

**UNITIL ENERGY SYSTEMS, INC.**

**DIRECT TESTIMONY**

**OF**

**JACOB S. DUSLING**

**EXHIBIT JSD-1**

**New Hampshire Public Utilities Commission**

**Docket No. DE 22-\_\_\_\_\_**

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### Exhibits

- Exhibit JSD-2: Request for Information
- Exhibit JSD-3: Request for Proposals – Site Evaluation
- Exhibit JSD-4(a) [CONFIDENTIAL]: Response to Request for Proposals from Selected Vendor – Site Evaluation
- Exhibit JSD-4(b) [CONFIDENTIAL]: Refreshed Pricing – Site Evaluation
- Exhibit JSD-5 [CONFIDENTIAL]: Purchase and Sale Agreement
- Exhibit JSD-6: Preliminary EPC Request for Proposals
- Exhibit JSD-7 [CONFIDENTIAL]: Quote for Appraisal

1 **I. INTRODUCTION**

2 **Q. Mr. Dusling, would you please state your name and business address?**

3 A. My name is Jacob S. Dusling. My business address is 30 Energy Way, Exeter, New  
4 Hampshire 03833.

5 **Q. What is your position and what are your responsibilities?**

6 A. I am a Principal Engineer for Unitil Service Corporation. In this capacity, I have  
7 responsibility over system and distribution planning activities as well as reliability  
8 planning for Unitil Energy Systems, Inc. (“UES” or the “Company”).

9 **Q. Please describe your business and educational background.**

10 A. I have been employed by Unitil Service Corporation for approximately 18 years. I  
11 was originally hired as an Associate Engineer in the Distribution Engineering group.  
12 I have held the positions of Engineer, Distribution Engineer, Design Engineer, and  
13 Senior Engineer. I hold a Bachelor of Science in Electric Engineering from the  
14 University of New Hampshire and a Master of Science in Power Systems  
15 Management from Worcester Polytechnic Institute.

16 **Q. Do you have any licenses that qualify you to speak to issues related to  
17 engineering?**

18 A. Yes. I am a registered Professional Engineer in the State of New Hampshire and  
19 the Commonwealth of Massachusetts.

1 **Q. Have you previously testified before the New Hampshire Public Utilities**  
2 **Commission (the “Commission”)?**

3 A. Yes, I testified before the Commission in DE 20-002, the Company’s 2020 Electric  
4 LCIRP.

5 **Q. What is the purpose of your testimony and how is it organized?**

6 A. The purpose of my testimony is to describe the Company’s proposal to construct,  
7 own, and operate a 4.99 megawatt (“MW”) utility-scale photovoltaic (“PV” or  
8 “solar”) generating facility in Kingston, New Hampshire (the “Kingston Solar  
9 Project” or the “Project”). Section II of my testimony provides an overview of the  
10 proposed Project and a description of the process undertaken to select the location  
11 for the facility. Section III describes the design, permitting, and construction process  
12 the Company intends to use to complete the Project. Section IV provides a  
13 discussion of the expected Project costs and benefits. Section V provides an  
14 overview of the operational aspects of the Project, and Section VI is the conclusion.

15 **II. OVERVIEW OF PROJECT DEVELOPMENT AND SITE SELECTION**  
16 **PROCESS**

17 **Q. Please provide an overview of the proposed project.**

18 A. As discussed in the testimony of Mr. Sprague (Exhibit KES-1), the New Hampshire  
19 General Court enacted Revised Statute Annotated (“RSA”) 374-G to encourage  
20 public electric utilities to invest in Distributed Energy Resources (“DERs”), which  
21 can increase overall energy efficiency and provide energy security and diversity to

1 New Hampshire’s electricity supply by eliminating or displacing traditional fossil  
2 fuels. Pursuant to RSA 374-G, the Company proposes to construct a 4.99 MW  
3 alternating current (“AC” or “ac”) utility-scale solar generating facility that will be  
4 located at 2 Mill Road / 24 Towle Road in Kingston, New Hampshire. The Kingston  
5 Solar Project’s annual energy output is anticipated to average 8,904 MWh over its  
6 expected 30-year life, at an assumed capacity factor of approximately 22 percent.  
7 At that level of output, the Project is expected to offset 57,300 tons of CO<sub>2</sub>  
8 emissions.

9 **Q. Please describe the process the Company used to identify and select the**  
10 **Kingston Solar Project site.**

11 A. The Company undertook a comprehensive, multi-step process to identify a suitable  
12 site for the Kingston Solar Project.

13 First, the Company used internal resources to review all of its parcels to determine  
14 whether there were any sites already owned by Unitil that would be suitable for PV  
15 development. Based on that review, UES identified two possible Company-owned  
16 sites for development. Those sites, however, ultimately were deemed unsuitable for  
17 PV development based on further evaluation by an outside contractor (as discussed  
18 below).

1 Second, consistent with the requirements of RSA 374-G:5, I(d)<sup>1</sup> and 374-G, II(g),<sup>2</sup>  
2 the Company issued a Request for Proposals (“RFP”) on January 28, 2022, for a  
3 firm to assess the two Company-owned parcels identified for PV development, as  
4 well as private and municipally owned property within the Company’s service  
5 territory that could be suitable for PV development (“Site Assessment RFP”). The  
6 scope of work for the Site Assessment RFP also included: (1) ranking potential  
7 properties based on their ability to support a PV facility; (2) providing a detailed  
8 assessment and developing a preliminary layout for the top ranked parcel(s); (3)  
9 developing final site plans once the final location for the PV facility is selected by  
10 the Company; (4) assisting UES in the construction permitting process; and (5)  
11 providing construction oversight and permit compliance of the site work. UES  
12 received responses to the Site Assessment RFP on February 25, 2022 from four  
13 bidders. The Company selected TF Moran, Inc. (“TFM”) as the winning bidder.  
14 TFM is a New-Hampshire based Land Planning firm specializing in Civil  
15 Engineering and Structural Engineering. The Site Assessment RFP and TFM’s  
16 response are attached as Exhibits JSD-3 and JSD-4(a) (CONFIDENTIAL),  
17 respectively.<sup>3</sup>

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<sup>1</sup> RSA 374-G:5, I(d) requires a showing that the utility has used a competitive bidding process to reasonably minimize the costs of the project to its customers.

<sup>2</sup> RSA 374-G, II(g) is one of the public interest factors that must be considered by the Commission and includes, among other things, a demonstration that the company has exercised competitive processes to reasonably minimize costs of the project to ratepayers and to maximize private investment in the project.

<sup>3</sup> The Company asked TFM to refresh its pricing once the location for the Kingston Solar Project was identified. The refreshed pricing submitted by TFM is provided as Exhibit JSD-4(b) (CONFIDENTIAL).

1           Once the work was awarded, TFM began its review with a list of parcels in the  
2           Company’s service territory at least ten acres in size and within one quarter mile of  
3           UES’s subtransmission system, or at least five acres in size and within one hundred  
4           feet of a three-phase 34.5 kV distribution line. The Company’s geographic  
5           information system team generated this list, which included the two Company-  
6           owned sites noted above. TFM performed a screening to narrow down this list based  
7           on an initial environmental assessment (e.g., determining whether a parcel was  
8           situated in floodplains, wetlands) and topology review (e.g., the slope/degree of  
9           inclination of a parcel), among other considerations. This screen yielded a targeted  
10          list of sites, which TFM provided to UES. UES evaluated this targeted list of sites  
11          based on their interconnection locations relative to the electric system. Following  
12          that review, the list was narrowed down to approximately 25 potential sites.

13          Next, on behalf of UES, TFM engaged a real estate firm to determine the status of  
14          the privately owned parcels on the short-list, including whether the parcel was on  
15          the market and whether it had been recently sold (in which case it may be less likely  
16          to be sold again in the near term). Following that review, the 2 Mill Road parcel in  
17          Kingston was identified as being on the market and meeting all the viability criteria  
18          applied by the Company and TFM in the site screening process.

19   **Q.    Has Unitil purchased the land for the Kingston Solar Project?**

20   **A.**    Unitil Realty Corporation, an unregulated subsidiary of Unitil Corporation, entered  
21          into a Purchase and Sale Agreement (the “P&S Agreement”) on August 25, 2022

1 for the Kingston Solar Project site. The P&S Agreement is attached as Exhibit JSD-  
2 5 (CONFIDENTIAL). The P&S Agreement is related to two parcels, both located  
3 in Kingston, New Hampshire. The Kingston Solar Project will be located on one of  
4 the two parcels, with the second parcel reserved for future development. The site  
5 due diligence process includes a determination of which portion of the property will  
6 be used for the Kingston Solar Project.

7 The purchase price for the two parcels is [REDACTED]. For purposes of its Benefit-  
8 Cost Analysis (Exhibit FDGP-2), the Company assumed that 50 percent of this cost  
9 is allocated to the Kingston Solar Project, because it will be located on only a portion  
10 of the property. Until Realty Corporation will transfer the parcel ultimately used for  
11 the Kingston Solar Project to UES and retain the remaining parcel for future  
12 development.

13 As shown in Exhibit JSD-5 (CONFIDENTIAL) at pages 3 and 5, the P&S  
14 Agreement is contingent upon:

- 15 ○ Title Examination
- 16 ○ Property Appraising at or above Purchase Price
- 17 ○ Site Due Diligence, including:
  - 18 ■ Environmental Assessment
  - 19 ■ Archeological Assessment
  - 20 ■ Rare & Endangered Species Studies
  - 21 ■ Full Site Engineering and Site Plan Development
  - 22 ■ All Necessary Construction Permits Received



1 **Q. With regard to the site due diligence items you identified above, please identify**  
2 **the status of that due diligence (i.e., items that are complete and the expected**  
3 **timing to complete any remaining items).**

4 A. The site due diligence began shortly after Unital Realty Corporation entered into the  
5 P&S Agreement. All items associated with the due diligence process are currently  
6 ongoing.

7 A title examination is being performed by Ransmeier & Spellman, P.C. (“R&S”), a  
8 general practice law firm with a real estate practice located in Concord, New  
9 Hampshire. The Company typically uses the services of R&S for land-related legal  
10 work such as title examinations. The title examination is expected to be completed  
11 by the end of November 2022.

12 The Company has retained Capital Appraisal Associates, Inc. (“Capital  
13 Appraisals”), a Concord New Hampshire firm, to perform the property appraisal.  
14 The Company has retained Capital Appraisals for other land appraisals in the past.  
15 The property appraisal is expected to be completed by the end of November 2022.

16 The Site Due Diligence is being performed by TFM and is a component of the Site  
17 Assessment RFP award described above. The site survey, wetlands delineation and  
18 initial site schematic are expected to be complete in November 2022. The initial  
19 environmental assessment, archeological assessment, and rare and endangered  
20 species review are expected to be complete by the end of November 2022. In the  
21 event these initial evaluations identify the need for major permitting or other issues,

1 the Company may extend the Site Due Diligence period by sixty days. All final  
2 studies and plans are expected to be completed by the end of 2022 and all  
3 construction permits are expected to be received by February 2023 (if the sixty-day  
4 extension is not needed and by April 2023 if the extension is exercised).

5 **Q. Has the Company met with local government officials in the Town of Kingston?**

6 A. The Company has contacted the Town of Kingston Select Board to provide an  
7 overview of the planned Kingston Solar Project. The Company plans to continue to  
8 engage with the Town of Kingston through the design and permitting process, and  
9 keep local officials apprised of project status through construction and energization.

10 **Q. Please summarize the Request for Information (“RFI”) the Company issued in**  
11 **connection with the Project?**

12 A. In February 2022, the Company issued an RFI to identify potentially qualified  
13 bidders and develop assumptions for the facility site assessment (e.g., area  
14 requirements, grade/slope conditions, distance to tree lines) and financial analysis  
15 (e.g., equipment and installation cost estimates, typical annual energy production to  
16 validate the Company’s estimations, anticipated useful life of major components,  
17 and efficiency degradation factor of PV modules) needed to assess the viability of  
18 constructing a PV facility. In March 2022, the Company received responses from  
19 three PV project developers.

20 The RFI is attached as Exhibit JSD-2.

1 **III. PERMITTING, PROCUREMENT, AND PROJECT CONSTRUCTION**  
 2 **APPROACH**

3 **Q. How does the Company plan to obtain the necessary permitting for the**  
 4 **Project?**

5 A. As discussed above, site permitting is part of the scope of work in the Site  
 6 Assessment RFP that was awarded to TFM. Accordingly, TFM will be responsible  
 7 for obtaining all the necessary permits for the site work component of project.

8 Any necessary permits required for the PV facility itself will be the responsibility  
 9 of the vendor designing, procuring, and constructing the PV facility.

10 **Q. What permits does the Company anticipate it will need for the Kingston Solar**  
 11 **Project?**

12 A. The Company anticipates that the following construction applications/permits will  
 13 be required:

<b>Town of Kingston</b>	<ul style="list-style-type: none"> <li>• Zoning Board           <ul style="list-style-type: none"> <li>○ Use Variance</li> </ul> </li> <li>• Planning Board           <ul style="list-style-type: none"> <li>○ Site Plan Review</li> </ul> </li> <li>• Conservation Commission           <ul style="list-style-type: none"> <li>○ Wetland Dredge and Fill Review</li> <li>○ Wetland Buffer Impact Review</li> </ul> </li> </ul>
<b>State of New Hampshire</b>	<ul style="list-style-type: none"> <li>• NH Natural Heritage Bureau (NHB)           <ul style="list-style-type: none"> <li>○ NHB Data Check</li> </ul> </li> <li>• NH Fish &amp; Game           <ul style="list-style-type: none"> <li>○ Wildlife Assessment per Env-Wq 1503.19(h)</li> </ul> </li> <li>• NH Dep't of Environmental Services           <ul style="list-style-type: none"> <li>○ Alteration of Terrain</li> <li>○ Major Wetlands Dredge and Fill (incl. functional assessment)</li> </ul> </li> <li>• NH Division of Historical Resources           <ul style="list-style-type: none"> <li>○ Request for Project Review</li> </ul> </li> </ul>

<b>Federal</b>	<ul style="list-style-type: none"><li>• US Army Corps of Engineers<ul style="list-style-type: none"><li>○ NH Programmatic General Permit</li></ul></li><li>• US Environment Protection Agency - NPDES<ul style="list-style-type: none"><li>○ Construction Stormwater Discharge Notice of Intent</li></ul></li></ul>
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1 **Q. What is the current status of permitting for the Project?**

2 A. The site survey and wetlands delineation is currently ongoing. Once complete, the  
3 site plan engineering and design will commence and is expected to be completed by  
4 the end of 2022. Permit application submittals are expected in late December of  
5 2022 and early January of 2023.

6 **Q. How does the Company plan on designing, procuring, and constructing the**  
7 **Kingston Solar Project?**

8 A. As discussed in the testimony of Mr. Sprague, Fitchburg Gas and Electric Light  
9 Company (“FG&E”) (UES’s Massachusetts affiliate company) constructed a 1.3  
10 MW solar facility in Massachusetts (the “Sawyer Passway Project”). For that  
11 facility, FG&E successfully employed a competitive RFP process to select a  
12 qualified contractor to build the Sawyer Passway Project. UES plans to leverage that  
13 experience for the Kingston Solar Project.

14 UES plans to use a three phase approach for the design, procurement, and  
15 construction of the Kingston Solar Project.

16 Phase 1 of this approach is site plan development, which is part of the on-going due  
17 diligence. TFM will be designing a “pad-ready” site that will include the  
18 specifications and construction requirements for tree clearing, access road  
19 construction, drainage facilities, and final site grading. This design will be used to

1           develop an RFP for “Civil Construction Services” for the construction of the “pad-  
2           ready” site. To the extent practical, it is the Company’s intent to include any below  
3           grade infrastructure required for the PV facility in the Civil Construction Services  
4           RFP.

5           Phase 2 is for the construction of the “pad-ready” site. UES intends to use local  
6           civil and land clearing contractors for this portion of the construction. TFM will  
7           provide construction oversight and permit compliance services.

8           Phase 3 includes the engineering/design, procurement, and construction of the PV  
9           facility. UES plans to rely on the experience of an outside contractor with proven  
10          expertise in the engineering, procurement, and construction of “turn-key” solar  
11          generation facilities, which will be installed on the “pad-ready” site constructed  
12          during Phase 2. UES expects the Project contractor will provide the necessary  
13          construction oversight services for this phase of the construction.

14   **Q.    How does the Company define a “turn-key” solar generation facility?**

15    A.    The Company defines a turn-key facility as a PV facility that will, upon completion  
16          of construction, generate AC electricity in a safe and reliable manner in accordance  
17          with all local, state, and federal laws and applicable codes and regulations.

1 **Q. Please elaborate on the Company’s procurement process for a contractor to**  
2 **construct the “pad-ready” site.**

3 Consistent with the requirements of RSA 374-G:5, I(d)<sup>4</sup> and 374-G, II(g),<sup>5</sup> the  
4 Company will employ a competitive RFP process to select a contractor to construct  
5 a “pad-ready” site for the Kingston Solar Project.

6 The Company will issue the “Civil Construction RFP” to select local site  
7 construction contractors. The “Civil Construction RFP” will be developed with the  
8 assistance of TFM and will include all the necessary information for site  
9 construction. The Final “Civil Construction RFP” will not be awarded unless and  
10 until the Commission issues an order finding that the Project is in the public interest.

11 **Q. What criteria will the Company use for selecting the winning contractor for the**  
12 **“pad-ready” site?**

13 **A.** Each proposal will be evaluated and ranked on a quantitative and qualitative basis  
14 using criteria that will include but not be limited to:

- 15 • Overall company background, history, and key characteristics;
- 16 • Experience with similar sized projects;
- 17 • Ability to comply/meet the components of the RFP;

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<sup>4</sup> RSA 374-G:5, I(d) requires a showing that the utility has used a competitive bidding process to reasonably minimize the costs of the project to its customers.

<sup>5</sup> RSA 374-G, II(g) is one of the public interest factors that must be considered by the Commission and includes, among other thing, a demonstration that the company has exercised competitive processes to reasonably minimize costs of the project to ratepayers and to maximize private investment in the project.

- 1                   • Ability to execute the work as evidenced by the project execution plan and  
2                   schedule; and
- 3                   • Overall pricing proposal.

4 **Q.    When does the Company expect to select the contractor for construction of the**  
5 **“pad-ready” site?**

6 A.    The Company expects to issue the RFP for the construction of the “pad-ready” site  
7        in the second calendar quarter of 2023. As noted above, the Company will award  
8        the contract only if the Commission issues an order finding that the Kingston Solar  
9        Project is in the public interest.

10 **Q.    Please elaborate on the Company’s procurement process for a contractor to**  
11 **design, procure, and construct the PV Facility for Kingston Solar Project.**

12        Consistent with the requirements of RSA 374-G:5, I(d)<sup>6</sup> and 374-G, II(g),<sup>7</sup> the  
13        Company is employing a two-stage, competitive RFP process to select an  
14        engineering, procurement, and construction (“EPC”) contractor to design and build  
15        the PV facility.

16        In Stage 1 of the procurement process, the Company conducted a preliminary RFP  
17        to obtain detailed cost estimates for this filing (the “Preliminary EPC RFP”), which  
18        are reflected in the Benefit-Cost Analysis described in Exhibit FDGP-1 and

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<sup>6</sup> RSA 374-G:5, I(d) requires a showing that the utility has used a competitive bidding process to reasonably minimize the costs of the project to its customers.

<sup>7</sup> RSA 374-G, II(g) is one of the public interest factors that must be considered by the Commission and includes, among other things, a demonstration that the company has exercised competitive processes to reasonably minimize costs of the project to ratepayers and to maximize private investment in the project.

1 presented in Exhibit FDGP-2. The Company issued the Preliminary EPC RFP on  
2 September 12, 2022 to the three contractors that responded to the RFI described  
3 above. The Company required bidders to provide cost estimates for all components  
4 of the PV facility up to the Point of Interconnection (“POI”), including PV modules,  
5 inverters, step-up transformers, equipment racking and foundations, and fencing.  
6 Responses to the Preliminary EPC RFP were due on October 11, 2022. The  
7 Preliminary EPC RFP is attached as Exhibit JSD-6. The responses to the Preliminary  
8 EPC RFP were used to estimate the costs of the Project and the configuration  
9 presented in this filing.

10 In Stage 2 of the procurement process, the Company will issue a Final RFP (the  
11 “Final EPC RFP”) to select the EPC contractor. The Company expects to issue the  
12 Final EPC RFP in the first calendar quarter of 2023.

13 **Q. What criteria will the Company use for selecting the winning EPC contractor**  
14 **for the PV Facility?**

15 A. Each proposal will be evaluated and ranked on a quantitative and qualitative basis  
16 by criteria that include but are not limited to:

- 17 • Overall company background, history and key characteristics;
- 18 • Experience with similar sized PV projects;
- 19 • Ability to comply/meet the components of the RFP;
- 20 • Ability to execute the work as evidenced by the project execution plan and  
21 schedule;



- 1           • Overall pricing proposal;
- 2           • Major equipment warranty periods;
- 3           • Origin of manufacture of major equipment; and
- 4           • Involvement of local businesses and/or local labor.

5   **Q.    When does the Company expect to select the EPC contractor?**

6   A.    As stated above, the Company expects to issue the Final EPC RFP for the EPC  
7       contract in the first quarter of 2023. The Company will move forward with the EPC  
8       award only if the Commission issues an order in this proceeding finding that the  
9       proposed Kingston Solar Project is in the public interest.

10 **Q.    What is the expected timeline for constructing the Kingston Solar Project?**

11 A.    After the competitive bidding process has been completed, the Company will  
12       execute contracts with the winning contractors. A formal, detailed construction  
13       schedule will be established as part of the contracts with the selected contractors.

14       The Company estimates construction would take approximately 12 months from the  
15       time the Commission issues an order finding the Project is in the public interest.

16 **IV.    EXPECTED PROJECT COSTS AND BENEFITS**

17 **Q.    What is the total expected cost to construct the Kingston Solar Project?**

18 A.    As shown in Exhibit FDGP-2, Schedule 11, the overall cost of the Kingston Solar  
19       Project is comprised of the PV array installation cost (including the inverter, racking,  
20       and other components), electric system upgrades, site work, permitting, and land

1 acquisition costs. The Company estimates the total cost to construct the Project will  
2 be \$13.23 million (Exhibit FDGP-2, Schedule 3). These cost estimates were  
3 developed through a combination of information provided in response to the RFI  
4 and the Preliminary EPC RFP, assistance from TFM, and the experience of FG&E  
5 (the Company's Massachusetts affiliate) in constructing a 1.3 MW solar facility in  
6 Massachusetts (the Sawyer Passway Project).

7 **Q. What are the physical components of the PV array installation?**

8 A. At a high level, the PV array installation is comprised of four major categories of  
9 physical plant:

- 10 • Modules or PV panels;
- 11 • Inverters or the DC to AC conversion equipment;
- 12 • Step-Up Transformer(s)
- 13 • Balance of Plant ("BOP") which includes the racking components and  
14 electrical equipment such as conduit, wiring, combiner and electrical boxes.

15 **Q. Will the PV arrays be tracking or stationary?**

16 A. In response to the Company's Preliminary EPC RFP, the contractors provided cost  
17 and production information for both fixed-tilt and single-axis tracker technologies.  
18 Although single-axis tracker technology is typically more expensive than a fixed-  
19 tilt approach, single-axis trackers allow for greater energy production because the  
20 solar panels rotate from east to west on a fixed axis throughout the day to track the

1 movement of the sun. Based on a review of the cost and performance tradeoffs of  
 2 these two technologies, the Company determined that the single-axis tracker  
 3 technology is a better approach because the increase in benefits exceeds the added  
 4 cost.

5 **Q. What are the costs estimates for the major categories of investment identified**  
 6 **above?**

7 A. The cost estimates for the four major categories identified above, as well as  
 8 estimates for additional cost categories are provided in the table below:

PROJECT CAPITAL COSTS	
Cost Element	Estimated Cost
Inverter and Associated Material	[REDACTED]
PV Modules and Associated Material	[REDACTED]
Step-up Transformer and Associated Material	[REDACTED]
Balance of Plant (e.g., racking, etc.)	[REDACTED]
Fencing	[REDACTED]
Project Management	[REDACTED]
Construction Field Representative	[REDACTED]
Spare Step-Up Transformer	[REDACTED]
Spare Inverter	[REDACTED]
Spare PV Modules (5)	[REDACTED]
Labor	[REDACTED]
<b>TOTAL</b>	[REDACTED]

9 The cost estimates in the table above are based on pricing information provided in  
 10 response to the Preliminary EPC RFP.

11 **Q. Does the Company anticipate any capital costs beyond the initial installed**  
 12 **costs?**

13 A. Yes. Inverters typically have a lifespan of 10 to 20 years. Accordingly, the Company  
 14 expects that it will need to replace the inverters once over the 30-year estimated life

1 of the facility. As shown in Exhibit FDGP-2, Schedule 3, the Company estimates  
 2 the inverters will be replaced in Year 15, at a cost [REDACTED]—which is an inflation-  
 3 adjusted figure.

4 **Q. Apart from the PV array installation costs, are there additional costs associated**  
 5 **with constructing the facility?**

6 A. Yes, the Company estimates system upgrade costs of \$600,000 to interconnect the  
 7 facility to the electric distribution system, which I discuss in more detail in Section  
 8 V below. There are also the costs for site work and permitting ([REDACTED]) and land  
 9 acquisition (\$857,938).

10 The breakdown of the site work and permitting costs is as follows:

<b>SITE WORK AND PERMITTING</b>	
Cost Element	Estimated Cost
Site Due Diligence, Design, and Permitting <sup>8</sup>	[REDACTED]
Site Work	\$550,000
<b>TOTAL</b>	[REDACTED]

11 The breakdown of the land acquisition costs allocated to the Kingston Solar  
 12 Project is as follows:

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<sup>8</sup> See Exhibit JSD-4(b).

<b>LAND ACQUISITION COSTS</b>	
<b>Cost Element</b>	<b>Estimated Cost</b>
Site Identification	\$25,000
Purchase Price <sup>9</sup>	[REDACTED]
Transfer Tax	[REDACTED]
Commission	[REDACTED]
Current Use Penalty	[REDACTED]
Title Search	\$10,500
Appraisal <sup>10</sup>	[REDACTED]
<b>TOTAL</b>	<b>\$1,715,876</b>
<b>ALLOCATED COST (50%)</b>	<b>\$857,938</b>

1 **Q. What factors could change the estimated project costs?**

2 A. Several factors could contribute to actual project costs being different than estimated  
 3 costs including material costs, labor market challenges, demand for solar  
 4 components, which is expected to increase in the wake of the federal Inflation  
 5 Reduction Act, and shipping and freight costs.

6 **Q. Will the Company be subject to property taxes for the Kingston Solar Project?**

7 A. Yes. The Company will pay property taxes to the Town of Kingston, New  
 8 Hampshire for the facilities it constructs. As shown in Exhibit FDGP-2, Schedules  
 9 3 and 5, the Company estimates that it will pay \$357,638 in the first year and a total  
 10 of nearly \$6.1 million over the projected 30 year life of the facility. Although  
 11 property taxes are a cost to the Project, they are a significant economic benefit to  
 12 the Town of Kingston.

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<sup>9</sup> Exhibit JSD-5. The Company assumed for purposes of its Benefit-Cost Analysis (Exhibit FDGP-2) that only 50 percent of this cost is allocated to the Kingston Solar Project because it will be located on only a portion of the property.

<sup>10</sup> Exhibit JSD-7.

1 **Q. Please provide an overview of the expected benefits that will be generated by**  
2 **the Project.**

3 A. As discussed in the joint testimony of Messrs. Francoeur, Diggins, Goulding, and  
4 Pentz, and the joint testimony of Ms. Gilbert and Mr. Pierce, the Company expects  
5 the Kingston Solar Project will generate avoided energy costs, avoided capacity  
6 costs, local and regional transmission benefits, Renewable Energy Certificates,  
7 avoided CO<sub>2</sub> and NO<sub>x</sub> costs, Demand Reduction Induced Price Effects, and  
8 economic development benefits.

9 **Q. How will the proposed Kingston Solar Project offset line losses consistent with**  
10 **the requirement of RSA 374-G:3, I?**

11 A. The Kingston Solar Project will be operated as a “load reducer,” meaning the energy  
12 produced by the facility will offset energy that otherwise would be received by UES  
13 from the transmission system, thus offsetting distribution system losses.<sup>11</sup>

14 Additionally, each component of the utility distribution system contributes to  
15 electricity losses and the amount of losses depends on the distance from the source  
16 to the load. Generally speaking, the longer the distance over which electricity is  
17 transmitted, the more electricity is lost. Output from the Kingston Solar Project will  
18 be injected directly into the electric distribution system and will offset the amount

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<sup>11</sup> ISO-NE’s Operating Procedure No. 14 allows any generating facility with a nameplate capacity between one to five megawatts to operate as a load reducer in the region as long as the facility does not participate in any ISO-NE. ISO new England Operating Procedure No. 14 – Technical Requirements for Generators, Demand Response Resources, Asset Related Demands and Alternative Technology Regulation Resources (Effective May 13, 2022).

1 of electricity that must be delivered to that point on the electric distribution system,  
2 marginally reducing distribution system losses.

3 **Q. The definition of DERs in RSA 374-G:2 includes, among other things,**  
4 **renewable generation that provides peak load shaving benefits as part of a**  
5 **strategy for minimizing transmission and distribution costs. Will the proposed**  
6 **Kingston Solar Project reduce peak demand?**

7 A. On days when output from the Project is available during peak hours (most likely  
8 during the summer months), the system can provide peak load shaving benefits.  
9 Since 2017, the ISO-NE and regional transmission annual peak hours have occurred  
10 during the summer months of June, July, and August from 16:00 to 18:00. Load  
11 reducers, like the Kingston Solar Project, decrease the capacity obligation for a  
12 utility by reducing the utility's load requirement at the time of the peak load for the  
13 ISO-NE system.

14 Based on information provided in response to the Preliminary EPC RFP, the  
15 Company has assumed the Project will generate approximately 37 percent of its  
16 nameplate capacity (1,850 kW) during the annual historical ISO-NE peak hour, thus  
17 reducing UES peak load by that amount. This capacity benefit is quantified in the  
18 testimony and accompanying exhibits of Messrs. Francoeur, Diggins, Goulding, and  
19 Pentz.

20 As a load reducer, the Kingston Solar Project also produces local and regional  
21 transmission benefits by reducing load, which are also captured in the Benefit-Cost

1 Analysis presented in the in the testimony and accompanying exhibits of Messrs.  
2 Francoeur, Diggins, Goulding, and Pentz. Based on information provided in  
3 response to the Preliminary EPC RFP, the Company has assumed the Project will  
4 generate approximately 12 percent of its nameplate capacity (600 kW) during the  
5 monthly historical ISO-NE peak hour, reducing UES peak load by that amount.

6 **Q. Will the project provide any advanced functionality such as voltage regulation**  
7 **or power factor management?**

8 A. The proposed facility will have the ability to provide advanced functionality such as  
9 voltage control and power factor management that the Company may elect to  
10 implement at a future time.

11 **Q. What are the expected environmental benefits associated with the Kingston**  
12 **Solar Project?**

13 A. CO<sub>2</sub> emissions make up the vast majority of New Hampshire's greenhouse gas  
14 emissions, most of which are generated by burning fossil fuels (e.g., oil, coal, gas)  
15 to produce heat and electricity, and to power vehicles.<sup>12</sup>

16 As noted above, UES estimates that the Kingston Solar Project annual generation  
17 will average 8,904 MWh and is expected to offset approximately 57,300 tons of CO<sub>2</sub>  
18 annually (*See* Exhibits GPP-1 and GPP-2). In addition to CO<sub>2</sub> reduction benefits,

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<sup>12</sup> New Hampshire Department of Environmental Services, *Greenhouse Gas Emissions Inventory*, <https://www.des.nh.gov/climate-and-sustainability/climate-change/greenhouse-gas> (last visited Sept. 9, 2022).



1 Daymark estimates the Project would reduce 0.15 tons of NO<sub>x</sub> (*See* Exhibits GPP-  
2 1 and GPP-2).

3 **V. PROJECT OPERATIONS**

4 **Q. What is the expected design life of the Kingston Solar Project?**

5 A. The Company has estimated a 30 year design life based on information provided by  
6 PV contractors in response to the RFI and the Preliminary EPC RFP.

7 **Q. Is the Kingston Solar Project below the statutory cap of 5MW on individual  
8 DER projects?**

9 A. Yes, as noted above the capacity of the Kingston Solar Project will be 4.99 MWac.

10 **Q. What is the expected Direct Current (“DC”) capacity of the Kingston Solar  
11 Project?**

12 A. The Company plans to upsize the DC capacity of the Kingston Solar Project to 6  
13 MWs or more to improve the capacity factor and output of the facility, including  
14 output at the traditional electric system annual peak hour. However, the inverters  
15 will be sized for 4.99 MWac, meaning the inverters will limit the facility’s output to  
16 4.99 MWac.

17 **Q. How will the Kingston Solar Project be dispatched?**

18 A. As discussed above, the Kingston Solar Project will operate as a load reducer and  
19 therefore it will not be “dispatched” like traditional fossil fuel generation resources.  
20 The Project will deliver electricity during the hours in which the facility is producing  
21 energy directly into the Company’s electric distribution system. The amount of

1 electricity produced by a generating unit is a function of (1) the project's capacity  
2 factor and (2) the degradation factor.

3 The capacity factor is the ratio of actual electrical energy output over a given period  
4 of time (typically the number of hours in a year—8,760) to the theoretical maximum  
5 electrical energy output over that same period. The actual energy output of a  
6 generating facility can vary greatly depending on a range of factors. With regard to  
7 solar, solar panels generally produce less energy during the winter months, due to  
8 less available sunlight, than during the summer. The Company has estimated an  
9 annual capacity factor of approximately 22 percent for the Kingston Solar Project.  
10 The Company's capacity factor estimate was developed based on information  
11 received in response to the Preliminary EPC RFP.

12 With regard to the degradation factor, all PV panels lose efficiency and production  
13 over time. Solar panel degradation is caused by a range of factors including  
14 temperature and humidity. The degradation factor accounts for the decrease in  
15 performance over time and the Company has assumed an annual degradation rate of  
16 0.5 percent. This assumption is based on information received in response to the  
17 Preliminary EPC RFP.

18 **Q. Will the Company be able to monitor energy production at the Kingston Solar**  
19 **Project?**

20 A. Yes. The Company will have the ability to monitor energy production from the  
21 Project at three locations.

1 The first location, which will be the location of record for facility production, will  
2 be the revenue meter installed at the POI for the facility. This location will record  
3 a minimum of fifteen minute interval revenue metering data.

4 The second location will be instantaneous AC and DC data from the facility  
5 inverters. This information, along with other AC and DC telemetry, will be  
6 integrated with the Company's SCADA system.

7 The third location will be from the recloser installed at the POI. The recloser will  
8 provide instantaneous telemetry, including power, to the Company's SCADA  
9 system.

10 **Q. What process will UES follow to interconnect the Kingston Solar Project?**

11 A. The AC output of the Kingston Solar project will be interconnected to one of the  
12 existing 34.5kV lines running through the property or one of the 34.5kV distribution  
13 circuits in close proximity to the property. The 34.5kV lines and circuits that are  
14 being considered for interconnection are supplied from the existing 115kV to  
15 34.5kV substation located adjacent to the facility. The combination of these factors  
16 results in a less expensive interconnection than otherwise would be necessary to  
17 modify the electric distribution system to accommodate a utility-scale solar facility.  
18 The Company will be responsible for the procurement, installation and  
19 commissioning of equipment required to interconnect the facility. As shown in  
20 Exhibit FDGP-2, Schedule 11, and summarized in the table below, the Company  
21 estimates a total interconnection cost of \$600,000, which breaks down as follows:

<b>ELECTRIC SYSTEM UPGRADES</b>	
<b>Category</b>	<b>Estimated Cost</b>
System Impact Study	\$75,000
POI Material and Installation	\$350,000
Tap 3345 Line with Gang Operated Air Break switch	\$50,000
Kingston Relaying Upgrades	\$125,000
<b>TOTAL</b>	<b>\$600,000</b>

1 **Q. Please further describe the cost elements that make up the total estimated**  
2 **interconnection cost.**

3 A. The infrastructure required to interconnect the facility is expected to consist of the  
4 POI, a three-phase 34.5 kV line extension from the interconnecting line/circuit to  
5 the step-up transformer and protection and relaying upgrades at the 115kV to  
6 34.5kV substation. The POI is expected to consist of disconnect switches, a recloser  
7 and primary metering outfit.

8 **Q. One of the public interest factors listed under RSA 374-G:5 is the effect on the**  
9 **reliability, efficiency, and safety of electric service. Will the Kingston Solar**  
10 **Project have any impact on the reliability, efficiency, and safety of electric**  
11 **service?**

12 A. The Project is expected to have a positive effect on the efficiency of electric service  
13 by offsetting losses and slightly reducing losses by generating energy locally.

14 The Company will take all appropriate steps to ensure the Kingston Solar Project  
15 does not adversely impact the reliability, efficiency, and safety of electric service.

16 As a matter of course, the Company will install protective devices at the POI to  
17 disconnect the Project from the electric power system (“EPS”) if a fault or abnormal

1 operating condition occurs. In addition, as part of the interconnection process, the  
2 Company will conduct a System Impact Study. A System Impact Study examines  
3 the potential impacts on the operation, safety, and reliability of the EPS that may  
4 result due to the interconnection of the facility. To the extent that the System Impact  
5 Study identifies any additional upgrades necessary to ensure the continued safe and  
6 reliable operation of the Company's EPS, the Company will undertake those  
7 upgrades. Furthermore, the technical specification for the Kingston Solar Project  
8 will require that the system components are compliant with applicable codes and  
9 safety standards. For example, the system inverters will be UL 1741 compliant.<sup>13</sup>

10 **Q. How is the Kingston Solar Project part of the Company's strategy for**  
11 **minimizing transmission and distribution costs as required by RSA 374-G:2?**

12 A. Renewable electricity, such as that produced by the Project, is a cost-effective and  
13 environmentally-friendly means of generating electricity locally to reduce energy  
14 received from the local transmission system and offset distribution peak load.

15 **Q. Will the Kingston Solar Project require ongoing maintenance?**

16 A. Yes. The Company expects that there will be annual operation and maintenance  
17 ("O&M") to ensure that the system operates safely and generates at its maximum  
18 capacity over the projected 30-year design life. Categories of ongoing O&M include  
19 regular site inspections, vegetation management, fence maintenance, panel

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<sup>13</sup> In response to the Preliminary EPC RFP, the EPC contractors submitted a listing of all applicable statutes, ordinances, codes, standards, and/or regulations the facility will be designed to comply with.

1 replacements, and inverter maintenance and/or replacements.

2 **Q. Who will be responsible for providing O&M services?**

3 A. Regular site inspections, vegetation management and fence maintenance will be  
4 performed by UES personnel or UES's maintenance contractors.

5 The Company will include ongoing O&M services as part of the Final PV Facility  
6 RFP and will evaluate the possibility of entering into an ongoing maintenance  
7 contract for PV facility specific items (inverter maintenance and/or panel and  
8 inverter replacement).

9 **Q. What is the annual estimated cost associated with O&M?**

10 A. As shown in Exhibit FDGP-2, Schedule3, the Company estimates an O&M cost of  
11 [REDACTED] in Year 1, and adjusts that estimate for inflation for the balance of the  
12 projected 30-year design life of the facility. The Company's estimated cost for O&M  
13 is based on responses to the Preliminary EPC RFP.

14 As noted above, due to an expected life of 15 years, the Benefit-Cost Analysis  
15 (Exhibit FDGP-2) assumes the replacement of the inverters in year 15 of the project  
16 life.

17 **Q. What warranty requirements is the Company placing on the developer?**

18 A. UES plants to request that all inverters be warrantied for a minimum of twelve years  
19 (with a preference for fifteen years) and all PV modules be warrantied for a  
20 minimum of twenty-five years (with a preference for thirty years) after energization.

1 All other equipment is expected to have a life expectancy and/or be corrosion  
2 resistant for a minimum of thirty years.

3 **VI. CONCLUSION**

4 **Q. Does this conclude your testimony?**

5 **A.** Yes, it does.