gas faster (new construction would
5 take 5 years), potential for lower cost than new gas construction, no
6 additive air pollutant emissions to the State of Michigan, and no new
7 incremental demand on the gas supply system.”
8

9 The only reason that the retirement analysis selected natural gas units was that it
10 only included gas plants. It excluded the Biomass Plants and TES Filer City. Moreover,
11 apart from the fuel they burn, the Biomass Plants and TES Filer City provide all of the
12 same foregoing benefits of the gas plants. The Biomass Plants and TES Filer City have no
13 execution risk because they are existing interconnected generating units, have a proven
14 record of reliability, are lower cost than a new gas plants, would result in no additional air
15 pollutant emissions and place no new incremental demand on the gas supply system.
16

17 **Q. Does Consumers make a clear case for the need of the Kalamazoo and Livingston**
18 **Pant capacity?**

19 A. No. Exhibit No. A-14 (ATW-11) provides tables on Consumers’ capacity position based
20 upon the PCA case and various scenarios. These charts indicate Consumers has sufficient
21 capacity through 2031 without Kalamazoo and Livingston Plants, which removes only 184
22 MW of ICAP, except for a one-year shortfall in 2027. The shortfall in 2027 could be
23 addressed by Consumers purchasing a years’ worth of capacity from the MISO market or
24 contracting directly with an existing peaking plant. After 2031, Consumers only needs the
25 Kalamazoo and Livingston capacity in 2032 and 2033, which could be addressed by
26 *continuing to purchase energy and capacity from the Biomass Plants and TES Filer City.*
27

1 **Q. Does Consumers' ratepayers take on additional risk with ownership of generation**
2 **facilities as compared to PPAs?**

3 A. Yes. With ownership of power generation facility, Consumers' customers take on the cost
4 risk of plant equipment failure, failure to operate when called upon by MISO, operating
5 cost changes, and cost of plant decommissioning. The NPV analysis included in the Aurora
6 models include the eventual cost of decommissioning the New Gas Generation Plants.
7 Kalamazoo & Livingston Plants were both placed into service in 1999. These facilities
8 have already been in operation for over 20 years and will be close to 25 years old when
9 purchased by Consumers. The Kalamazoo and Livingston Plants were designed, built, and
10 operated as merchant generation over their lifetime. Cost pressures on merchant plants are
11 different than utility plants because they cannot recover unexpected costs from ratepayers
12 and their fixed costs need to be covered through power sales or PPAs. Cost pressures on
13 merchant plants can place pressure on plant maintenance costs to maintain sufficient cash
14 flow to keep the lights on.

15 Consumers' ratepayers do not have the same risks with PPAs. Depending on the
16 PPA contractual terms, ratepayers would not be responsible for catastrophic failures that
17 cause expensive repairs. With proper PPA contract terms, ratepayers do not incur the
18 replacement power costs in the event the generation source is unable to meet MISO day-
19 ahead generation commitments. With most PPAs, ratepayers are not responsible for
20 sudden price spikes in generation source fuel costs, such as what happened with gas prices
21 in the winter of 2021. With PPAs, ratepayers are not responsible for the cost of plant
22 decommissioning. There is always risk of the supplier defaulting on the PPA contract,

1 causing the potential purchase of replacement capacity and energy, but if the purchaser has
2 sufficient capacity to meet MISO reserve margins this is a low and manageable risk.

3
4 **VI. BIOMASS ENVIRONMENTAL BENEFITS**

5 **Q. What is the definition of “net-zero carbon” when used in reference to carbon**
6 **emissions?**

7 A. The term “net-zero carbon” is defined as achieving a balance between the impact of CO₂
8 emissions on global warming and removal of the same impact by reduction in greenhouse
9 gases from the atmosphere.

10
11 **Q. What are the benefits of wood waste power production?**

12 A. Use of fossil fuels in the production of electricity releases carbon to the atmosphere that
13 would otherwise remain trapped underground. In contrast, use of wood waste to produce
14 electricity merely releases carbon to the atmosphere that would otherwise have been
15 released to the atmosphere through decay or wildfire and is, therefore, part of the natural
16 carbon cycle. Sustainably managed forest harvesting operations provide an ongoing supply
17 of wood waste biomass that can be used to produce energy, displacing more greenhouse
18 gas-intensive alternatives. Using forest biomass for energy bolsters domestic energy
19 production, provides jobs to rural communities, improves soil and water quality, reduces
20 wildfire risk, and ensures forests continue to remove carbon from the atmosphere.

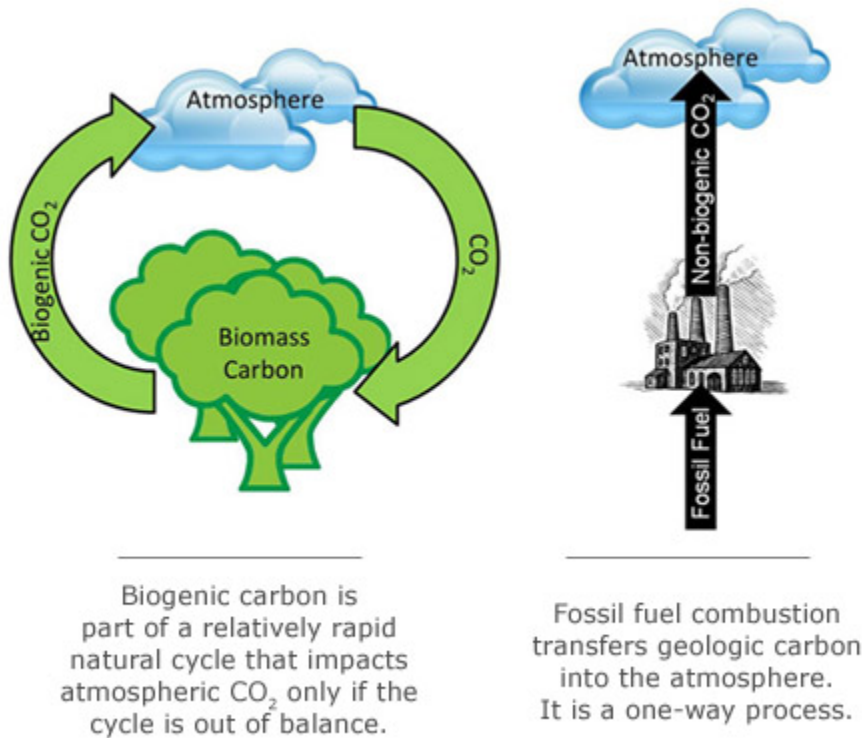
21 The use of biomass residuals has been found to yield low to negative emissions of
22 biogenic greenhouse gases in relatively short periods of time, and essentially

1 instantaneously when displacing fossil fuels. This is why Biomass Plants are considered
2 to be a net-zero carbon method of electric production.

3

4 **Q. How are CO₂ emissions from biomass energy resources handled by the US**
5 **Environmental Protection Agency (“EPA”)?**

6 A. The release of carbon from biomass combustion is balanced by the uptake of carbon when
7 the feedstock is grown. The EPA’s policy regarding CO₂ emissions resulting from the
8 combustion of biomass from managed forests at stationary resources for energy production
9 is to treat these emissions as carbon neutral or net-zero carbon.¹



10

¹ US EPA. 2018. *Biomass Policy Statement*. https://www.epa.gov/sites/default/files/2018-04/documents/biomass_policy_statement_2018_04_23.pdf

1 **Q. What are the benefits of collecting wood waste for use as biomass energy fuel, instead**
2 **of alternate methods of disposal?**

3 A. Biomass energy production has minimal or no net atmospheric contributions of biogenic
4 CO₂ emissions and reduces these impacts when compared to alternate methods of disposal
5 of wood waste products.² In the absence of collecting wood waste to be used as fuel for
6 energy production, the material is typically either burned onsite or left to decay on forest
7 floors. For cases in which the alternative is burning the material onsite, the environmental
8 benefits of biomass energy production are the production of electricity from the same
9 energy source without adding additional CO₂ to the atmosphere. When wood waste
10 material is left on forest floors to decay, the decay process produces methane and continues
11 to produce methane for two decades. Methane emissions impact on global warming is 21
12 times worse than the same amount of CO₂ emissions.³ Burning wood for a fuel in a biomass
13 plant does not produce methane and thus prevents the release of methane into the
14 atmosphere. Due to the reduction in methane emissions, the collection of wood waste from
15 forestry harvesting further increases the emissions savings for electricity generation from
16 biomass when compared to traditional fossil fuels. Using wood waste for biomass energy
17 production is a net benefit to leaving the material to decay on forest floors or in a landfill,
18 which is not true of natural gas electricity. Studies indicate that use of wood waste for

² US EPA. 2014. *Addressing Biogenic Carbon Dioxide Emissions from Stationary Sources*.
<https://19january2017snapshot.epa.gov/sites/production/files/2016-08/documents/biogenic-co2-emissions-memo-111914.pdf>

³ Biomass Power Association. 2017. *Carbon Intensity of Harvesting Residue-Based Electricity*.
<https://www.usabiomass.org/wp-content/uploads/2019/03/Final-BPA-Khanna-Dwivedi-Biomass-Carbon-Study-May-2017.pdf>

1 electricity production, can reduce global warming emissions by over 110% in comparison
2 to natural gas generated electricity.⁴

3
4 **Q. Please describe the fuel source for Cadillac Renewable Energy, LLC.**

5 A. The wood fuel procurement program at Cadillac Renewable Energy is based on business
6 relationships with reliable suppliers from all sectors of the forest products industry and
7 associated manufacturers. The facility consumes only virgin wood waste products that
8 have not been painted or treated in any way from forest waste wood, sawdust, bark, and
9 tub grindings. Cadillac currently has over 30 suppliers from throughout Michigan reaching
10 out as far as 100 miles from the plant. Forestry waste from state and federal forest
11 management as well as private land management and residential trimming is brought in
12 along with bark, sawdust, and slabs ground or chipped at local sawmills and board
13 processing plants.

14
15 **Q. Please describe the fuel source for Genesee Power Station LP and Grayling
16 Generation Station LP.**

17 A. The Genesee Power Station LP and Grayling Generation Station LP are fueled by wood
18 biomass which is made up of forest logging residues, mill residues and landfill diverted
19 wood waste material. This is waste material that has no other purpose for reuse or
20 recycling. Using this waste material as fuel for power generation prevents such waste being

⁴ Society of American Foresters. 2014. *Forest Carbon Accounting Considerations in US Bioenergy Policy*.
<https://www.fs.usda.gov/treearch/pubs/48712>

1 left on forest floor or in landfill where it decomposes producing methane and CO₂. Putting
2 forest logging waste to use ensures the forest floor is managed to reduce risk of fire.

3
4 **Q. Please describe the fuel source for National Energy of Lincoln LLC and National**
5 **Energy of McBain LLC.**

6 A. The Lincoln and McBain Biomass Plants are fueled by wood from forest logging residues,
7 sawmill residues, ground railroad ties, and used tires. Sawmill residue, tires, and railroad
8 ties would be disposed of in landfills. This is waste material that has no other purpose for
9 reuse or recycling. Using waste material as fuel for power generation prevents such waste
10 being left on forest floor or disposed of in landfills where it decomposes producing methane
11 and CO₂. Putting forest logging waste to use ensures the forest floor is managed to reduce
12 risk of fire. Genesee primarily utilizes urban wood waste from tree trimmings or
13 commercial/industrial waste wood that would be landfilled in the Detroit/Flint region.

14
15 **Q. Please describe the fuel source for TES Filer City Station.**

16 A. While TES Filer City Station burns mostly coal, it also burns wood waste from PCA as
17 well as waste forest residuals totaling approximately 300 tons per day. Moreover, TES
18 could be reconfigured to burn all wood, but doing so would decrease its generation output.

19

1 **VII. BIOMASS PLANT BENEFITS**

2 **Q. Please provide an overview of the Biomass Plants.**

3 A. Table 2 below provides the capacity, PPA expiration dates and fuel sources for the Biomass
 4 Plants. The combined output of these facilities is over 209 MW with a MISO Zonal
 5 Resource Capacity (“ZRC”) of 202 MW. Each of these facilities is currently dispatchable
 6 by Consumers down to minimum load. With the retirement of Hillman, the Biomass Plants
 7 still provide 201.2 MW of capacity and ZRC of 188 MW.

BIOMASS PLANT	CAPACITY (MW)	Zonal Resource Capacity	PURPA PPA EXPIRATION DATE	FUEL SOURCE
Cadillac Renewable Energy, LLC	34	34	7/15/2028	Wood Waste
Genesee Power Station LP	35	26	12/12/2030	Wood Waste
Grayling Generation Station LP	36.2	35	12/31/2027	Wood Waste
Hillman Power Company, LLC.	18	14	5/31/2022	Wood Waste
TES Filer City Station LP	60	58	6/15/2025	Wood Waste, Tires & Coal
National Energy Energy of Lincoln LLC	18	17	5/31/2027	Woodwaste
National Energy Energy of McBain LLC	18	18	5/31/2027	Woodwaste
TOTAL	219.2	202		
TOTAL w/o Hilman	201.2	188		

Table 2 - Biomass Plants

8

9 **Q. Please describe the dispatch of the Biomass Plants and TES Filer City by Consumers?**

10 A. Exhibit No. BMP-5 (RAP-5) provides some of the operating history for these facilities for
 11 the last several years. TES Filer City, National Energy of Lincoln and National Energy of
 12 McBain are being dispatched as base load plants. Cadillac, Genesee and Grayling are being
 13 dispatched between minimum and full load to follow demand on the power grid.

14

15 **Q. What are the cost benefits of the Biomass Plants and TES Filer City over the New Gas**
 16 **Generation peaking facilities?**

1 A. Extending the biomass contracts will not result in Consumers capital cost expenditures,
2 depreciation expenses, return on investment, interest expense, taxes and other costs
3 included in Consumers revenue requirement calculations that will be charged to ratepayers
4 if Consumers purchases the New Gas Generation plants. As discussed earlier, this would
5 eliminate approximately \$ [REDACTED] million of ratepayer impact on an NPV basis over the 15-
6 year of operations included in the IRP period for Kalamazoo and Livingston and further
7 elimination of costs if the plants operate after 2040. The cost metrics presented in
8 Consumers Exhibit No. A-47 (KGT-3) only includes the capital costs and is skewed by the
9 size of the DIG facility. Using the same calculation method as Consumers Exhibit No. A-
10 47 (KGT-3) for only Kalamazoo and Livingston Plants with the projected NPV discussed
11 earlier and using 15-year operating period in the IRP, results in an embedded capacity cost
12 of \$ [REDACTED]/MW-year, [REDACTED]% higher than shown in Consumers Exhibit No. A-47 (KGT-3),
13 line 10.

14
15 **Q. Is the generation from the Biomass Plants eligible for renewable Energy Credits**
16 **(REC)?**

17 A. Yes, electricity generated from biomass is eligible to generate RECs. Depending on market
18 conditions, current year RECs have minimum value in the \$10.00/MWh - \$30.00/MWh
19 range. This is value added that is not provided by the New Gas Generation plants.

20
21 **Q. Do the Biomass Plants provide Consumers' ratepayers benefits over the New Natural**
22 **Gas plants in regards to meeting Consumers goal of carbon free generation by 2040?**

1 A. Yes. If Consumers goal is to be carbon free by 2040, all of its natural gas plants will need
2 to be retired or converted to using net-zero carbon fuels. If the natural gas plants are retired,
3 these plants will have to be replaced with new net-zero carbon generation resources which
4 will likely increase Consumers' ratepayer cost due to the capital investment. In addition,
5 Consumers will need to decommission its natural gas plants, adding additional cost to be
6 recovered from ratepayers. If Consumers chooses to modify its natural gas plants to burn
7 hydrogen, the plant modification costs will be passed on to ratepayers. Adding to these
8 costs is the higher price of net-zero carbon fuels, such as renewable natural gas with a
9 current cost of \$30.00/mmBtu or hydrogen which has a DOE target price of over \$1.00/kg
10 or \$36.00/mmBtu. Extending the Biomass Plants' PPAs and TES Filer City's PPA if
11 converted to burn wood could reduce Consumers' ratepayer exposure to the costs of
12 meeting Consumers zero carbon 2040 goal.

13

14 **Q. What is the fuel diversity benefits of the Biomass Plants over the New Gas Generation**
15 **peaking facilities?**

16 A. With the retirement of the Karn Units, Campbell Units, and Palisades Nuclear Plant,
17 Consumers fuel sources for electric generation will primarily only include natural gas, solar
18 and wind, with a minor amount of hydroelectric generation and landfill gas generation.
19 Ludington pumped storage and any future storage technology will rely on other generation
20 sources to supply the stored energy. Storage systems cannot create electricity and are
21 usually available for only short periods. Ludington Pumped storage can only operate at
22 full capacity for about nine hours. Reviewing Consumers Exhibit N0. A-6 (STW-3)
23 reveals that in natural gas provides 61% of Consumers' dispatchable generation capacity

1 (ZRC Basis) in 2025 and 45% in 2040. This makes Consumers' ratepayers vulnerable
2 large increase in electric bills when natural gas prices spike.

3 The Biomass Plants, and TES Filer City if converted to burn wood, diversify
4 Consumers' generation portfolio with a net-zero carbon and dispatchable generation
5 resource which can be relied upon 24-hours a day. The value of diversified fuel generation
6 portfolio was proven with this winter when natural gas supplies exceed \$23.86/mmBtu
7 (Henry Hub February 17, 2021) and prices in certain areas of the country exceed
8 \$1,250/mmBtu. In 2020, natural gas price averaged \$2.05/mmBtu and 2022 Henry Hub
9 one year strip settlement price was \$4.48/mmBtu (as of October 12, 2021), an increase of
10 118%. Natural gas 2022 price projections by Energy Information Administration average
11 30.2% higher than the natural gas prices used in the IRP study period (2021-2040). This
12 illustrates the volatility of natural gas prices and the need for fuel diversity. Consumers'
13 2021 IRP PCA does not include fuel diversity with the purchase of the New Gas Generation
14 plants. Consumers' IRP should include extending the Biomass Plant PPAs in its generation
15 mix as an alternative net-zero carbon fueled generation resource.

16 Additionally, various catastrophic events could impact gas deliveries to gas plants.
17 If supply of gas is interrupted by something other than high gas prices, the natural gas
18 plants have no other option than to shut down. There is only one delivery method, i.e.
19 natural gas pipelines. The Biomass Plants have up to 30 days of on-site fuel storage should
20 something catastrophic impact fuel supply. Additionally, the Biomass Plants have multiple
21 suppliers that have access to multiple fuel sources to continue to deliver fuel. If 1 or 2
22 suppliers suffer a catastrophic event, other suppliers are available for delivering fuel.

23

1 **Q. Are the Biomass Plants and TES Filer City a better generation resource than**
2 **Kalamazoo and Livingston natural gas plants?**

3 A. Yes. The high cost of natural gas and high heat rate for these two plants result in the plants
4 being seldomly dispatched in Consumers' Aurora modeling of the 2021 IRP PCA.
5 Kalamazoo is dispatched around 0.03% of time and Livingston is dispatched less than
6 0.004% of the period of the IRP study. In contrast, the Biomass Plants and TES Filer City
7 can be dispatched in the 90%+ capacity factor range, depending on Consumers' energy
8 needs and plant availability and historically have been dispatched in a range of 30% to over
9 100% capacity factor. With high natural gas prices, the Biomass Plants will typically
10 dispatch more often than Kalamazoo and Livingston plants.

11

12 **Q. How do the Biomass Plants compare to DIG?**

13 A. The Biomass Plants compare very favorably to DIG. As with DIG, these plants are
14 dispatchable and provide equivalent availability. Because the Biomass Plants are net zero
15 carbon generation sources, DIG's CO₂ emissions is significantly higher. NO_x emissions of
16 the Biomass Plants are comparable to DIG. Moreover, the Biomass Plants have the added
17 environmental benefit of preventing methane from being released to the atmosphere, which
18 would otherwise occur if their waste wood was left to decay on forest floors or in landfills.
19 Based on Consumers modeling, it appears DIG will only dispatch at a capacity factor of
20 only approximately 47%. This is considerably lower than the average historic capacity
21 factor of 66% for the Biomass Plants in calendar years 2018-2020. Thus, the Biomass
22 Plants provide a generation resource with the similar dispatchability capability, similar

1 availability and with lower environmental impact as DIG. From an LCOE perspective, the
2 Biomass plants are also cost competitive with DIG.

3
4 **Q. Is the capacity factor for solar projects contained in Consumers modeling**
5 **appropriate?**

6 A. No. Consumers assumed [REDACTED] % capacity factor for both utility scale and distributed solar
7 generation projects. As those of us who have lived in Michigan know, the state is subject
8 to frequent periods of cloud cover. The following map of solar irradiance provided by
9 National Renewable Energy Laboratory (“NREL”) shows how Michigan’s solar capacity
10 factors should be less than the rest of the country.

11 The map indicates Michigan’s solar irradiance is in the range of 4.0-
12 4.4kWh/m²/day. This equates to a capacity factor of about 17.5% for a utility scale solar
13 project. Distributed solar projects can be expected to have a 2%-3% lower capacity factor
14 due to tree cover and use of fixed base mounting. Using NREL’s PVWatts solar simulation
15 system, sample 100 MW projects were modeled in Traverse City, Lansing and Jackson,
16 Michigan and the results are provided in Exhibit BMP-6 (RAP-6). The capacity factor for
17 these solar facilities ranged from 16.5% to 17.7%, indicating Consumers assumed solar
18 capacity factor is over [REDACTED] % higher than can be expected for a Michigan solar production
19 facility. Based on this and other data sources, Consumers’ Aurora modeling is
20 overestimating the output of Michigan based solar projects and will require Consumers to

1 intermittent solar generation is not available. Thus, in accessing the economics of solar
2 production, it is necessary to include the costs of other generation resources needed to
3 provide power when the solar generation facility is not producing electricity.
4

5 **Q. Why are the Biomass Plants a better net-zero carbon generation resource than solar?**

6 A. The Biomass Plants have the capability of producing power around the clock without the
7 need for another generation resource or energy storage. The Biomass Plants can operate
8 with capacity factors in the 90-98% range as compared to 17.7% for solar generation. This
9 means the 201 MW of Biomass plants could produce 1,727 GWh in a year as compared to
10 201 MW of solar which would produce only 312 GWh in a year. Operation of the Biomass
11 Plants around the clock will provide net-zero carbon electricity to meet Consumers’
12 customer load when the solar production is not generating electricity and to substitute net-
13 zero carbon electricity for Consumers’ carbon producing natural gas generation when solar
14 production is available. If solar generation is sufficient to meet Consumers’ customer load
15 requirements, the Biomass Plant’s dispatchability will allow them to reduce production and
16 save fuel. Thus, the Biomass Plants become a valuable additional net-zero carbon
17 generation source to solar generation. TES Filer City currently burns 300 tons of wood
18 waste a day and all of the foregoing would also be true of TES Filer City if it were converted
19 to burn all wood.
20

21 **Q. Consumers has indicated that it considered the economic impact on the Michigan**
22 **communities that would be affected by the Karn and Campbell plant closures. Did**

1 **Consumers consider the economic impact of the Michigan communities that would**
2 **be affected by the closure of the Biomass Plants and TES Filer City?**

3 A. No.

4

5 **Q. Please describe that impact.**

6 A. Cadillac has 21 full time employees and paid \$772,000 in 2021 local property taxes. It
7 uses 34 fuel suppliers that each typically have 5 to 6 crew members.

8 Genesee has 25 full time employees and paid \$500,000 in 2021 local property taxes.
9 It purchases its fuel from Mid-Michigan Recycling which employs 15 people as equipment
10 operators, truck drivers, management and administrative staff. Thus, Genesee provides
11 employment for approximately 40 people in addition to the property taxes it pays.

12 Grayling also has 25 full time employees and purchases it fuel from fuel suppliers
13 that employ 25 people as equipment operators and truck drivers. Thus, Grayling provides
14 employment for approximately 50 people in addition to the property taxes it pays. Grayling
15 paid also \$500,000 in 2021 local property taxes.

16 For semi-annual planned outages, Genesee and Grayling employ 20 to 30 additional
17 contract personnel through privately owned Michigan firms supplying services to the plant,
18 i.e. boilers cleaning and repairs, other specialized repairs, consulting services, etc.

19 TES Filer City has 30 full time employees and paid \$800,000 in 2021 local property
20 taxes. It pays over \$5 million in wages and local services and \$1.6 million per year in lime
21 purchases from Michigan vendors for lime to support its scrubber system. In addition, it
22 spends another \$4 to \$5 million per year on maintenance services to Michigan contractors
23 and equipment vendors. Finally, TES Filer City purchases over \$21 million per year in

1 fuel that is shipped via lake freighter, and wood from three to four contractors with a total
2 of 12 to 16 employees that provide waste wood from the local region. Cumulatively, TES
3 Filer City provides an economic benefit to the State of Michigan that exceeds \$15 million
4 per year.

5 National Energy of Lincoln has 28 full time employees and paid \$243,910 in 2021
6 local property taxes. National Energy of McBain has 32 full time employees and paid
7 \$43,214 in 2021 local property taxes. Through their fuel suppliers and other contractors,
8 Lincoln and McBain each indirectly employ approximately 50 additional people. Thus,
9 Lincoln and McBain provide employment for approximately 160 people in addition to the
10 property taxes they pay.

11 The Biomass Plants and TES Filer City are generally located in rural or
12 economically stressed areas of Michigan and the closure of those plants will have a
13 profound impact on those communities. Consumers' IRP would result in approximately
14 23,100 GWhs of energy being imported into Michigan from other states, much of which
15 could otherwise be produced in Michigan. Continuing to purchase power from the
16 Biomass Plants and TES Filer City would leave the Capacity Important limit unchanged to
17 the extent of that power as well as support local jobs in rural and economically stressed
18 areas.

19
20 **VIII. BIOMASS PLANTS' ROLE IN 2021 IRP**

21 **Q. Should the Biomass Plants have been included in the 2021 IRP PCA long term plan?**

22 A. Yes, Consumers failed to even consider including the Biomass Plants net-zero carbon
23 electricity production beyond their current PPA expiration dates in any of the 2021 IRP

1 modeling. This is a critical oversight because the Biomass Plants are a viable, reliable
2 alternative to carbon producing natural gas generation and a supplemental net-zero carbon
3 source to solar generation resources. Consumers also failed to consider that TES Filer City
4 can be reconfigured in the future to burn more wood or perhaps all wood.

5
6 **Q. How do the Biomass Plants economics compare to Consumers' proposed New Gas**
7 **Generation resources?**

8 A. The Biomass Plants can provide Consumers a reliable, dispatchable, and net-zero carbon
9 generation resource at lower costs than the combined cost of DIG, Kalamazoo, and
10 Livingston Plants. In comparison to Consumers' forecasted use of Kalamazoo and
11 Ludington plants, the Biomass Plants would provide significantly more electric generation
12 over the IRP planning period providing Consumers' ratepayers higher value added for
13 similar life cycle costs. If converted to burn wood, the same would be true of TES Filer
14 City.

15
16 **Q. How should the Biomass Plants be modeled in Consumers' 2021 IRP PCA?**

17 A. The Biomass Plants and TES Filer City should have been included in the Aurora modeling
18 to continue operation after expiration of the current PPAs. In addition, Consumers should
19 have considered the Biomass Plants and TES Filer City as a replacement for the Kalamazoo
20 and Livingston Plants since these facilities provide little value to Consumers' ratepayers at
21 costs of over \$173 million during the IRP planning period and additional costs after the
22 planning period.

23

1 **Q. Are there other actions that should be included in Consumers' IRP as it pertains to**
2 **the Biomass Plants?**

3 A. Yes. The Biomass Plants are fundamentally different from the other forms of non-
4 intermittent natural gas generation that are included in Consumers' IRP. They are net zero
5 carbon, non-intermittent, renewable, baseload generation. The New Gas Generation plants
6 are not net-zero carbon generation resources. Given this significant difference, the capacity
7 and energy from the Biomass Plants and TES Filer City if reconfigured should not be priced
8 in the same manner as non-intermittent fossil fueled generating plants. Their capacity
9 should also not be priced in the same manner as intermittent renewable wind or solar
10 generation because they are capable of providing dispatchable, high-capacity factor and
11 reliable generation. The foregoing being true, the Commission should require Consumers
12 to amend its IRP to include the Biomass Plants and TES Filer City generation resources
13 through the entire IRP study period and consider issuing competitive bids for net-zero
14 carbon, non-intermittent, renewable, baseload generation separate from, and addition to,
15 any competitive bids for intermittent renewable generation and non-intermittent fossil fuel
16 generation.

17

18 **IX. CONCLUSIONS**

19 **Q. What is your recommendation to the Commission regarding adjustments to**
20 **Consumers' 2021 IRP PCA?**

21 A. Consumers' failure to even consider including the operation of net-zero carbon Biomass
22 Plants in the 2021 IRP PCA which is intended to be road map to a Michigan clean energy
23 future is a critical omission. I recommend that the Commission require Consumers to

1 include the Biomass Plants and TES Filer City as part of the 2021 IRP PCA supply-side
2 generation resources, through the entire planning period, not just up to the expiration of
3 their current PPAs. If the Commission determines that Consumers supply side resources
4 are overstated because Consumers assumed a [REDACTED]% solar capacity factor and should have
5 assumed a solar capacity factor in the 17.5% range, the IRP should be amended to include
6 both Kalamazoo and Livingston, as well as the generation of the Biomass Plants and TES
7 Filer City. If the Commission determines that Consumers correctly assumed a [REDACTED]% solar
8 capacity factor, its IRP should be amended to substitute the Biomass Plants generation, and
9 TES Filer City if reconfigured, for that of Kalamazoo and Livingston. The Kalamazoo and
10 Livingston plants appear to provide little value to Consumers' ratepayers, the need for these
11 facilities' capacity is questionable and can be replaced with the capacity of the Biomass
12 Plants and TES Filer City if reconfigured. The Commission should not approve the
13 purchase of the Kalamazoo and Livingston plants in this proceeding because the need for
14 their capacity in the next five years has not been adequately demonstrated. I also
15 recommend that the Commission require the IRP be amended to call for separate
16 competitive bids for zero net carbon, non-intermittent capacity and energy as discussed
17 above.

18
19 **Q. Does this conclude your direct testimony?**

20 A. Yes.



Richard A. Polich, P.E.
Managing Director – Generation Services

EDUCATION

Master of Business Administration, University of Michigan, 1990
Bachelor of Science, Mechanical Engineering, University of Michigan, 1979
Bachelor of Science, Nuclear Engineering, University of Michigan, 1979

ENGINEERING REGISTRATION

Professional Engineer in the State of Michigan

PROFESSIONAL MEMBERSHIP

National Society of Professional Engineers
American Nuclear Society
American Society of Mechanical Engineers
Association of Energy Engineers Senior Member

PROFESSIONAL EXPERIENCE

Mr. Polich has more than 30 years' experience as an energy industry engineer, manager, and leader, combining his business and technical expertise in the management of governmental, industrial and utility projects. He has worked extensively in nuclear, coal, IGCC, natural gas, green/renewable generation. Mr. Polich has developed generation projects in wind, solar, and biomass in Australia, Canada, Caribbean, South American and United States locales. His generation experience includes engineering of systems and providing engineering support of plant operations. Notable projects include the Midland Nuclear Project and its conversion to natural gas combined cycle, start-up testing support for Consumers' coal-fired Campbell 3, Palisades nuclear steam generator replacement support, Covert Generating Station feasibility evaluation, and a Lake Erie offshore wind project. He also has extensive experience in utility rates and regulation, having managed Consumers Energy's rates group for a number of years. In that function his responsibilities included load and revenue forecasting, overseeing the design of gas and electric rates and testifying in regulatory proceedings. Mr. Polich has testified in over thirty regulatory and legislative proceedings.

Mr. Polich has testified in over 30 regulatory proceedings on a variety of issues. Recently, Mr. Polich provided direct and rebuttal testimony before the Hawaii Public Utilities Commission in Docket No. 2015-0022, regarding the Hawaiian Electric Company, Inc. and NextEra Merger. Over 15 years' experience working with Michigan Public Service Commission on renewable energy policies, independent power supplier regulations, and electric rate cases. He has also worked with the Michigan Legislature: defined laws for open markets, renewable portfolio standards. Mr. Polich has worked on various projects and policies in Arizona, Arkansas, California, Georgia, Indiana, Minnesota Nebraska, New Mexico, Ohio, Texas, and Wisconsin Commissions over the last ten years. Mr. Polich also established Consumers Energy's Federal Energy Regulatory Commission transmission tariffs.

SPECIFIC PROJECT EXPERIENCE

RATES & REGULATORY

GDS Associates, Inc. – Managing Director

Florida Public Utility Commission – Docket No. 219001-E1, Duke Energy Florida Power Cost Recovery Clause
Provided testimony on the why the steam turbine failure at Duke Energy Florida's Bartow Combined Cycle Plant was the result of excess steam flow resulting in turbine blade failure and quantified the cost impact of replacement power on customers. Administrative law judge ruled Duke Energy Florida should refund over \$1 million in power costs to customers.



Richard A. Polich, P.E.
Managing Director – Generation Services

Federal Energy Regulatory Commission – Docket No. ER17-1821-002, Panda Generation Reactive Power Revenue Requirement

Provided testimony on allocation of costs in opposition to Panda’s reactive power revenue requirement request. Administrative Law Judge agreed with GDS allocation of costs, FERC yet to issue decision.

Indiana Utility Regulatory Commission – Cause No. 38707-FAC111-S1, Duke Energy Indiana Fuel Clause Adjustment Charge Proceeding

Provided testimony on why the cause of Duke Energy Indiana’s Cayuga 1 outage was the result of negligence and should result in disallowance of fuel cost recovery. Resulted in disallowance of over \$3 million.

North Carolina Department of Justice – Docket E-2, Sub 1142, Duke Energy Progress General Rate Case

Provide testimony on return on equity and debt to equity ratio on behalf of the North Carolina Attorney General Office.

Joint Municipal Intervenor Group – Cause 44967, Indiana-Michigan General Rate Case

Provided testimony on behalf of the City of Fort Wayne, the City of Marion, Marion Municipal Utilities, the Muncie Sanitary District, and the City of South Bend, all located in the State of Indiana, before the Indiana Utility Regulatory Commission, on the proposed return on equity and impact on rate of return; and the 2018 test year debt structure.

SunEdison – Docket No. 2015-0022, The Hawaiian Electric Company, Inc. and NextEra Merger

Provided testimony on behalf of Sun Edison, before the Hawai’i Public Utility Commission, evidence regarding NextEra’s regulatory practices in Florida through its affiliate, Florida Power and Light (FPL), that indicated it would not be in the best interest for Hawai’i to approve the merger. This project involved significant research into Hawai’i energy policy, past parties of Hawaiian Electric Company (HECO), the Hawai’i renewable energy markets and operations of NextEra and its affiliates.

North Dakota Public Service Commission Staff – Case No. PU-16-666 MDU General Rate Case

Provided testimony on behalf of the North Dakota Public Service Commission Staff, before the North Dakota Public Utility Commission, regarding return on equity, cost of capital, revenue requirement, and generation resource costs.

North Dakota Public Service Commission Staff – Case No. PU-15-96 NSP Determination of Prudence

Provided testimony on behalf of the North Dakota Public Service Commission Staff, before the North Dakota Public Utility Commission, regarding analysis and recommendation concerning Northern States Power’s (“NSP”) need for additional generation resources.

Consumers Energy - Supervisor of Pricing and Forecasting

Managed the group responsible for setting and obtaining regulatory approval for the company’s electric and gas rates. Developed new approaches to electric and natural gas competitive pricing, redesigned electric rates to simplify rates and eliminate losses and defined new strategies for customer energy pricing. Negotiated new electric supply contracts with key industrial electric customers resulting in over \$800M in annual revenue. Testified in multiple regulatory proceedings.

EOS Energy Options & Solutions – Consulting Company

Provided testimony for multiple clients in both Detroit Edison and Consumers Energy in over 30 regulatory proceedings. Testimony topics included rates, public policy and deregulation. Also testified in several legislative proceedings in both Michigan and Ohio, addressing energy policy. Provided expert witness testimony in Massachusetts regarding wind energy projects.

Case No.: U-21090
Exhibit No.: BMP- 1 (RAP-1)
Page: Page **3** of **6**
Witness: RA Polich
Date: October 28, 2021



Richard A. Polich, P.E.
Managing Director – Generation Services

OTHER EXPERIENCE

NATURAL GAS COMBINED CYCLE EXPERIENCE

Consumers Energy – 1,560 MW Midland Cogeneration Venture

Member of a small team selected to investigate the feasibility of converting the mothballed Midland Nuclear Plant into a fossil fueled power plant. Established new plant configuration that repowered the existing nuclear steam turbine with natural gas fired combustion turbines and heat recovery steam generators. Developed the new thermal cycle and heat rate, determined how to supply steam to Dow chemical for cogeneration, developed models for projecting plant performance, defined which portions of the nuclear plant were useful in the new combined cycle plant and forecasted project economics.



Richard A. Polich, P.E.
Managing Director – Generation Services

Nordic Energy – (2) 1,150 MW IGCC Projects

Project Manager for the development of two IGCC projects proposed to Georgia Power and Xcel Energy in response to RFPs. Responsibilities included establishing thermal cycles, equipment selection, site selection, supervising engineering, developing project proforma and proposals.

Nordic Energy – 230 MW Power Barge

This unit was to be located on the Columbia River near Portland Oregon. Lead the project development team responsible for securing equipment, designing the power plant, design of barges, assessing site feasibility, developing project economics and interconnection applications.

RENEWABLE ENERGY EXPERIENCE

Matinee Energy – Utility Scale Solar Developer

Engineering design and project development consultant for utility scale solar photovoltaic projects. Development activities include site selection, equipment specifications, financial analysis and preparation of proposals. Also responsible for engineering and securing electrical interconnection.

Windlab Developments USA – Wind Power Developer

Responsible for greenfield development of the US platform for wind energy projects east of the Mississippi. Developed the company's engineering protocol for wind project design and construction, responsible for managing engineering design and construction of projects, and established six wind power projects (750 MW). Responsible for negotiation of Power Purchase Agreements, electrical interconnection studies, interface with Midwest ISO and submitting Generation Interconnection Application.

TradeWind Energy - Wind Power Project Developer

Project developer for 800 MW of wind power projects in Michigan and Indiana. Introduced new project management methods to the development process which resulted in savings of over \$200,000 annually on each project.

Third Planet Windpower – Wind Power Project Developer

Engineering and project management consultant to support the startup of new wind power company. Established engineering standards used for selection of wind project equipment and project construction, analysis tools for evaluating projecting wind project power production, and performed project economic modeling.

Noble Environmental Power – Wind Power Project Developer

Electric transmission system consultant on the development of several wind power projects. Supported Noble's decisions on transmission grid interconnect and negotiate interconnection agreements.

ENERGY EFFICIENCY EXPERIENCE

Arkansas Energy Office – Weatherization Assistance Program Evaluation

Evaluated the performance and operations of Arkansas's Weatherization Assistance Program. This included review of program effectiveness, program operations, energy efficiencies attained, adequacy of energy efficiency measures and subcontractor performance.

CLEARResult – Arkansas Energy Efficiency Programs

Energy efficiency operations and program support for 400% increase in Arkansas energy efficiency programs. Developed processes for data collection, field staff deployment and job assignments.



Richard A. Polich, P.E.
Managing Director – Generation Services

ECONOMIC IMPACT ASSESSMENT

Michigan Department of Environmental Quality - Economic Impacts of a Renewable Portfolio Standard and Energy Efficiency Program for Michigan

Project Manager for this report which focused on the economic impact of renewable portfolio standard and energy efficiency programs on the State of Michigan. The evaluation used in this report encompassed using integrated resource planning models, econometric modeling and electric pricing models for the entire State of Michigan.

West Michigan Business Alliance - Alternative and Renewable Energy Cluster Analysis

Prepared the report provided a road map for Western Michigan businesses to establish new business in the renewable energy industry.

POWER PURCHASING AND TRADING

Nordic Energy LLC - Vice President

Established an innovative energy trading floor, created customer metering and billing systems that enabled Nordic to be the first non-utility company to supply electricity to retail customers in Michigan.

POWER PROJECT EXPERIENCE

Detroit Edison St Clair Power Station – Performed coal combustion analysis associated with conversion Powder River Basin coal. Work included pulverizer mill performance testing, boiler combustion analysis on new coal, and unit performance analysis.

Consumers Energy Campbell 3 - Supported start-up efforts of this 800 MW pulverized coal power plant. Part of team that performed analysis of boiler data and determined the cause of superheater failure. Also part of team to analyze performance test data for warranty evaluation.

Consumers Energy Weadock Plant – Design oversight and specified various plant upgrades during major maintenance outage. Included replacement of high pressure superheater, design of new steam supply pipes, valve specifications and supported plant restart.

Consumers Energy Midland Nuclear Plant – Responsible for overseeing EPC contractor design and construction of primary and secondary nuclear systems. Included review of systems for compliance with Nuclear Regulatory Commission regulations. Key projects included:

- Leading team to analyze plant and determine best methods for compliance with new CFR Appendix R Fire Protection rules
- Design of primary cooling system pump oil collection and disposal systems.
- Oversight of redesign of component cooling water systems.
- Analysis of diesel generator capability to meet emergency shutdown power requirements.
- Primary interface with Dow Chemical for steam supply contract.

Consumers Energy Midland Cogeneration Venture – Part of team to assess and develop design for converting nuclear plant to gas combined cycle project. This included researching and developing scenarios for project funding and regulatory approach Primary responsibilities included:

- Developing new thermal cycle that best utilized existing steam turbine and supply steam to Dow Chemical.
- Determining which existing assets could be utilized in new plant and determining the original construction value of these assets.



Richard A. Polich, P.E.
Managing Director – Generation Services

PAPERS & PUBLICATIONS

Engineering and Economic Evaluation of Offshore Wind Plant Performance and Cost Data, 2011, Produced for the Electric Power Research Institute, KEMA, Inc.

FERC's 15% Fast Track Screening Criterion, 2012, Paper reviewing the FERC 15% screening criteria for electrical interconnection, KEMA, Inc.

Island of Saint Maarten Sustainable Energy Study, 2012, Produced for the Cabinet of Ministry VROMI, KEMA Inc.

A Study of Economic Impacts from the Implementation of a Renewable Portfolio Standard and an Energy Efficiency Program in Michigan, 2007, Produced for the Michigan Department of Environmental Quality

Alternative and Renewable Energy Cluster Analysis, 2007, Produced for the West Michigan Strategic Alliance and The Right Place

COURSES & SEMINARS

Association of Energy Engineers – Certified Energy Manager
Green Building Council – Associated LEED Certification Training
CLEAResult Leadership Academy

COMMUNITY SERVICE AND ACTIVITIES

Bicycling, hiking and cross-country skiing
Instrument-Rated Private Pilot
Habitat for Humanity
Scoutmaster
Soccer coach and referee
Volunteer work for disaster relief and building homes in Mexico

PREVIOUS TESTIMONY OF RICHARD A. POLICH

COMMISSION	CASE	ON BEHALF	TITLE
Minnesota	E999/AA-20-171	Minnesota Department of Commerce Division of Energy Resources	Independent investigation of the unplanned outages at Minnesota Power's Clay Boswell coal power plant during the period of July 1, 2018 to December 21, 2019
FERC	ER-21-864	Meyersdale Storage	Schedule 2, Reactive Supply and Voltage Control from Generation Sources Service
Florida	2019140-EI	Florida Office of Public Council	Crystal River 3 Accelerated Decommissioning
Florida	2019001-EI	Florida Office of Public Council	Fuel Adjustment Clause – Bartow Steam Turbine Failure Power Supply Cost Recovery Disallowance
FERC	ER17-1821-002	Joint Customers	Revenue Requirement for Reactive Power Production Capability of the Panda Stonewall Generating Facility
North Carolina	E-2 Sub1142	Duke Energy Progress	Duke Energy Progress General Rate Case
Indiana	38707 FAC111-S1	Nucor Steel	Duke Energy Indiana, LLC for Fuel Cost Adjustment Clause
North Dakota	PU-16-166	ND PSC Staff	Montana-Dakota Utilities 2016 Electric Rate Increase Application
Hawaii	2015-0022	Sun Edison	Regarding the Hawaiian Electric Company, Inc. and NextEra Merger
North Dakota	PU-15-96	ND PSC Staff	Northern States Power Determination of Prudence
Michigan	U-10143	Consumers Energy	Consumers Energy Approval of an Experimental Retail Wheeling Case
Michigan	U-10335	Consumers Energy	General Rate Case
Michigan	U-10625	Consumers Energy	Proposal for Market-Based Rates Under Rate-K
Michigan	U-10685	Consumers Energy	1996 General Rate Case
Michigan	U-11915	Energy Michigan	Supplier Licensing
Michigan	U-11955	Energy Michigan	Consumers Energy Stranded & Implementation Cost Recovery
Michigan	U-11956	Energy Michigan	Detroit Edison Stranded & Implementation Cost Recovery
Michigan	U-12478	Energy Michigan	Detroit Edison Asset Securitization Case
Michigan	U-12488	Energy Michigan	Consumers Energy Retail Open Access Tariff
Michigan	U-12489	Energy Michigan	Detroit Edison Retail Open Access Tariffs
Michigan	U-12505	Energy Michigan	Consumers Energy Asset Securitization Cases
Michigan	U-12639	Energy Michigan	Stranded Cost Methodology Case
Michigan	U-13380	Energy Michigan	Consumers Energy 2000, 2001 & 2002 Stranded Cost Case
Michigan	U-13350	Energy Michigan	Detroit Edison 2000 & 2001 Stranded Cost Case
Michigan	U-13715	Energy Michigan	Consumers Energy Securitization of Qualified Costs
Michigan	U-13720	Energy Michigan	Consumers Energy 2002 Stranded Costs

PREVIOUS TESTIMONY OF RICHARD A. POLICH

COMMISSION	CASE	ON BEHALF	TITLE
Michigan	U-13808	Energy Michigan	Detroit Edison General Rate Case
Michigan	U-13808-R	Energy Michigan	Detroit Edison 2004 Stranded Cost &
Michigan	U-14474	Energy Michigan	Detroit Edison 2004 PSCR Reconciliation Case
Michigan	U-13933	Energy Michigan	Detroit Edison Low-Income Energy Assistance Credit for Residential Electric Customers
Michigan	U-13917-R	Energy Michigan	Consumers Energy 2004 PSCR Reconciliation Case
Michigan	U-13989	Energy Michigan	Consumers Energy Request for Special Contract Approval
Michigan	U-14098	Energy Michigan	Consumers Energy 2003 Stranded Costs
Michigan	U-14148	Energy Michigan	Consumers Energy MCL 460.10d(4) Case
Michigan	U-14347	Energy Michigan	Consumers Energy General Rate Case
Michigan	U-14274-R	Energy Michigan	Consumers Energy 2005 PSCR Reconciliation Case
Michigan	U-14275-R	Energy Michigan	Detroit Edison Company 2005 PSCR Reconciliation Case
Michigan	U-14399	Energy Michigan	Detroit Edison Company Application for Unbundling of Rate
Michigan	U-14992	Energy Michigan	Power Purchase Agreement and for Other Relief in Connection with the sale of the Palisades Nuclear Power Plant and Other Assets

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the application of)
CONSUMERS ENERGY COMPANY)
for approval of an Integrated Resource)
Plan under MCL 460.6t, certain accounting)
approvals, and for other relief.)
_____)

Case No. U-21090

CONFIDENTIAL

EXHIBIT BMP-3 (RAP-3)

FILED UNDER SEAL

CONSUMERS ENERGY PROJECT CAPACITY POSITION

Based on 2021 IRP Preferred Course of Action Scenario
as Presented in Exhibit No. A-14 (STW-11) Page 9 of 10

Case No.: U-21090
Exhibit No.: BMP-4 (RAP-4)
Page: 1 of 1
Witness: RA Polich
Date: October 28, 2021

Line		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
1	Consumers Energy's Projected Demand (MW)	7,558	7,600	7,542	7,553	7,435	7,516	7,558	7,575	7,627	7,625	7,770	7,796	7,883	7,844	7,807	7,804	7,785	7,745	7,734	7,739
2	Behind the Meter Demand Adjustments																				
3	New EWR	-	-	-	20	57	91	123	157	187	216	231	232	229	229	225	222	220	218	215	213
4	New DR	-	-	12	25	37	49	62	74	87	99	99	99	99	99	99	99	99	99	99	99
5	New BTMG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	Net Load Served by Generation Resources	7,558	7,600	7,530	7,508	7,341	7,376	7,372	7,344	7,352	7,310	7,439	7,465	7,555	7,516	7,484	7,483	7,467	7,428	7,420	7,427
7	Existing ZRC w/o Early Retirement Exhibit A-14 (STW-11)	8,175	7,754	7,665	7,911	7,823	7,825	7,757	7,722	7,722	6,359	4,965	4,925	4,925	4,925	4,925	4,925	4,925	4,925	4,168	4,168
8	Net Capacity Position	617	154	135	403	482	449	384	377	369	(951)	(2,474)	(2,541)	(2,630)	(2,591)	(2,559)	(2,558)	(2,542)	(2,503)	(3,251)	(3,259)
9	Early Retirement Adjustments																				
				Retirement Date																	
10	Karn 3	2023	-	-	344	335	336	338	340	340	340	340	-	-	-	-	-	-	-	-	-
11	Karn 4	2023	-	-	444	450	448	449	449	450	450	450	-	-	-	-	-	-	-	-	-
12	Campbell 1	2025	-	-	-	252	252	252	252	252	252	-	-	-	-	-	-	-	-	-	-
13	Campbell 2	2025	-	-	-	337	335	335	335	335	335	-	-	-	-	-	-	-	-	-	-
14	Campbell 3	2025	-	-	-	757	757	756	756	756	756	756	756	756	756	756	756	756	756	-	-
15	Early Retirement Adjustments		-	-	787	785	2,130	2,132	2,133	2,132	2,132	2,132	2,132	756	756	756	756	756	756	-	-
16	Capacity Position With Early Retirements	617	154	(652)	(382)	(1,649)	(1,682)	(1,748)	(1,755)	(1,763)	(3,083)	(3,230)	(3,297)	(3,387)	(3,348)	(3,315)	(3,315)	(3,298)	(2,503)	(3,251)	(3,259)
17	Additon of Covert & DIG Natural Gas Plant																				
18	Covert	-	-	1,114	1,114	1,114	1,114	1,114	1,114	1,114	1,114	1,114	1,114	1,114	1,114	1,114	1,114	1,114	1,114	1,114	1,114
18	Dearborn Industrial Generation	-	-	-	-	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728	728
19	Capacity Position With Covert & DIG	617	154	462	732	193	160	94	87	79	(1,241)	(1,388)	(1,455)	(1,545)	(1,506)	(1,473)	(1,473)	(1,456)	(661)	(1,409)	(1,417)
20	2021 IRP Resource Selections (ZRC)																				
20	New solar	-	-	-	-	250	352	602	852	1,102	1,352	1,498	1,513	1,591	1,591	1,759	2,009	2,259	2,509	2,759	3,009
21	New storage	-	-	-	-	-	-	-	-	-	55	57	58	59	60	138	216	293	371	449	450
22	TOTAL	-	-	-	-	250	352	602	852	1,102	1,407	1,555	1,571	1,650	1,651	1,897	2,225	2,552	2,880	3,208	3,459
23	Capacity Position Without Livingston & Kalamazoo	617	154	462	732	443	512	696	939	1,181	166	166	116	106	146	424	752	1,096	2,218	1,798	2,042

BIOMASS PLANT OPERATIONS

Case No.: U-21090
 Exhibit No.: BMP- 5 (RAP-5)
 Page: 1 of 1
 Witness: RA Polich
 Date: October 28, 2021

Line	BIOMASS PLANT	Year	Availability	CF	NOTES
1	Cadillac Renewable Energy, LLC	2018	92.0%	48.0%	
2		2019	72.0%	27.0%	Extended shutdown for repairs affected availability.
3		2020	37.0%	15.0%	
4	Genesee Power Station LP	2018	69.0%	23.0%	
5		2019	98.4%	28.8%	
6		2020	92.1%	28.6%	
7	Grayling Generation Station LP	2018	94.8%	60.3%	
8		2019	96.7%	59.0%	
9		2020	35.8%	20.9%	Major plant overhaul.
10	TES Filer City Station LP	2018		96.2%	
11		2019		86.2%	
12		2020		97.1%	
13	Viking Energy of Lincoln A LP	2018	97.1%	99.8%	
14		2019	97.6%	100.1%	
15		2020	97.2%	99.0%	
16	Viking Energy of McBain A LP	2018	97.5%	101.8%	
17		2019	97.8%	100.0%	
18		2020	93.1%	96.5%	

SOLAR PLANT PROJECTED PERFORMANCE
National Renewable Energy Laboratory PVWATTS Model
JACKSON, MI LOCATION

PVWatts Calculator

<https://pvwatts.nrel.gov/pvwatts.php>



Caution: Photovoltaic system performance predictions calculated by PVWatts include many inherent assumptions and uncertainties and do not reflect variations between PV technologies nor site-specific characteristics except as represented by PVWatts inputs. For example, PV modules with better performance are not differentiated within PVWatts from lesser performing modules. Both NREL and private companies provide more sophisticated PV modeling tools (such as the System Advisor Model at <https://sam.nrel.gov>) that allow for more precise and complex modeling of PV systems.

The expected range is based on 30 years of actual weather data at the given location and is intended to provide an indication of the variation you might see. For more information, please refer to this NREL report: The Error Report.

Disclaimer: The PVWatts Model ("Model") is provided by the National Renewable Energy Laboratory ("NREL"), which is operated by the Alliance for Sustainable Energy, LLC ("Alliance") for the U.S. Department Of Energy ("DOE") and may be used for any purpose whatsoever.

The names DOE/NREL/ALLIANCE shall not be used in any representation, advertising, publicity or other manner whatsoever to endorse or promote any entity that adopts or uses the Model. DOE/NREL/ALLIANCE shall not provide any support, consulting, training or assistance of any kind with regard to the use of the Model or any updates, revisions or new versions of the Model.

YOU AGREE TO INDEMNIFY DOE/NREL/ALLIANCE AND ITS AFFILIATES, OFFICERS, AGENTS, AND EMPLOYEES AGAINST ANY CLAIM OR DEMAND, INCLUDING REASONABLE ATTORNEYS' FEES, RELATED TO YOUR USE, RELIANCE, OR ADOPTION OF THE MODEL FOR ANY PURPOSE WHATSOEVER. THE MODEL IS PROVIDED BY DOE/NREL/ALLIANCE AS IS AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY DISCLAIMED. IN NO EVENT SHALL DOE/NREL/ALLIANCE BE LIABLE FOR ANY SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES OR ANY DAMAGES WHATSOEVER, INCLUDING BUT NOT LIMITED TO CLAIMS ASSOCIATED WITH THE LOSS OF DATA OR PROFITS, WHICH MAY RESULT FROM ANY ACTION IN CONTRACT, NEGLIGENCE OR OTHER TORTIOUS CLAIM THAT ARISES OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THE MODEL.

The energy output range is based on analysis of 30 years of historical weather data for nearby, and is intended to provide an indication of the possible interannual variability in generation for a Fixed (open rack) PV system at this location.

147,794,368 kWh/Year*

RESULTS *System output may range from 138,586,779 to 153,883,496 kWh per year near this location.*

Month	Solar Radiation (kWh / m ² / day)	AC Energy (kWh)	Value (\$)
January	2.07	5,719,269	612,534
February	3.32	8,179,584	876,033
March	4.86	12,667,662	1,356,707
April	6.32	14,991,267	1,605,565
May	6.81	16,441,283	1,760,861
June	7.85	17,847,230	1,911,438
July	8.38	19,539,460	2,092,676
August	7.05	16,927,330	1,812,917
September	6.07	14,518,446	1,554,926
October	3.80	9,736,174	1,042,744
November	2.45	6,286,605	673,295
December	1.83	4,939,995	529,073
Annual	5.07	147,794,305	\$ 15,828,769

Location and Station Identification

Requested Location	49202, USA
Weather Data Source	Lat, Lon: 42.25, -84.42 1.1 mi
Latitude	42.25° N
Longitude	84.42° W

PV System Specifications (Commercial)

DC System Size	100000 kW
Module Type	Premium
Array Type	1-Axis Tracking
Array Tilt	0°
Array Azimuth	180°
System Losses	11.42%
Inverter Efficiency	96%
DC to AC Size Ratio	1.5
Ground Coverage Ratio	0.4

Economics

Average Retail Electricity Rate	0.107 \$/kWh
--	--------------

Performance Metrics

Capacity Factor	16.9%
------------------------	-------

SOLAR PLANT PROJECTED PERFORMANCE
National Renewable Energy Laboratory PVWATTS Model
LANSING, MI LOCATION

PVWatts Calculator

<https://pvwatts.nrel.gov/pvwatts.php>



Caution: Photovoltaic system performance predictions calculated by PVWatts® include many inherent assumptions and uncertainties and do not reflect variations between PV technologies nor site-specific characteristics, except as represented by PVWatts® inputs. For example, PV modules with better performance are not differentiated within PVWatts® from lesser performing modules. Both NREL and private companies provide more sophisticated PV modeling tools (such as the System Advisor Model at <https://sam.nrel.gov>) that allow for more precise and complex modeling of PV systems.

The expected range is based on 30 years of actual weather data at the given location and is intended to provide an indication of the variation you might see. For more information, please refer to this NREL report: The Error Report.

Disclaimer: The PVWatts® Model (Model) is provided by the National Renewable Energy Laboratory ("NREL"), which is operated by the Alliance for Sustainable Energy, LLC ("Alliance") for the U.S. Department of Energy ("DOE") and may be used for any purpose whatsoever.

The names DOE/NREL/ALLIANCE shall not be used in any representation, advertising, publicity or other manner whatsoever to endorse or promote any entity that adopts or uses the Model. DOE/NREL/ALLIANCE shall not provide any support, consulting, training or assistance of any kind with regard to the use of the Model or any updates, revisions or new versions of the Model.

YOU AGREE TO INDEMNIFY DOE/NREL/ALLIANCE, AND ITS AFFILIATES, OFFICERS, AGENTS, AND EMPLOYEES AGAINST ANY CLAIM OR DEMAND, INCLUDING REASONABLE ATTORNEYS' FEES, RELATED TO YOUR USE, RELIANCE, OR ADOPTION OF THE MODEL FOR ANY PURPOSE WHATSOEVER. THE MODEL IS PROVIDED BY DOE/NREL/ALLIANCE "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY DISCLAIMED. IN NO EVENT SHALL DOE/NREL/ALLIANCE BE LIABLE FOR ANY SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES OR ANY DAMAGES WHATSOEVER, INCLUDING BUT NOT LIMITED TO CLAIMS ASSOCIATED WITH THE LOSS OF DATA OR PROFITS, WHICH MAY RESULT FROM ANY ACTION IN CONTRACT, NEGLIGENCE OR OTHER TORTIOUS CLAIM THAT ARISES OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THE MODEL.

The energy output range is based on analysis of 30 years of historical weather data for nearby, and is intended to provide an indication of the possible interannual variability in generation for a fixed (open rack) PV system at this location.

154,826,352 kWh/Year*
RESULTS *System output may range from 145,180,670 to 161,205,198 kWh per year near this location.*

Month	Solar Radiation (kWh / m ² / day)	AC Energy (kWh)	Value (\$)
January	2.01	5,653,838	638,884
February	3.18	7,833,310	885,164
March	4.76	12,787,044	1,444,936
April	6.27	15,708,636	1,775,076
May	7.72	19,657,152	2,221,258
June	8.11	19,583,358	2,212,919
July	8.34	20,533,572	2,320,294
August	7.22	17,898,042	2,022,479
September	5.85	14,191,087	1,603,593
October	3.91	10,106,279	1,142,010
November	2.42	6,227,340	703,689
December	1.72	4,646,704	525,077
Annual	5.13	154,826,362	\$ 17,495,379

Location and Station Identification

Requested Location	48911, USA
Weather Data Source	Lat, Lon: 42.69, -84.58 1.0 mi
Latitude	42.69° N
Longitude	84.58° W

PV System Specifications (Commercial)

DC System Size	100000 kW
Module Type	Premium
Array Type	1-Axis Tracking
Array Tilt	0°
Array Azimuth	180°
System Losses	11.42%
Inverter Efficiency	96%
DC to AC Size Ratio	1.2
Ground Coverage Ratio	0.4

Economics

Average Retail Electricity Rate	0.113 \$/kWh
---------------------------------	--------------

Performance Metrics

Capacity Factor	17.7%
-----------------	-------

SOLAR PLANT PROJECTED PERFORMANCE
National Renewable Energy Laboratory PVWATTS Model
TRAVERSE CITY, MI LOCATION

PVWatts Calculator

<https://pvwatts.nrel.gov/pvwatts.php>



Caution: Photovoltaic system performance predictions calculated by PVWatts include many inherent assumptions and uncertainties and do not reflect variations between PV technologies nor site-specific characteristics except as represented by PVWatts inputs. For example, PV modules with better performance are not differentiated within PVWatts from lesser performing modules. Both NREL and private companies provide more sophisticated PV modeling tools (such as the System Advisor Model at <https://sam.nrel.gov>) that allow for more precise and complex modeling of PV systems.

The expected range is based on 30 years of actual weather data at the given location and is intended to provide an indication of the variation you might see. For more information, please refer to this NREL report: The Error Report.

Disclaimer: The PVWatts Model (Model) is provided by the National Renewable Energy Laboratory (NREL), which is operated by the Alliance for Sustainable Energy, LLC ("Alliance") for the U.S. Department Of Energy (DOE) and may be used for any purpose whatsoever.

The names DOE/NREL/ALLIANCE shall not be used in any representation, advertising, publicity or other manner whatsoever to endorse or promote any entity that adopts or uses the Model. DOE/NREL/ALLIANCE shall not provide any support, consulting, training or assistance of any kind with regard to the use of the Model or any updates, revisions or new versions of the Model.

YOU AGREE TO INDEMNIFY DOE/NREL/ALLIANCE, AND ITS AFFILIATES, OFFICERS, AGENTS, AND EMPLOYEES AGAINST ANY CLAIM OR DEMAND, INCLUDING REASONABLE ATTORNEYS' FEES, RELATED TO YOUR USE, RELIANCE, OR ADOPTION OF THE MODEL FOR ANY PURPOSE WHATSOEVER. THE MODEL IS PROVIDED BY DOE/NREL/ALLIANCE AS IS AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY DISCLAIMED. IN NO EVENT SHALL DOE/NREL/ALLIANCE BE LIABLE FOR ANY SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES OR ANY DAMAGES WHATSOEVER, INCLUDING BUT NOT LIMITED TO CLAIMS ASSOCIATED WITH THE LOSS OF DATA OR PROFITS, WHICH MAY RESULT FROM ANY ACTION IN CONTRACT, NEGLIGENCE OR OTHER TORTIOUS CLAIM THAT ARISES OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THE MODEL.

The energy output range is based on analysis of 30 years of historical weather data for nearby, and is intended to provide an indication of the possible interannual variability in generation for a Fixed (open rack) PV system at this location.

144,405,152 kWh/Year*

RESULTS *System output may range from 134,989,936 to 146,181,335 kWh per year near this location.*

Month	Solar Radiation (kWh / m ² / day)	AC Energy (kWh)	Value (\$)
January	1.28	3,570,230	372,732
February	2.56	6,381,718	666,251
March	4.75	12,487,354	1,303,680
April	6.57	15,501,887	1,618,397
May	7.72	18,300,408	1,910,563
June	8.38	19,121,800	1,996,316
July	8.78	20,617,474	2,152,464
August	7.30	17,605,022	1,837,964
September	5.73	14,088,731	1,470,864
October	3.25	8,600,354	897,877
November	1.97	5,118,420	534,363
December	1.10	3,011,659	314,417
Annual	4.95	144,405,057	\$ 15,075,888

Location and Station Identification

Requested Location	49684, USA
Weather Data Source	Lat, Lon: 44.77, -85.7 1.4 mi
Latitude	44.77° N
Longitude	85.70° W

PV System Specifications (Commercial)

DC System Size	100000 kW
Module Type	Premium
Array Type	1-Axis Tracking
Array Tilt	0°
Array Azimuth	180°
System Losses	11.42%
Inverter Efficiency	96%
DC to AC Size Ratio	1.5
Ground Coverage Ratio	0.4

Economics

Average Retail Electricity Rate	0.104 \$/kWh
--	--------------

Performance Metrics

Capacity Factor	16.5%
------------------------	-------

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the application of)
CONSUMERS ENERGY COMPANY)
for approval of an Integrated Resource)
Plan under MCL 460.6t, certain accounting)
approvals, and for other relief.)
_____)

Case No. U-21090

CERTIFICATE OF SERVICE

The undersigned certifies that on the 28th day of October, 2021, a copy the **Public Version** of the **Direct Testimony and Exhibits of Richard A. Polich, P.E.** on behalf of Cadillac Renewable Energy, LLC; Genesee Power Partners Limited Partnership, Decker Energy-Grayling, LLC, Hillman Power Company, LLC, Tondu Corporation, Viking Energy of Lincoln, Inc., and Viking Energy of McBain, Inc. and this Certificate of Service were served on the attorneys for the parties hereto, referenced on the attached Service List, via electronic mailing to said attorneys at their appropriate email addresses.



Angela R. Patrick

U-21090
SERVICE LIST

Timothy J. Lundgren	Michigan Energy Innovation Business Council (MIEIBC)	tlundgren@potomaclaw.com
Timothy J. Lundgren	Clean Grid Alliance	tlundgren@potomaclaw.com
Timothy J. Lundgren	Energy Michigan Inc.	tlundgren@potomaclaw.com
Timothy J. Lundgren	Institute for Energy Innovation	tlundgren@potomaclaw.com
Theresa A.G. Staley	Consumers Energy Company	theresa.staley@cmsenergy.com
Stephen A. Campbell	Association of Businesses Advocating Tariff Equity (ABATE)	scampbell@clarkhill.com
Spencer A. Sattler	MPSC Staff	sattlers@michigan.gov
Sally Wallace	ALJs - MPSC	wallaces2@michigan.gov
Robert W. Beach	Consumers Energy Company	robert.beach@cmsenergy.com
Robert A. Weinstock	Urban Core Collective	rweinstock@uchicago.edu
Richard J. Aaron	Michigan Electric Transmission Company LLC	raaron@dykema.com
Peter H. Ellsworth	Michigan Public Power Agency (MPPA)	pellsworth@dickinson-wright.com
Olivia R.C.A. Flower	Michigan Electric Transmission Company LLC	oflower@dykema.com
Nolan J. Moody	Michigan Public Power Agency (MPPA)	nmoody@dickinsonwright.com
Nicholas Q. Taylor	MPSC Staff	taylorn10@michigan.gov
Meagan Kolioupoulos	MPSC Staff	kolioupoulosm@michigan.gov
Nicholas Leonard	Urban Core Collective	nicholas.leonard@glelc.org
Michael J. Pattwell	Association of Businesses Advocating Tariff Equity (ABATE)	mpattwell@clarkhill.com
Michael C. Soules	Sierra Club	msoules@earthjustice.org
Michael C. Rampe	Consumers Energy Company	michael.rampe@cmsenergy.com
Mark N. Templeton	Urban Core Collective	templeton@uchicago.edu
Margrethe Kearney	Environmental Law & Policy Center	mkearney@elpc.org
Margrethe Kearney	Union of Concerned Scientists Inc.	mkearney@elpc.org
Margrethe Kearney	The Ecology Center	mkearney@elpc.org
Margrethe Kearney	Vote Solar	mkearney@elpc.org
Lydia Barbash-Riley	Sierra Club	lydia@envlaw.com
Lydia Barbash-Riley	Natural Resources Defense Council	lydia@envlaw.com
Lydia Barbash-Riley	Michigan Environmental Council	lydia@envlaw.com
Lisa M. Agrimonti	Michigan Electric Transmission Company LLC	lagrimonti@fredlaw.com
Laura A. Chappelle	Energy Michigan Inc.	lchappelle@potomaclaw.com
Laura A. Chappelle	Clean Grid Alliance	lchappelle@potomaclaw.com
Laura A. Chappelle	Institute for Energy Innovation	lchappelle@potomaclaw.com
Laura A. Chappelle	Michigan Energy Innovation Business Council (MIEIBC)	lchappelle@potomaclaw.com
Joseph J. Baumann	Wolverine Power Supply Cooperative Inc.	jbaumann@wpsci.com
John A. Janiszewski	Midland Cogeneration Venture LP	jjaniszewski@dykema.com
Jennifer U. Heston	Hemlock Semiconductor Operations LLC	jheston@fraserlawfirm.com
Jason T. Hanselman	Wolverine Power Supply Cooperative Inc.	jhanselman@dykema.com

James J. Fleming	Association of Businesses Advocating Tariff Equity (ABATE)	jffleming@clarkhill.com
Ian F. Burgess	Consumers Energy Company	ian.burgess@cmsenergy.com
Gary A. Gensch Jr.	Consumers Energy Company	gary.genschjr@cmsenergy.com
Don L. Keskey	Great Lakes Renewable Energy Association Inc.	donkeskey@publiclawresourcecenter.com
Derk A. Wilcox	Mackinac Center for Public Policy (MPCC)	wilcox@mackinac.org
Christopher M. Bzdok	Sierra Club	chris@envlaw.com
Christopher M. Bzdok	Natural Resources Defense Council	chris@envlaw.com
Christopher M. Bzdok	Michigan Environmental Council	chris@envlaw.com
Celeste R. Gill	Department of Attorney General	gillc1@michigan.gov
Brian W. Coyer	Great Lakes Renewable Energy Association Inc.	bwcoyer@publiclawresourcecenter.com
Brian W. Coyer	Residential Customer Group	bwcoyer@publiclawresourcecenter.com
Bret A. Totoraitis	Consumers Energy Company	bret.totoraitis@cmsenergy.com
Anne M. Uitvlugt	Consumers Energy Company	anne.uitvlugt@cmsenergy.com
Andrew Bashi	Urban Core Collective	andrew.bashi@glelc.org
Amy Monopoli	Michigan Electric Transmission Company LLC	amonopoli@itctransco.com
Amit T. Singh	MPSC Staff	singha9@michigan.gov
Abigail Hawley	Citizens Utility Board of Michigan	abbie@envlaw.com
Holly L. Hillyer	Citizens Utility Board of Michigan	holly@envlaw.com