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See attached.

Anthony C. Wilson, Esq.
United States Nuclear Regulatory Commission
Attorney / Office of the General Counsel
New Reactor Programs
Phone: 301 415-3699(o)
202 590-0040 (c)

Email: Anthony.Wilson@nrc.gov

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Recipients:
"Kirkwood, Sara" <Sara.Kirkwood@nrc.gov>
Tracking Status: None
"Cort, Katherine A" <Katherine.Cort@pnnl.gov>
Tracking Status: None
"Parkhurst, Mary Ann" <maryann.parkhurst@pnnl.gov>
Tracking Status: None
"Chapman, Elaine G" <elaine.chapman@pnnl.gov>
Tracking Status: None
"Gendelman, Adam" <Adam.Gendelman@nrc.gov>
Tracking Status: None
"Quinn-Willingham, Laura" <Laura.Quinn-Willingham@nrc.gov>
Tracking Status: None
"Kugler, Andrew" <Andrew.Kugler@nrc.gov>
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November 18, 2011

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	)	
	)	
CALVERT CLIFFS 3 NUCLEAR PROJECT,	)	
LLC AND UNISTAR NUCLEAR	)	Docket No. 52-016
OPERATING SERVICES, LLC	)	
	)	
(Calvert Cliffs Nuclear Power Plant, Unit 3)	)	

UNISTAR REBUTTAL STATEMENT OF POSITION ON CONTENTION 10C

David A. Repka
Tyson R. Smith
Winston & Strawn LLP
1700 K Street, NW
Washington, DC 20006

Carey W. Fleming
UniStar Nuclear Energy, LLC
750 E. Pratt Street
Baltimore, MD 21202

COUNSEL FOR CALVERT CLIFFS 3 NUCLEAR PROJECT, LLC AND UNISTAR NUCLEAR OPERATING SERVICES, LLC

Dated at Washington, District of Columbia
this 18th day of November 2011

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	)	
	)	
CALVERT CLIFFS 3 NUCLEAR PROJECT, LLC AND UNISTAR NUCLEAR OPERATING SERVICES, LLC	)	Docket No. 52-016-COL
	)	
(Calvert Cliffs Nuclear Power Plant, Unit 3)	)	

UNISTAR REBUTTAL STATEMENT OF POSITION ON CONTENTION 10C

I. INTRODUCTION

Pursuant to 10 C.F.R. § 2.1207(a)(2), the Licensing Board's Order (Revising Initial Schedule), dated June 24, 2011, and the Order (Providing Direction on Pre-filed Evidentiary Material), dated September 22, 2011, Calvert Cliffs 3 Nuclear Project and UniStar Nuclear Operating Services (collectively, "UniStar") hereby submit this Rebuttal Statement of Position on Contention 10C. This Rebuttal Statement of Position is supported by rebuttal testimony from Dimitri Lutchenkov, Stefano Ratti, and Septimus van der Linden ("UniStar Rebuttal Testimony") and the accompanying exhibits.

This Rebuttal Statement of Position responds to the legal arguments, factual assertions, and supporting materials filed by the Joint Intervenors on October 28, 2011.[1] This Rebuttal Statement of Position also addresses the NRC Staff statement of position and testimony filed on October 21, 2011.[2] For the reasons set forth below, the NRC Staff analysis of energy

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[1] "Testimony of Scott Sklar, President of the Stella Group, Ltd., on Contention 10," dated October 28, 2011 ("Sklar Testimony") (Exh. JNT000001).

[2] "NRC Staff Initial Statement of Position," dated October 21, 2011 ("NRC Staff Position Statement"); "Prefiled Direct Testimony of Andrew J. Kugler and Katherine A. Cort

alternatives in the Final Environmental Impact Statement for Calvert Cliffs 3 ("FEIS")[3] satisfies the requirements of the National Environmental Policy Act ("NEPA"). Contention 10C should be resolved in favor of UniStar and the NRC Staff.

II. SUMMARY OF ARGUMENT

As required by NEPA, in the FEIS the NRC Staff considered a range of energy alternatives that could satisfy the project's purpose and need — generating 1600 MW(e) of baseload generation in Maryland. The energy alternatives considered included coal-fired generation, natural gas, and a combination of alternatives (a mix of renewables, in conjunction with energy storage, and natural gas), in addition to nuclear. These alternatives and their environmental impacts were fully discussed in the FEIS.

Based on the FEIS discussion of energy alternatives, the NRC Staff has taken the requisite hard look at the significant environmental considerations associated with energy alternatives and has "come to grips with all important considerations."[4] The NRC Staff considered the technical feasibility and economic viability of these alternative sources of energy and took into account the potential contribution of these sources that can reasonably be expected within the timeframe of the proposed project. In contrast, the testimony of the Intervenors' witness takes a flawed and overly-simplistic view of the potential contribution of wind and solar generation that does not account for the economic, commercial, and technical limitations

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Concerning Environmental Contention 10C," dated October 21, 2011 (Exh. NRC000004) ("NRC Staff Testimony").

[3] Environmental Impact Statement for the Combined License (COL) for Calvert Cliffs Nuclear Power Plant Unit 3, Final Report, NUREG-1936 (May 2011) (ADAMS Accession Nos. ML11129A167, ML1129A179) (Exhs. NRC00003A and NRC00003B).

[4] *Exelon Generation Co., LLC* (Early Site Permit for Clinton ESP Site), CLI-05-29, 62 NRC 801, 811 (2005).

associated with development of these resources. And, the Intervenors' witness wholly fails to grapple with the need for energy storage to produce baseload-equivalent power from wind and solar. Instead, the witness attempts to dismiss the concept of baseload power and would inappropriately redefine the project purpose.

Overall, the Intervenors' testimony and exhibits do not call into question the reasonableness of the NRC Staff's combination of alternatives. The hypothetical combination of energy alternatives, including wind and solar, in conjunction with energy storage, and natural gas, selected by the NRC Staff is reasonable and would satisfy the purpose and need for the proposed action. As discussed in the FEIS, and as supplemented by the testimony and exhibits introduced in this hearing, no reasonable combination of energy alternatives is environmentally preferable to the proposed action — even accounting for some uncertainty in the amount of baseload energy that could be produced using wind or solar, in conjunction with energy storage, and in combination with natural gas. The FEIS satisfies Part 51 and NEPA.

III. BACKGROUND

The procedural history of Contention 10C was discussed in detail in the "UniStar Statement of Position on Contention 10C," dated October 21, 2011 ("UniStar Position Statement"), as well as in the "Direct Testimony of UniStar Witnesses Dimitri Lutchenkov, Stefano Ratti, and Septimus van der Linden," dated October 21, 2011 ("UniStar Testimony").

The legal standards applicable to Contention 10C were also addressed in the UniStar Position Statement. In short, NEPA requires that agencies take a "hard look" at the environmental impacts of a proposed action and reasonable alternatives to that action.[5] This

[5] *See La. Energy Servs., L.P.* (Claiborne Enrichment Ctr.), CLI-98-3, 47 NRC 77, 87-88 (1998); *see also Balt. Gas & Elec. Co. v. NRDC*, 462 U.S. 87, 97-98 (1983) (holding that NEPA requires agencies to take a "hard look" at environmental consequences prior to taking major actions).

"hard look" is subject to a "rule of reason."[6] This means that an "agency's environmental review, rather than addressing every impact that could possibly result, need only account for those that have some likelihood of occurring or are reasonably foreseeable."[7] When faced with uncertainty, NEPA only requires "reasonable forecasting."[8] NRC licensing boards do not sit to "flyspeck" the FEIS or to add minor details or nuances to the analysis.[9]

IV. UNISTAR REBUTTAL WITNESSES

UniStar's rebuttal testimony is presented by the same three witnesses that provided initial testimony: Mr. Dimitri Lutchenkov, Mr. Stefano Ratti, and Mr. Septimus van der Linden. A description of their qualifications was provided in UniStar's Initial Statement of Position.[10] Mr. Lutchenkov is the Director, Environmental Affairs and Special Projects, for UniStar Nuclear Energy, LLC, and has responsibility for the environmental aspects of the Calvert Cliffs 3 licensing reviews. Mr. Ratti was responsible for several years for developing strategic renewable initiatives, including evaluation of potential acquisitions in the renewable energy sector and creation of renewable energy businesses in the United States. Mr. van der Linden has over 30 years experience with compressed air energy storage ("CAES") systems.

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6 *La. Energy Servs.* (National Enrichment Facility), LBP-06-8, 63 NRC 241, 258-59 (2006) (*citing Long Island Lighting Co.* (Shoreham Nuclear Power Station), ALAB-156, 6 AEC 831, 836 (1973)); *see also Dep't of Transp. v. Pub. Citizen*, 541 U.S. 752, 767-69 (2004) (stating that the rule of reason is inherent in NEPA and its implementing regulations).

7 *LES*, LBP-06-8, 63 NRC at 258-59 (*citing Shoreham*, ALAB-156, 6 AEC at 836).

8 *Scientists' Inst. for Pub. Info., Inc. v. AEC*, 481 F.2d 1079, 1092 (D.C. Cir. 1973).

9 *Hydro Resources, Inc.* (P.O. Box 15910, Rio Rancho, NM 87174), CLI-01-04, 53 NRC 31, 71 (2001).

10 The detailed statements of qualification for Mr. Lutchenkov, Mr. Ratti, and Mr. van der Linden were included in Exhs. APL000002, APL000003, and APL000004.

Mr. van der Linden was involved in the design of CAES plants in the United States and has participated in many EPRI-lead workshops on CAES.

V. DISCUSSION

A. Response to NRC Staff Statement of Position and Testimony

UniStar's expert witnesses agree with the NRC Staff Position Statement and the conclusions in the testimony of Mr. Kugler and Ms. Cort. The methodologies, assumptions, and results in the NRC Staff testimony are generally in agreement with those made by the UniStar witnesses. In particular, UniStar agrees with the following aspects of the NRC Staff testimony:

- The NRC Staff developed the combination of energy alternatives based on the maximum contribution from renewable sources that could be reasonably expected within the region of interest and within the timeframe of the proposed project.[11]
- The FEIS energy alternatives analysis considered energy sources that are technically feasible and commercially viable in the region of interest and that would be able to meet the purpose and need of the project and supply the projected demand for electrical energy identified in the need for power analysis. The energy conversion technology should be developed, proven, and available in the relevant region.[12]

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11 NRC Staff Testimony at ¶7.

12 *Id.* at ¶10.

- Because the proposed project is intended to supply baseload power, a competitive alternative would also need to be capable of supplying baseload power.[13]
- When considering future actions, the NRC Staff focused on those that are reasonably foreseeable. Reasonably foreseeable actions include (1) actions which have been approved by the proper authorities, have submitted license/permit applications, or which may not require approval of a regulating agency, but for which procurement contracts have been signed; (2) actions conditioned upon approval of the project under review.[14] Actions that are not reasonably foreseeable are those that are based on mere speculation or conjecture, or those that have only been discussed on a conceptual basis.[15]
- The apportionment of energy sources within the combination of alternatives was based on data from a number of sources. The analysis did not speculate concerning the achievement of theoretical maximums (*i.e.*, converting "potential" into reality) for individual energy technologies.[16] The NRC Staff properly struck a balance between the limited

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13 *Id.* at ¶10.

14 *Id.* at ¶11.

15 *Id.*

16 *Id.* at ¶18.

implementation successes for energy technologies such as wind and solar, and the potential of those resources in Maryland.[17]

- The NRC Staff based its conclusions on the insights of the U.S. Department of Energy ("DOE"), which is the agency responsible for energy planning in the United States. DOE is a reliable source for future predictions and market analyses. To the degree that information unique to the State of Maryland was available, the NRC Staff adjusted the DOE predictions for renewable energy production where appropriate.[18] Although it used a slightly different methodology, UniStar also relied on Maryland-specific data in reaching the same conclusions as the NRC Staff.[19]
- For wind power, the NRC Staff did not equate the "potential" of wind energy off the coast of Maryland with a technically feasible and commercially exploitable electric generation resource in the region of interest. Rather, the NRC Staff examined DOE data and assessments performed by Maryland. The NRC Staff also examined specific projects in the region, including those mentioned by the Joint Intervenors.[20] This is similar to the approach followed by the UniStar witnesses, which focused

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17 *Id.*

18 *Id.*

19 *See, e.g.*, UniStar Testimony at ¶¶34-37 (wind), ¶¶48-49 (solar), and ¶¶57-62 (CAES).

20 NRC Staff Testimony at ¶¶31-37.

on Maryland-specific data, in reaching the same conclusion as the NRC Staff.[21]

- Likewise, for solar power, the NRC Staff did not equate the "potential" of solar energy in Maryland with a technically feasible and commercially exploitable electric generation resource in the region of interest. Rather, the NRC Staff examined DOE data and assessments performed by Maryland. The NRC Staff also examined specific projects in the region, including those mentioned by the Joint Intervenors.[22] This is similar to the approach followed by the UniStar witnesses, which focused on Maryland-specific data, in reaching the same conclusion as the NRC Staff.[23]
- In order to produce "baseload" power, the NRC Staff concluded that energy storage (*e.g.*, CAES) would be necessary. Although there are no plans for CAES facilities in Maryland, the NRC Staff included some CAES in the combination of energy alternatives in order to include the contributions of wind and solar power in an alternative to the proposed baseload project. However, the NRC Staff concluded that a CAES facility in Maryland large enough to significantly reduce the air emissions impacts of the combination of energy alternatives is speculative, and not within the reasonable range of alternatives based on the history, current state, and

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21 UniStar Testimony at ¶¶34-37.

22 NRC Staff Testimony at ¶¶38-43.

23 UniStar Testimony at ¶¶48-49.

projected future potential for CAES development.[24] The UniStar witnesses reached a similar conclusion in their testimony.[25]

Because the NRC Staff relied on similar data and methodologies as UniStar and reached similar conclusions regarding the reasonableness of the combination of energy alternatives used in the FEIS, the NRC Staff testimony does not change (and, in fact, supports) the conclusions in the UniStar Position Statement and UniStar Testimony. To the extent that there are any differences between the NRC Staff and UniStar testimony, those differences are not significant and do not affect the overall conclusion that the NRC Staff has taken a hard look at the combination of energy alternatives in the FEIS. In fact, the similarity of the results in the NRC Staff and UniStar analyses, which used different data and approaches, confirms the robustness of the FEIS analysis and conclusions.

B. Response to Joint Intervenors' Testimony

The Joint Intervenors' assessment of the issues in Contention 10C was presented by Scott Sklar. Mr. Sklar's testimony includes his views on the wind and solar potential in Maryland and the potential for wind and solar to produce baseload power in Maryland. The key aspects of his testimony are discussed by the UniStar witnesses, as summarized below.

1. Baseload Power

Any reasonable energy alternative must be able to satisfy the purpose and need articulated in the FEIS. Here, the purpose and need for the proposed NRC action (issuance of a combined license for Calvert Cliffs 3) is to provide for additional large baseload electrical

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24 NRC Staff Testimony at ¶¶44-46.

25 UniStar Testimony at ¶¶57-62.

generating capacity within the State of Maryland.[26] Calvert Cliffs 3 will provide approximately 1600 MW(e) of baseload power in the region of interest. Mr. Sklar asserts that the best value that solar can achieve is to reduce the midday energy loads, which are the highest cost power. However, reducing midday loads does not satisfy the project purpose or meet the need for power described in the FEIS. Mr. Sklar also argues (at ¶10, page 17) that Calvert Cliffs 3 cannot be a baseload plant because it is a merchant plant. But, the manner in which the power from Calvert Cliffs is sold does not change the nature of the energy source.[27] Nuclear power plants can run continuously for hundreds of days in a row. The mere fact that the plant must periodically shut down for refueling and maintenance does not make it something other than baseload power.[28]

In any event, the Licensing Board has already ruled, in LBP-10-24 (slip op. at 44), that challenges to the purpose and need for the project are outside the scope of the admitted contention.

2. Energy Alternatives

Mr. Sklar incorrectly asserts that the FEIS understates the potential contribution of wind and solar power.[29] To the contrary, Mr. Sklar fails to recognize that the FEIS discusses alternatives that are reasonably foreseeable, not those that are theoretically possible. For example, Mr. Sklar states that "using existing, proven technology in shallow waters (0-35 m), there is potential to install 14,625 MW of capacity, generating 4,982 MW on average" and that

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26 UniStar Testimony at ¶18.

27 UniStar Rebuttal Testimony at ¶12.

28 *Id.*

29 Sklar Testimony at ¶5.

"[t]his is far greater than the potential contribution for wind power provided in the FEIS."[30] Mr. Sklar also claims that "over 450 million square feet of roof space would be suitable for solar panels in the State of Maryland [and] would add over 5,000 megawatts of capacity to the State."[31] However, such "potential" merely indicates what is "theoretically possible." This is not a useful metric as the mere availability of resources does not necessarily translate into deployment. The FEIS correctly focuses on "reasonably foreseeable" contributions of wind and solar power.[32]

Mr. Sklar also argues that all renewable energy resources should be considered in the FEIS.[33] In fact, they were.[34] Regardless, based on economic considerations, the cumulative deployment of all renewable energy sources, which are all more costly to harness than conventional natural gas generation, will be driven by and bounded by the Renewable Portfolio Standard ("RPS") requirement. For example, even in the highly unlikely case that marine power technologies become cheaper than wind technologies, the former would be deployed instead of, and not in addition to, the latter. Therefore, while it is possible that the mix of renewable resources deployed in Maryland in the upcoming years could deviate from the FEIS scenario, it is unlikely that the cumulative amount of renewable energy deployed will be materially different

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30 Sklar Testimony at ¶7.

31 *Id*. at ¶9.

32 *See Scientists' Inst. for Pub. Info.*, 481 F.2d at 1092 (explaining that an agency cannot be expected to "foresee the unforeseeable" but nevertheless noting that "[r]easonable forecasting" is "implicit in NEPA").

33 Sklar Testimony at ¶5.

34 FEIS at 9-20 to 9-27 (Exh. NRC000003A).

from that considered in the FEIS — the total contribution from all renewable energy resources is effectively limited by the RPS.

Mr. Sklar's comments regarding the declining costs of solar power also do not undermine the reasonableness of the combination of energy alternatives considered in the FEIS. Natural gas is still significantly cheaper than solar PV and offshore wind, and cheaper than onshore wind.[35] Therefore, wind and solar cannot be expected to displace other, cheaper generation sources unless it is mandated or incentivized. Wind and solar energy are deployed because wind and solar developers can monetize Renewable Energy Credits ("RECs") or Solar Renewable Energy Credits ("SRECs") and use federal and state incentives, such as Investment or Production Tax Credits, to lower their effective prices.[36] Significantly, offshore wind is not competitive even with RECs and federal incentives. Thus, the mere fact that the cost of solar PV (or wind) is declining does not mean that more solar (or wind) will be deployed beyond the RPS.

3. Wind Power

Mr. Sklar states that there is well-documented, substantial real interest in developing Maryland's offshore wind resources.[37] Mr. Sklar cites NRG Bluewater Wind's proposal for a 600 MW wind farm off the coast of Maryland and asserts that Bluewater Wind has received approval to build a 450 MW wind farm off the coast of Delaware.[38] However, the interest in building offshore wind farms in Maryland is actually quite limited. NRG Bluewater Wind has taken virtually no steps towards developing an offshore wind farm off the coast of

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35 UniStar Rebuttal Testimony at ¶15.

36 *Id.*

37 Sklar Testimony at ¶7.

38 *Id.*

Maryland, other than expressing publicly an interest in building one.[39] And, Bluewater Wind has not received final approval to build a wind farm off the Delaware coast.[40] Moreover, the Maryland Offshore Wind Energy Act failed to get out of committee in the last legislative session.[41] Nothing in Mr. Sklar's testimony undermines the reasonableness of the wind power contribution to the combination of energy alternatives in the FEIS.

4. Solar Power

With respect to solar power, Mr. Sklar asserts that the FEIS assumption of 75 MW ignores Maryland law and that the minimum amount is "likely to be greatly exceeded."[42] In fact, the 75 MW is driven almost entirely by the solar carve out in the Maryland RPS and, at present, solar power deployment in Maryland is tracking the solar RPS. Based on the prices for solar renewable energy credits and existing incentives, the solar RPS is likely to continue to be fulfilled up until 2018.[43] After that, even assuming the continued availability of incentives, the pricing structure for renewable energy credits and "penalty" payments for failing to meet the RPS changes are such that additional solar deployment is unlikely.[44] Thus, Mr. Sklar did not provide any information that would call into question the contribution from solar power used in the FEIS combination of energy alternatives.

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39 UniStar Rebuttal Testimony at ¶17.

40 *Id.*

41 *Id.*

42 Sklar Testimony at ¶8.

43 UniStar Rebuttal Testimony at ¶18.

44 *Id.* at ¶¶18-19. Making an alternative compliance payment is one method of complying with Maryland's RPS. *Id.* at ¶18.

5. Energy Storage

Although Mr. Sklar asserts that the FEIS combination of energy alternatives should include a greater contribution from renewable sources, including more wind and solar power, Mr. Sklar does not address the inability of those energy sources to provide "baseload" power. For a large solar or wind facility to be practical as a means of providing baseload power, a mechanism to store large quantities of energy is needed, such as CAES. However, development of utility-scale CAES plants in Maryland, even assuming suitable geologic structures are available, would be a lengthy process.[45] Given the length of time needed to permit CAES facilities and, based on his experience with CAES projects, CAES facilities on the scale needed to support the wind and solar generation assumed in the FEIS combination of alternatives are not reasonably foreseeable.[46] And, neither batteries nor thermal storage are viable energy storage options.[47] Thus, the Intervenors have provided no basis for including a greater contribution from wind or solar power, in conjunction with CAES, than that considered in the FEIS already.

6. Environmental Impacts

Mr. Sklar's testimony focuses on the relative contribution of wind and solar to the combination of alternatives. Mr. Sklar does not testify that the impacts associated with wind or solar power production are any different from those discussed in the FEIS. Mr. Sklar therefore has not provided any information that calls into question the NRC Staff's assessment of the environmental impacts of the combination alternative. Nor has Mr. Sklar disputed the

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45 UniStar Testimony at ¶65.

46 *Id*. at ¶¶66-69.

47 UniStar Rebuttal Testimony at ¶24.

conclusions of the NRC Staff's "sensitivity analysis" for environmental impacts (quadrupled wind power assumption in the combination of energy alternatives).[48] As that sensitivity analysis indicates, even a much larger contribution from wind power (assuming availability of sufficient energy storage) would not change the conclusions in the FEIS.

VI. CONCLUSIONS

For the reasons stated above, as supported by the UniStar and NRC Staff testimony and exhibits, the FEIS shows that the NRC Staff has taken the requisite "hard look" at reasonable energy alternatives, including a combination of alternatives with significant contributions from wind or solar power, in conjunction with energy storage, and natural gas. The NRC Staff considered the potential for wind and solar power, in conjunction with energy storage, and natural gas to provide baseload power. The specific combination of energy alternatives selected by the NRC Staff is reasonable and realistic. The NRC Staff's evaluation of the environmental impacts of a combination of energy alternatives demonstrates that no reasonable combination of alternatives is environmentally preferable to the proposed action — even accounting for some uncertainty in the amount of baseload energy that could be produced using wind or solar, in conjunction with energy storage. As a result, the FEIS satisfies Part 51 and NEPA. The Licensing Board therefore should resolve Contention 10C in favor of UniStar and the NRC Staff.

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[48] *Id.* at ¶26.

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OPERATING SERVICES, LLC	)	
	)	
(Calvert Cliffs Nuclear Power Plant, Unit 3)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "UNISTAR REBUTTAL STATEMENT OF POSITION ON CONTENTION 10C" have been served upon the following persons via the Electronic Information Exchange ("EIE") this 18th day of November 2011, which to the best of my knowledge resulted in transmittal of the foregoing to those on the EIE Service List for the captioned proceeding.

U.S. Nuclear Regulatory Commission
Office of Commission Appellate Adjudication
Mail Stop O-16C1
Washington, DC 20555-0001
E-mail: ocaamail@nrc.gov

U.S. Nuclear Regulatory Commission
Office of the Secretary of the Commission
Mail Stop O-16C1
Washington, DC 20555-0001
E-mail:hearingdocket@nrc.gov

Atomic Safety and Licensing Board Panel
Mail Stop – T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Ronald M. Spritzer, Chair
Administrative Judge
E-mail: rms4@nrc.gov

Gary S. Arnold - Administrative Judge
E-mail: gxa1@nrc.gov

William W. Sager - Administrative Judge
E-mail:wws1@nrc.gov

Megan Wright - Law Clerk
E-mail: mxw6@nrc.gov

U.S. Nuclear Regulatory Commission
Office of the General Counsel
Mail Stop – O-15 D21
Washington, DC 20555-0001
Marian Zobler, Esq.
Susan Vrahoretis, Esq.
Marcia J. Simon, Esq.
Anthony Wilson, Esq.
Adam Gendelman, Esq.
Joseph Gilman, Paralegal

E-mail: Marian.Zobler@nrc.gov
E-mail: Susan.Vrahoretis@nrc.gov
E-mail: Marcia.Simon@nrc.gov
E-mail: Anthony.Wilson@nrc.gov
E-mail: Adam.Gendelman@nrc.gov
E-mail: Joseph.Gilman@nrc.gov
OGC Mail Center: ogcmailcenter@nrc.gov

State of Maryland
Office of the Attorney General
Maryland Energy Administration and
Power Plant Research Program of the
Department of Natural Resources
1623 Forest Drive, Suite 300
Annapolis, Maryland 21403
Bret A. Bolea, Assistant Attorney General
M. Brent Hare, Assistant Attorney General
E-mail: BBolea@energy.state.md.us
E-mail: bhare@energy.state.md.us

Michael Mariotte, Executive Director
Diane D'Arrigo
Nuclear Information Resource Service
6390 Carroll Avenue, #340
Takoma Park, MD 20912
Michael Mariotte, Executive Director
Diane D'Arrigo

E-mail: nirsnet@nirs.org
E-mail: dianed@nirs.org

Southern MD CARES
P.O. Box 354
Solomons, MD 20688
June Sevilla, Spokesperson
E-mail: qmakeda@chesapeake.net

Harmon, Curran, Spielberg, & Eisenberg
1726 M Street N.W., Suite 600
Washington, D.C. 20036
Diane Curran
Mathew D. Fraser
E-mail: dcurran@harmoncurran.com
E-mail: mfraser@harmoncurran.com

Beyond Nuclear
6930 Carroll Avenue, Suite 400
Takoma Park, MD 20912
Paul Gunter, Director
E-mail:paul@beyondnuclear.org

Public Citizen
215 Pennsylvania Avenue, SE
Washington, DC 20003
Allison Fisher, Organizer – Energy Program
E-mail:afisher@citizen.org

William Johnston
3458 Holland Cliffs Road
Huntingtown, MD 20639
E-mail:wj3@comcast.net

Cathy Garger
10602 Ashford Way
Woodstock, MD 21163
E-mail:savorsuccesslady3@yahoo.com

/s/ signed electronically by
David A. Repka
Tyson R. Smith
Rachel Miras-Wilson
Winston & Strawn LLP
1700 K Street, NW
Washington, DC 20006

Carey W. Fleming
Constellation Energy Nuclear Group, LLC
100 Constellation Way, Suite 200C
Baltimore, MD 21202

COUNSEL FOR CALVERT CLIFFS 3 NUCLEAR PROJECT, LLC AND UNISTAR NUCLEAR OPERATING SERVICES, LLC

November 18, 2011

UNITED STATES OF AMERICA
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(Calvert Cliffs Nuclear Power Plant, Unit 3)	)	

REBUTTAL TESTIMONY OF UNISTAR WITNESSES DIMITRI LUTCHENKOV, STEFANO RATTI, AND SEPTIMUS VAN DER LINDEN

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In the Matter of:	)	
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CALVERT CLIFFS 3 NUCLEAR PROJECT, LLC AND UNISTAR NUCLEAR OPERATING SERVICES, LLC	)	Docket No. 52-016-COL
	)	
(Calvert Cliffs Nuclear Power Plant, Unit 3)	)	

REBUTTAL TESTIMONY OF UNISTAR WITNESSES DIMITRI LUTCHENKOV, STEFANO RATTI, AND SEPTIMUS VAN DER LINDEN

I. INTRODUCTION

Q1. Please state your full name.

A1. My name is Dimitri Lutchenkov ("DL").

My name is Stefano Ratti ("SR").

My name is Septimus van der Linden ("SVDL")

Q2. Have you previously presented testimony in this proceeding?

A2. (DL, SR, SVDL) Yes. We provided testimony to support UniStar's position on October 21, 2011. Specifically, we sponsored those statements that were marked with our initials. In addition, our professional qualifications were included in that filing.

Q3. Have you reviewed the Intervenors' testimony and NRC Staff's statement of position and testimony?

A3. (DL, SR, SVDL) Yes, we have reviewed the Intervenors' testimony and exhibits that were filed on October 28th as well as the NRC Staff's testimony and exhibits that were filed on October 21st.

Q4. Please describe the purpose of your Rebuttal Testimony.

A4. (DL, SR, SVDL) The purpose of our Rebuttal Testimony is to respond to statements made in Exh. JNT000001, entitled "Testimony of Scott Sklar, President of the Stella Group, Ltd., on Contention 10," dated October 28, 2011, the "NRC Staff's Initial Statement of Position," dated October 21, 2011 ("NRC Staff Position Statement"), and "Prefiled Direct Testimony of Andrew J. Kugler and Katherine A. Cort Concerning Environmental Contention 10C," dated October 21, 2011 (Exh. NRC000004) ("NRC Staff Testimony").

II. OVERVIEW

Q5. Please summarize the conclusions in your initial testimony regarding Contention 10C.

A5. (SR) In my initial testimony, I concluded that, on balance, assuming that the addition of a storage technology was technically and economically feasible, it is plausible, but unlikely, that 100 MW(e) of "baseload" wind energy could be available in Maryland in the next 10 years. I therefore concluded that the use of 100 MW(e) of wind energy in the FEIS is reasonable.

In addition, I concluded that installation of the equivalent of 75 MW(e) "baseload" solar (assuming that energy storage is technically and economically feasible) is plausible and therefore reasonable. I therefore concluded that the use of 75 MW(e) of solar energy in the FEIS is reasonable.

(SVDL) In my initial testimony, I concluded that, assuming that sufficient wind energy over and above 100 MW can be delivered on a continuous basis such that another 100 MW could be stored for use in a CAES plant, it is technologically

plausible to create 100 MW of "baseload" wind power. Similarly, I concluded that, assuming that enough solar energy can be delivered on a continuous basis such that sufficient energy can be stored, it is technologically plausible to create 75 MW of "baseload" solar power. However, I also concluded that, given the current state of CAES development and the lack of any known storage resources in Maryland, such volumes of storage are not reasonably foreseeable. Thus, I concluded that the FEIS combination of energy alternatives is speculative, at least to the extent that it relies on the availability of CAES.

(DL) In my initial testimony, I agreed with the NRC Staff's conclusions in the FEIS. I concluded that the combination of energy alternatives considered in the FEIS is reasonable based on evaluations of technologically and economically achievable generation technologies in the region of interest. Based on the assessment of the environmental impacts of a range of reasonable energy alternatives, I concluded that combinations involving wind and solar power with storage, supplemented with natural gas, are not environmentally preferable to Calvert Cliffs 3 — even considering the potential for significant increases in the contributions of wind and solar. Finally, I explained that any dispute over the specific mix of wind or solar used in the combination of alternatives is not one that would affect the outcome of the NEPA analysis.

Q6. Have you reviewed the NRC Staff Testimony and the exhibits cited in that testimony?

A6. (DL, SR, SVDL) Yes, we have reviewed the NRC Staff testimony and the exhibits.

Q7. What is your general reaction to the NRC Staff Testimony?

A7. (DL, SR, SVDL) Overall, we agree with the testimony of Mr. Kugler and Ms. Cort. The methodologies, assumptions, and results in the NRC Staff testimony are generally in agreement with those in the UniStar testimony. The NRC Staff used a slightly different approach to estimating the relative contribution of renewable energy sources (mostly DOE/EIA projections, adjusted for Maryland), but reached the same result as the methodology employed in the UniStar testimony. These independent lines of analysis demonstrate the robustness of the FEIS conclusions.

Q8. Have you reviewed the Intervenors' testimony and the exhibits cited in that testimony?

A8. (DL, SR, SVDL) Yes, we have reviewed the Intervenors' testimony and the exhibits.

Q9. What is your general reaction to the Intervenors' Testimony?

A9. (DL, SR, SVDL) The Intervenors' testimony does not appear to take into account the purpose of the FEIS discussion at issue. The FEIS aims to provide a range of energy alternatives, including a combination of energy alternatives, that reflects what is reasonably foreseeable. The FEIS analysis does not aim to chronicle the theoretical maximum contribution of wind, solar, and other renewable sources to the energy supply. Much of the Intervenors' testimony is therefore immaterial. In addition, the Intervenors' testimony does not take into account the project purpose and need, which is to generate 1600 MW(e) of baseload power in Maryland. Instead, the testimony of Mr. Sklar questions the need for baseload generation. In short, the Intervenors' testimony does not provide any information that calls into question the conclusions in the FEIS, the NRC Staff's testimony, or our testimony.

III. DISCUSSION

A. Need for Baseload Power

Q10. In Mr. Sklar's testimony (at ¶9, page 15), he asserts that the best value that solar can achieve is to reduce the midday energy loads, which are the highest cost power. Can you comment on whether this is relevant to the FEIS analysis.

A10. (DL) This is not relevant to the FEIS analysis. As noted in my initial testimony at ¶18, the purpose and need for the proposed NRC action (issuance of a combined license for Calvert Cliffs 3) is to provide for additional large baseload electrical generating capacity within the State of Maryland. Calvert Cliffs 3 will provide approximately 1600 MW(e) of baseload power in the region of interest. Reducing midday loads does not satisfy the project purpose or meet the need for power described in the FEIS. Baseload power is necessary to meet the anticipated overall load, whether those loads are reduced by solar or not.

Q11. To the best of your knowledge, is the need for Calvert Cliffs 3 within the scope of Contention 10C?

A11. (DL) As I understand it, the scope of Contention 10C does not include a challenge to the purpose and need for the project. In fact, the Licensing Board specifically rejected the Intervenors' challenge to the purpose and need for the project.

Q12. In Mr. Sklar's testimony (at ¶10, page 17), he argues that it is "disingenuous" to rely on Calvert Cliffs 3 as a baseload plant since it is a merchant plant. Can you comment on this?

A12. (DL) The manner in which the power from Calvert Cliffs is sold does not change the nature of the energy source. Nuclear power plants can run continuously for hundreds of days in a row. The mere fact that the plant must periodically shut down for refueling and maintenance does not make it something other than baseload power.

Overall baseload capacity must account for periodic maintenance or refueling of baseload generation plants regardless of fuel type. Mr. Sklar's testimony also ignores the conclusions of the MPSC that the proposed new unit at Calvert Cliffs will promote stability and reliability of the grid. By increasing the stability and reliability of the grid, Calvert Cliffs 3 could actually facilitate increased contributions from renewable energy sources.

B. Energy Alternatives

Q13. In ¶5 of his testimony, Mr. Sklar states that the "Applicants and NRC staff have consistently understated the potential contributions of solar and wind power to Maryland." Do you agree with this statement?

A13. (SR) No. First, Mr. Sklar is ignoring the fact that these potential contributions are not baseload. But, even more significantly, Mr. Sklar is confusing the notion of what is "theoretically possible" with what is "reasonably foreseeable."

In his testimony, Mr. Sklar correctly points out that the absolute potential for wind and solar energy in Maryland is relatively high, referring to some of the same sources I referred to in my October 21 filing. For example, Mr. Sklar states (at ¶7) that "using existing, proven technology in shallow waters (0-35 m), there is potential to install 14,625 MW of capacity, generating 4,982 MW on average" and that "[t]his is far greater than the potential contribution for wind power provided in the FEIS." Mr. Sklar also claims (at ¶9) that "over 450 million square feet of roof space would be suitable for solar panels in the State of Maryland [and] would add over 5,000 megawatts of capacity to the State." However, such "potential" merely indicates what is "theoretically possible." This is not a very useful metric, and gives no indication of what is "reasonably foreseeable." Availability of resources does not

translate into technology deployment, if the economics or state of technology do not justify or allow it.

Mr. Sklar's testimony does not provide any discussion of the economics of solar and wind energy in Maryland at the current or projected state of the technological development, which ultimately determines what is "reasonably foreseeable." At bottom, Mr. Sklar's testimony, which focuses on the "theoretically possible," does not call into question the NRC Staff analysis of what is reasonably foreseeable.

Q14. Mr. Sklar states (at ¶5, page 5) that "all the renewable energy resources should be considered in an EIS profile of options, including baseload renewables, sustainable biomass electric power and marine power (freeflow hydropower, wave, tidal, and ocean currents)." Do you agree?

A14. (SR) I concur with Mr. Sklar's statement that a variety of renewable energy resources should be considered. Indeed, the FEIS already accounts for other forms of renewable energy, such as biomass and hydropower.[1] Other renewable energy technologies, such as marine power, are more expensive to deploy than the renewable energy technologies selected in the FEIS, and therefore would not be deployed at all unless costs of those technologies can be reduced to levels competitive with the other, more mature, renewable energy technologies. Any such developments are speculative at present.

Regardless, the cumulative deployment of all renewable energy sources, which are all more costly to harness than conventional natural gas generation, will be driven by the

[1] The FEIS calls for a cumulative deployment of 300 MW(e) of average renewable energy capacity: 75 MW(e) solar, 25 MW(e) hydropower, 100 MW(e) biomass, and 100 MW(e) wind.

Renewable Portfolio Standard ("RPS") requirement. In other words, even in the highly unlikely case that marine power technologies became cheaper than wind technologies, the former would be deployed instead of, and not in addition to, the latter.

The RPS standard, as outlined in the Maryland LTER, is likely to drive approximately 2,800 GWh of renewable energy in Maryland.[2] This is approximately 320 MW(e) of average capacity. Importantly, this estimate includes some renewable resources that have already been developed — that is, additional new renewable capacity is projected by the LTER to be less than 320 MW(e). As noted above, the FEIS calls for a cumulative deployment of 300 MW(e) average renewable capacity. The FEIS also calls for a 100 MW(e) additional demand-side reduction, which, for a 20% RPS, results in a 20 MW(e) reduction in the renewable energy requirements. Thus, the RPS-based projection in the LTER further supports my conclusion that the contribution from renewables in the FEIS combination of energy alternatives is reasonable (and, if anything, optimistic with respect to the total contribution of renewables).

Therefore, while it is possible that the mix of renewable resources deployed in Maryland in the upcoming years could deviate from the FEIS scenario, it is unlikely that the cumulative amount of renewable energy deployed will be materially different from that considered in the FEIS. The total contribution from all renewable energy

[2] A large portion of the Maryland RPS is expected to be met with out-of-state renewable energy.

resources is still effectively defined by the RPS, given the anticipated economics of those energy sources.

Q15. Mr. Sklar asserts that "the costs for solar photovoltaics are now competitive, and in many cases already cheaper than other forms of electricity generation" and states that this should lead to more solar PV. Do you agree with his conclusions? Is this applicable to wind power as well?

A15. (SR) While solar photovoltaics ("PV") may be "cheaper than other forms of electricity generation," it not necessarily the cheapest alternative. Solar cannot be expected to displace other, cheaper generation sources unless it is mandated or incentivized. For reference, EIA's Annual Energy Outlook of 2011 (Exh. NRC000021) reports the following levelized costs:

- Advanced natural gas combined cycle: $63.1 per MWh
- Onshore wind: $97.0 per MWh
- Offshore wind: $243.2 per MWh
- Solar PV: $210.7 per MWh

Clearly, natural gas is significantly cheaper than solar PV and offshore wind, and cheaper than onshore wind, especially considering that these estimates for solar PV and onshore wind are based on national averages and are likely to be optimistic for Maryland's relatively mediocre solar and wind resources. Additionally, these estimates do not include the energy storage costs that would be needed for these intermittent sources to make a true "baseload-to-baseload" cost comparison.

Wind and solar energy still are deployed because wind and solar developers can monetize Renewable Energy Credits ("RECs") or Solar Renewable Energy Credits ("SRECs") and use federal and state incentives, such as Investment or Production Tax

Credits, to lower their effective prices. For example, Maryland SRECs trade at $200 per MWh today and therefore are crucial for the economics of solar power.

However, even assuming that federal and state incentives remain in place indefinitely — an optimistic assumption — RECs and SRECs are only available up to the point in which the RPS requirements are fulfilled. Therefore, the contribution of onshore wind and solar energy is effectively capped at the RPS percentage, unless a completely new RPS is put in place, which is speculative at best.

Significantly, offshore wind is not competitive even with RECs and federal incentives. Offshore wind is even more expensive than solar, but does not benefit from a special carve-out (*e.g.*, the 2% of the RPS allocated to solar), and therefore does not have access to a high-price REC market that can close the economic gap. Deployment of offshore wind will occur only if a new legislative framework is passed, which is, again, speculative.

C. Wind Power

Q16. Mr. Sklar states (at ¶7, page 8-9) that Google and GoodEnergies have established a consortium in a $5 billion transmission backbone to bring offshore wind in the region to shore. He also states that such large investments are not made to transmit small amounts of electricity. Does this consortium have any relevance to the FEIS analysis?

A16. (SR) No. There has been no significant investment in transmission for offshore wind power yet. While the formation of the Atlantic Wind Consortium is an interesting development regarding offshore wind energy in the Mid-Atlantic, no "large investments" have been made to date. The $5 billion sum is simply the total estimated price tag for all five phases of the project. The announcement of such a

project does not indicate that offshore wind deployment is likely to occur anytime soon. Any significant investment will be made only if there is a clear indication that offshore wind farms will actually be deployed.

Q17. Mr. Sklar states (at ¶7, page 8) that that there is well-documented, substantial real interest in developing Maryland's offshore wind potential. Mr. Sklar cites NRG Bluewater Wind's proposal for a 600 MW wind farm off the coast of Maryland and asserts that the project would itself provide four times the amount of wind power initially examined in the FEIS. Mr. Sklar also states that Bluewater Wind has received approval to build a 450 MW wind farm off the coast of Delaware. Can you comment on these statements?

A17. (SR) The interest in building offshore wind farms in Maryland is actually quite limited. NRG Bluewater Wind has taken virtually no steps towards developing an offshore wind farm off the coast of Maryland, other than expressing publicly an interest in building one. Also, Mr. Sklar refers to an October 2010 source (Exh. JNT000005), at which time the Maryland Offshore Wind Energy Act was about to be introduced to the Maryland legislature. That bill was subsequently defeated.

Additionally, Bluewater Wind has not received final approval to build a wind farm off the Delaware coast. As mentioned in the October 21 submittal, the only offshore wind project in the U.S. that has received permits to build is the Cape Wind project. And, even those permits are uncertain because on October 21st the United States Court of Appeals for the District of Columbia Circuit vacated and remanded the Federal Aviation Administration's ("FAA") "No Hazard" determinations for the Cape Wind project.[3] This is another setback for the project. While not necessarily

[3] *Cape Wind v. FAA*, __ F.3d __ (D.C. Cir.) (slip op. October 28, 2011) (Exh. APL000059).

applicable to the offshore wind in the Mid-Atlantic region, this does highlight the challenges associated with permitting offshore wind projects.

Finally, 600 MW of offshore wind would only equate to a maximum of 240 MW(e) of average capacity, which is only 2.4 times the amount of wind power considered in the FEIS (not the "four times" asserted by Mr. Sklar).

D. Solar Power

Q18. Do you agree with Mr. Sklar's conclusion (at ¶8) that the FEIS assumption of 75 MW ignores Maryland law and that the minimum amount is "likely to be greatly exceeded"?

A18. (SR) No. Mr. Sklar states that "Maryland state law … mandates that a minimum of 2% of the state's generating capacity be provided from solar power by 2022" and notes that "approximately 250 MW" (presumably indicating 250 MW of average generation)[4] must be generated from solar power. I concur that the 2% requirement should be taken into consideration. And, my assessment is that a portion of this requirement will be fulfilled through new solar power installations, whether they are rooftops or utility-scale projects. However, it is unlikely that the entire 2% requirement will be fulfilled through new solar power installations, and extremely unlikely that there will be any solar energy deployed beyond the 2% requirement.

[4] As explained in the UniStar testimony, the "MW(e)" values presented for wind and solar power are average values based on capacity factors. A reference to "MW" without any modifier indicates installed capacity — that is, the maximum power than a plant can provide on an instantaneous basis. The use of MW(e) indicates average equivalent capacity — that is, the average power provided by a power plant over a sufficiently long period of time (typically one year). This allows for comparison of energy sources by taking account of different capacity factors for each energy sources. While we use MW(e) in the testimony, the latter may also be described as "MWa" (average megawatt).

My conclusions are based on an assessment of the market for renewable energy in Maryland. Today's SREC prices (November 2011) are at $200 per MWh. The Solar Alternative Compliance Payment ("SACP") is at $400 per MWh, so Load Serving Entities ("LSEs") are currently choosing to purchase SRECs to fill their solar RPS quota.[5] The structure of the Maryland solar RPS is such that the ACP decreases, but stays above $200 per MWh until 2018. As a result, the solar RPS is likely to continue to be fulfilled up until 2018, when the requirement is 0.9% (approximately 75 MW(e)) of Maryland electricity sales. This is predicated upon the continued availability of federal and state incentives, such as the Investment Tax Credit ("ITC"), which pays for 30% of the installed cost of a solar plant, and the Maryland Clean Energy Grant Program, which provides a $500 per KW rebate. Should such incentives disappear, solar energy developers would have to make up the difference by obtaining higher REC prices, which is not likely given the SACP reduction schedule, or by lowering their production costs very significantly.

After 2018, the SACP goes below $150 per MWh. At this level, LSEs would elect to make the compliance payment rather than invest in more solar development — that is, because the cost of developing solar exceeds the SACP, the economics are unlikely to support further solar development, even considering continuous availability of the ITC and other incentives, unless there are very significant cost reductions. Mr.

[5] The SACP is the amount that LSEs must pay per MWh of solar electricity that they are unable to generate themselves or buy rights to through SREC purchases in order to meet the Maryland RPS solar requirement. Making an alternative compliance payment is an alternate method for complying with the Maryland RPS.

Sklar's statement that the minimum (2%) contribution is "likely to be greatly exceeded" is not substantiated, and is speculative at best.[6]

In summary, compliance up to 2018 levels of the solar RPS (0.9%) is likely, compliance up to the full 2% amount is possible, but unlikely, and compliance beyond the 2% amount is extremely unlikely.

Q19. Do you have any comment on Mr. Sklar's statement that the 2% solar contribution amounts to 250 MW, which exceeds the 75 MW used in the FEIS?

A19. (SR) Based on Maryland Long-term Electricity Report ("LTER") and an average capacity factor of 15%, the 2% contribution is equal to roughly 160 MW of average generation capacity, not 250 MW (presumably also average generation capacity), as stated by Mr. Sklar. The discrepancy may be due to different capacity factors (Mr. Sklar does not specify the capacity factor he uses) or to overestimating the base on which the 2% is calculated, which is Maryland electricity sales and not generating capacity. Regardless, as I explained above, installed capacity up to the full 2% amount is unlikely. Instead, I conclude that the 2018 level of the solar RPS (0.9%) is likely, which is 75 MW(e).

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[6] In the Intervenors' testimony that was subsequently withdrawn, Mr. Mariotte mentioned deployment of solar power in New Jersey and Germany. These examples highlight the reliance of solar power on incentives. For example, New Jersey has a solar carve-out in its RPS that is approximately double the size of Maryland's 2022 target (and more than ten times Maryland's 2011 target). But, most importantly, the New Jersey solar RPS has a SACP of $675 per MWh and SRECs in New Jersey traded just below the SACP in November 2011, at $670 per MWh. *See* "SREC Trade – Results of November 2011 Auction" (Exh. APL000060). Germany has a system of so-called "feed-in-tariffs" ("FIT"), which provide "off-the-shelf" long-term contracts to renewable energy developers at a pre-determined price. In Germany, solar FITs are currently in the $300-$400 per MWh range, depending on the size of the installation and the exchange rate, and a few years ago were in the $700-$750 per MWh range.

Q20. Does Mr. Sklar provide any information that undermines your prior testimony on solar power.

A20. (SR) No. Solar power deployment in Maryland is tracking the solar RPS, as expected. Mr. Sklar notes (at ¶8, page 14) that "[SunEdison and Standard Solar recently completed] 16.4 MW [of solar power installations] in Maryland. This indicates that a potential solar photovoltaic contribution of well above 75 MW is well within reach."[7] However, 16.4 MW of installed solar capacity is only equivalent to 2.5 MW(e) of average capacity. That is about 3.3% of 75 MW(e) — hardly a clear indication that a "contribution of well above 75 MW is "well within reach." According to SRECtrade,[8] the total supply of SRECs in Maryland was 30.8 MW, as of November 2011, which is in line with demand (driven by the solar RPS). This represents approximately 4.6 MW(e) of average capacity, or about 6.2% of 75 MW(e).

Q21. Mr. Sklar argues (at ¶8, page 15) that the FEIS undervalues solar PV because it does not take into account the effects of line losses. Can you comment on this statement?

A21. (SR) I concur with Mr. Sklar that rooftop installations will contribute to the overall solar mix in Maryland. I also concur with Mr. Sklar that transmission and distribution losses have not been discussed in previous documents. However, as

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7 As an aside, Mr. Sklar refers to SunEdison as a regional company (at ¶8, page 14). SunEdison moved its headquarters from Maryland to California in October 2011, and will transfer 100 employees to the new location in Belmont, CA. SunEdison decided to move away from Maryland to be closer to its customers and to the California renewable energy market.

8 *See* "SREC Trade – Results of November 2011 Auction" (Exh. APL000060).

explained in my October 21 filing,[9] solar rooftops are even more expensive than utility-scale plants — approximately $6,000 per KW for solar residential rooftops versus $3,500 per KW for utility-scale plant. That is a significant differential in installed cost between the two options, which can only be partially off-set by the transmission and distribution advantage of solar rooftops. These cost differences are a critical impediment to development of rooftop solar PV, even taking into account line losses.

Q22. Mr. Sklar argues (at ¶10, page 19) that solar thermal plants, which use hot heat-transfer oil or molten salt as heat storage, can operate into the night, thereby contributing to "baseload" (or near-baseload) power. Can you comment on this?

A22. (SR) Solar thermal plants are not a viable option in the Mid-Atlantic, because they cannot operate in diffuse light conditions, which are typical of the region. Therefore, a discussion of these types of storage options is not relevant to meeting the need for baseload power in Maryland.

E. Energy Storage

Q23. Can you please provide your views on Mr. Sklar's assessment of the energy storage?

A23. (SVDL) There should be no misconception about "baseload" operation — it is the ability to be online 24/7 and provide capacity to the grid demand cycle, with the inevitable load changes experienced throughout the day. This is consistent with the definition of baseload used by the NRC Staff and UniStar.[10] Solar PV and wind

[9] UniStar Testimony at ¶42.

[10] NRC Staff Testimony at ¶10.

simply cannot provide that service in the absence of an energy storage system with suitable capacity. Energy storage systems range from capacitors to batteries to large storage technologies that can facilitate the integration of the renewable resources mentioned. However, no storage device or system can provide baseload power delivery. At best, the use of wind or solar, in conjunction with an energy storage system, can provide energy that approximates baseload.

Q24. Can you provide some examples to illustrate this point?

A24. (SVDL) Yes. Two examples are given below to illustrate this point. First, the 98 MW Laurel Mountain wind facility in West Virginia is the largest project to couple wind with batteries.[11] The shipping container size batteries allow AES to gradually adjust power to the grid up and down rather than have a sudden drop off in power due to a change in wind. From a commercial point of view, the purpose of the battery is to sell frequency regulation services to the local grid operator, PJM. The batteries supply 32 megawatts of power in quick bursts to maintain an even balance between power supply and demand on the grid, displacing a job which had been done by a natural gas power plant. Significantly, the quick bursts of 32 MW from batteries cannot be sustained for longer than a few hours before the batteries need recharging — if wind is not available the energy must be drawn from the grid. This example demonstrates that energy storage may have limited benefits for specialized services, but not enough to turn variable wind into baseload power.

[11] The 98 MW wind farm has 32 MW battery system this reflects the 30% capacity factor for wind.

Mr. Sklar also references thermal storage. However, this is not a low cost option and, in any event, cannot deliver baseload power. The reality is, that to provide 100 MW(e) for 4 hours, two salt storage tanks are required measuring 30 ft high x 80 ft diameter. These formulated nitrate salts are expensive, corrosive, and require special material for pumps, valves, and piping. Furthermore the "cold" salt at (290 degrees C) cannot be allowed to go to lower temperatures as the salt will solidify. The back up heat source must be electrical power or fired natural gas heaters. In addition, the power recovery uses a Rankine steam cycle, which entails the associated issues of a conventional steam cycle, water management, and cooling needs.

Q25. Does the Mr. Sklar's testimony change your conclusion regarding energy storage in the combination of alternatives?

A25. (SVDL). No. Mr. Sklar's testimony does not in any way grapple with the challenges associated with generating baseload-equivalent power from intermittent renewable resources. As I concluded previously, given the current state of CAES development and the lack of any known storage resources in Maryland, volumes of storage such as those included in the FEIS are not reasonably foreseeable.

F. Assessment of Environmental Impacts of Reasonable Energy Alternatives

Q26. Does the Intervenors' testimony call into question the NRC Staff's analysis of the impacts of the combination of energy alternatives?

A26. (DL) No. Mr. Sklar's testimony is limited to discussing the relative contribution of wind and solar to the combination of alternatives. He does not testify that the impacts associated with wind or solar power production are any different from those discussed in the FEIS. Mr. Sklar has not provided any information that calls into question the NRC Staff's "sensitivity analysis" regarding environmental impacts (quadrupled wind

power assumption in combination of alternatives). As that sensitivity analysis indicates, even a much larger contribution from wind power (assuming availability of sufficient energy storage) would not change the conclusions in the FEIS regarding environmental impacts.

IV. CONCLUSIONS

Q27. What are your conclusions regarding the NRC Staff testimony?

A27. (DL, SR, SVDL) We agree with the methodologies, statements, and conclusions in the NRC Staff testimony. To the extent that we utilized a different approach, we reached similar conclusions. This demonstrates the robustness of the FEIS analysis.

Q28. What are your conclusions regarding the Intervenors' testimony?

A28. (DL, SR, SVDL) We conclude that the statements and information presented in the Intervenors' testimony are mostly irrelevant to the FEIS analysis because they fail to account for the project purpose and need (1600 MW(e) of baseload power in Maryland) and because they do not focus on reasonably foreseeable contributions from wind or solar power. The FEIS is not (and should not be) based on the theoretical potential of wind and solar power.

Q29. What are your overall conclusions regarding the reasonableness of the NRC Staff's assumption of 100 MW(e) of wind power, in conjunction with energy storage, as baseload power in the FEIS combination of alternatives?

A29. (SR) On balance, assuming that the addition of a storage technology was technically and economically feasible, it is plausible, but unlikely, that 100 MW(e) of "baseload" wind energy could be available in Maryland in the next 10 years. The use of 100 MW(e) of wind energy in the FEIS is therefore reasonable.

(SVDL) Assuming that sufficient wind energy over and above the 100 MW can be delivered on a continuous basis such that another 100 MW could be stored for use in a CAES plant, it is technologically plausible to create 100 MW of "baseload" wind power. However, given the current state of CAES development and the lack of any known storage resources in Maryland, this is not reasonably foreseeable. Thus, the FEIS combination of energy alternatives is speculative, at least to the extent that it relies on the availability of CAES.

Q30. What are your overall conclusions regarding the reasonableness of the NRC Staff's assumption of 75 MW(e) of solar power, in conjunction with energy storage, as baseload power in the FEIS combination of alternatives?

A30. (SR) As I noted previously, increases in installed solar capacities are likely to be driven by Maryland's RPS. In my professional opinion, installation of the equivalent of 75 MW(e) "baseload" solar (assuming that energy storage is technically and economically feasible) is plausible and therefore reasonable. The use of 75 MW(e) of solar energy in the FEIS is therefore reasonable. However, generation of greater amounts of "baseload" solar is unlikely to occur in the next 10-15 years.

(SVDL) Assuming that enough solar energy can be delivered on a continuous basis such that sufficient energy can be stored, it is technologically plausible to create 75 MW(e) of "baseload" solar power. However, given the current state of CAES development and the lack of any known storage resources in Maryland, the current state of thermal solar storage development generally (and particularly in Maryland), and the technological and economic limitations associated with batteries, it is not reasonably foreseeable that energy storage technologies could support the use of solar power as "baseload" generation. Thus, the solar contribution to the FEIS

combination of energy alternatives is speculative, at least to the extent that it relies on the availability of energy storage.

Q31. What are your overall conclusions regarding the assessment of energy alternatives in the FEIS?

A31. (DL) I continue to agree with the NRC Staff's conclusions. The combination of energy alternatives considered in the FEIS is reasonable based on evaluations of technologically and economically achievable generation technologies in the region of interest. Based on the assessment of the environmental impacts of a range of reasonable energy alternatives, combinations involving wind and solar power with storage, supplemented with natural gas, are not environmentally preferable to Calvert Cliffs 3 — even considering the potential for significant increases in the contributions of wind and solar. Any dispute over the specific mix of wind or solar used in the combination of alternatives is not one that would affect the outcome of the NEPA analysis.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	)	
	)	
CALVERT CLIFFS 3 NUCLEAR PROJECT, LLC AND UNISTAR NUCLEAR OPERATING SERVICES, LLC	)	Docket No. 52-016-COL
	)	
(Calvert Cliffs Nuclear Power Plant, Unit 3)	)	

AFFIDAVIT OF DIMITRI LUTCHENKOV

I, Dimitri Lutchenkov, do hereby state as follows:

1. I am currently employed as the Director, Environmental Affairs and Special Projects, for UniStar Nuclear Energy, LLC ("UniStar"). In my position at UniStar I have responsibility for the environmental aspects of the Calvert Cliffs 3 licensing reviews. A statement of my professional qualifications is attached.
2. I am responsible for the paragraphs in the rebuttal testimony filed today that are marked with my initials.
3. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding.
4. I hereby certify under penalty of perjury that the forgoing is true and complete to the best of my knowledge, information, and belief.

Executed in accord with 10 C.F.R. § 2.304(d),

signed electronically by Dimitri Lutchenkov
Dimitri Lutchenkov
Director, Environmental Affairs and
Special Projects
UniStar Nuclear Energy, LLC
100 Constellation Way
Baltimore, MD 21202
dimitri.lutchenkov@unistarnuclear.com

Dated at Baltimore, Maryland
this 18th day of November 2011

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	)	
	)	
CALVERT CLIFFS 3 NUCLEAR PROJECT, LLC AND UNISTAR NUCLEAR OPERATING SERVICES, LLC	)	Docket No. 52-016-COL
	)	
(Calvert Cliffs Nuclear Power Plant, Unit 3)	)	

AFFIDAVIT OF STEFANO RATTI

I, Stefano Ratti, do hereby state as follows:

1. I am the founder and owner of Chaberton Consulting. Prior to starting Chaberton Consulting, I was Vice President, Renewable Energy Business Group, at AREVA where I developed strategic renewable initiatives, including evaluation of potential acquisitions in the renewable energy space and creation of renewable energy businesses in the United States. A statement of my professional qualifications is attached.
2. I am responsible for the paragraphs in the rebuttal testimony filed today that are marked with my initials.
3. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding.
4. I hereby certify under penalty of perjury that the forgoing is true and complete to the best of my knowledge, information, and belief.

Executed in accord with 10 C.F.R. § 2.304(d),

signed electronically by Stefano Ratti

Stefano Ratti
Principal/Owner
Chaberton Consulting
10410 Kensington Parkway
Suite 313
Kensington, MD 20895
Stefano@ChabertonConsulting.com

Dated at Kensington, Maryland
this 18th day of November 2011

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	)	
	)	
CALVERT CLIFFS 3 NUCLEAR PROJECT, LLC AND UNISTAR NUCLEAR OPERATING SERVICES, LLC	)	Docket No. 52-016-COL
	)	
(Calvert Cliffs Nuclear Power Plant, Unit 3)	)	

AFFIDAVIT OF SEPTIMUS VAN DER LINDEN

I, Septimus van der Linden, do hereby state as follows:

1. I am the founder, co-owner, and President of BRULIN Associates LLC. During my previous employment with Curtiss/Wright Power Systems and Alstom, I investigated compressed air energy storage systems ("CAES"). I worked for Brown Boveri Corporation which built the first CAES plant in Huntorf, Germany. I was also involved in the design and application aspects of CAES plant and technology in the U.S. A statement of my professional qualifications is attached.
2. I am responsible for the paragraphs in the rebuttal testimony filed today that are marked with my initials.
3. I attest to the accuracy of those statements, support them as my own, and endorse their introduction into the record of this proceeding.
4. I hereby certify under penalty of perjury that the forgoing is true and complete to the best of my knowledge, information, and belief.

Executed in accord with 10 C.F.R. § 2.304(d),

_ signed electronically by Septimus van der Linden
Septimus van der Linden
President
BRULIN Associates LLC
14418 Old Bond Street
Chesterfield, VA 23832
brulinassoc@comcast.net

Dated at Chesterfield, Virginia
this 18th day of November 2011

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA CIRCUIT

Argued September 14, 2011 Decided October 28, 2011

No. 10-1276

TOWN OF BARNSTABLE, MASSACHUSETTS
PETITIONER

v.

FEDERAL AVIATION ADMINISTRATION,
RESPONDENT

CAPE WIND ASSOCIATES, LLC,
INTERVENOR

Consolidated with 10-1307

On Petitions for Review of an Order
of the Federal Aviation Administration

W. Eric Pilsk argued the cause for Barnstable, petitioner in No. 10-1276, and for the Alliance to Protect Nantucket Sound, petitioner in No. 10-1307. With him on the briefs were *Catherine M. van Heuven* and *Charles C. Lemley*.

Daniel J. Lenerz, Attorney, U.S. Department of Justice, argued the cause for respondent. With him on the brief were *Tony West*, Assistant Attorney General, *Michael Jay Singer*,

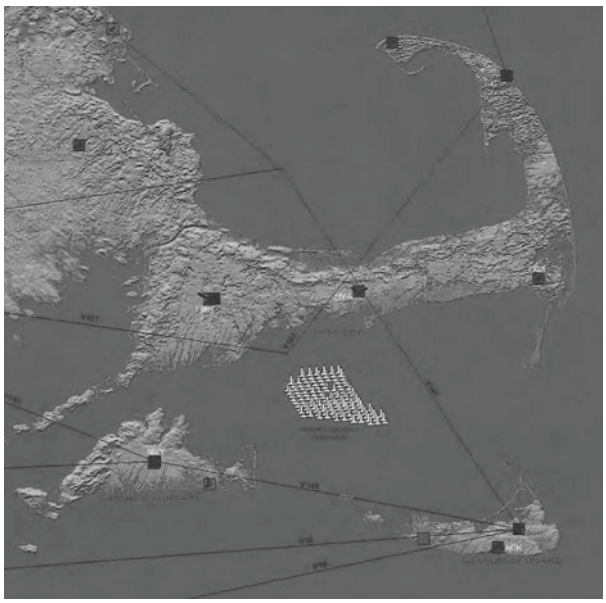
Attorney, *Richard H. Saltsman*, Assistant Chief Counsel for Litigation, Federal Aviation Administration, and *Vicki Leemon*, Manager.

Geraldine E. Edens, *Frederick R. Anderson*, and *Daniel G. Jarcho*, were on the brief for intervenor Cape Wind Associates, LLC.

Before: TATEL and BROWN, *Circuit Judges*, and WILLIAMS, *Senior Circuit Judge*.

Opinion for the Court filed by *Senior Circuit Judge* WILLIAMS.

WILLIAMS, *Senior Circuit Judge*: Cape Wind Associates has proposed building 130 wind turbines, each 440 feet tall, in a 25-square mile area of Nantucket Sound—an area roughly the size of Manhattan island. If constructed, the project would be the nation's first offshore wind farm. See Impact Study of 130 Offshore Wind Turbines in Nantucket Sound at 1 fig.1, Joint Appendix ("J.A.") 59, shown below:



As required by federal regulations, Cape Wind notified the Federal Aviation Administration of its proposed construction. See 14 C.F.R. § 77.13. After a preliminary investigation, the FAA issued a Notice of Presumed Hazard, J.A. 43, and initiated more extensive aeronautical studies to decide whether the project would "result in an obstruction of the navigable airspace or an interference with air navigation facilities and equipment or the navigable airspace." 49 U.S.C. § 44718(b). The FAA also circulated a public notice of these studies and invited interested persons to submit comments.

The FAA ultimately issued 130 identical Determinations of No Hazard, one for each of the proposed wind turbines. In the determinations, the FAA concluded that the turbines "would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities." See, e.g., Determination of No Hazard to Air Navigation, No. 2009-WTE-332-OE (May 17, 2010) ("Determination") at 1, J.A. 1. Although it ultimately decided that the project was not a hazard, its decision was contingent on Cape Wind's implementing a number of measures to mitigate the turbines' adverse impact on nearby radar facilities. See Determination at 5–6, J.A. 5–6.

Petitioners—the town of Barnstable, Massachusetts and the Alliance to Protect Nantucket Sound, a non-profit organization of private citizens and other organizations—challenge these No Hazard determinations. They argue that the FAA violated its governing statute, misread its own regulations, and arbitrarily and capriciously failed to calculate the dangers posed to local aviation.

In response, the FAA claims that petitioners lack standing to challenge the FAA's determinations and that their merits claims are faulty. We find that petitioners do have standing

and that the FAA did misread its regulations, leaving the challenged determinations inadequately justified.

* * *

Petitioners bear the burden of providing, "by affidavit or other evidence," "specific facts" sufficient to demonstrate standing; once provided, however, those facts "will be taken as true" by this Court. *Sierra Club v. EPA*, 292 F.3d 895, 899 (D.C. Cir. 2002) (quoting *Lujan v. Defenders of Wildlife*, 504 U.S. 555, 560 (1992)). At this stage, however, we must assume the petitioners will prevail on the merits, see *City of Waukesha v. EPA*, 320 F.3d 228, 235 (D.C. Cir. 2003), which means we must assume the FAA would determine the wind farm poses a hazard of the degree and kind the petitioners allege.

Of the three familiar prerequisites to Article III standing—injury, causation, and redressability—the FAA acknowledges the adequacy only of petitioners' injury claims. These include the risk of collisions, as well as delay and inconvenience for pilots and other members of the Alliance involved in aviation over and about the proposed wind farm area, with collateral damage for Barnstable as owner and operator of the town's municipal airport (HYA) and for members of the Alliance affected by the adverse impact on aviation. Accordingly, petitioners seek a determination from the FAA that the wind farm poses an unmitigable hazard.

But the FAA sharply asserts inadequacy as to causation and redressability. Here petitioners' burden is to show that their injuries are fairly traceable to the challenged conduct and that any ultimate success on the merits would yield a "significant increase in the likelihood that [they] would obtain relief that directly redresses the injur[ies] suffered." *Utah v. Evans*, 536 U.S. 452, 464 (2002); see also *Nat'l Parks*

Conservation Ass'n v. Manson, 414 F.3d 1, 7 (D.C. Cir. 2005) (quoting the same). Put another way, there must be a "substantial probability" that a favorable outcome would redress petitioners' injuries. *St. John's United Church of Christ v. FAA*, 550 F.3d 1168, 1170 (D.C. Cir. 2009).

Potentially undermining petitioners' showing of causation and redressability is the fact that the FAA's hazard determinations, by themselves, have "no enforceable legal effect." *BFI Waste Sys. v. FAA*, 293 F.3d 527, 530 (D.C. Cir. 2002) (quoting *Aircraft Owners & Pilots Ass'n v. FAA*, 600 F.2d 965, 966 (D.C. Cir. 1979)). The Interior Department, as lessor of the project area to Cape Wind, is the ultimate arbiter of whether the wind farm receives government permission. See 43 U.S.C. § 1337(p) (delineating Interior's authority to grant leases on the outer continental shelf). Thus, answering the causation and redressability questions requires us, first, to assume that the FAA will determine that the wind farm poses a hazard of the degree and kind petitioners allege, and second, to appraise the likely effects of such a finding on Interior—specifically whether it would generate a significant increase in the likelihood that Interior would exercise its authority to revoke the lease or to modify it in a way that would in whole or in part redress petitioners' threatened injuries. See Commercial Lease of Submerged Lands for Renewal Energy Development on the Outer Continental Shelf (Oct. 6, 2010) ("Lease"), *available at* http://www.boemre.gov/offshore/RenewableEnergy/PDFs/CapeWind_signed_lease.pdf, at 3 §§ 7, 8.

We conclude that petitioners have shown the requisite likelihood. Interior repeatedly assigned the FAA a significant role in its decision-making process, mandating that Cape Wind "could not begin construction until [its] receipt of the FAA's final determination on whether a hazard exists and [Cape Wind's] compliance with any resulting mitigation measures." Record of Decision, Cape Wind Energy Project,

Horseshoe Shoal, Nantucket Sound (Apr. 28, 2010) ("Record of Decision"), *available at* http://boemre.gov/offshore/renewableenergy/PDFs/CapeWIndROD.pdf, at 24. And despite recognizing that "FAA [hazard] determinations are advisory in nature," Interior incorporated in the lease a requirement that Cape Wind abide by *any* mitigation measures FAA might propose in its ultimate determination. *Id*. at 59. Thus the final lease with Cape Wind states that if the FAA "imposes requirements on the Lessee which supersede those in the [prior] FAA Determination [], the Lessee shall comply instead with such superseding post-lease requirements." Lease at C-28. Interior thereby gave its blessing to the FAA to impose any future mitigation measures that the FAA might deem necessary to reduce or eliminate a hazard on Cape Wind, and to do so without any further consultation.

In a curious display of agency modesty, the FAA dismisses its influence with Interior. It emphasizes that Interior reached its decision only after years of deliberation that involved consultation with over a dozen agencies, and that Interior decided to move forward with the project only "[a]fter careful review of the project need, the various alternatives considered, the concerns expressed through years of public comment, as well as the many agency consultations that were conducted and the potential impact to Nantucket Sound and environs therein." Record of Decision at 5.

But in fact the evidence seems to us to show that Interior would take an FAA finding of hazard very, very seriously. First, the statutory mandate under which Interior issued the lease explicitly requires it to take into account the "safety" of the activities enabled by the lease. 43 U.S.C. § 1337(p)(4). Interior acknowledges this obligation in the lease itself. Lease at 3.

And the record contains numerous contentions indicating that the wind farm might pose just such a safety risk. For example, petitioners cite evidence that the many pilots who regularly operate under visual flight rules ("VFR") near the proposed wind farm would have a difficult time staying beneath the foggy and otherwise inclement weather that often plagues Nantucket Sound, while at the same time maintaining a safe distance from the wind turbines. During such times, there would be a "clear risk of collision with the wind turbine generators." Submission of managers of the Barnstable, Nantucket and Martha's Vineyard airports (May 14, 2010) at 4, J.A. 586. The "finely balanced airspace over Nantucket Sound is already one of the most congested, foggy, and dangerous airspaces on the eastern seaboard." Submission of chairman of Barnstable airport (Mar. 17, 2009) at 3, J.A. 109. A group of air traffic controllers summed it up by saying that adding the turbines to the area would be a "disaster waiting to happen." Submission of National Air Traffic Controllers Association (Oct. 19, 2004) at 3, J.A. 343.

Petitioners also submitted evidence that attempts to circumvent the turbines would not solve the problem. Such attempts, said the CEO and president of Island Airways after reviewing the volume of traffic and its multiple layers, would be "problematic because even horizontal diversions of only one or two miles can further compress air traffic into concentrated corridors." Aff. of W. Scott LaForge (June 15, 2010) at 5, J.A. 857. A "horizontal diversion around a 25 square mile project would certainly lead to concentrated corridors of travel" and thereby "increase the possibility of a collision." *Id.* Moreover, such "encroachment of established VFR routes [would] severely compromise [pilots'] ability to execute collision avoidance maneuvers in the dead center of the three airports of Nantucket Sound." Letter from W. Scott LaForge (Apr. 14, 2009) at 2, J.A. 138.

While of course the wind farm may be one of those projects with such overwhelming policy benefits (and political support) as to trump all other considerations, even as they relate to safety, the record expresses no such proposition.

Moreover, of the many agencies that Interior consulted, it adopted prospective, automatic incorporation of mitigation measures proposed by only two—the Coast Guard and the FAA. See Lease at C-28, C-30. Interior's deference to these two agencies, one tasked with protecting safety on the sea and the other in the air, appears to reflect a serious effort to meet its statutory obligation to ensure safety. We note, moreover, that the Coast Guard determined only that navigation at sea would be "moderately impaired." Record of Decision at 25. The required assumption of the merits in favor of petitioners precludes our supposing that the FAA's ultimate label will speak only of a "moderate" aviation hazard.

The FAA also argues that Interior did not wait for a final determination before approving the project. But it is hardly surprising that Interior's decision came shortly before the FAA's final determination. In 2001, when Cape Wind first proposed the project, the turbines had been designed to be 417 feet tall; only later did it raise them to 440 feet. The FAA had studied the impact of the original configuration and had issued a no-hazard determination. See Record of Decision at 24. Interior cited this previous study in its Record of Decision, *id.*, and likely did not expect that the 23-foot height increase would alter the FAA's viewpoint. Despite this expectation, Interior still conditioned any start of construction on receipt of a final FAA determination. *Id.*

The facts here are rather similar to those underlying our decision in *National Parks Conservation Ass'n v. Manson*, 414 F.3d 1 (D.C. Cir. 2005), where we found that petitioners had standing to challenge a non-binding Department of

Interior opinion on the visibility impact of a project over which the State of Montana had sole and final authority. *Id*. at 6–7. The state agency there retained "discretionary authority" over whether the challenged project ultimately went forward, *id*. at 6; the only legal effect of a federal finding on visibility would have been to require the state agency to consider the federal report, and, if it disagreed, to justify its decision in writing, *id*. In fact, in an opinion we cited, the Montana Supreme Court had reversed the state agency's earlier determination in part because it found that Montana law compelled the state agency to make its decision independently of Interior's opinion. See *Mont. Envtl. Info. Ctr. v. Mont. Dep't of Envtl. Quality*, 112 P.3d 964, 972 (Mont. 2005). Although we noted in *National Parks* that Interior's opinion had been "virtually dispositive" of the state's earlier decision, 414 F.3d at 6, this fact was not necessary to our standing determination as the intervening Montana Supreme Court decision had relegated Interior's opinion to an important, but nevertheless advisory role. Yet we still found standing because a changed ruling "doubtless would significantly affect" the state decision. *Id*. at 7.

Indeed, courts have often found standing where there was no binding legal mechanism by which the challenged action might be redressed. See, e.g., *Bennett v. Spear*, 520 U.S. 154, 170 (1997) (finding standing despite noting that the ultimate decision-maker was "technically free to disregard" the challenged opinion). Given Interior's incorporation in the lease of all past and prospective mitigation measures proposed by the FAA, its conditioning of initial construction on the final FAA decision, and its persistent attention to the safety mandate in its authorizing statute, we think it improbable that Interior would then turn around and blithely disregard a determination that the project posed a substantial danger to aviation safety that defied cure through mitigation measures. We find it "likely, as opposed to merely speculative," that the

Interior Department would rethink the project if faced with an FAA determination that the project posed an unmitigable hazard. *Lujan*, 504 U.S. at 561.

* * *

Petitioners make two arguments on the merits. They contend that the FAA's No Hazard determinations are arbitrary and capricious because they depart from the agency's own internal guidelines. They also argue that the FAA failed to fulfill its obligations under 49 U.S.C. § 44718(b). We need reach only the first of these arguments because we agree with petitioners that, in light of the FAA's improper application of its own handbook, the FAA did not "adequately explain its result." *Public Citizen v. FAA*, 988 F.2d 186, 197 (D.C. Cir. 1993).

According to the handbook, see Procedures for Handling Airspace Matters, FAA Order 7400.2G (Apr. 10, 2008) (hereafter "handbook"), the FAA can find a hazard if the proposed structure would have a "substantial adverse effect." *Id.* § 7-1-3(e). A "substantial adverse effect" is defined to include one that would have an "[a]dverse effect" on a "significant volume of aeronautical operations." *Id.* § 6-3-5 (defining "Substantial Adverse Effect"); see also *id.* § 6-3-4 (noting that the volume of flights is significant "if one or more aeronautical operation per day would be affected"). We will return shortly to the concept of "adverse effect."

After discussing the adverse effects the turbines would have on nearby radar facilities, the FAA's Determination addressed the impact on VFR operations, purporting to find no adverse effect on such operations. In so doing, the FAA relied solely on § 6-3-8(c)1 of the handbook, which says:

> A structure would have an adverse [aeronautical] effect upon VFR air navigation if its height is greater than 500 feet above the surface at its site, and within 2 statute miles of any regularly used VFR route.

Handbook, § 6-3-8(c)1 (accurately paraphrased in Determination at 7, J.A. 7). After acknowledging that a regularly used VFR route would be affected, and correctly reciting § 6-3-8(c)1, the FAA leapt to the conclusion that the turbines would not have an adverse effect because they would not exceed the 500-foot threshold. *Id.* ("Therefore, . . . , the wind turbines . . . do not meet the criteria to have an adverse effect.").

But under any reasonable reading of the handbook, § 6-3-8(c)1 simply identifies *one* circumstance in which a structure could have an adverse effect, potentially one among many. A different part of the handbook, § 6-3-3 (including subsections (a) through (f)), introduces the concept of "adverse effect":

> 6-3-3. Determining adverse effect.
>
> A structure is considered to have an adverse aeronautical effect if it first exceeds the obstruction standards of part 77, *and/or* is found to have physical or electromagnetic radiation effect on the operation of air navigation facilities. A proposed or existing structure, if not amended, altered, or removed, has an adverse effect if it would:
>
> . . .
>
> b. Require a VFR operation, to change its regular flight course or altitude.

§ 6-3-3 (emphasis added). It is undisputed that the project turbines would (i) have the threshold "physical or

electromagnetic radiation effect on the operation of air navigation facilities" (per the first sentence), and would (ii) "[r]equire a VFR operation, to change its regular flight course or altitude" (per the second sentence, together with § 6-3-3(b)).[1] See Determination at 5, 7. The FAA's complete reliance on § 6-3-8(c)1 is therefore inconsistent not only with the language of that provision (reading into it a non-existent "only"), but with the organization of the handbook, which anticipates that structures qualifying under either segment of § 6-3-3's first sentence are to be assessed for the harms identified in the second sentence's subsections (a) through (f).

Improperly relying solely on § 6-3-8(c)1, the FAA failed to supply any apparent analysis of the record evidence concerning the wind farm's potentially adverse effects on VFR operations. A study by a consulting firm, MITRE, commissioned by the FAA, charted how many flights flew through a three-dimensional zone around the project, the boundaries of which were 500 feet to the side and 1000 feet above the turbines. The study found that over the course of a 90-day period 425 VFR flights flew through the immediate vicinity of the project site and that 94.1% of these 425 were flying at an altitude of 1000 feet or less. J.A. 381, 391–92. The 425 flights would be, of course, more than four and a half times the one flight per day that § 6-3-4 sets as the threshold of significance.

Once the turbines are built, many of these flights may be forced to be rerouted or to proceed in violation of the FAA's own regulation, 14 C.F.R. § 91.119, which requires a 500-foot

[1] In assuming that elements (i) and (ii) are both necessary, we give the benefit of the doubt to the FAA, reading the "first" of § 6-3-3's first sentence as implying that structures qualify as having adverse effects only if they satisfy the criteria of both the first sentence and the second (through one or more of its subsections).

distance between an aircraft and any structure. Further, the FAA's own weather compressibility study concluded that, during instances of inclement weather, "VFR aircraft could potentially be compressed to a lower altitude" to avoid cloud cover, such that they also would come within 500 feet of the turbines in violation of § 91.119. J.A. 469. Indeed, § 6-3-8(b)2 of the handbook says that any structure "that would interfere with a significant volume of low altitude flights by actually excluding or restricting VFR operations in a specific area would have a substantial adverse effect and may be considered a hazard to air navigation." The FAA may ultimately find the risk of these dangers to be modest, but we cannot meaningfully review any such prediction because the FAA cut the process short in reliance on a misreading of its handbook and thus, as far as we can tell, never calculated the risks in the first place.

The FAA repeatedly notes in its brief that the handbook "largely consists of criteria rather than rules to follow." Respondent's Br. at 40. We agree. Any sensible reading of the handbook, and of § 6-3-8(c)1 in particular, would indicate there is more than one way in which the wind farm can pose a hazard to VFR operations. Indeed, other sections of the handbook, especially when read in light of some of the evidence noted above, suggest that the project may very well be such a hazard. Here, by abandoning its own established procedure, see *D&F Alfonso Realty Trust v. Garvey*, 216 F.3d 1191, 1197 (D. C. Cir. 2000), the FAA catapulted over the real issues and the analytical work required by its handbook.

Whether in fact an application of the handbook's guidelines to the studies discussed above will cause the FAA to find the project a hazard, and if so, of what degree, we obviously cannot tell at this stage. But it surely is enough to trigger the standard requirement of reasoned decision-making, i.e., to require the FAA to address the issues and explain its

conclusion. *Public Citizen*, 988 F.2d at 197. The FAA's misplaced reliance on § 6-3-8(c)1 is no substitute.

* * *

The petitions for review are accordingly granted, and the FAA's determinations are

Vacated and Remanded.

November 2011 SREC Auction Results

SRECTrade's November 2011 SREC Auction has completed. Below are the clearing prices at which SRECs traded this month.

November SREC Prices	Energy Year Ending		
State	2010	2011	2012*
Delaware	-	-	$88.99
Maryland In-State	$174.98	$200.00	
Maryland Out-of-State	-	-	
Massachusetts	-	$535.00**	
New Jersey	-	$670.00	$225.00
Ohio In-State	-	$380.00	
Ohio Out-of-State	-	$55.00	
Pennsylvania	-	$10.00	-
Washington, DC	$119.00	$150.00	

Notes:
*Delaware, New Jersey and Pennsylvania operate on a June-May energy year.
**Massachusetts Q2 auction occurred on October 17th
Green text represents a price improvement over October, red text represents a decrease.
"-" reflects no sale, which would result if there were no matching bids and offers that cleared for a sale in the auction.

State Market Observations:

Delaware (Supply: 22.7 MW | Demand: 19.5 MW): Legislation increasing the SREC requirement went into effect this past June but the market has yet to pick up in response. Stakeholders in DE continue to work to wards a long-term SREC contract solicitation program for new facilities. This program should be approved within the next month. Meanwhile, the SREC market will likely pick up at the end of the energy year when electricity suppliers are more active.

Maryland (Supply: 30.8 MW | Demand: 26.9 MW): SRECs continue to hover around $200. The state seems on a good pace to maintain a balanced supply relative to demand. As 2011 comes to an end, a shortage of SRECs in the state, if any, will be reflected by an increase in prices at the end of the trading period in the first quarter of 2012. Out-of-state SRECs continue to be a non-factor in Maryland.

Massachusetts (Supply: 27.1 MW | Demand: 55.7 MW): Mass SREC values rose to $535 in the Q2 2011 sale on October 18th. This trend should continue as the SREC shortage becomes more apparent. The next big quarterly MA SREC auction will close on Monday January 16th. In the meantime, solar owners can offer unsold SRECs in our regular monthly auctions.

New Jersey (Supply: 448 MW | Demand: 368 MW): The 2012 market continues to rebound up to $225 from $205 last month. As more buyers become active in the 2012 market, prices should continue to correct, though the oversupply continues to grow as 18 more megawatts were added in September.

Ohio (Supply: 82.0 MW | Demand: 37.7 MW) : In-State SRECs demand dropped slightly. Activity in the out-of-state SREC market increased this month.

Pennsylvania (Supply: 146.4 MW | Demand 40.4 MW): HB 1508 was recently introduced to address the state's SREC market. This marks the beginning of a long process to rescue the PA SREC market. Until then, SRECs will continue to bottom out.

Washington, DC (Supply: 21.4 MW | Demand: 41.9 MW): Prices continue to increase as new legislation closing the DC market borders and increasing requirements take effect on the market.


U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment