

**From:** [Geoff West](#)  
**To:** [Bard, Richard;](#)  
**cc:** [Timpano, Steve; Lynne Williams \(lwill@earthlink.net\); Boden, Kelly;](#)  
[Murphy, Donald;](#)  
**Subject:** Blue Sky East, LLC letter to IFW concerning curtailment study  
**Date:** Thursday, June 02, 2011 3:19:50 PM  
**Attachments:** [Blue Sky East, LLC letter to Rich Bard \(IFW\) regarding Curtailment\\_06022011.pdf](#)  
[BCI letter.pdf](#)

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Rich,

Please find the attached letter concerning our recent discussions. I will be sending the original via mail. I look forward to working with you on the study.

Geoff

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June 2, 2011

**VIA EMAIL:** [Richard.Bard@maine.gov](mailto:Richard.Bard@maine.gov)  
**AND U.S. POSTAL SERVICE**

Richard Bard  
Assistant Regional Wildlife Biologist  
Maine Department of Inland Fisheries and Wildlife  
317 Whitneyville Road  
PO Box 220  
Jonesboro, ME 04648

Re: Bull Hill Curtailment Request

Dear Mr. Bard:

The purpose of this letter is to summarize our discussions which took place from May 16-26, 2011 between the Maine Department of Inland Fisheries and Wildlife (“IFW”) and First Wind. Those present during the May 26<sup>th</sup> meeting included the following from IFW: Rich Bard, Shawn Haskell, Steve Timpano and John DePue. First Wind representatives included Geoff West and Bob Roy from ecological services. Don Murphy from the Land Use Regulation Commission (“LURC”) was also present.

On March 10, 2011, IFW first recommended that First Wind change the cut-in speeds for all 19 turbines at the Bull Hill project from 3.0 m/s to 5.0 m/s (known as curtailing turbines) during the period of April 20-October 15 in order to reduce bat fatalities. First Wind responded to that recommendation on April 13, 2011 in a memo which revised the post construction mortality plan; subsequently, IFW in response to that letter requested curtailment again on May 9, 2011. On May 16, 2011 Blue Sky East responded with a proposal to study curtailment. The proposal was developed to determine the efficacy of curtailment as a means for mitigating impacts to bats at the project and to determine the appropriate schedule for implementing curtailment. Data previously collected at operating wind projects indicates that a majority of bat fatalities occur during relatively low-wind conditions over a relatively short period of time during the summer-fall bat migration period.<sup>1</sup> Altering turbine operations poses significant economic and operational challenges but may be appropriate when the strategy is limited to the periods when bats are most active.

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<sup>1</sup> Arnett, E. B., M. P. Huso, M. R. Schirmacher, and J. P. Hayes. 2010. Altering turbine speed reduces bat mortality at wind-energy facilities. *Frontiers in Ecology and the Environment*.

Richard Bard  
Assistant Regional Wildlife Biologist  
Maine Department of Inland Fisheries and Wildlife  
June 2, 2011  
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Blue Sky East, LLC ("Blue Sky East") has submitted an application to LURC to construct a wind-energy facility in Hancock County, Maine known as the Bull Hill Wind Farm. Construction is anticipated to begin in the first quarter of 2012 and the facility is expected to become fully operational by the end of 2012. Prior to becoming fully operational, Blue Sky East has agreed to develop a robust study plan in consultation with IFW that closely follows the Sheffield protocol, with specific details to be decided by the principal investigator with the goal of ensuring that the results are statistically valid and defensible.

First Wind and IFW agreed that a detailed study design for the first two years of operation will be developed in consultation with IFW, the Bat and Wind Energy Cooperative, Bat Conservation International ("BCI"), and potentially the University of Maine. Attached please find an email confirmation from BCI expressing their commitment to the study. The results of this study will help Blue Sky East develop a curtailment plan that is both economically and operationally feasible while reducing impacts to bats at the Bull Hill Wind Farm.

Regards,



Geoff West

Enclosure: Email from BCI

cc: Don Murphy, LURC, via email and USPS  
Kelly Boden, Verill Dana, via email  
Steve Timpano, IFW, via email  
Lynn Williams, CCRHC, via email

### ***Operation Control Measures:***

Operational mitigation has demonstrated to be effective at reducing bat fatalities at wind farms, particularly in the mid-Atlantic region where fatalities are much higher than in Maine (Arnett 2010). As such, during the Maine Department of Inland Fisheries and Wildlife (MDIFW)'s review of the Bull Hill Wind Project (Project), MDIFW expressed concern for declining populations of *Myotis* species as a result of White Nose Syndrome (MDIFW memo dated May 9, 2011) and recommended operational control measures be implemented along with post construction monitoring as a minimization strategy to reduce potential impacts to bats. Although mortality studies at operational wind energy projects in Maine to date have shown low bat mortality relative to other operational projects in the northeast, First Wind will commit to operational control measures as part of this revised post construction monitoring plan for the Project.

First Wind will implement operational control measures at the Project during the first two years of operation. This will include curtailment of half of the turbines in the Project at a cut-in speed of 5 meters/second (m/s). The other half of the turbines will be allowed to operate at normal cut-in speeds so that a control can be established to determine the effectiveness of these minimization measures for a project in Maine, a state where bat mortality has been documented to be low. Operational control measures will occur only during night hours (roughly ½ hour after sunset until sunrise) when bats are active and when wind speeds are less than 5 m/s and temperatures are above 50 degrees Fahrenheit. Operational control measures will be implemented from early May through late September to coincide with the period when the majority of bat mortality has occurred at other operational wind projects. The need for additional years of curtailment will be discussed with MDIFW after the second year of curtailment at the Project.

If the first two years of monitoring reveal that changing the cut-in speed to 5 m/s is successful at reducing bat mortality, the applicant will apply this cut-in speed to all turbines for the life of the Project. If, however, operational curtailment does not significantly reduce mortality, the applicant will continue additional monitoring in consultation with MDIFW.

### ***Post-Construction Monitoring:***

In order to assess wildlife impacts due to operation of the Project, post-construction monitoring will be conducted for at least two years. During the first two years of operation, 2012 and 2013, monitoring will entail bird and bat fatality searches.

The need for, scope, focus, and timing of consecutive years of post-construction monitoring will depend on the results of the first two years of monitoring; therefore, this work plan is applicable to the first two years of post-construction monitoring only. The results of each year of fatality monitoring will be discussed with MDIFW. This monitoring plan also includes adaptive management in the event that unusually high bird or bat fatality rates are found at the Project area as a whole, or in isolated parts of the Project area, or if there are impacts to species of conservation concern. The methods in this work plan are based on standard post-construction monitoring techniques used at existing wind farms in the region and were developed in consultation with MDIFW.

### ***Objectives of post-construction monitoring:***

- to document the species and number of individuals of bird and bat fatalities during the spring, summer, late-summer, and fall of the first two years of operation of the wind farm;
- to estimate the level of take of birds and bats during the 2012 and 2013 study periods based on the results of standardized searches, searcher efficiency trials, scavenger carcass removal trials, and if necessary, a search area correction factor;
- to determine if fatality events are uniform across the Project area;
- to assess whether fatality rates constitute an unreasonable adverse impact to birds or bats;
- if fatality rates are unusually high, to determine the factors influencing mortality;
- in the event of unusually high mortality, to determine the need for and appropriateness of additional curtailment (described above) and adaptive management action(s); and

- If possible, attempt to relate the two consecutive years of radar data to fatality data at specific turbine locations.

**Fatality Search Methods:**

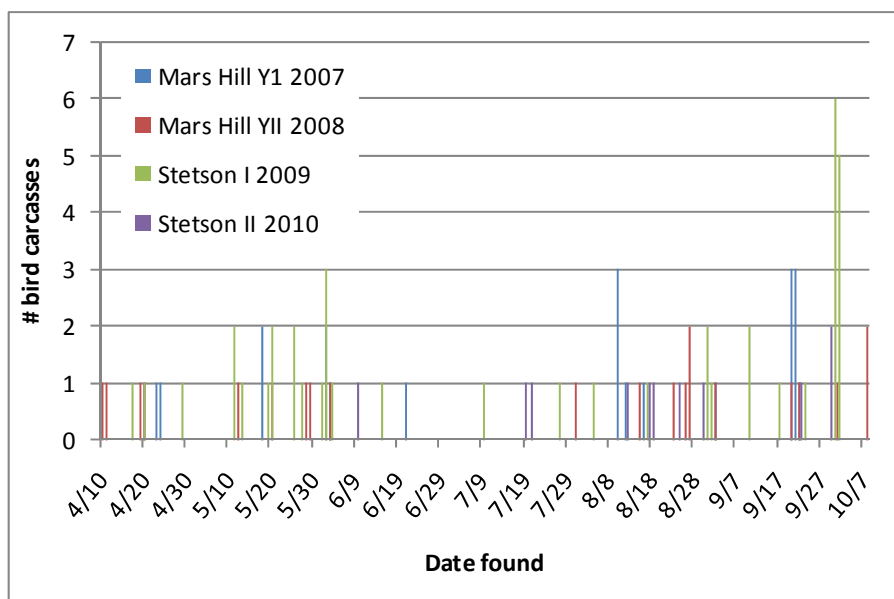
Mortality monitoring in 2012 and 2013 will involve searches at all 19 turbines (100%). Survey effort will include weekly searches at all 19 turbines between the periods of April 15 to June 7 and July 7 to October 15 (Table 1). Daily searches will be conducted at approximately half of the curtailed, turbines (n=5) and at approximately half of the non-curtailed turbines (n=5) between the periods of May 1 to June 7 and July 15 to September 30 (Table 1). By searching a subset of the curtailed (“test” turbines) and non-curtailed turbines (“control” turbines), the effectiveness of operational curtailment on reducing bat fatalities at the Project can be assessed.

**Table 1.** Post Construction Survey Schedule

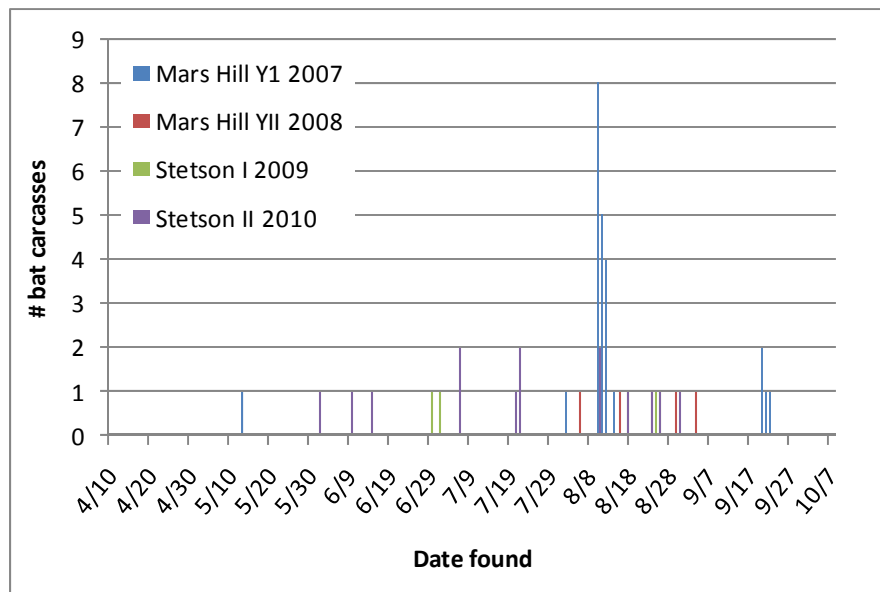
Weekly Searches at all 19 turbines	April 15 - June 7	July 7 – Oct 15	4 to 6 turbines searched a day for a total of 4 survey days a week during these two time periods*
Daily searches at 5 Curtailed WTGs	May 1 – June 7	July 15 – Sept 30	5 turbines searched daily during these two time periods
Daily searches at 5 Non-Curtailed WTGs	May 1 – June 7	July 15 – Sept 30	5 turbines searched daily during these two time periods

\* Search intervals to be calculated in accordance with scavenger trials.

Figures 1 and 2 show the peak timing of discovery of bird and bat fatalities during four mortality studies at wind farms in Maine (Mars Hill 2007 and 2008, Stetson I 2009, and Stetson II 2010).



**Figure 1.** Timing of bird carcass discovery during four mortality studies in Maine.



**Figure 2.** Timing of bat carcass discovery during four mortality studies in Maine.

Peak periods of avian carcass discovery occurred between May 15 and June 5 in the spring, and September 15 and September 30 in the fall. Bat fatality discovery peaked between July 15 and September 22. To cover the peak timing of bird and bat fatalities determined by the recent mortality studies, daily searches will be conducted at 10 turbines (5 curtailed and 5 non-curtailed as mentioned above) for a period of 5 weeks during spring migration (May 1 to June 7); and for 6 weeks during the bat swarming and fall migration periods (July 15 to September 30); weekly surveys will continue at the remaining 9 turbines during these two timeframes. In Stantec's written letter response to MDIFW's initial comments to the post construction monitoring plan dated April 13, 2011, some dates were inadvertently omitted and did not include the periods of likely higher bird and bat activity. As recommended by MDIFW this post construction monitoring plan has been revised to include weekly searches between April 15 to June 7, and July 7 to October 15.

Monitoring will cover three distinct seasons, and will cover the periods of potentially high bird and bat activity as identified by MDIFW (Table 1):

- spring migration – April 15 to June 7;
- late-summer – July 7 to August 31; and
- fall migration – September 1 to October 15.

The entire leveled, graded lay-down area, adjacent stable side slopes, and adjacent road sections will be searched. Therefore, the standard search area is expected to be approximately 80 meters (m) in diameter, on average. Transects will be established 4 m (13 feet [']) apart within search areas.

During periods when weekly surveys alone are being conducted, it is anticipated that 19 turbine searches will be completed during 4 survey days per week (a biologist will search 4 to 6 turbines per day). Searches will generally be scheduled for the same four days each week (Monday through Thursday). During the weekly and daily search timeframes, it is anticipated that the 9 weekly-searched turbines will be surveyed over a period of 4 days (3 to 4 weekly-searched turbines per day), in addition to the 10 turbines that will be searched daily (period of 7 days). It is expected that two biologists will be needed during the periods of concurrent daily and weekly searches (Table1).

Biologists conducting turbine searches will be trained on the search protocol by the project manager. During searches, biologists will walk at a rate of approximately 10 to 20 meters per minute. All carcasses found (intact or scavenged) will be photographed and documented on standardized field forms. The following information will be recorded for each carcass found:

- date and time;
- biologist identification;
- search plot identification;
- general weather conditions;
- ground cover conditions (e.g., vegetation type and height, wet, dry, gravel);
- distance (determined by a laser range finder) and compass direction from the turbine;
- distance and compass direction from the transect from which the carcass was detected;
- carcass condition (e.g., fresh, rigor, decomposed, intact carcass, scavenged, feather spot);
- carcass position (e.g., face-up or down, sprawled out or balled up); and
- species, age, gender, and reproductive condition (when possible).

Carcasses will be collected under the appropriate state and federal permits and will be individually bagged and frozen. Carcasses will be retained in a freezer at the Operations and Maintenance building and may be used in searcher efficiency and scavenger carcass removal trials.

In the event that a federally or state-listed species is found, the appropriate agency will be contacted and arrangements will be made to submit the carcass to the agency. If a large-scale fatality event (i.e., more than 5 carcasses at one turbine, more than 20 carcasses found across the Project area in one survey day) is observed, MDIFW will be contacted within 24 hours. If an injured bird or bat is found, when possible, the animal will be transported to a local wildlife rehabilitator.

Maintenance personnel will be informed of the timing of standardized searches and will be trained on the collision event reporting protocol in the event that a carcass or injured animal is found. Carcasses found outside of standardized searches will be documented and collected but will be reported separately from those carcasses found during standard searches, and will not be used for estimates of take.

Vegetation conditions, including percent coverage within search areas and vegetation height, will be monitored on a weekly basis. First Wind will assess the need to mow plots to increase searcher efficiency throughout the survey year.

Nightly weather conditions will be monitored throughout the survey period. Wind speed and direction, barometric pressure, and temperature will be recorded at an on-site meteorological tower, and/or by an anemometer on a turbine nacelle. Additional weather parameters will be recorded by the biologists from a location in proximity of the Project on nights prior to fatality searches. These parameters will include cloud type, percent cloud cover, general ceiling height, relative visibility, moon phase, precipitation, and any notable weather events (passing of storms or fronts). Additionally, during site visits the biologists will document incidental wildlife observations on standardized field forms.

#### ***Searcher Efficiency Trials:***

Searcher efficiency trials will be conducted throughout the study period, and the biologists will be unaware of trial dates. Carcasses will be discreetly marked and placed at turbines by the trial coordinator early in the morning prior to scheduled turbine searches. Any carcasses not found during searches will be retrieved at the end of the survey day. Trial results will be documented on standardized field forms. A target number of 25 carcasses will be placed during trials over the course of the survey year. No more than four carcasses will be placed at a single turbine during a trial to avoid the "flooding" effect (Smallwood et al. 2010). Carcasses will be of native species, if available; otherwise, surrogate non-native species will be selected. Trial carcasses will include both large and small bird and bat carcasses. Trials will be distributed across the four seasons of surveys, and carcasses will be placed in the variety of ground cover types that occur within search areas. The percent of carcasses found during trials will be used to estimate the level of bird and bat take during the study period.

#### ***Scavenger Carcass Removal Trials:***

Scavenging rate trials will be conducted during each survey season and will be completed independently of the searcher efficiency trials. A target total of 25 carcasses will be placed within all available ground cover types within search areas, and no more than 4 carcasses will be placed at a single turbine. Fresh

bird and bat carcasses of native species will be discretely marked and monitored until they are removed by scavengers or completely decomposed. Carcasses will be checked during the first 5 days after they are placed, then again on days 7, 10, 14, 24, 28, and on additional days if necessary. During the trial periods, the status of all carcasses, including all evidence of scavenging or decomposition, will be documented on standardized field forms. The scavenger carcass removal data will be used to estimate the percent of carcasses that remain detectable in search areas during the 7-day interval between standardized searches. Monitoring of carcasses beyond the 7-day period will also indicate the average number of days that carcasses remain in search areas.

***Search area correction:***

If the generally 80-m diameter search area is significantly reduced by forest edge at any search turbines, a correction factor may be applied to the number of carcasses found at these turbines. To estimate the number of carcasses that may have occurred in non-searchable areas at abbreviated search plots, a correction factor would take into account the total searchable area, the total non-searchable area, and the number of carcasses observed within the searchable area.

***Analysis and Reporting:***

The species, date, turbine number, and weather conditions for each bird and bat fatality will be compiled into a table and included in the annual report. Analysis will include a summary of the distances bird and bat carcasses were found from turbines and the distribution of fatalities among turbines throughout the Project area in relation to topographical and Project design features (e.g., on slope, top of hill, turbine string, location within turbine string, Federal Aviation Administration [FAA] lighting). The number of carcasses found during standard searches, the percent of carcasses found by the biologist as determined by the searcher efficiency trials, the percent of carcasses that are not removed by scavengers between search intervals, and if necessary, an area correction factor will be used to determine an estimate of bird and bat take during the study period. This will include an estimate of the number of bird and bat fatalities per turbine and per megawatt per study period. The formula used to estimate mortality will be a standard formula employed by other recent mortality studies and will be based on the method deemed most accurate at estimating fatality at the time of reporting.

***Nocturnal Migration Radar Survey***

The fall 2009 and spring 2010 nocturnal marine radar surveys indicated a low mean nightly flight height and relatively high mean nightly passage rate at the Project (Appendix 13C) during the spring migration period; consequently, supplemental radar surveys are being conducted in 2011 to provide additional information on migration activity at the Project. Although to date there has been no connection between pre-construction radar survey results and post construction mortality, a second year of radar surveys is being conducted to determine if migration as observed during the spring 2010 surveys is indicative of migration in this part of the state or if the results were an anomaly based on unusual weather patterns during that season.

Nocturnal migration activity is currently being sampled by radar at the Project this spring, and will be sampled this fall, 2011. A total of 20 nights of supplemental radar surveys will be conducted in 2011: 10 nights in spring and 10 nights in fall. Sampling is timed to occur during peak migration periods, and corresponds with weather conditions either conducive to migration activity, and/or conditions that could place nocturnal migrants at greater risk of collision (i.e., foggy or inclement weather). Standard marine surveillance radar methodologies are used to document and calculate nightly passage rates, flight heights, and flight directions. The survey will help identify if the higher passage rates and relatively low flight heights documented during the spring 2010 at the Project represents a pattern or an anomaly.

If an additional season of radar survey takes place post-construction, a radar location at which at least five turbines are visible on the radar screen will be selected. The nightly radar surveys will be followed by fatality searches at the five turbines visible on the radar screen the following morning. The radar data will be analyzed to determine if use, as documented with the radar, and fatality appear to be related and, if so, how.



***Adaptive Management:***

An adaptive management plan (AMP) will be developed in consultation with MDIFW. The AMP will include 1) an assessment of the level of impact of observed fatality rates, 2) if fatality rates are unusually high, further study to determine the biological or behavioral factors, project design features, and/or environmental conditions (i.e., weather) that may influence mortality, and 3) implementation of appropriate management action(s) to reduce mortality in the event that it is determined to be an unreasonable adverse impact.

Subsequent monitoring would focus on determining the factors (biological/behavioral, Project design, and/or environmental) that are influencing mortality. The scope and methods of more focused monitoring would be determined in consultation with MDIFW.

Based on the results of more focused monitoring, the need for and appropriateness of possible management actions would be investigated. Management actions would largely depend upon the bird or bat species group impacted, as well as the factors contributing to mortality. Possible management options, pending the specific circumstances resulting in increased collision risk, include but are not limited to:

- lighting schemes on Project structures may be changed, as permissible by the FAA;
- Project structures, such as stairways leading up to tower doors, may be modified if being used for perching or nesting by birds;
- nests may be relocated and/or nesting birds may be deterred from an area if the locations of nests are resulting in increased collision mortality;
- the formation of seasonal water sources may be prevented in the direct vicinity of turbines if resulting in increased collision mortality of birds or bats;
- pending cooperation of landowners, on-site land uses or habitats surrounding turbines may be altered to reduce attraction of birds or bats.

The appropriateness and effectiveness of potential management actions would be determined in consultation with MDIFW. Specific management actions would focus on the factors contributing to increased mortality. Development of the components of the Bull Hill AMP will consider the best available and most current scientific information, including the results of the 2011 post-construction study at the Sheffield Wind Project in Vermont.

***Literature Cited:***

- Arnett, E., M. Schirmacher, M. Huso, J. Hayes. 2009. Effectiveness of changing wind turbine cut-in speed to reduce bat fatalities at wind facilities. Prepared for the Bats and Wind Energy Cooperative and the Pennsylvania Game Commission.
- Arnett, E. B., M. P. Huso, M. R. Schirmacher, and J. P. Hayes. 2010. Altering turbine speed reduces bat mortality at wind-energy facilities. *Frontiers in Ecology and the Environment*. : 101101071900096 DOI: 10.1890/100103
- Smallwood, K. S., D. A. Bell, S. A. Snyder, and J. E. Didonato. 2010. Novel Scavenger Removal Trials Increase Wind Turbine—Caused Avian Fatality Estimates. *The Journal of Wildlife Management* 74: 1089–1096.

## Geoff West

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**From:** Ed Arnett <earnett@batcon.org>  
**Sent:** Wednesday, June 01, 2011 5:15 PM  
**To:** Robert Roy; Geoff West  
**Cc:** Cris Hein  
**Subject:** Bull Hill Wind Project

Greeting Bob and Geoff,

Thanks for contacting me and inquiring about a potential curtailment project for reducing bat fatalities at your proposed Bull Hill Wind Project in Maine. Per our discussion, we (BCI) understand that the work would not likely begin until the spring of 2013, the beginning of the first full bat-activity year after project construction. BCI is very interested in working with you on this project and including this site in our research portfolio for the region. We are happy to advise on development of survey protocol and study design, and would be interested in leading project efforts. Our design for a similar study at the Sheffield project seems appropriate for this proposed project, but we are happy to entertain alternatives as well.

Thanks again and we look forward to discussing this project, and other efforts we're working together on, in the upcoming months.

Regards,  
Ed

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*Bat Conservation International's mission is to conserve the world's bats and their ecosystems in order to ensure a healthy planet.*

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