

**STATE OF VERMONT
PUBLIC UTILITY COMMISSION**

Petition of Green Mountain Power Corporation)
for a certificate of public good authorizing the)
purchase of electricity from Great River) Case No. 21-____-PET
Hydro, LLC)

**PREFILED TESTIMONY OF
CHRISTOPHER COLE
ON BEHALF OF
GREEN MOUNTAIN POWER CORPORATION**

March 4, 2021

Mr. Cole describes the major features of the proposed Power Purchase Agreement (“PPA”), including an overview of its products, pricing, and other commercially significant provisions. He also introduces the testimony of the other GMP witnesses who explain why approval of this PPA is in the best interests of customers and in the general good of the State.

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EXHIBITS

Exhibit GMP-CC-1

Power Purchase Agreement

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1 **1. Introduction**

2 **Q1. What is your name and business affiliation?**

3 A1. My name is Christopher Cole. I am Director of Market Operations for Green Mountain
4 Power Corporation (“Green Mountain Power” or “GMP”).

5 **Q2. Please describe your educational background and business experience.**

6 A2. I have worked in the Vermont energy industry for over 20 years, focused primarily on
7 commercial power supply. I hold a bachelor’s degree from St. Lawrence University in
8 economics, and I started my career working for the Vermont Public Power Supply
9 Authority in its power supply department in 1999 before joining Green Mountain Power
10 in 2003. At GMP I have held a number of roles related to wholesale energy procurement
11 and risk management. Currently, I am Director of Market Operations, in which capacity
12 I am engaged in many of GMP’s regional wholesale market settlement and procurement
13 functions.

1 **Q3. Have you previously testified before the Vermont Public Utility Commission?**

2 A3. Yes, I have testified before the Commission in Cases 7670, 7742, 8445, 8191 and 8827.

3 **Q4. What is the purpose of your testimony?**

4 A4. My testimony describes the Power Purchase Agreement (“PPA”) dated as of March 2,
5 2021, between GMP and Great River Hydro, LLC (“GRH”), a copy of which is provided
6 as Exhibit GMP-CC-1

7 **Q5. Please describe how GMP has organized its testimony in support of the petition for**
8 **Section 248 approval.**

9 A5. The petition is supported by my testimony and two other GMP witnesses, Douglas Smith,
10 and Andrew Quint. Mr. Smith reviews GMP’s power supply portfolio reliability and
11 needs, explains how they fit with the key terms of the proposed PPA, and explains how
12 the PPA’s flexibility and other characteristics will make it a useful component of GMP’s
13 power supply portfolio in the context of an evolving wholesale power market. Mr. Smith
14 also explains how the PPA will help GMP meet our power supply goals and Tier I
15 obligations under Vermont’s Renewable Energy Standard (the “RES”) in a low-cost way
16 for customers and why the PPA meets the applicable criteria of 30 V.S.A. § 248. Mr.
17 Quint explains how GMP evaluated the PPA and its fit with GMP’s short-term and long-
18 term energy needs and renewable goals. Mr. Quint also addresses how the proposed
19 PPA helps to meet customer demand on a monthly and annual basis.

1 **2. Agreement Overview**

2 **Q6. Please provide an overview of the PPA and its benefits.**

3 A6. In its most general terms, the PPA provides for the purchase of energy and environmental
4 attributes sourced from GRH’s hydroelectric facilities (the “GRH Facilities”) over a
5 schedule starting in 2023 and extending to the end of 2052. The PPA features established
6 prices for firm hydroelectric energy starting in 2028, and prices for peaking hydroelectric
7 energy and environmental attributes starting in 2023, all of which increase at a fixed
8 annual rate throughout the term. The energy products delivered under the PPA ramp up
9 gradually through 2032 such that most of the energy GMP will receive over the term of
10 the contract is provided after the expiration of GMP’s Seabrook and Hydro-Québec
11 agreements and at a time in the future for which GMP has limited other resource
12 commitments. Throughout the PPA’s term, GMP will receive a constant annual volume
13 of environmental attributes sourced from the GRH Facilities.

14 GMP seeks approval of the PPA to fulfill a portion of our customer’s long-term needs for
15 reasonably priced, renewable energy to meet the requirements of Tier I of Vermont’s
16 RES as well as GMP’s broader goal to achieve 100% renewable electric-resource supply
17 by and after 2030. The pricing and other terms of the PPA are favorable compared to
18 alternative renewable options potentially available to GMP as well as compared to other
19 renewable contracts in our existing portfolio. The PPA will provide a hedge against
20 future market uncertainty and competition for supply resources, while leaving
21 considerable room for GMP to procure renewable energy from other resources to serve
22 our customers. The shape of the energy deliveries under the PPA is a good fit with

1 GMP's needs and will be complementary to the continued growth of solar and other
2 renewable resources in our portfolio, as further explained in the prefiled testimony of
3 Andrew Quint and Doug Smith.

4 **Q7. Please describe the GRH Facilities that will be underpinning the energy products**
5 **and environmental attributes described above.**

6 A7. GRH will be delivering the energy products and the environmental attributes from its
7 fleet of 13 New England hydroelectric facilities located along the Connecticut and
8 Deerfield Rivers in Vermont, New Hampshire, and Massachusetts. Together, the GRH
9 Facilities produce on average more than 1,600,000 MWh per year under typical
10 hydrologic conditions. The sequentially-located facilities on these two rivers represent
11 nearly 40% of the region's installed hydroelectric capacity, producing nearly a quarter of
12 the annual energy generated by our region's hydroelectric facilities. GMP's share of the
13 renewable energy secured under the PPA will represent a significant portion of this
14 output over the term of the agreement, reaching roughly 36% based on energy deliveries
15 to GMP in the early 2030s, and approximately 50% on the basis of delivered
16 environmental attributes throughout the term of the agreement.

17 **Q8. Why did GMP pursue this hydroelectric PPA opportunity?**

18 A8. A key underpinning rationale for this PPA is our commitment to the RES requirements
19 and the overall energy and climate goals of the state and GMP. GMP's resource planning
20 process is focused on the delivery of clean, cost-effective and reliable power to our
21 customers. Affordable, existing renewable resources play an important role in meeting

1 these commitments particularly as we push to achieve a quicker transition away from
2 fossil fuels. One of the most significant available sources of existing renewable
3 generation in our region are hydroelectric facilities, which led us to focus on finding
4 suitable resources within this category that fit our customers' specific energy needs and
5 complement our portfolio. We are also aware that this resource category is both finite
6 and the subject of growing competition as surrounding states continue to adopt ambitious
7 climate goals that encompass this type of carbon-free and renewable supply.

8 Based on our commitment to increasing the renewable resources in our energy portfolio
9 cost-effectively and ultimately achieving a fully renewable supply, we have been actively
10 exploring existing renewable resource additions with multiple counterparties and
11 evaluating new renewable development both within Vermont and regionally. To evaluate
12 and screen these resources, we began by measuring each resource in its ability to meet the
13 following objectives that guide our portfolio transition for customers:

- 14 1. **Utilize a diverse supply that satisfies RES targets and supports sustained**
15 **progress toward a fully renewable, carbon-free portfolio.** To effectively
16 achieve the RES commitments and deliver a fully renewable supply in future
17 years, GMP wants a diverse portfolio of renewables with different attributes and
18 suppliers in order to stabilize costs and lower risks for our customers.
- 19 2. **Ensure our supply is cost effective to support beneficial electrification.** GMP
20 is focused on quickly and responsibly enabling electrification as required to
21 address climate change and achieve GHG reduction goals, and therefore focuses

1 on maintaining a portfolio at a low overall blended cost to keep electricity
2 competitive with other resource options.

- 3 3. **Fits well with our customers' needs and provides a dependable hedge against**
4 **future electric costs.** We look for opportunities that provide a good fit with our
5 portfolio needs including on a daily and seasonal basis, and also provide
6 significant long-term value as a hedging tool within our portfolio.

7 The PPA with GRH achieves each of these important goals. As described in the
8 testimony of Mr. Smith, there are few if any other resources in the region that can provide
9 the shape of dependable renewable supply that will be delivered under the PPA with
10 GRH. The PPA's combination of firm energy and dispatchable "peaking" energy is an
11 important complement to the intermittent resources in GMP's long-term resource
12 portfolio, and its price will provide both short- and long-term value to customers.

13 **Q9. Did GMP evaluate other supply available to fulfill its needs covered by this PPA?**

14 A9. Yes. Through our operations, we are familiar with the potential available resources and
15 counterparties for the products that would fit our identified needs from our Integrated
16 Resource Plan, as described by Mr. Smith. We also have experience through short-term
17 contractual arrangements with some of the potential counterparties. We know that
18 GRH's fleet offers flexibility that we would welcome in our portfolio. We sought
19 bilateral discussions with GRH, rather than another process such as a request for
20 proposals, given the flexibility and specific characteristics of the products we were
21 seeking (e.g., degree of storage capability and locational profile). We also reviewed the

1 regional supply/demand balance for existing renewable generation sources in the region
2 which illustrated the finite scale of existing renewables within the New England region.

3 These observations, along with the fact that GRH's hydroelectric fleet has unique
4 characteristics (e.g., fleet of multiple plants, significant storage with favorable licensing
5 status, and location within and otherwise proximate to Vermont) that could make their
6 output attractive from the perspective of GMP's power portfolio, indicated that it would
7 be worthwhile to pursue a long-term cost-effective PPA with GRH.

8 **Q10. Please describe the energy products and quantities provided in the PPA.**

9 A10. The energy products in the PPA are provided under two separate schedules: the first is a
10 peaking hydroelectric energy schedule beginning in 2023, and the second is a firm
11 hydroelectric energy schedule beginning in 2028.¹ The peaking hydroelectric energy is
12 supplied specifically from the output of the Fifteen Mile Falls hydroelectric facilities (the
13 "FMF Facilities") on the Connecticut River with GMP receiving a set percentage of the
14 FMF Facilities' hourly production on a unit-contingent basis. The FMF Facilities
15 encompass three stations along 26 miles of the upper Connecticut River in Vermont and
16 New Hampshire. The Moore and Comerford stations are the two largest facilities in the
17 group and provide daily and seasonal storage and peaking power generation. The third
18 facility in the group is the McIndoes station, which is a smaller station downstream of the
19 other two and highly influenced by the upstream operations. These three closely
20 associated facilities operate under a single FERC license, which affords GRH leeway to

¹ See PPA Exh. C (firm schedule) and Exh. D (peaking schedule).

1 schedule or “dispatch” the output of the FMF Facilities in the ISO-New England market
2 during time periods of highest energy need in the region. GMP’s purchase percentage of
3 the peaking energy begins at 20% of the FMF Facilities’ hourly output in 2023 and
4 gradually ramps up to 50% of the hourly output by 2029. Based on average historical
5 production, these percentages equate to annual delivery volumes of approximately
6 145,000 MWh in 2023 and reaching roughly 360,000 MWh in 2029 and in each delivery
7 year thereafter. As owner, GRH retains all rights and responsibilities with regard to
8 ownership and operation of the underlying facilities supporting the PPA, including all
9 relicensing and ongoing maintenance requirements, subject to the operations agreement
10 set forth in the PPA and described further below.

11 The firm hydroelectric energy schedule does not vary with hourly production, but is
12 rather a fixed, firm volume that provides a steady quantity of energy in every hour of the
13 year only subject to reduction under extremely limited conditions. This provides the
14 ongoing stability and reliability we seek. Scheduled deliveries of this product begin at
15 5 MW per hour in 2028 and ramp up gradually to a volume of 30 MW per hour by 2033
16 and every year thereafter. All energy in the firm energy schedule is delivered to GMP at
17 the Vermont Load Zone within the ISO-New England settlement system.²

² Please see Exhibit A to the PPA for the delivery points for all energy purchased from the GRH Facilities.

1 **Q11. How does the volume of renewable energy delivered under the PPA compare to**
2 **other significant PPAs in GMP’s portfolio?**

3 A11. For a sense of scale, the GRH PPA is significantly smaller than the current Hydro-
4 Québec purchase at roughly 40% less than its size, about 50% more than the average
5 annual output of GMP’s existing hydroelectric fleet, and roughly a third more than
6 GMP’s long-term PPA from NextEra Seabrook. Importantly, due to the GRH PPA’s
7 gradual ramping up to full volume there is limited overlap with the Hydro-Québec and
8 Seabrook purchases.

9 **Q12. Please describe the firm environmental attributes volume and how the**
10 **environmental attributes are associated with the PPA energy schedules.**

11 A12. Under the PPA, GRH is obligated to provide the environmental attributes associated with
12 the quantities of peaking and firm energy delivered, plus a fixed schedule of total
13 renewable attribute deliveries to ensure that GMP receives a steady annual volume of
14 800,000 renewable energy attributes for the entire term.³ The PPA broadly defines the
15 environmental attributes GMP will receive to include, among other items, credits,
16 certificates, payments, benefits, offsets, and allowances that would be based on the output
17 from the existing GRH Facilities, which the Commission has certified as eligible for
18 compliance with Tier I of the RES.⁴ Transfers of these attributes begins in 2023 using
19 renewable energy certificates (“RECs”) in the NEPOOL Generation Information System
20 on a quarterly basis for the sole and exclusive use of GMP.

³ See PPA § 4.9 & Exh. E (REC Schedule).

⁴ See PPA Art. 1.

1 **Q13. Please describe the PPA pricing terms for the energy products and the**
2 **environmental attributes.**

3 A13. The specific prices for each of the delivered products are set forth by year in Exhibit F to
4 the PPA. The pricing is based on applying a steady escalation factor to the starting prices
5 of each individual product. The first-year price for the peaking hydroelectric energy is
6 \$45.15 per MWh, while the first-year price for the firm hydroelectric energy is \$46.87
7 per MWh, both of which prices are inclusive of associated environmental attributes.
8 Following the first year, the prices are adjusted for each subsequent period by an
9 escalation rate of 2.4%. Similarly, the price for incremental environmental attributes
10 above the delivered energy quantities needed to reach the fixed annual attribute quantity
11 starts at \$2.44 per REC during the first year and escalates each year at the same annual
12 rate applied to the two energy products.

13 **Q14. Is GMP buying capacity or ancillary service products from GRH under the PPA?**

14 A14. No, the PPA does not include capacity or ancillary service products. While the GRH
15 Facilities provide the region with a considerable amount of capacity and ancillary
16 services due to their controlled and highly available nature, GMP does not believe these
17 products are complementary to this long-term agreement. Instead of contracting for
18 additional long-term capacity from GRH, we are addressing open positions through
19 shorter-term overlapping transactions and by using the ISO-New England annual auctions
20 at this time of very low capacity prices. Presently, the regional supply of ancillary
21 services and capacity from generation is ample relative to the need assigned to these
22 products from ISO-New England. This abundant supply results in very low prevailing

1 prices and a decrease in hedging opportunities. Moreover, capacity products also present
2 greater uncertainty in contracting due to the capacity market's tendency to undergo
3 meaningful structural changes through revisions to the applicable market rules.

4 **Q15. Please describe any other commercially significant PPA provisions, including any**
5 **credit provisions.**

6 A15. The PPA includes a number of other standard commercial provisions the parties
7 negotiated based on precedent GMP contracts as well as the terms of long-term contracts
8 recently adopted in the region. As for the unique aspects of the proposed product
9 deliveries, the PPA includes obligations to follow operating and dispatching procedures
10 for the FMF Facilities that are intended to maximize energy production during the highest
11 demand periods in New England, avoid scheduling and delivery of the peaking
12 hydroelectric energy when LMPs are negative, and provide regular summaries of actions
13 taken to avoid such deliveries.⁵ The PPA also provides both parties a right to terminate
14 without liability in the event that Commission approval is not received by three months
15 prior to the scheduled commencement of deliveries in 2023.⁶

16 The PPA includes credit protections for the benefit of both parties in the form of a
17 performance assurance collateral posting requirement in the event that either party's
18 creditworthiness (as measured by leading rating agencies) deteriorates below investment-
19 grade levels or either party experiences a credit event.⁷ The amounts required to be

⁵ See PPA §§ 3.1(c) (maximizing energy production) & 4.4 (negative LMPs with summaries).

⁶ See PPA Art. 8.

⁷ See PPA Annex A ¶ 4.

1 posted by each party are described in the Collateral Agreement included as Annex A to
2 the PPA, which also sets forth acceptable forms of collateral available for satisfying the
3 requirement in the event one is triggered. These credit protections are consistent with
4 those used in other GMP purchase power contracts such as the long-term Hydro-Québec
5 US/Vermont transaction, and they afford each party a reasonable opportunity to address
6 anything that may emerge with respect to the ongoing ability of a party to meet its
7 obligations following these negative outcomes in credit markets. The amount of potential
8 collateral posting requirements is capped, which is good because it limits the amount of
9 short-term borrowing capacity GMP must reserve, which helps GMP maintain strong
10 financial metrics and a strong credit rating.

11 **Q16. How does the PPA address the possibility of material changes in the energy**
12 **marketplace over the term of the agreement?**

13 A16. GMP and GRH both understand and appreciate that our region is undergoing an
14 important transition away from fossil fuel resources driven largely by state climate
15 policy. Recognizing that this regional transformation increases the likelihood that there
16 could be changes in market rules in addition to evolving operational practices, the PPA
17 includes a number of provisions designed to make it more responsive to this environment
18 while preserving the original intent of the parties. For instance, the agreement includes
19 operating procedures where representatives are assigned ongoing roles and
20 responsibilities to do all things necessary to give effect to the original intention of the
21 parties.⁸ The operating procedures also require that both parties review operating results

⁸ See PPA Exh. B § 6.

1 on a quarterly basis, and that GRH provide GMP with timely information on hydrologic
2 conditions that could have a bearing on future operation.⁹ In the body of the PPA,
3 sections have also been included to clarify how changes in ISO-New England Rules and
4 Procedures and changes in law that cause material impact will require the parties to
5 negotiate in good faith to amend and clarify the PPA to restore the original intent.¹⁰
6 Further, the underlying form of the PPA itself and many of its sections draw upon long-
7 term agreements currently in effect regionally, such as the New England Clean Energy
8 Connect contract, improving the likelihood that this PPA will receive similar
9 consideration in any future regional proceedings where changes to rules and standards are
10 being considered.

11 **Q17. How does the FERC relicensing process with respect to the underlying GRH**
12 **Facilities affect the products that GMP will be purchasing under the PPA?**

13 A17. GMP does not expect significant risk due to ongoing or scheduled FERC licensing
14 requirements throughout the term of the PPA. The PPA benefits from the long remaining
15 license period associated with the peaking hydroelectric energy schedule, where the
16 current FERC license for the FMF Facilities was renewed in 2002 for a period of 40
17 years. As a result, a key observation from GMP's perspective is that the FMF Facilities
18 can maintain their operations—and therefore their unique value in the context of GMP's
19 portfolio of supply sources—through that time. There is a limited period of uncertainty
20 after 2042; we believe it is reasonable because of the typical length of a relicensing

⁹ See PPA Exh. B § 5.

¹⁰ See PPA §§ 19.5 & 19.7.

1 process. Moreover, the firm hydroelectric energy schedule is not conditioned on any
2 single station among the GRH Facilities and, when GMP's firm volumes reach their
3 maximum volumes, the proportion from the FMF Facilities will represent only about a
4 third of the overall fleet output. While the GRH Facilities' output could be affected if
5 GRH were unable to renew the license of a significant operating facility, we believe our
6 overall output percentage protects against that risk for our customers. Presently, GRH is
7 actively seeking to relicense three facilities on the Connecticut River: the Vernon station,
8 the Bellows Falls station, and the Wilder station. Based on progress to date and a recent
9 memorandum of understanding executed between GRH and the relicensing stakeholders,
10 many flow, impoundment, and operational-related resource concerns regarding the
11 facilities appear to have been positively and proactively addressed. It is also GMP's
12 understanding that GRH expects to secure these renewals in a timely manner and has
13 made significant progress with their key stakeholders toward achieving new 40-year
14 licenses that would extend well beyond the term of the PPA.

15 **3. Conclusion**

16 **Q18. Does this conclude your testimony?**

17 A18. Yes.