STATE OF VERMONT
PUBLIC UTILITY COMMISSION

Case No. _____

Petition of Green Mountain Power Corporation and	)
GLOBALFOUNDRIES U.S. 2 LLC re: approval of	)
term contract	)

PREFILED DIRECT TESTIMONY OF PATRICK M. FLAHERTY ON BEHALF OF GLOBALFOUNDRIES U.S. 2 LLC

September 11, 2018

Summary: Sr. Director of Site Operations Patrick M. Flaherty describes the critical importance of energy costs to GLOBALFOUNDRIES U.S. 2 LLC's ability to succeed in a competitive market, and how stable, predictable, and lower costs will allow the company to remain viable and competitive so that it continues to employ thousands of Vermonters. Mr. Flaherty supports the Term Contract between Green Mountain Power and GLOBALFOUNDRIES and also provides background on GLOBALFOUNDRIES' business, facilities, and significant contributions to the Vermont economy in support of that agreement.

EXHIBIT LIST

Exhibit GF-PMF-1: Curriculum Vitae of Patrick M. Flaherty

Exhibit GF-PMF-2: Table and Graphs Reflecting GLOBALFOUNDRIES Electricity Consumption and Rate Change, 2010-2018Please state your name, occupation, and business address.

A1. My name is Patrick M. Flaherty and I presently serve as the Senior Director of Fab 9 and Fab 10 Site Operations for GLOBALFOUNDRIES U.S. 2 LLC ("GLOBALFOUNDRIES"). My business address is 2070 Route 52, Hopewell Junction, NY 12533.

Q1. On whose behalf are you submitting testimony?

A2. I am testifying on behalf of GLOBALFOUNDRIES, a business that purchases electricity from Green Mountain Power ("GMP") pursuant to GMP's industrial transmission service rate tariff.[1] GLOBALFOUNDRIES is a co-petitioner in this proceeding because it is seeking to redress the impact of rising electricity costs on the ability of GLOBALFOUNDRIES' Vermont plant to compete with semiconductor manufacturing plants elsewhere in the country and around the world.

Q2. Please describe your responsibilities at GLOBALFOUNDRIES.

A3. As the Senior Director of Site Operations for Fab 9 in Essex Junction, VT and Fab 10 in Hopewell Junction, NY, my team and I are responsible for all aspects of utilities, facilities, buildings, property, Site Systems, chemicals, construction, chemical management, fire protection, waste, environmental, life safety, waste treatment, energy, and all support systems to operate and maintain around-the-clock continuous reliability and cost competitive operations for the semiconductor manufacturing fabricators. My responsibilities are identical at GLOBALFOUNDRIES' New York and Vermont

[1] GLOBALFOUNDRIES also purchases a much smaller amount of power under GMP's general service commercial tariff.

Campuses and, consequently, I am in a unique position to compare both usage and energy costs at the two sister Sites.

Q3. What is the purpose of your testimony?

A4. My testimony describes the intense competitive pressures that GLOBALFOUNDRIES' Vermont facility faces, and the urgent need to have stable, predictable, and lower energy costs to allow GLOBALFOUNDRIES to continue to maintain its operations in Vermont. I explain how the agreement reached with GMP will help meet these needs and resolve issues related to GMP's open rate dockets. I also testify about the Vermont facility generally and its positive and important impact on the State, community, and local economies.

Q4. Please summarize your educational background and your work experience.

A5. A copy of my curriculum vitae is attached as ***Exhibit GF-PMF-1***.

Q5. Please provide a general description of GLOBALFOUNDRIES' business.

A6. GLOBALFOUNDRIES is a semiconductor design, development, fabrication, and innovation company headquartered in Santa Clara, California, with approximately 18,000 employees worldwide. GLOBALFOUNDRIES designs and manufactures integrated circuits in high volume at fabrication plants around the world, including six in Singapore, one in Germany, two in New York, one in China, and one in Vermont. GLOBALFOUNDRIES is an industry leader and is presently the second largest chip design and manufacturing company in the world.

The GLOBALFOUNDRIES facility in Vermont develops and manufactures semiconductor products including logic, microprocessor, and custom microchips. These devices are used in products such as cell phones, routers, and other electronics produced by technology companies worldwide. There is tremendous demand for these products worldwide, but they are also commodity products subject to intense manufacturing competition and thin margins. GLOBALFOUNDRIES' business is extremely unit cost sensitive. If costs rise after customer orders are in, the business suffers. That means that stability and predictability of costs are extremely important to GLOBALFOUNDRIES.

Q6. Please further describe GLOBALFOUNDRIES' facility in Vermont.

A7. GLOBALFOUNDRIES had 2,536 employees in 2017. These workers earned $195.5 million in wages, with an average of $77,100 per worker at the site. The total average compensation package per worker, which includes wages and fringe benefits, is $111,400, for a total of $282.6 million for all GLOBALFOUNDRIES' Vermont workers.

The GLOBALFOUNDRIES campus in Essex Junction, Vermont has 30 buildings on 725 acres totaling more than 3.5 million square feet, including over half a million square feet of high tech clean room space. We also have buildings across the river in Williston, Vermont. Last year, GLOBALFOUNDRIES paid a total of $2.35 million in property taxes to our host towns of Essex and Williston. (The company's employees also pay an undetermined amount of property taxes to the towns in which they live, along with income taxes.)

Q7. How does GLOBALFOUNDRIES benefit the Vermont economy and GMP customers?

A8. In 2017 GLOBALFOUNDRIES spent $70.2 million for various goods and services provided by Vermont vendors; its largest local expense by far is for electricity delivered by GMP, at $39.1 million last year.

Since 2015, GLOBALFOUNDRIES has spent an average $92.8 million annually on capital improvements, using local contractors as well as equipment purchased locally, nationally, and internationally.

The impacts of GLOBALFOUNDRIES on Vermont are further described in the testimony of economist Art Woolf.

Q8. What positive financial impact does GLOBALFOUNDRIES have on the State, community, and local economies?

A9. All of the wages, capital improvements, and spending I describe above translates into significant positive impact on the economy in Chittenden County and the State of Vermont as a whole. We are the largest for-profit employer in Vermont. International exports from GLOBALFOUNDRIES' Vermont operation totaled approximately $600 million in 2016. As I noted above, we pay approximately $2.3 million annually in property taxes, and our employees also pay income, property, and sales taxes in the local communities. In addition, GLOBALFOUNDRIES procures goods and services from dozens of Vermont providers. This includes, for example, production related equipment and parts, construction contractors (plumbers, electricians, etc.), facilities and construction management services, environmental services, HVAC services, and so on.

The businesses that GLOBALFOUNDRIES supports pay corporate income taxes and property taxes and their employees pay income and property taxes as well. Art Woolf, in his testimony, estimates that GLOBALFOUNDRIES supports more than 8,800 jobs directly and indirectly, and adds $1 billion annually to the State's economy.

Q9. What are GLOBALFOUNDRIES' electricity needs for its Vermont facility?

A10. Electricity is a vital component of our manufacturing and testing processes. The cost of electricity for the Vermont site represents nearly 50 percent of the operational cost of the site to support manufacturing. In addition to providing power to operate the thousands of pieces of production equipment, we use electricity for numerous direct support processes and equipment, including: HVAC, environmental control equipment, deionized water, high purity gases and chemicals, lighting, central utility plant equipment, chillers, compressors, pumps, and data processing equipment. Production at GLOBALFOUNDRIES occurs 24 hours per day, 365 days per year, which results in a relatively high energy demand that is very stable. The electricity consumption for our Vermont facility totaled approximately 407 million kilowatt-hours (kWh) in 2014, 409 million kWh in 2015, 403 million kWh in 2016, and 404 million kWh in 2017. We are on track for similar usage in 2018.

Q10. Are there ways in which GLOBALFOUNDRIES is a unique GMP customer?

A11. Yes. GLOBALFOUNDRIES is situated differently from all other GMP customers in a number of respects. First, as the state's largest manufacturer, GLOBALFOUNDRIES consumes more electricity than any other single GMP customer. Second,

GLOBALFOUNDRIES is unique in that it takes service from GMP at 115 kV, directly from the state transmission grid. We are the only customer in Vermont that takes retail service at the 115 kV transmission level. Third, unlike other customers, we own and pay to maintain the step-down transformers to which the transmission service is connected, as well as our internal on-site distribution system. As such, we do not use GMP's distribution system—and distribution is one of GMP's primary functions.

Q11. How much does GLOBALFOUNDRIES pay for the electricity consumed by its Vermont facility?

A12. In 2018, GLOBALFOUNDRIES will pay approximately $38 million for electricity from GMP compared to $35.5 million in 2017. That translates into a unit cost paid to GMP of around $0.094 per kWh in 2018. That figure does not fully capture our electricity costs, however. As part of state policy, GLOBALFOUNDRIES will also spend over $1 million in 2018 on investments in efficiency through the Self-Managed Energy Efficiency Program. In addition, because we—unlike other GMP customers—own and maintain our own switchyards (3 in all) and on-site distribution system, we will incur $3.5M in costs in 2018 to operate and maintain our distribution system and transformers. Taking into account all of these costs, and assuming we consume the same amount of electricity as we did in 2017 (404 million kWh), our effective rate for electricity in 2018 will be approximately $0.1052 per kWh.

Q12. How does the amount GLOBALFOUNDRIES expects to pay for electricity for its Vermont facility in 2018 compare to prior years?

A13. The unit cost for electricity that we and our predecessor IBM have purchased from GMP has steadily increased over the years. Attached hereto as ***Exhibit GF-PMF-2*** is an overview of the fabrication plant's electricity consumption and the escalation of rates since 2010. As depicted in that Exhibit, we made significant efforts to reduce our electricity consumption during that period but increasing rates have hampered our ability to control our overall energy costs.

It is my understanding that in order to help control costs and make the facility viable, the predecessor to GLOBALFOUNDRIES entered into a memorandum of understanding ("MOU") in 2014, under which the electric rate was frozen for three years ending 2017 at $0.0878 per kWh. Our current blended rate paid to GMP is $0.094 per kWH, a seven percent increase over 2017.

Q13. Why is the cost of electricity important to GLOBALFOUNDRIES' Vermont operations?

A14. To put it simply, energy costs are a primary determinant of the competitiveness of GLOBALFOUNDRIES' operations in Vermont. The semiconductor industry is extremely competitive, and our customers continually expect to buy more performance at a lower price. GLOBALFOUNDRIES competes on a national and an international level and faces stiff competition from facilities that pay significantly less for electricity than we do in Vermont. To maintain our ability to compete in this market, it is imperative that we reduce costs where possible, and here in Vermont electricity is a primary driver of our costs. Any increase in electricity costs will have a direct and harmful impact on the competitiveness of GLOBALFOUNDRIES' Vermont facility.

Q14. Has GLOBALFOUNDRIES expressed this concern before?

A15. Yes. For many years, GLOBALFOUNDRIES and its predecessor, IBM, have intervened in rate proceedings before the Public Utility Commission ("Commission" or "PUC") to express concern about the impact of rising electricity costs on the ability of GLOBALFOUNDRIES' Vermont plant to compete with semiconductor manufacturing plants elsewhere in the country and around the world. In doing so, GLOBALFOUNDRIES has emphasized its need for electricity rates that are not just lower but also stable and predictable. Most recently, GLOBALFOUNDRIES has intervened in three rate-related petitions pending before the Commission: (a) a GMP tariff filing seeking an increase in its base rates from January 1, 2019 through September 30, 2019, to be fully offset by bill credits (Case No. 18-0974-TF) (the "2019 Rate Case"); (b) a GMP tariff filing seeking approval of rate design changes to take effect April 1, 2019 (Case No. 18-2850-TF) (the "Rate Design Filing"); and (c) a GMP petition to approve a multi-year regulation plan, (Case No. 18-1633-PET) (the "MYRP Filing").

Q15. Please explain GLOBALFOUNDRIES' position further.

A16. Our Vermont facility competes with manufacturing facilities that enjoy significant cost advantages, including those located in New York, elsewhere in the United States, and overseas. Our Vermont operations must maximize productivity and reduce costs to meet the competitive challenge both domestically and abroad if we are to maintain and improve our market position. We have achieved cost stabilization and reductions in other key areas, including negotiating price reductions and volume purchase agreements for many commodities, materials, and services. We have devoted considerable attention and

engineering resources to managing our electricity costs through choices we control, but have not been able to keep pace with increasing costs. Therefore, the relative impact of our electricity costs has increased and, as I mentioned before, is now about 50 percent of our operational costs in Vermont. GLOBALFOUNDRIES cannot continue to offset higher electricity costs with increased productivity or additional cost-cutting efforts in other areas indefinitely; increasing electric unit costs have a significant impact on our present and future competitiveness. Without stable and reliable energy costs that are more competitive, the constant downward pressure on world-wide semiconductor pricing will force GLOBALFOUNDRIES to manufacture products in less expensive fabricators elsewhere and run the risk of losing customers to the competition.

Q16. Can you provide any examples of the competitive disadvantage GLOBALFOUNDRIES' Vermont facility faces due to energy costs?

A17. Yes. Because GLOBALFOUNDRIES operates fabrication plants in New York and in other countries, it has direct, firsthand knowledge of the advantage enjoyed by manufacturers in other markets, including GLOBALFOUNDRIES' facilities in Malta and East Fishkill.

Q17. What are the prices for electricity at GLOBALFOUNDRIES' New York facilities?

A18. The delivered cost of electricity that GLOBALFOUNDRIES paid its suppliers at its New York facilities in 2018 was $0.0575 per kWh for East Fishkill and $0.0452 per kWh for Malta.

Q18. Can you quantify the cost disadvantage that GLOBALFOUNDRIES' Vermont facility faces due to its higher electricity rates?

A19. I can provide a rough estimate that illustrates the magnitude of the impact the differences in rates have on electricity costs for the Vermont facility. Using the total amount of electricity consumed by GLOBALFOUNDRIES' Vermont facility for 2018, its electricity costs would be as follows under the rates referenced above:

Rate	Unit Cost / kWH	Total
Vermont Facility (actual)	$0.0940	$38.0M
East Fishkill Facility	$0.0575	$23.2M
Malta Facility	$0.0452	$18.3M

Again, our effective rate for electricity rises to $0.1052 per kWH in Vermont when one includes the cost to operate and maintain the GLOBALFOUNDRIES on-site electric switchyards and distribution system.

The Vermont and Malta unit costs in the table above are probably the most comparable. The GLOBALFOUNDRIES' East Fishkill facility switchyard is owned by a public utility and thus the switchyard operating costs are embedded in the delivered rate. The Vermont and Malta facilities, on the other hand, must each incur the added cost of operating and maintaining their switchyards.

No matter how you make the comparison, the competitive disadvantage to our Vermont facility compared to two New York facilities caused by high energy costs is substantial—in the range of $15M to $20M annually at this time—and is unsustainable.

GLOBALFOUNDRIES recognizes that the Vermont costs are indicative of costs in New England, and that GMP has worked with GLOBALFOUNDRIES over the years (along with VELCO) to ensure high reliability of our system. Those are important factors that are helpful to maintaining the competitive edge in our Vermont facility. However, the fact remains that the unit cost of electricity in Vermont, and its overall impact on the Vermont cost structure, is out of line with our costs just across the border at facilities that can manufacture the same products. The rate freeze for the period of the Term Contract helps ameliorate this issue, while the parties also commit to work together on longer-term solutions.

Q19. Has GLOBALFOUNDRIES Vermont tried to reduce its electric costs through demand reduction?

A20. Yes. Doing our own energy efficiency makes good business sense as well as environmental sense; GLOBALFOUNDRIES' corporate policy reflects a goal of ensuring the responsible use and consumption of energy throughout its business while ensuring efficiency measures are cost-effective and reliable.

Consistent with this policy, GLOBALFOUNDRIES Vermont, and IBM Vermont before it, have aggressively pursued energy efficiency. Energy costs significantly impact the production costs of our products, as I previously discussed. For that reason, we constantly seek ways to reduce our energy consumption. Over the last 20 years, the GLOBALFOUNDRIES site implemented approximately 2,000 energy efficiency and conservation measures. Many of those measures have been recognized through a variety of awards on both a state and regional level. While GLOBALFOUNDRIES will continue

to look for opportunities to reduce its electricity demand as a means of controlling cost, it is already a leader in this area, and its substantial efforts to date have not been sufficient to control the increase in its overall energy costs.

Q20. The proposed contract between GMP and GLOBALFOUNDRIES would require GLOBALFOUNDRIES to continue pursuing energy efficiency. Please explain.

A21. Under the contract, GLOBALFOUNDRIES will continue to pursue all cost-effective energy efficiency and conservation measures in cooperation with GMP, thereby advancing the State's energy policy with respect to energy efficiency. In that regard, GLOBALFOUNDRIES will file an annual report within 120 days of the anniversary of each year following contract approval. The report would identify the past year's load for the Vermont facility, the amount spent on energy efficiency, a description of specific energy efficiency or other energy savings actions undertaken, and the amount of energy saved.

Q21. The proposed contract calls for not just a rate freeze but also a downward adjustment of 2.73 percent of GLOBALFOUNDRIES' Transmission Rate, consistent with GMP's recently filed rate design petition. Why is that provision included?

A22. GLOBALFOUNDRIES has argued in prior PUC proceedings that its allocation of overall costs is too high, compared to other customers. GMP considered our arguments that additional downward adjustments were warranted. While GLOBALFOUNDRIES had argued for a greater overall reduction, GMP's recommendation of a 2.73 percent

downward adjustment in the Transmission Class is acceptable to GLOBALFOUNDRIES. However, the proceeding would not otherwise provide that reallocation on January 1, 2019—and that timing is critical for GLOBALFOUNDRIES to demonstrate the continued competitiveness of the Vermont site. Therefore, the parties agreed to include a downward adjustment in the Term Contract consistent with the rate design allocation GMP has sought. Upon approval of the Term Contract, that reallocation would go into effect as a rate decrease and would serve to set GLOBALFOUNDRIES' allocation for the period of the Term Contract, leaving the remainder of the class allocations for review in the GMP Rate Design proceeding.

Q22. The proposed contract would exempt GLOBALFOUNDRIES from the Exogenous Change Adjustors except for storm response costs reasonably related to transmission infrastructure repairs. Why should GLOBALFOUNDRIES be exempt from storm costs related to the repair of the distribution and sub-transmission system?

A23. As explained earlier, GLOBALFOUNDRIES takes service at 115kV directly from the transmission grid and does not use GMP's distribution and sub-transmission system. The costs that GMP recovers through the exogenous storm change adjustor are generally incurred to repair and maintain the distribution and sub-transmission system that we do not use. GLOBALFOUNDRIES pays for its own costs associated with maintaining its distribution system, and those costs are not allocated to other customers. As a matter of fairness and cost allocation principles, it does not make sense to require GLOBALFOUNDRIES to pay for costs to maintain a distribution and sub-transmission

system that it does not use and from which it does not benefit. To the extent that major storm costs are incurred to repair transmission infrastructure that GLOBALFOUNDRIES does use, GLOBALFOUNDRIES would share in those costs under the proposed term contract.

Q23. The proposed contract also would exempt GLOBALFOUNDRIES from rate adjustment mechanisms related to quarterly collections or returns to customers based upon the variance of the forecasted amounts included in base rates and the actual costs and revenue of the Company for power supply. Why should GLOBALFOUNDRIES be exempt from the power cost adjustors?

A24. Application of the power cost adjustors can lead to variability and unpredictability in the cost of power to the user. For GLOBALFOUNDRIES, the power cost adjustors create the potential for meaningful and problematic swings in our operating expenses each month. GLOBALFOUNDRIES' power demand, unlike some other customers, is extremely stable and predictable, and we need to have the stability of that demand reflected in our electricity costs in order to manage our supply and output at levels that allow us to succeed. GLOBALFOUNDRIES is willing to trade both upside and downside risk for stability and predictability. It is our understanding from GMP that over the past 10 years ending in 2016 there was a net return to customers of $12 million in power costs under the adjustor. *See* October 5, 2017 Exhibit GMP-DCS-1 (Rev.) in Public Utility Commission Case No. 17-3232-PET. Under the proposed contract, while past results are not a guarantee of future performance, GLOBALFOUNDRIES is choosing cost stability and predictability over the prospect of a net return benefitting

customers in power costs under the adjustor. Obviously, other customers will benefit if that comes to pass.

Q24. The proposed contract also would provide additional incentives to GLOBALFOUNDRIES to develop new and curtailable loads. Please explain.

A25. GLOBALFOUNDRIES' property in Williston presently has a significant amount of unused manufacturing space, which could be sold or leased to other companies and contribute to the economic development of the region. Its strategic advantage as a site that takes service at transmission voltage provides an opportunity for both GLOBALFOUNDRIES and GMP, as GMP asserts in its witness testimony. If GLOBALFOUNDRIES increases operations or attracts newly dispatchable load from users of GLOBALFOUNDRIES' properties, the contract incentives to develop new and curtailable loads would benefit all GMP customers. Of course, we would expect there would also be ancillary economic benefits to the region and State from these activities.

Q25. The proposed contract calls for a "Collaborative Process" between GMP and GLOBALFOUNDRIES to investigate and develop programs that would provide tools to retain or grow commercial and industrial load in Vermont. Why did GLOBALFOUNDRIES agree to this provision?

A26. GLOBALFOUNDRIES has now operated in Vermont for more than three years and we want to continue operating here for years to come. We are proud of the history our site represents, and its tremendously positive impact on the State economy. We recognize that short- and medium-term measures, such as the prior settlement reached with IBM or

this Term Contract, while essential for maintaining GLOBALFOUNDRIES' facility in Vermont, do not address all of the longer-term mutual interests of GLOBALFOUNDRIES and the State to support Vermont's economy and way of life over time. Deep engagement on possible solutions, including those that leverage the innovations in load curtailment and carbon reduction, will be critical and that's why we included this collaborative process as a part of our agreement. We now have our feet fully under us here in Vermont and we are ready to engage on these solutions with GMP and with State policymakers. The State has recognized the importance of this work through 30 V.S.A. § 218e.

Q26. The proposed contract sets January 1, 2019 as the effective date for the incentives. Please explain.

A27. As I stated earlier in my testimony, without stable and reliable energy costs that are more competitive, the constant downward pressure on world-wide semiconductor pricing will force GLOBALFOUNDRIES to manufacture products in less expensive fabricators elsewhere. To discourage this from happening, it is critical that we know before the end of this calendar year that the agreed-upon changes to the Transmission Rate for GLOBALFOUNDRIES will go into effect as of January 1, 2019.

Q27. Does this conclude your testimony?

A28. Yes, it does.