PROVIDENCE WATER

Tap Water Delivers

December 9, 2020

Mrs. Luly Massaro
Commission Clerk
RI Public Utilities Commission
89 Jefferson Boulevard
Warwick, RI 02888

RE: Renewable Energy Study; Docket 4994 Report & Order #23928

Dear Mrs. Massaro:

Pursuant to the Docket 4994 Report & Order #23928 (item #8), and as approved by the Commission at an open meeting on August 27, 2020, please find an original and five copies of Providence Water's Renewable Energy Study.

If you have any questions, please reach me at 521-6300 ext. 7217.

Sincerely,

Alicia Mignanelli for MDW

Mary L. Deignan-White
Division Manager - Finance

cc: Service List (via email)
File

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Providence Water Supply Board
Study of alternatives to achieving its 100% renewable energy goal

In response to:
Rhode Island Public Utilities Commission Docket 4994
Report and Order dated August 25, 2020

Date: December 09, 2020
Prepared by: Clean Economy Development, LLC

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Executive Summary

The Providence Water Supply Board ("PW") is proud to demonstrate its environmental stewardship in achieving its goal of sourcing 100% of its energy use from its own renewable energy sources. Moreover, this goal was achieved in a manner that provides significant long-term savings to all of PW's ratepayers.

Over the past four years, PW has explored a multitude of ways to achieve its 100% renewable energy goal, including:

- On-site and remote renewable energy projects on PW facilities and land.
- REC procurement through existing competitive supplier and/or independently.
- Alternative multi-municipal partnerships.

Through its research, planning and procurement, PW has executed contracts with solar projects – the first being a 497 kW, behind-the-meter, rooftop solar PV system at PW's Central Operations Facility ("COF") in Providence, RI and the second being a 4.99 MW, remote net metering system at PW's Pine Hill location in Johnston, RI. Combined, these projects provide about 108% of PW's current annual electricity consumption of 8,602,030 kWh. PW will retire these 8,602 RECs to ensure full claim to the local energy, environmental and societal values of these renewable energy projects, as PW meets its' 100% renewable energy goal.

While achieving this 100% renewable energy goal, PW welcomed the opportunity to review its current strategy through the Rhode Island Public Utilities Commission Docket 4994. Through this review, PW has identified new market data, trends and opportunities. It has explored new means of monetizing RECs generated from projects, procuring RECs independently, as well as partnering with other public agency consortiums in the possible procurement of renewable energy. This process has also provided further insight as to how PW may seek to identify and implement additional "green" measures, such as the electrification of its fleet vehicle operations, to possibly fully offset all of its carbon impact.

In its review, one critical factor became quite clear: PW has been in a unique position with respect to procuring its own renewable energy, as it is not only driven by board policy, but PW has its own available land, with no alternate means of development options, to host its own renewable energy projects. By hosting its own project, PW was able to add about 35% value to its renewable energy options, as PW did not have to factor in land costs typically associated with these projects (ex: land lease or similar payments to 3rd party owned systems). Because of this, the value proposition of PW's current renewable energy strategy far exceeds other comparable options. PW can procure 100% of its electricity use, retire the associated RECs, sell any excess RECs, and still save the ratepayers significant amounts years after year.

In summary, after a thorough review of alternatives, PW has concluded that meeting the specific PW Board of Directors 100% renewable energy policy and goals is best achieved through its current strategy of renewable energy production and REC retirement from its COF and Pine Hill solar projects, and then the sale of all excess RECs generated after achieving this 100% renewable energy goal. A summary of the specific questions posed by the RIPUC are provided below and expounded upon later in this document.

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Providence Water Supply Board
Study of alternatives to achieving its 100% renewable energy goal.
Summary Response to RIPUC Questions

a) Determination of PWSB's baseline annual electricity consumption.
Based on the three (3) years average annual kWh usage for all electricity accounts as presented in Providence Water's "Schedule B - Additional Information Required for Net Metering Service," the annual average use is 7,833,106 kWh (7,833 RECs). The three (3) years average annual kWh production and consumption from its on-site COF solar facility, as calculated by the COF data acquisition service ("inaccess" unit) is 768,924 kWh (768 RECs). The resulting combined annual consumption and RECs is 8,602,030 kWh and 8,602 RECs.

b) Determine the quantity of RECs needed in each rate year to meet PW's 100% renewable energy goal. This shall include all assumptions, including the treatment of Providence Water's current RES-compliant energy supply contract, RECs generated from the company's on-site solar facility, and RECs generated from the off-site renewable energy facility.
The annualized base REC need (7,833) is adjusted based on the following measures:
1. RES-compliant energy supply contract.
2. RECs generated from PW's on-site solar project.
3. RECs generated from PW's off-site (Pine Hills) solar project.

Rate Year	Annual Use Schedule B	Adj. 1: RES Compliance	Adj. 2 COF on-site use	Total kWh Needed	Total RECs Needed	REC Production COF Solar	REC Production Pine Hills Solar	REC Production Total	Surplus/ Deficit
1	7,833,106	-	768,924	8,602,030	8,602	769	7,535	8,304	(298)
2	7,833,490	-	768,540	8,602,030	8,602	769	8,517	9,285	683
3	7,833,875	-	768,156	8,602,030	8,602	768	8,513	9,281	679
Total	**23,500,471**	**-**	**2,305,620**	**25,806,091**	**25,806**	**2,306**	**24,565**	**26,870**	**1,064**

Please see Attachment 1 for a more detailed updated savings schedule and assumptions.

c) Explanation of the time period in which PW wants to be considered 100% renewable.
PW implemented its 100% renewable goal with no defined or implied timetable, and as such it is inferred that these policies and goals are put in place in perpetuity.

d) Quantity of excess RECs (derived from answer to b) and the estimated market value.
At 100% of PW's estimated solar production, PW would realize a REC deficit of 298 in RY1 and a surplus of 1,064 cumulatively over the rate period. At $38.80/REC, the market value of these RECs would be $0 in RY1 and $41,285 cumulatively.

Rate Year	REC Production COF Solar	REC Production Pine Hills Solar	REC Production Total	RECs Needed	RECs Surplus/ Deficit	Market Value RECs	Market Value Total
1	769	7,535	8,304	8,602	(298)	$38.80	$(11,563)
2	769	8,517	9,285	8,602	683	$38.80	$ 26,514
3	768	8,513	9,281	8,602	679	$38.80	$ 26,334
Total	**2,306**	**24,565**	**26,870**	**25,806**	**1,064**		**$ 41,285**

In the event the total solar production only achieves 90% of estimated production, this would result in a REC deficit, of which we have ascribed $0 market value in this event.

e) **Explanation of alternatives to achieving PW's 100% renewable energy goals. This shall include descriptions of the costs (including administrative costs), benefits, and risks of each alternative. Alternatives considered should include purchasing new and/or existing RECs through an updated or new energy supply contract , and participating in the anticipated municipal aggregation with the City of Providence.**
Outside of PW's existing renewable energy projects, PW further considered:

- Purchasing RECs (either Class I RECs from its existing supplier and/or Class II RECs independently): Either option would require PW to utilize a REC arbitrage buy/sell strategy where PW would sell RECs it generates from its solar projects, while simultaneously purchase alternative RECs at a lower cost. While this might allow PW to save on REC procurement and claim 100% renewable, it does not allow PW to realize its goal of attaining 100% renewable "created through [PW's] own system." Further, given the fluctuation and volatility in the long-term REC market, there is no guarantee that this strategy provides these same economics over the long-term.

- Participating in the municipal aggregation: PW could participate in the Providence Community Choice Aggregation (CCA) program. CCA transactionally acts just like procuring energy and RECs from its own competitive supplier, just with the added benefit of the economies of scale through the aggregate load of multiple municipal participants. While CCA offers potentially added savings on electricity supply, there are some key programmatic details which would impact the CCA's ability to a) meet PW's 100% renewable energy goals and b) provide a more compelling economic proposal when compared to PW's current renewable energy strategy. PW believes its current strategy is cost-effective, and has a reduced risk profile than the current CCA option.

f) **Justification of PWs recommended approach to meeting its 100% renewable energy goals.**
PW has explored multiple alternative options when considering the best way to reach its goal of 100% renewable, and has determined that its current strategy is most in line with its policy, while also being the most feasible and economical approach for its ratepayers. From a policy standpoint, PW has made clear that it would like to procure renewable energy from its own systems. None of the alternative options would allow PW to meet this policy component. From an economic standpoint, PW acknowledges that it is in a unique position with respect to procuring its own renewable energy, as it owns the land on which its projects are hosted. This adds approximately 35% more value to PW's renewable energy value propositions, compared to similar agencies and opportunities in the market. In summary, PW can procure 100% of its electricity use from its own systems, retire the RECs generated from its systems, and still save the ratepayers significant amounts years after year.

g) **Provide a revised revenue requirement for electric supply procurement based on the recommended approach in f. Two scenarios will be assumed 1) RY1 rates are updated on January 1, 2021, or 2) revenue requirement is updated for RY 2.**

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While this review has outlined the potential for there to be market sales of excess RECs, PW respectfully requests that the revenue requirement not be required at this time. The values presented are largely based on best production estimates and based on industry-standard modeling methods. However, as with many newly commissioned projects, we do anticipate there to be downtime and other factors that impact the overall production of the Pine Hills solar project, particularly in RY1. PW would be far more comfortable in presenting the first year production values, and any impact/change to revenue requirements, after a full, first-year of production is recorded.

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Providence Water Supply Board
Assumptions and Notes to PW's solar annual production and savings

1. **kWh Produced - Pine Hills:** 8,521,100 – this is the annual estimated output (as provided by the EDF production report) at 100%. RY1 is reduced by 986,000 to 7,535,100 kWh as it represents Pine Hills estimated production for the month of July 2020, which was not delivered to PW in 2020. Each year project has a degradation factor of 0.05%. The contract term is 25 years commencing at COD (July 21, 2020).

2. **kWh Produced – COF:** • 768,924: This amount is added to PW's RY 1 annual base use, as it reflects the production (and consumption) of the COF facility. This represents the 3-year average production of COF solar, as provided by its data acquisition service. Each year COF has a production degradation factor of 0.05%.

3. **PW Annual Use (Schedule B):** 7,833,106 kWh – PW's annual use based on Schedule B. Adjustments:
   - 768,924: This amount is added to PW's RY 1 annual base use, as it reflects the production (and consumption) of the COF facility (see #2 above).

4. **Pine Hills kWh as % of total use:** Pine Hill production against PW's overall consumption to ensure a) it does not exceed 100% of PW total consumption and to ensure net metering credits do not exceed the statutory limit of 125% of total consumption.

5. **kWh eligible for remote net metering:** All kWh produced at or below 125% of PW use.

6. **kWh NOT eligible for remote net metering:** Any kWh above 125% of PW annual use.

7. **RECs needed to meet 100% of PW total use:** Total kWh used expressed in RECs. Combination of Schedule B use and COF production: 7,833,106 + 768,924 = 8,602,030 kWh or 8,602 RECs.

8. **REC Surplus/ Deficit:** Excess RECs produced by combined production of COF and Pine Hills.

9. **Net Metering Credit Rate (Updated):** 18-month average of real-life, remote net metering credit values.

10. **PPA Rate:** Price PW pays per remote net metering credit delivered.

11. **Credit to PW Electric Accounts:** The value of remote net metering credits received on all accounts (as specified by the Schedule B) from the Pine Hills solar production.

12. **Payment to Developer:** Payment made to EDF for the quantity/value of RNM credits received (see above).

13. **Total Savings:** Credits received less payments below.

14. **PW Sale of excess RECS:** Value of excess RECs PW sells in the market. Not applicable for current analysis.

Summary of Savings

Credit to PW Electric Accounts:	Pine Hills production 7,535,100	X	RNM credit rate: $0.1684	=	**$1,268,835**
Payment to Developer:	Pine Hills production 7,535,100	x	NMCA payment rate: $0.0914	=	**$688,708**
Total Savings:	Total Credits Received $1,268,835	-	Payments made to Developer $688,708	=	**$580,127**

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Pine Hill solar estimated schedule of solar and REC production

Contract term: 25 Years, commencing at COD (July 21, 2020)

Contract Year	Solar Production Pine Hills	Solar Production (COF)	Solar Production Total	Annual Use (Schedule B)	Annual Use (COF Solar)	Annual Use (Total) (Schedule B + COF)	Pine Hills % of Total Use	RECs needed to reach 100% Goal	RECs produced: (COF + Pine Hill)	REC Surplus (Deficit)
1	7,535,100	768,924	8,304,024	7,833,106	768,924	8,602,030	87.60%	8,602	8,304	(298)
2	8,516,841	768,540	9,285,381	7,833,490	768,540	8,602,030	99.01%	8,602	9,285	683
3	8,512,583	768,156	9,280,739	7,833,875	768,156	8,602,030	98.96%	8,602	9,281	679
4	8,508,327	767,772	9,276,098	7,834,259	767,772	8,602,030	98.91%	8,602	9,276	674
5	8,504,073	767,388	9,271,460	7,834,643	767,388	8,602,030	98.86%	8,602	9,271	669
6	8,499,821	767,004	9,266,825	7,835,026	767,004	8,602,030	98.81%	8,602	9,267	665
7	8,495,571	766,621	9,262,191	7,835,410	766,621	8,602,030	98.76%	8,602	9,262	660
8	8,491,323	766,237	9,257,560	7,835,793	766,237	8,602,030	98.71%	8,602	9,258	656
9	8,487,077	765,854	9,252,931	7,836,176	765,854	8,602,030	98.66%	8,602	9,253	651
10	8,482,834	765,471	9,248,305	7,836,559	765,471	8,602,030	98.61%	8,602	9,248	646
11	8,478,592	765,089	9,243,681	7,836,942	765,089	8,602,030	98.57%	8,602	9,244	642
12	8,474,353	764,706	9,239,059	7,837,325	764,706	8,602,030	98.52%	8,602	9,239	637
13	8,470,116	764,324	9,234,439	7,837,707	764,324	8,602,030	98.47%	8,602	9,234	632
14	8,465,881	763,941	9,229,822	7,838,089	763,941	8,602,030	98.42%	8,602	9,230	628
15	8,461,648	763,559	9,225,207	7,838,471	763,559	8,602,030	98.37%	8,602	9,225	623
16	8,457,417	763,178	9,220,595	7,838,853	763,178	8,602,030	98.32%	8,602	9,221	619
17	8,453,188	762,796	9,215,984	7,839,234	762,796	8,602,030	98.27%	8,602	9,216	614
18	8,448,962	762,415	9,211,376	7,839,616	762,415	8,602,030	98.22%	8,602	9,211	609
19	8,444,737	762,034	9,206,771	7,839,997	762,034	8,602,030	98.17%	8,602	9,207	605
20	8,440,515	761,652	9,202,167	7,840,378	761,652	8,602,030	98.12%	8,602	9,202	600
21	8,436,295	761,272	9,197,566	7,840,759	761,272	8,602,030	98.07%	8,602	9,198	596
22	8,432,076	760,891	9,192,967	7,841,139	760,891	8,602,030	98.02%	8,602	9,193	591
23	8,427,860	760,511	9,188,371	7,841,520	760,511	8,602,030	97.98%	8,602	9,188	586
24	8,423,646	760,130	9,183,777	7,841,900	760,130	8,602,030	97.93%	8,602	9,184	582
25	8,419,435	759,750	9,179,185	7,842,280	759,750	8,602,030	97.88%	8,602	9,179	577
	210,768,269	**19,108,215**	**229,876,483**	**195,942,548**	**19,108,215**	**215,050,762**	**98.01%**	**215,051**	**229,876**	**14,826**

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Pine Hill solar estimated schedule of savings

Contract term: 25 Years, commencing at COD (July 21, 2020)

Net Metering Credit Rate	PPA Payment Rate	NGRID Credits to PW Accounts	PW payment to solar project	PW Sale Excess RECs	Total Savings
$ 0.1684	$ 0.0914	$ 1,268,835	$ 688,708	$ -	$ 580,127
$ 0.1718	$ 0.0914	$ 1,462,834	$ 778,439	$ -	$ 684,395
$ 0.1752	$ 0.0914	$ 1,491,345	$ 778,050	$ -	$ 713,294
$ 0.1787	$ 0.0914	$ 1,520,411	$ 777,661	$ -	$ 742,750
$ 0.1823	$ 0.0914	$ 1,550,044	$ 777,272	$ -	$ 772,771
$ 0.1859	$ 0.0914	$ 1,580,254	$ 776,884	$ -	$ 803,370
$ 0.1896	$ 0.0914	$ 1,611,053	$ 776,495	$ -	$ 834,558
$ 0.1934	$ 0.0914	$ 1,642,453	$ 776,107	$ -	$ 866,346
$ 0.1973	$ 0.0914	$ 1,674,464	$ 775,719	$ -	$ 898,745
$ 0.2012	$ 0.0914	$ 1,707,099	$ 775,331	$ -	$ 931,768
$ 0.2053	$ 0.0914	$ 1,740,371	$ 774,943	$ -	$ 965,427
$ 0.2094	$ 0.0914	$ 1,774,291	$ 774,556	$ -	$ 999,735
$ 0.2136	$ 0.0914	$ 1,808,871	$ 774,169	$ -	$ 1,034,703
$ 0.2178	$ 0.0914	$ 1,844,126	$ 773,781	$ -	$ 1,070,345
$ 0.2222	$ 0.0914	$ 1,880,068	$ 773,395	$ -	$ 1,106,674
$ 0.2266	$ 0.0914	$ 1,916,711	$ 773,008	$ -	$ 1,143,703
$ 0.2312	$ 0.0914	$ 1,954,068	$ 772,621	$ -	$ 1,181,446
$ 0.2358	$ 0.0914	$ 1,992,152	$ 772,235	$ -	$ 1,219,917
$ 0.2405	$ 0.0914	$ 2,030,979	$ 771,849	$ -	$ 1,259,130
$ 0.2453	$ 0.0914	$ 2,070,563	$ 771,463	$ -	$ 1,299,100
$ 0.2502	$ 0.0914	$ 2,110,918	$ 771,077	$ -	$ 1,339,841
$ 0.2552	$ 0.0914	$ 2,152,060	$ 770,692	$ -	$ 1,381,369
$ 0.2603	$ 0.0914	$ 2,194,004	$ 770,306	$ -	$ 1,423,698
$ 0.2655	$ 0.0914	$ 2,236,765	$ 769,921	$ -	$ 1,466,844
$ 0.2708	$ 0.0914	$ 2,280,360	$ 769,536	$ -	$ 1,510,823
		$ 45,495,100	**$19,264,220**	**$ -**	**$ 26,230,880**

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Providence Water Supply Board
Study of alternatives to achieving its 100% renewable energy goal

In response to:
Rhode Island Public Utilities Commission Docket 4994
Report and Order dated August 25, 2020

Date: December 09, 2020
Prepared by: Clean Economy Development, LLC

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Providence Water Supply Board
Study of alternatives to achieving its 100% renewable energy goal.
Full Response to RIPUC Questions

Background

The Providence Water Supply Board ("PW") has long been a steward in the protection of the environment. Protecting the environment is more than a philosophical goal of PW. Ensuring long-term environmental health and sustainability are measures that protect water quality, which is at the core of PW's mission of providing "reliable, high-quality safe, clean drinking water."

PW recognizes the critical importance of the environment as it relates to its ability to deliver upon its mission. Within PW's 93 square mile watershed, PW owns and manages over 25 square miles that is continuously invested in to reduce pollution and maintain water quality. PW continuously seeks to acquire land, such as the 55 acres PW acquired in 2018 using public bond funding, to support PW's efforts in the long-term planning and management of its water quality protection.

PW has also long recognized the potential negative long-term impacts that climate change could have on its watershed and forest, which is a direct threat to PW's ability to continuously maintain its high water quality. There are numerous reports and studies that highlight the environmental, operational and financial risk climate change presents to water utilities. Briefly, climate change, and more specifically, temperature increase changes directly increase:

- Precipitation patterns and its impact on water availability, flood and storage management.
- Drought and evaporation rates and its impact on water supply levels.
- Storms, floods and other extreme events and their impacts on both the impacts to water quality (ex: change in water chemistry) and the overall availability of utility (electricity) needs for PW to operate during these times.
- New invasive insects and diseases and their impact on forest health and management.
- New non-native invasive plants, and their impacts on forest health and management.

These are just some of the potential threats PW identifies as potentially negatively impacting forest and watershed management. PW has been very methodical and proactive in studying and implementing measures that directly reduce these risks and impacts. From an environmental and forest management standpoint, PW doesn't just simply and directly acquire additional forestry and conservation lands around its watershed, but it takes an active role in their management in order to increase their resiliency and ability to recover from varied impacts of climate change. For example, in 2015, PW implemented a trial program to explore how trees from warmer climates will perform within its watershed and forested areas.

PW understands the impact the sourcing and use of energy, particularly the use of fossil fuel sources of energy, has on climate change. PW's forest management activities are supported by PW's methodical and proactive approach to significantly reduce its energy use and carbon footprint. This includes the installation of new energy efficiency measures such as treatment metering pumps, lighting upgrades, variable frequency drives, motors, and low-water-

consumption plumbing fixtures; the addition and use of electric vehicles and charging stations, as well as a suite of sustainable initiatives, including the production its own electricity through on-site solar, in the design and construction of PW's COF.

In addition to reducing its energy use, PW has similarly been meticulous in its planning and implementation of measures that increase its production and/or sourcing of its energy away from fossil-fuel burning sources in favor of new, clean and renewable sources of electricity.

One of the first steps PW took in achieving this goal was the commissioning of an independent consultant study in June of 2016, to conduct a feasibility assessment to identify various PW locations that could potentially host solar PV projects. Of all the possibilities explored, the study identified PW's Central Operations Facility ("COF") located at 125 Dupont Drive, Providence, RI 02907 as the greatest opportunity to install a PW owned solar facility. PW issued a competitive Request for Proposals ("RFP") for the design and installation of this proposed solar project, and on January 4, 2018 commissioned its 497 kW, behind-the-meter, rooftop solar PV system. This system currently produces, on average, 768,924 kWh annually and covers about 55% of PW's COF use, and about 9% of all of PW's overall electricity consumption.

At the time of the feasibility study, ground-mounted solar projects did not present favorable opportunities for PW to pursue. Following this report, the local renewable energy market conditions improved along with the economic viability of ground-mount solar projects. On April 2018, PW issued a public Request for Proposals ("RFP") from qualified respondents to "develop renewable energy generating system(s) that will utilize remote net metering (a/k/a "virtual net metering") to offset existing PW electric accounts". This RFP specified PW's goal to procure up to 110% of its currently sourced grid electricity from renewable energy resources, from one or more third parties. At this level of procurement, this RFP was expected to get PW as close to 100% of total electricity consumption from renewable as possible. When adding in the amount of electricity consumed from PW's COF solar facility, the 110% remote solar project would represent about 99% of total PW electricity consumption.

PW received very strong responses to its RFP, with eight (8) firms bidding, with half of the respondents providing multiple alternatives, resulting in 22 contract options for consideration. Options ranged in both technologies and compensation structure for PW to consider, including:

- Fixed price, discounted electricity rate contracts.
- Indexed, discounted electricity rate contracts.
- Land lease only contract.

Included within many of these varying offers were the option for PW to retain the RECs generated from the proposed renewable energy facilities. While the inclusion of RECs represented a slight premium to underlying economic proposal(s), it would allow PW to claim all of the renewable, social and environmental attributes associated with the project (rather than assigning them away to another party). Further, and more importantly, it would allow PW to

clearly demonstrate that this renewable energy project was additive to the overall energy produced and used by PW, and as a result would directly replace the use of fossil fuels for its electricity needs. This is a critical distinction for PW as it sought for its solar project to be "*additive*" in order to truly count as a measure that reduces carbon emissions and mitigates the effects of climate change.

> Additive value of Renewable Energy: In procuring renewable energy as a means of reducing greenhouse gas and carbon emissions, the underlying source of renewable energy must demonstrate that new renewable energy capacity has been build and added to the electric grid as a result of PW's investment. For PW to simply monetize the RECs generated form its Pine Hills solar project and sell them into the market, not only would PW be selling away all of the environmental and societal benefits that come with the production of this renewable energy, but as these RECs enter into the marketplace to be bought, presumably under a pre-existing macroeconomic condition (such as for compliance with the state's RES) the development and operation of the Pine Hills solar would effectively not even contribute to adding new renewable energy capacity into the marketplace above and beyond the state's existing business-as-usual scenario. More pointedly, the State currently has a 16% RES requirement. By PW generating, keeping and retiring the RECs from its solar facilities, obligated entities will have to purchase RECs to meet the RES from renewable energy projects other than PW, resulting in PW's solar projects "adding" to the amount of renewable energy produced and utilized in the state above and beyond the business-as-usual case. On the other hand, if PW were to sell its RECs, the RECs would in all likelihood be sold to an obligated entity who in turn utilizes them to satisfy their RES requirement, rendering the renewable energy benefits of PW's solar projects as within the existing business-as-usual case and not adding to new capacity and its associated benefits of added reduction in emissions, carbon, etc.
>
> A final note on additive. In addition to being real and permanent, a renewable energy project must be verified in order to truly qualify as a carbon offset mechanism:
>
> > An offset project is "a specific activity or set of activities intended to reduce GHG emissions, increase the storage of carbon, or enhance GHG removals from the atmosphere." The project must be deemed additional; the resulting emissions reductions must be *real, permanent, and verified*; and credits (i.e., offsets) issued for verified emissions reductions must be enforceable".
>
> While this report recognizes that these emissions must be verified, as PW is undertaking these climate change measures voluntarily, it is not the current recommendation (nor is it within the scope of the assignment) for PW to seek out emissions verification.

By generating and retiring the RECs, it supports the notion that PW's solar projects are actually driving responses to climate change – independent from any other existing market requirement – rather than simply having its renewable energy value going to comply with existing regulatory requirements.

PW sees investments in new, additive renewable energy generation as a core component to meeting its sustainability goals and mitigating the impacts of climate change and to protect its long-term water supply and quality. Similar to investments in forest acquisition, maintenance and management, the "opportunity costs" of retaining and retiring the RECs generated from its solar projects represent the investment required to ensure the PW's renewable energy project can truly represent the addition of new, fossil-fuel offsetting sources of its energy. These opportunity costs are far more offset by the net savings of the solar facilities.

PW made clear its goal to be a demonstrated environmental leader, and in doing so determined that it retain/retire the RECs to claim the local energy, environmental and economic benefits associated with it, if this can be done in a comprehensive means that has a net positive cost-benefit impact to ratepayers.

PW's Board of Directors crystalized this position and made clear the importance of retaining RECs and their associated values, by passing its renewable energy policy on June 26, 2019, where PW declared that it wanted to promote green renewable energy, to "*...supply all of PW's electricity through its own renewable energy systems, and to ensure that PW retained or retired the Renewable Energy Credits ("REC") generated through these renewable energy systems in order to promote and receive the social and environmental value of all electricity produced by these renewable energy systems.*"

With this policy guidance, supported by a thorough review of both technical and economic merits of each of the RFP responses, PW decided to award the contract, and partner with EDF Renewable Development, Inc. (San Diego, CA) to design, finance, install and operate a 4.99 MW, 17,739 panel, solar PV system at PW's Pine Hill location (10 Pine Hill Road, Johnston, RI 02919). This RFP will get PW as close to 100% renewable as possible, using reasonable estimates and without exceeding the three-year average PW total consumption. At 100% of estimated production, the Pine Hill solar facility is expected to produce approximately 8,521,100 kWh, which represents 108% of PW's current estimated annual use from the electrical grid (schedule B), and a total of 99.06% of PW's overall total consumption, when including the production and consumption of electricity generate from its COF solar facility. The Pine Hill solar project is a "front of the meter" project, resulting in its producing net metering credits that will be sent to reduce PW's electricity use. Under the agreement between PW and EDF, PW will purchase these net metering credits at a contracted rate of $0.0914/kWh for the next 25 years, resulting in approximately $580,000 in first-year annual savings, and over $26 million in savings over the course of the next 25 years. The RECs generated from the project will be retained and retired by PW, ensuring PW's 100% renewable energy goal is met over the course of the life of the project.

An updated schedule of savings and assumptions is attached to this document as Attachment 1.

With Pine Hill producing 99.06% of PW's current annual consumption (assuming 100% output), PW has not only met its target as set forth in the RFP, but it believes it is a reasonable and prudent target.

RIPUC: Specific Questions and Answers

a) Determination of PWSB's baseline annual electricity consumption.

Based on the three (3) years average annual kWh usage for all electricity accounts as presented in Providence Water's "Schedule B - Additional Information Required for Net Metering Service," the annual average use is 7,833,106 kWh (7,833 RECs). The three (3) years average annual kWh production and consumption from its on-site COF solar facility, as calculated by the COF data acquisition service ("inaccess" unit) is 768,924 kWh (768 RECs). The resulting combined annual consumption and RECs is 8,602,030 kWh and 8,602 RECs.

In Docket 4994, it has been assumed for ratemaking purposes that the annual cost and kWh use of PW's electricity shall remain constant. However, some planned/proposed actions that may have a significant impact on annual kWh consumption, include:

- Acquisition of additional Water District(s).
- Addition of a new tank mixing project.
- Electrification of PW's vehicle fleet.

While these measures would increase annual kWh usage, these potential increase factors are not included in the electricity use/costs as presented in Docket 4994, and are not included in the REC requirement calculation for this purpose. The only variance realized in this base annual amount is the net effect of any lost solar production, due to annual degradation, by the COF facility. This lost production is realized in RY2 and RY3, and lost production from the solar facility is made up in the base amount by pulling this lost amount from the utility grid, when calculating total annual kWh use (described more within Adjustment #2 below). This base annual kWh value is meant to ensure alignment with the overall Docket proceeding. However, in the event additional study is required to either account for this potential increase in annual kWh and/or longer-term impact on RECs (generation, requirements, costs, etc.) beyond the timeframe of this rate period analysis, this can be updated to provide such detail.

b) Determine the quantity of RECs needed in each rate year to meet PW's 100% renewable energy goal. This shall include all assumptions, including the treatment of Providence Water's current RES-compliant energy supply contract, RECs generated from the company's on-site solar facility, and RECs generated from the off-site renewable energy facility.

The annualized base kwH for calculation of REC need is 7,833,106 kWh, as outlined above. This value is further adjusted by the factors described below to generate annual kWh and correlating REC values, which are summarized in the Table included in this section.

Adjustment #1: RES-compliant energy supply contract

PW currently has an electricity supply contract with Constellation NewEnergy, Inc. ("Constellation") that runs through the ratemaking period, with contract end dates on electricity accounts ranging from 05/28/20 – 06/24/23. The Constellation contract incorporates a "Fixed Price Confirmation, " and the cost components of this contract are as follows:

Exhibit 1: Constellation Contract Pricing

Cost Components. Each of the items listed as "Fixed" below is included in Participant's Contract Prices as set forth in the Account Schedule. For each of the items listed as "Passed Through" below, Participant will be charged the costs associated with the line item in accordance with the definitions of each item in Section 1.1, Definitions or as defined in the Participant Agreement.

Energy Costs	**Fixed**
Ancillary Services And Other ISO Costs	**Fixed**
Capacity Costs	**Fixed**
Line Loss Costs	**Fixed**
FERC Order 745 Costs	**N/A**
Renewable Portfolio Standard Costs	**Fixed**

PW's current competitive supply contract is compliance with the state's Renewable Portfolio Standard, currently set at 16.00% for year 2020 (14.00% new, 2.00% existing).

While PW's existing competitive supply contract is currently compliant with the RES, the RES compliant portion of this contract shall not be credited towards PW's 100% renewable energy goal, and will not reduce the annual number of RECs needed in order to achieve PW's 100% renewable energy goal. The primary reason for this rests in the difference between voluntary vs. mandatory goals:

Voluntary vs. Mandatory goals: PW's 100% renewable energy policy is a voluntary decision that was discussed, deliberated and decided by PW's Board of Directors. In seeking compliance with this goal, PW sought guidance on whether or not mandated renewable energy purchases should be included and counted toward PW's efforts. This included reviewing positions published by the United States Environmental Protection

Agency's (EPA) "Green Power Partnership," where they specifically provide the guidance that organizations that voluntarily buy green power, should take several factors into consideration, including to "*ensure your REC purchases does not count toward a mandate*" as "*such a situation would constitute a double claim between you and your supplier.*" Further, in consultation with PW's competitive supplier, Constellation NewEnergy, their specific guidance on the matter was that "*...unfortunately, the current 16% RES is the amount that the supplier has to purchase to adhere to the State of RI guidelines to keep us in compliance. Our customers cannot claim that 16%.*"

Even as PW's competitive supply contract is compliant with the state's RES, due to the fact that PW's goal is a voluntary goal, PW has not adjusted its annual kWh calculation for determining how many RECs are needed to achieve its voluntary goal of becoming 100% renewable.

Adjustment #1: No adjustment made.

Adjustment #2: RECs generated from the company's on-site solar facility
PW has installed a 496 kW, behind-the-meter, rooftop solar PV system on its Central Operations Facility ("COF"). This system became operational on January 4, 2018, and per PW and its solar provider, is producing on average, 768,924 kWh annually.

As the system is behind the meter, the resulting electricity bills for the COF do not reflect the electricity that is produced and used by the system, as these invoices are "net" of the solar production and consumption. To accurately reflect the total kWh used by PW, CED will add back this production and resulting on-site use of PW's COF solar facility to establish PW's total annual kWh use and correlating REC requirements.

PW's rooftop solar facility is expected to experience an industry standard degradation in annual output of approximately 0.05%. This annual degradation has been factored into the system's production (and PW's use). Under Docket 4994, the annual electricity consumption is proposed to stay constant, and as such, while the solar degradation is taken into consideration from a production standpoint, it is assumed that any reduction in solar production (due to degradation, maintenance, and any other issues), will be made up from electricity provided by PW's utility service. These have offsetting effects, and remain constant through RY 2 and RY3.

Adjustment #2: Add back the annual kWh produced by PW's COF solar facility, and consumed on site.

Adjustment #3: RECs generated from PW's Pine Hill solar facility.
PW's Pine Hill solar facility, which obtained its COD on July 21, 2020, is a "remote" net metering facility, and as such, it generates electricity at the generator source, which is sent to and accounted for by the Utility. The Utility then sends only the economic value of this electricity – in the form of calculated remote net metering credits to PW's electricity

accounts. As a remote net metering facility, Pine Hills Solar has no impact on PW's electricity usage, nor the kWh usage as illustrated on its utility bills.

In calculating PW's Schedule B for purposes of REC calculation, there would be no impact on the kWh use and correlating REC needs to satisfy this use, as a result of the Pine Hills solar project. These RECs would be defined and accounted for separate from PW's calculation of electricity use.

PW's Pine Hill solar project applied for and received its conditional approval as an Eligible Rhode Island Renewable Energy Resources on 06/25/2020. As such, the RECs generated from this facility will be eligible to satisfy RES compliance. Included in the table below are the calculation of the RECs produced by the Pine Hills solar projects, and the impact on the total RECs PW needs to procure to meet its 100% renewable energy goal. As the PW Pine Hills solar project has just hit COD and PW is in its first year of collecting performance data, the tables below include this REC analysis for two scenarios, the first in which Pine Hills solar operates at 100% of estimated production, and the second where Pine Hills solar operates at 90% of estimated production. PW has confidence in COF's rooftop solar performance, and has left its production value at 100% of historical performance, adjusted for annual degradation in RY2 and RY3.

Based on its three (3) year average, PW uses 7,833,106 kWh, and adding back the 768,924 kWh of onsite production and use from its COF solar facility, PW uses 8,602,030 kWh correlating to 8,602 RECs needed to achieve its voluntary goal of 100% renewable. Over the proposed ratemaking period, cumulative RECs needed to meet this goal is 25,806.

When operating at 100% estimated production, PW's Pine Hill solar facility is expected to produce 8,521,100 annually. For RY1, this amount is reduced by 986,000 kWh 7,535,100 kWh, in order to account for the lost production in the month of July as the system was not operational at that time. When added to the 769 RECs from COF rooftop solar, PW's RY1 REC production totals 8,304, or a deficit of 298 RECs. With Pine Hills expected to be fully operational in RY2 and RY3, the annual RECs produced increases to 9,285 and 9,281, resulting in REC surpluses of 683 and 679, respectively. Total REC production from these two facilities over the ratemaking period is 26,870, representing a cumulative surplus of 1,064 RECs.

When operating at 90% estimated production, PW's Pine Hill solar facility is expected to produce 6,781590 for a total of 6,782 RECs in RY1. When added to the 769 RECs from COF rooftop solar, RY1 RECs total 7,551, or a deficit of 298 RECs. Total REC production from these two facilities over the ratemaking period is 22,108, representing a cumulative deficit of 1,392 RECs.

Table 2A: Summary of RECs needed and provided by current PW operations
Pine Hill Solar: 100% Production

Rate Year	Annual Use Schedule B	Adj. 1: RES Compliance	Adj. 2 COF on-site use	Total kWh Needed	Total RECs Needed	REC Production COF Solar	REC Production Pine Hills Solar	REC Production Total	Surplus/ Deficit
1	7,833,106	-	768,924	8,602,030	8,602	769	7,535	8,304	(298)
2	7,833,490	-	768,540	8,602,030	8,602	769	8,517	9,285	683
3	7,833,875	-	768,156	8,602,030	8,602	768	8,513	9,281	679
Total	**23,500,471**	**-**	**2,305,620**	**25,806,091**	**25,806**	**2,306**	**24,565**	**26,870**	**1,064**

Table 2B: Summary of RECs needed and provided by current PW operations
Pine Hill Solar: 90% Production

Rate Year	Annual Use Schedule B	Adj. 1: RES Compliance	Adj. 2 COF on-site use	Total kWh Needed	Total RECs Needed	REC Production COF Solar	REC Production Pine Hills Solar	REC Production Total	Surplus/ Deficit
1	7,833,106	-	768,924	8,602,030	8,602	769	6,782	7,551	(1,052)
2	7,833,490	-	768,540	8,602,030	8,602	769	7,665	8,434	(168)
3	7,833,875	-	768,156	8,602,030	8,602	768	7,661	8,429	(173)
Total	**23,500,471**	**-**	**2,305,620**	**25,806,091**	**25,806**	**2,306**	**22,108**	**24,414**	**(1,392)**

c) Explanation of the time period in which PW wants to be considered 100% renewable. Providence Water wants to be considered 100% renewable in perpetuity. PW's board of directors passed its renewable energy policy on June 26, 2019. This policy states that:

> *"It is the policy of the Board of Directors of Providence Water to promote green renewable energy and install the necessary renewable energy systems to supply all of Providence Water's electricity demands. It is also the policy of Providence Water to maintain ownership or exclusive rights to all associated Renewable Energy Credits (RECs) created through our systems in order to receive the social and environmental value of all electricity produced by our renewable energy systems."*

Further Providence Water has declared as a goal:

> *"It is the goal of Providence Water to produce enough renewable energy in order for Providence Water to become 100% green and utilize all electricity from our own in-house renewable energy systems."*

This policy has been implemented with the explicit meaning of being a long-term policy. In PW's Docket 4994 rebuttal testimony, it was reiterated that PW's goal is to eliminate its carbon footprint and have *long-lasting* positive impacts on the environment by utilizing 100% renewable power. Additionally, the remote net metering contract with AEP that PW has entered into is a 25-year contract. If any timing were to be placed with respect to establishing a time period for compliance, it would start with this 25-year contract term being the floor. Starting at this point, and absent a timeframe for 100% compliance, it can be inferred that these policies and goals are put in place in perpetuity.

d) The quantity of excess RECs (derived from the answer to b) and the estimated market value.

PW has provided production estimates for its renewable energy produced by its two solar facilities (at both the 100% and 90% of expected Pine Hills solar production levels). At these production levels, and the correlating number of RECs produced, this system will generate RECs surplus and/or deficits as outlined in **Table 2A** and **Table 2B**.

In order to most accurately assess the estimated market value of excess RECs, CED consulted with multiple sources of REC market data, including:

- New England based market research firm specializing in renewable energy and REC pricing.
- Real-time REC market pricing from energy and environmental brokerage firms, with specific market coverage in Rhode Island.
- REC pricing assumptions provided by renewable energy developers active in the Rhode Island public remote net metering marketplace.

Based on the cumulative data obtained from these sources, the current value of Class I RECs that are generated from PW's two solar facilities would be $38.80 per REC. This calculation is inclusive of all REC broker and associated fees. Using this figure, the tables below provide the estimated market value of excess RECs for the two scenarios, where Pine Hills solar is operating at 100% of estimated production, and where Pine Hills solar is operating at 90% of estimated production.

When Pine Hills solar operates at 90% of estimated production, the result is a REC deficit. For any year in which there is a REC deficit, the market value of these RECs is set at $0. In the event there is a year in which Pine Hills solar only produces 90% (or an amount that does not allow PW to reach its 100% goal), PW would seek to make up this deficit by utilizing RECs from prior years surpluses, or estimating future year excess production against current year deficit. If the Pine Hills solar project demonstrates to operate consistently at the 90% level, PW would consider the addition of a supplemental long-term renewable energy strategy/project to make up this shortfall.

Table 3A: Estimated market value of RECs produced by PW current operations
Pine Hills Solar: 100% Production

Rate Year	REC Production COF Solar	REC Production Pine Hills Solar	REC Production Total	RECs Needed	RECs Surplus/ Deficit	Market Value RECs	Market Value Total
1	769	7,535	8,304	8,602	(298)	$38.80	$(11,563)
2	769	8,517	9,285	8,602	683	$38.80	$ 26,514
3	768	8,513	9,281	8,602	679	$38.80	$ 26,334
Total	**2,306**	**24,565**	**26,870**	**25,806**	**1,064**		**$ 41,285**

Table 3B: Estimated market value of RECs produced by PW current operations
Pine Hills Solar: 90% Production

Rate Year	REC Production COF Solar	REC Production Pine Hills Solar	REC Production Total	RECs Needed	RECs Surplus/ Deficit	Market Value RECs	Market Value Total
1	769	6,782	7,551	8,602	(1,052)	$ -	$ -
2	769	7,665	8,434	8,602	(168)	$ -	$ -
3	768	7,661	8,429	8,602	(173)	$ -	$ -
Total	**2,306**	**22,108**	**24,414**	**25,806**	**(1,392)**		**$ -**

e) **Explanation of alternatives to achieving PW's 100% renewable energy goals. This shall include descriptions of the costs (including administrative costs), benefits, and risks of each alternative. Alternatives considered should include purchasing new and/or existing RECs through an updated or new energy supply contract , and participating in the anticipated municipal aggregation with the City of Providence.**
As has been previously summarized, PW has taken significant measures over the years to research, review and implement renewable energy projects that have culminated in PW reaching its 100% renewable energy goal. These measures include:

- **New on-site generation:** In 2016, PW, through its consultant CDM Smith, completed a feasibility study to identify potential solar PV projects that could be installed across various PW locations. This included studying the potential for both rooftop and ground mounted systems that could be potentially installed at five (5) PW facilities. At the time of the study, there was one project that was identified as most feasible and appropriate to pursue – PW's COF facility at 125 Dupont Drive. PW moved forward with this project, which has been designed, installed and operational since January 4, 2018.

  There are no new on-site generation options that would constitute either a viable or alternative means of achieving PW's goal of 100% renewable energy.

- **Additional off-site (remote) generation:** At the time of the 2016 feasibility study, the balance of solar PV options identified (after the COF rooftop solar project) were ground-mount solar projects that, at the time, did not represent economically feasible options. Following completion of the feasibility study, the overall Rhode Island renewable energy market experienced positive changes in the marketplace that increased the potential for remote, public remote net metered systems. These factors included, but were not limited to, reduced project development cost, increased developer interest and participation in the Rhode Island public remote net metering market and increased understanding and/or availability of incentives for ground mount solar and public remote net metering projects. Given the favorable change in landscape, PW issued a competitive RFP for remote renewable energy projects to be located on one or more of eight (8) identified PW sites.

  As a result of this competitive RFP, PW selected EDF Renewable Energy to develop a 4.99MW ground-mount, remote net metered facility at its Pine Hill location. This project was completed and achieved COD on July 21, 2020. Pine Hills solar, along with the COF solar facility, now generates enough solar power in order to provide 100% of PW's annual electricity needs through renewable energy.

  There are no new off-site generation options that would constitute a more cost-effective or otherwise more viable means of achieving PW's goal of 100% renewable energy.

The remaining response will focus on the two alternative options presented in the RIPUC question: purchasing new and/or existing RECs through an updated or new energy supply

contract and/or participating in the anticipated municipal aggregation with the City of Providence).

With respect to exploring alternatives to achieving PW's 100% renewable energy goals, it is important to highlight a significant factor that is unique to PW, in the broader context and comparison against other organizational achievement goals of 100% renewable energy.

PW's land ownership: Providence Water has been in the fortunate position of owning real estate, that is part of the watershed for its reservoir system, and has limited to no alternative commercial value. It is neither available nor suited for any commercial development (ex: residential and/or commercial building development). However, the development of land based renewable energy systems are not only compatible with the land use, but complimentary to PW's goals and mission. As a result, PW has developed its Pine Hills solar project on one of its parcels through the RFP process previously discussed.

The value of this available land is quite significant. Many of the alternatives for public agencies seeking to procure up to 100% renewables are centered around third party REC procurement, remote net metering, and similar strategies as most public agencies don't have sufficient, available and/or suitable land of their own to develop and host renewable energy projects. For these entities, when pricing out renewable energy options, because their options rely on projects that are developed on 3rd party land, these land costs (acquisitions, leases, etc.) are factored into their renewable energy pricing proposals. Entities, like PW, that have their own land to contribute to renewable energy projects, eliminate these costs, and as a result the value proposition of sourcing renewables is significantly greater than those who do not have available land.

In the case of PW, when it put out to competitive bid its land for renewable energy development, the value of this provided real estate was certainly factored into the proposals it received. Table 3 below highlights the estimated market premium PW received from its remote net metering competitive Request for Proposals, when compared to similar public agencies who issued RFPs, without their own land to contribute:

Table 4: Estimated market premium of PW's renewable energy RFP pricing

Contract Type	PW RFP Pricing	Market Rate Average Bid	PW Premium
Fixed Rate (price per kWh)	$0.0914	$0.1239	35.51%
Indexed (discount from RNM credit)	39.00%	25.00%	35.90%

In terms of economic value, by PW having its own land to contribute to the 3rd party renewable energy proposal, this added 35% of added value, compared to renewable energy pricing for similar proposals where the client does not have the land to contribute.

As a result of PW's having its own land to provide as a host site for its own renewable energy project, the significant value of this land and the positive impact it has on its renewable energy pricing, represents a uniquely significant advantage this strategy holds over most other options for consideration.

e.1. Purchasing new and/or existing RECs through an updated or new energy supply contract

Obtaining new and/or existing RECs is a widely used strategy that is generally available in the market, and many organizations choose to meet their respective renewable energy goals through such a mechanism. This could be done as part of an energy supply contract, or can be purchased independently. For purposes of this analysis, PW explored:

A) Purchasing new and/or existing Class I RECs (nationally)
B) Purchasing existing Class II RECs (locally)

As PW has an existing, long-term contract with EDF where it owns and retires the RECs produced via the Pine Hills solar project, PW would have to execute mutual contractual agreements in order to not "double purchase" RECs. Known as a "REC Arbitrage" strategy, this process is a familiar concept, and one that is described by the EPA as a possible procurement strategy to enhance overall project economics. REC Arbitrage is a procurement strategy often used by organizations who have self-financed their renewable energy projects and/or purchase Renewable Electricity Certificates (RECs) directly from a renewable electricity project, which is the case with PW through their COF rooftop facility and their Pine Hills solar project.

Under a REC arbitrage transaction, PW would simultaneously sell its own generated RECs, while buying the same volume of similar or alternative RECs at market price lower than its sale price. The difference in market pricing would result in both retaining RECs to meet its 100% goal, while saving on the market differences in REC prices.

In implementing this REC arbitrage in a cost-beneficial way, PW would:

1. Sell the RECs it generates from its renewable energy facilities.
2. Purchase the equivalent number of RECs from its competitive supplier, which would then be sourced through currently unidentified renewable energy facilities.

A REC arbitrage strategy can generate a short-term economic argument to consider procuring RECs from PW's competitive supplier. However, this is done at the expense of retaining claim to the renewable energy and its associated benefits from the organization's own renewable energy project.

PW has evaluated the REC arbitrage options for both procuring RECs from its competitive supplier, as well as procuring Class II RECs independently.

Competitive Supply: PW's competitive supplier, Constellation New Energy, can add to PW's existing contract, an option to go 100% renewable, through their REC program at a

cost of $0.00209/kWh or $2.09/REC. The Constellation REC program would procure and provide RECs from a portfolio of their available wind projects currently located primarily in the state of Texas.

Class II RECs: PW sought pricing from independent REC brokers in the market to purchase the requisite amount of Class II RECs. The current market pricing for Class II RECs is approximately $1.60/REC. These RECs would be sourced from existing Rhode Island projects.

Tables 5A – 5D below outlines the net economic effect of implementing a REC arbitrage strategy.

Table 5A: REC Arbitrage Economics: Competitive Supplier Class I RECs (national wind) Pine Hills Solar: 100% Production

Rate Year	RECs Produced for Sale	REC Price	Total REC Sales	REC's Needed for 100%	REC Price	Total REC Purchases	Total REC (Cost)/Savings
1	8,304	$ 38.80	$ 322,196	8,602	$ 2.09	$ 17,978	$ 304,218
2	9,285	$ 38.80	$ 360,273	8,602	$ 2.09	$ 17,978	$ 342,295
3	9,281	$ 38.80	$ 360,093	8,602	$ 2.09	$ 17,978	$ 342,114
Total	**26,870**		**$1,042,562**	**25,806**		**$ 53,935**	**$ 988,627**

Table 5B: REC Arbitrage Economics: Competitive Supplier Class I RECs (national wind) Pine Hills Solar: 90% Production

Rate Year	RECs Produced for Sale	REC Price	Total REC Sales	REC's Needed for 100%	REC Price	Total REC Purchases	Total REC (Cost)/Savings
1	7,551	$ 38.80	$ 292,960	8,602	$ 2.09	$ 17,978	$ 274,982
2	8,434	$ 38.80	$ 327,227	8,602	$ 2.09	$ 17,978	$ 309,249
3	8,429	$ 38.80	$ 327,064	8,602	$ 2.09	$ 17,978	$ 309,086
Total	**24,414**		**$ 947,251**	**25,806**		**$ 53,935**	**$ 893,317**

Table 5C: REC Arbitrage Economics: Independently Sourced Class II RECs Pine Hills Solar: 100% Production

Rate Year	RECs Produced for Sale	REC Price	Total REC Sales	REC's Needed for 100%	REC Price	Total REC Purchases	Total REC (Cost)/Savings
1	8,304	$ 38.80	$ 322,196	8,602	$ 1.60	$ 13,763	$ 308,433
2	9,285	$ 38.80	$ 360,273	8,602	$ 1.60	$ 13,763	$ 346,510
3	9,281	$ 38.80	$ 360,093	8,602	$ 1.60	$ 13,763	$ 346,329
Total	**26,870**		**$ 1,042,562**	**25,806**		**$ 41,290**	**$ 1,001,272**

Table 5D: REC Arbitrage Economics: Independently Sourced Class II RECs Pine Hills Solar: 90% Production

Rate Year	RECs Produced for Sale	REC Price	Total REC Sales	REC's Needed for 100%	REC Price	Total REC Purchases	Total REC (Cost)/Savings
1	7,551	$ 38.80	$ 292,960	8,602	$ 1.60	$ 13,763	$ 279,197
2	8,434	$ 38.80	$ 327,227	8,602	$ 1.60	$ 13,763	$ 313,464
3	8,429	$ 38.80	$ 327,064	8,602	$ 1.60	$ 13,763	$ 313,301
Total	**24,414**		**$ 947,251**	**25,806**		**$ 41,290**	**$ 905,962**

With Pine Hills solar operating at 100% estimated production, PW could possibly sell all of the RECs it currently generates from its Pine Hills and COF rooftop solar projects at a spot price of $38.80/REC, while purchasing existing Class I RECs from its current competitive supplier for $2.09/REC, or Class II RECs at $1.60/REC. The net effect of this strategy could save PW between $304,218 - $308,433 , with cumulative savings ranging between $988,627 - $1,001,272.

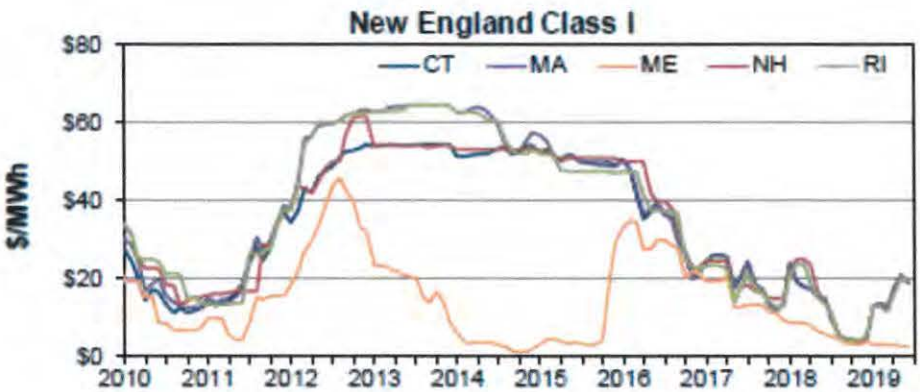
With Pine Hills solar operating at 90% estimated production, with the same pricing assumption above, this strategy could save PW between $274,982 - $279,197, with cumulative savings ranging between $893,317 - $905,962.

It is important to note that the above illustration does not represent "guaranteed" savings or "likely" savings, rather savings that are currently available in the marketplace. The REC marketplace is one where there is significant volatility and risk, and where pricing can change drastically on a daily basis. In the absence of utilizing PW's solar projects to meet its 100% renewable energy and climate mitigation goals, the economic allure of incorporating a REC arbitrage strategy is attractive, however does not come without risk.

REC prices in New England, like most other markets, are respondent to market conditions and experience volatility in pricing. Primary factors that impact changes in REC pricing include:

- Supply and demand balances:
  - Volume
  - Timing
- Regulatory environment (policy and legislative changes), particularly RPS/RES policies.
- Generation date(s) and timing
- Large-buyer (ex: utility) motivations, strategies and timing

Provided below is a snapshot of REC prices from 2010 – 2019.



Source: MarexSpectron. Plotted values are the average monthly closing price for the current or nearest future compliance year traded in each month.

The volatility in the annual pricing of RECs, and associated exposure to risk, is heightened by the day-to-day fluctuations in pricing in any given year. The table above represents the *average monthly closing price* for Bew England Class I RECs. While this is useful in devising and implementing a REC arbitrage strategy, it is important to hone in closer on the daily volatility of REC pricing in the spot market, as this fluctuates significantly more than average annual values.

For example, in 2019, we saw REC spot pricing closings that were 43% off the average annual value. During the same period, we saw a one day price swing of 43% (which is not to say that that is the greatest one-day price swing realized during this period, only the greatest one day swing in which was tracked). Further, within the deviation from average REC pricing, we saw a drop in prices by as much as 77% off the average.

Utilizing the four-year forecasted average REC value of $38.80/REC offers estimated savings of $985,183 over the three-year rate period (assuming 100% of estimated system production). With exposure of up to 43% off daily estimated prices, and 77% from average annual pricing, REC closings could drop to as low as $22.12 – $8.92 per REC, respectively. This could impact the three-year cumulative savings from the REC arbitrage strategy to drop to $540,325 - $185,854.

Table: REC volatility impacts on pricing and cumulative REC arbitrage savings 100% estimated annual solar production

Average REC Price	3-Year REC (Cost)/Savings	Difference
$ 38.80	$ 988,627	$ -
$ 22.12	$ 540,325	$ (448,301)
$ 8.92	$ 185,854	$ (802,772)

Policy Alignment: In procuring RECs from either its competitive supplier or independently, such a strategy would not be in complete alignment with PW's goals and policies, due to the fact that the RECs provided by its competitive supplier are neither

1) *Created through [PW's] own systems.*
2) Providing PW with the *"social and environmental value of all electricity produced by [PW's] renewable energy systems."*

The significance of PW's policy and its implementation should not be lost in the short term economic analysis in considering a REC arbitrage scenario. To start, it is the policy

and goals of PW that has led PW to undertake all of the actions resulting in the development of its solar projects and the RECs they are generating. Absent the implementation of PW's policy, it is quite likely that the solar projects under discussion (at least the Pine Hill solar project, where the vast majority of RECs are produced) would not have been brought to fruition. Without these solar projects in place, there would be no RECs generated to even consider such a REC Arbitrage strategy.

Thus, the consideration of the economic savings of implementing a REC Arbitrage strategy must also incorporate the entirety of the value proposition of the solar projects. The REC Arbitrage strategy is just one of several factors that go into a comprehensive cost-benefit analysis, and like any other input, its measure can't be evaluated in isolation.

In determining the net cost/benefit to PW and its ratepayers, and taking into account all factors (both cost and savings measures), it is clear that the PW renewable energy strategy still provides significant savings to the ratepayers. Table 6 below highlights the net savings to the ratepayers, if foregoing a REC arbitrage strategy is taken into consideration. As will be highlighted, even by forgoing the REC arbitrage potential savings, PW's renewable energy strategy still delivers significant savings to its ratepayers:

Table 6A: REC Arbitrage "Opportunity Cost" and net savings
Competitive Supplier Class I RECs
Pine Hills Solar: 100% Production

Rate Year	REC Arbitrage (Cost)/Savings	Add Back NMCA Savings	Net Contract Savings ("Opportunity Cost")
1	$ 304,218	$ 580,127	$ 275,909
2	$ 342,295	$ 684,395	$ 342,100
3	$ 342,114	$ 713,294	$ 371,180
Total	**$ 988,627**	**$ 1,977,816**	**$ 989,190**

Table 6B: REC Arbitrage "Opportunity Cost" and net savings
Competitive Supplier Class I RECs
Pine Hills Solar: 90% Production

Rate Year	REC Arbitrage (Cost)/Savings	Add Back NMCA Savings	Net Contract Savings ("Opportunity Cost")
1	$ 274,982	$ 522,115	$ 247,133
2	$ 309,249	$ 615,955	$ 306,706
3	$ 309,086	$ 641,965	$ 332,879
Total	**$ 893,317**	**$ 1,780,035**	**$ 886,718**

Table 6C: REC Arbitrage "Opportunity Cost" and net savings
Independently Sourced Class II RECs
Pine Hills Solar: 100% Production

Rate Year	REC Arbitrage (Cost)/Savings	Add Back NMCA Savings	Net Contract Savings ("Opportunity Cost")
1	$ 308,433	$ 580,127	$ 271,694
2	$ 346,510	$ 684,395	$ 337,885
3	$ 346,329	$ 713,294	$ 366,965
Total	**$ 1,001,272**	**$ 1,977,816**	**$ 976,545**

Table 6D: REC Arbitrage "Opportunity Cost" and net savings
Independently Sourced Class II RECs
Pine Hills Solar: 90% Production

Rate Year	REC Arbitrage (Cost)/Savings	Add Back NMCA Savings	Net Contract Savings ("Opportunity Cost")
1	$ 279,197	$ 522,115	$ 242,918
2	$ 313,464	$ 615,955	$ 302,491
3	$ 313,301	$ 641,965	$ 328,664
Total	**$ 905,962**	**$ 1,780,035**	**$ 874,073**

Long Term Economic Strategy: Procuring RECs through competitive supply (or other procurement means), is a shorter term strategy. Currently in the market, favorable pricing that leads to the short term attractiveness of incorporating a REC arbitrage strategy are typically available in contract terms of three (3) years, and while less frequently, five (5) years. PW's COF solar project and Pine Hills remote Net Meter Credit Agreement, have been modeled and evaluated on long-term economic value. This takes into consideration both economic savings, and the establishment of a long-term hedge against fluctuations in both electricity and REC prices. With specific respect to REC prices, entering into a series of short term independent REC contracts increases REC pricing exposure in each year out.

The current REC value of $38.80 is on the high end of long-term REC pricing forecasts. REC prices are expected to decline significantly over the coming 10-15 years, with an estimated low REC price holding around $10/REC. While longer term REC prices past the 15 year mark anticipate an increase, it highlights the level of long-term economic uncertainty to PW when budgeting. While the estimated low REC forecast price is still forecasted to be lower than the RECs in which PW could swap for under an arbitrage strategy, at the $10.00/REC price, the annual REC arbitrage savings diminishes down

from $308,433 to just $69,277. As REC prices decrease and annual savings are reduced, while economic volatility and risk is increased.

e.2. Purchasing new and/or existing RECs through an updated or new energy supply contract

Participation in the anticipated municipal aggregation with the City of Providence is a second REC procurement option that PW could consider and participate in. The municipal aggregation would act, transactionally, the same as PW's existing contract with its competitive supplier. As described by the City of Providence: "*Through the CCA, the program's consultant will utilize the aggregate electricity load of participating municipalities in order to issue a competitive bid from competitive 3rd party energy suppliers*". The only difference for PW is that through the CCA, the economies of scale of all accounts involved in procuring energy (and RECs) would be the basis for pricing.

While this may certainly have an impact on the price of competitive energy supply that is offered, it is unclear at this juncture if there would be any competitive or cost advantages to procuring the renewable energy (RECs) under the municipal aggregation, as compared to any other means for independently procuring RECs.

At the time of this writing, it is also unclear as to both the specific renewable energy target as well as the pricing that will be offered under the final CCA program.

Exhibit 2: Providence Community Choice Aggregation Options

PROVIDENCE CCA OPTIONS

Standard Product:

1. **Local Green:** This is the standard product that you will be **automatically enrolled in** if you do nothing. It includes XX% (#inwords) more local renewable energy (RI New) than required by State law. **This product helps you be a climate leader, while still focusing on competitive prices.** As future Standard Offer Service rates are unknown, savings cannot be guaranteed.

Optional Products: Providence CCA also offers three optional electricity products, each with differing amounts of renewable energy relative to State requirements. To enroll in any of these optional products, you must contact the supplier, **SupplierName**, at XXX-XXX-XXX or XXXXXXX.com

2. **Local Green 100%:** This is an **optional product.** It includes one hundred (100) percent more local renewable energy (RI New) than required by State law.
3. **Local Green 50%:** This is an **optional product.** It includes fifty (50) percent more local renewable energy (RI New) than required by State law.
4. **Basic:** This is an **optional product.** It includes **no more** of local renewable energy (RI New) than required by State law.

While the CCA offers potentially added savings through its municipal aggregation, there are some key programmatic details, which would impact the CCA's ability to a) meet PW's 100% renewable energy goals and b) provide a more compelling economic proposal when compared to PW's current renewable energy strategy. This is simply due to the timing of the program, which is still being finalized, and not a reflection on the value of the program itself.

With respect to the renewable energy offering, the CCA represents an option for PW (and all participants) to procure its renewable energy via RECs. These RECs will be local, Class I RECs, or the same RECs currently being produced by PW's two solar facilities. If PW were to participate in the CCA at the 100% renewable level, it would have to execute the same strategy as outlined under the REC Arbitrage option, which would require PW to:

- Sell the RECs it generates from its renewable energy facilities.
- Purchase the equivalent number of RECs from the CCA. The RECs that the CCA sources may or may not be from PW's existing solar projects.

It is important to note here, that it may still be possible for PW to opt-in to the CCA for its competitive supply portion of the contract, assuming it is priced at a rate that is more competitive than its current supplier.

While the transaction is the same in nature as the REC Arbitrage option, the economics would likely differ, based on the RECs to be procured under the CCA. Unlike an open REC Arbitrage transaction, where RECs could be sourced from anywhere in the United States (as proposed by Constellation the RECs would be sourced out of Texas), the RECS procured by the CCA are slated to be sourced from local renewable energy (RI New) sources. The RECs sources to provide the Providence CCA renewable energy requirement will be the same type of RECs (Class I, new) produced from PW's existing solar projects. Under this proposal, PW would be selling its Class I RI New RECs, in order to be part of an aggregation program that will then purchase those very same Class I RI New RECs.

f) Justification of PWs recommended approach to meeting its 100% renewable energy goals.

PW has explored multiple options including siting renewable energy both on-site and off-site, which resulted in the installation of PW's COF rooftop solar facility and Pine Hills solar remote net metering projects. Through these projects, not only has PW demonstrated its environmental stewardship, but is proud to have done so in a manner that provides long-term savings to its ratepayers.

PW made the deliberate decision to explore and execute options to obtain its full 100% renewable energy "*through its own renewable energy systems, and to ensure that PW retained or retired the Renewable Energy Credits ("REC") generated through these renewable energy systems in order to promote and receive the social and environmental value of all electricity produced by these renewable energy systems.*" PW has been in a fortunate position of owning real estate assets to which there were no viable development alternatives, other than the hosting of its renewable energy projects. With these assets, it allowed PW to more competitively bid and then contract with a 3rd party renewable energy developer to design, build and operate a solar facility on PW's land. This was done, and as a result of this NMCA, PW will save approximately $580,000 in the first year and over $26,000,000 over the life of the contract.

It does not go without notice, that PW could enter into a REC Arbitrage agreement, as described within this document, where PW would sell its generated RECs at a high market price, while simultaneously purchasing the same volume of RECs at a lower market price. This strategy could save PW over $275,000 annually in the short term. However, this assumes that PW actively monitors, markets and participates in the REC market. The daily pricing fluctuations, along with the challenge of matching up REC volume needs of purchasers requires a specific and dedicated skill set. PW could certainly outsource this skill set to a 3rd party consultant or broker, but even with that in place it would not completely insulate PW from price volatility exposure. Moreover, the savings identified in executing this strategy are still inextricably linked to the PW renewable energy projects and strategy as a whole. PW made the deliberate decision to develop Pine Hills solar on PW its own land and to retain the RECs produced from it. Even when factoring into the opportunity cost of not implementing a REC arbitrage strategy, the PW renewable energy efforts still deliver significant savings across its ratepayers.

g) Provide a revised revenue requirement for electric supply procurement based on the recommended approach in f. Two scenarios will be assumed 1) RY1 rates are updated on January 1, 2021, or 2) revenue requirement is updated for RY 2.

While this review has outlined the potential for there to be market sales of excess RECs, PW respectfully requests that the revenue requirement not be required at this time. The values presented are largely based on best production estimates, based on industry-standard modeling methods. However, as with many newly commissioned projects, we do anticipate there to be downtime and other factors that impact the overall production of the Pine Hills solar project, particularly in RY1. PW would be far more comfortable in presenting the first year production values, and any impact/change to revenue requirements, after a full, first-year of production is recorded.

Attachment 1
Providence Water Supply Board
Assumptions and Notes to PW's solar annual production and savings:

1. **kWh Produced - Pine Hills:** 8,521,100 – this is the annual estimated output (as provided by the EDF production report) at 100%. RY1 is reduced by 986,000 to 7,535,100 kWh as it represents Pine Hills estimated production for the month of July 2020, which was not delivered to PW in 2020. Each year project has a degradation factor of 0.05%.

2. **kWh Produced – COF:** • 768,924: This amount is added to PW's RY 1 annual base use, as it reflects the production (and consumption) of the COF facility. This represents the 3-year average production of COF solar, as provided by its data acquisition service. Each year COF has a production degradation factor of 0.05%.

3. **PW Annual Use (Schedule B):** 7,833,106 kWh – PW's annual use based on Schedule B. Adjustments:
   - 768,924: This amount is added to PW's RY 1 annual base use, as it reflects the production (and consumption) of the COF facility (see #2 above).

4. **Pine Hills kWh as % of total use:** Pine Hill production against PW's overall consumption to ensure a) it does not exceed 100% of PW total consumption and to ensure net metering credits do not exceed the statutory limit of 125% of total consumption.

5. **kWh eligible for remote net metering:** All kWh produced at or below 125% of PW use.

6. **kWh NOT eligible for remote net metering:** Any kWh above 125% of PW annual use.

7. **RECs needed to meet 100% of PW total use:** Total kWh used expressed in RECs. Combination of Schedule B use and COF production: 7,833,106 + 768,924 = 8,602,030 kWh or 8,602 RECs.

8. **REC Surplus/ Deficit:** Excess RECs produced by combined production of COF and Pine Hills.

9. **Net Metering Credit Rate (Updated):** 18-month average of real-life, remote net metering credit values.

10. **PPA Rate:** Price PW pays per remote net metering credit delivered.

11. **Credit to PW Electric Accounts:** The value of remote net metering credits received on all accounts (as specified by the Schedule B) from the Pine Hills solar production.

12. **Payment to Developer:** Payment made to EDF for the quantity/value of RNM credits received (see above).

13. **Total Savings:** Credits received less payments below.

14. **PW Sale of excess RECS:** Value of excess RECs PW sells in the market. Not applicable for current analysis.

Summary of Savings

Credit to PW Electric Accounts:	Pine Hills production 7,535,100	X	RNM credit rate: $0.1684	=	**$1,268,835**
Payment to Developer:	Pine Hills production 7,535,100	x	NMCA payment rate: $0.0914	=	**$688,708**
Total Savings:	Total Credits Received $1,268,835	-	Payments made to Developer $688,708	=	**$580,127**

Pine Hill solar estimated schedule of solar and REC production

Contract term: 25 Years, commencing at COD (July 21, 2020)

Contract Year	Solar Production Pine Hills	Solar Production (COF)	Solar Production Total	Annual Use (Schedule B)	Annual Use (COF Solar)	Annual Use (Total) (Schedule B + COF)	Pine Hills % of Total Use	RECs needed to reach 100% Goal	RECs produced: (COF + Pine Hill)	REC Surplus (Deficit)
1	7,535,100	768,924	8,304,024	7,833,106	768,924	8,602,030	87.60%	8,602	8,304	(298)
2	8,516,841	768,540	9,285,381	7,833,490	768,540	8,602,030	99.01%	8,602	9,285	683
3	8,512,583	768,156	9,280,739	7,833,875	768,156	8,602,030	98.96%	8,602	9,281	679
4	8,508,327	767,772	9,276,098	7,834,259	767,772	8,602,030	98.91%	8,602	9,276	674
5	8,504,073	767,388	9,271,460	7,834,643	767,388	8,602,030	98.86%	8,602	9,271	669
6	8,499,821	767,004	9,266,825	7,835,026	767,004	8,602,030	98.81%	8,602	9,267	665
7	8,495,571	766,621	9,262,191	7,835,410	766,621	8,602,030	98.76%	8,602	9,262	660
8	8,491,323	766,237	9,257,560	7,835,793	766,237	8,602,030	98.71%	8,602	9,258	656
9	8,487,077	765,854	9,252,931	7,836,176	765,854	8,602,030	98.66%	8,602	9,253	651
10	8,482,834	765,471	9,248,305	7,836,559	765,471	8,602,030	98.61%	8,602	9,248	646
11	8,478,592	765,089	9,243,681	7,836,942	765,089	8,602,030	98.57%	8,602	9,244	642
12	8,474,353	764,706	9,239,059	7,837,325	764,706	8,602,030	98.52%	8,602	9,239	637
13	8,470,116	764,324	9,234,439	7,837,707	764,324	8,602,030	98.47%	8,602	9,234	632
14	8,465,881	763,941	9,229,822	7,838,089	763,941	8,602,030	98.42%	8,602	9,230	628
15	8,461,648	763,559	9,225,207	7,838,471	763,559	8,602,030	98.37%	8,602	9,225	623
16	8,457,417	763,178	9,220,595	7,838,853	763,178	8,602,030	98.32%	8,602	9,221	619
17	8,453,188	762,796	9,215,984	7,839,234	762,796	8,602,030	98.27%	8,602	9,216	614
18	8,448,962	762,415	9,211,376	7,839,616	762,415	8,602,030	98.22%	8,602	9,211	609
19	8,444,737	762,034	9,206,771	7,839,997	762,034	8,602,030	98.17%	8,602	9,207	605
20	8,440,515	761,652	9,202,167	7,840,378	761,652	8,602,030	98.12%	8,602	9,202	600
21	8,436,295	761,272	9,197,566	7,840,759	761,272	8,602,030	98.07%	8,602	9,198	596
22	8,432,076	760,891	9,192,967	7,841,139	760,891	8,602,030	98.02%	8,602	9,193	591
23	8,427,860	760,511	9,188,371	7,841,520	760,511	8,602,030	97.98%	8,602	9,188	586
24	8,423,646	760,130	9,183,777	7,841,900	760,130	8,602,030	97.93%	8,602	9,184	582
25	8,419,435	759,750	9,179,185	7,842,280	759,750	8,602,030	97.88%	8,602	9,179	577
	210,768,269	**19,108,215**	**229,876,483**	**195,942,548**	**19,108,215**	**215,050,762**	**98.01%**	**215,051**	**229,876**	**14,826**

Pine Hill solar estimated schedule of savings

Contract term: 25 Years, commencing at COD (July 21, 2020)

Net Metering Credit Rate	PPA Payment Rate	NGRID Credits to PW Accounts	PW payment to solar project	PW Sale Excess RECs	Total Savings
$ 0.1684	$ 0.0914	$ 1,268,835	$ 688,708	$ -	$ 580,127
$ 0.1718	$ 0.0914	$ 1,462,834	$ 778,439	$ -	$ 684,395
$ 0.1752	$ 0.0914	$ 1,491,345	$ 778,050	$ -	$ 713,294
$ 0.1787	$ 0.0914	$ 1,520,411	$ 777,661	$ -	$ 742,750
$ 0.1823	$ 0.0914	$ 1,550,044	$ 777,272	$ -	$ 772,771
$ 0.1859	$ 0.0914	$ 1,580,254	$ 776,884	$ -	$ 803,370
$ 0.1896	$ 0.0914	$ 1,611,053	$ 776,495	$ -	$ 834,558
$ 0.1934	$ 0.0914	$ 1,642,453	$ 776,107	$ -	$ 866,346
$ 0.1973	$ 0.0914	$ 1,674,464	$ 775,719	$ -	$ 898,745
$ 0.2012	$ 0.0914	$ 1,707,099	$ 775,331	$ -	$ 931,768
$ 0.2053	$ 0.0914	$ 1,740,371	$ 774,943	$ -	$ 965,427
$ 0.2094	$ 0.0914	$ 1,774,291	$ 774,556	$ -	$ 999,735
$ 0.2136	$ 0.0914	$ 1,808,871	$ 774,169	$ -	$ 1,034,703
$ 0.2178	$ 0.0914	$ 1,844,126	$ 773,781	$ -	$ 1,070,345
$ 0.2222	$ 0.0914	$ 1,880,068	$ 773,395	$ -	$ 1,106,674
$ 0.2266	$ 0.0914	$ 1,916,711	$ 773,008	$ -	$ 1,143,703
$ 0.2312	$ 0.0914	$ 1,954,068	$ 772,621	$ -	$ 1,181,446
$ 0.2358	$ 0.0914	$ 1,992,152	$ 772,235	$ -	$ 1,219,917
$ 0.2405	$ 0.0914	$ 2,030,979	$ 771,849	$ -	$ 1,259,130
$ 0.2453	$ 0.0914	$ 2,070,563	$ 771,463	$ -	$ 1,299,100
$ 0.2502	$ 0.0914	$ 2,110,918	$ 771,077	$ -	$ 1,339,841
$ 0.2552	$ 0.0914	$ 2,152,060	$ 770,692	$ -	$ 1,381,369
$ 0.2603	$ 0.0914	$ 2,194,004	$ 770,306	$ -	$ 1,423,698
$ 0.2655	$ 0.0914	$ 2,236,765	$ 769,921	$ -	$ 1,466,844
$ 0.2708	$ 0.0914	$ 2,280,360	$ 769,536	$ -	$ 1,510,823
		$ 45,495,100	**$ 19,264,220**	**$ -**	**$ 26,230,880**