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# Report of OEIS Assessment of Cumulative Visual Impacts from Wind Energy Development, 2012

Maine Governor's Office of Energy Independence and Security

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**Report of OEIS Assessment of Cumulative Visual  
Impacts from Wind Energy Development**

*(CVI Assessment)*

March, 2012

## Executive Summary

The 125<sup>th</sup> Maine Legislature's Resolve 93 (LD 1366) directs the Office of Energy Independence and Security (OEIS) to conduct an assessment of the Wind Energy Act including the method by which permitting authorities should consider the cumulative impact on scenic resources of state or national significance. OEIS worked with the Land Use Regulation Commission (LURC) to develop a process for the assessment of cumulative visual impact from wind power development based on the experiences of the state's reviewing authorities in permitting grid-scale wind projects.

This assessment process convened a study group and assembled resources for their consideration, defined and described the cumulative visual impact issues to be addressed by the assessment, developed and evaluated options for addressing cumulative visual impacts from wind energy development, and reported on the process and findings. Three experts in the fields of landscape architecture and visual resource assessment participated in the study group along with staff from OEIS, LURC and Maine Department of Environmental Protection (MDEP).

The study group identified and described a fairly large and diverse set of potential solutions and strategies and then worked on evaluating the options in a systematic manner based on the feasibility and importance of the option. The report sets out the twenty-two options the group felt merit consideration.

The options are grouped by the type of approach offered by the potential solution or strategy.

- **Threshold analysis** approaches generally look at providing a method and/ or criteria for indicating when the accumulation of visual impacts from wind power development has crossed some unacceptable threshold.
- **Cluster** approaches generally look to pre-determine (or proactively plan) where a certain amount of development could be accommodated and, conversely, where it could not.
- The **Other** approaches category includes options that do not fit either the threshold or cluster category but which may have some ability to reduce the impact on visual resources from cumulative wind power development (and in many instances from individual projects).

This study and report is understood by the study group to be part of the OEIS report conducted pursuant to LD 1366 and is not separate or independent from that report. **The study group has not made specific recommendations and this report leaves any policy choices or preferences to others.**

## 1. Task for the Study Group

Resolve 93 (LD 1366) directs the Office of Energy Independence and Security (OEIS) to conduct an assessment of the progress on meeting the wind energy development goals under the Wind Energy Act and to include in the assessment, to the extent resources are available, “[r]ecommendations for the method by which permitting authorities should consider the *cumulative impact on* natural resources at the state or regional level, including but not limited to mountain areas and to *scenic resources of state or national significance*” (emphasis added).

The resolve also states that OEIS may draw on existing state data and studies rather than new analyses for the assessment.

## 2. Study Process

The Land Use Regulation Commission (LURC) has reviewed six grid-scale wind energy projects and in doing so considered cumulative visual impact (CVI) issues on multiple occasions. These project reviews prompted LURC to seek public comment on CVI issues and to engage in a series of discussions on CVI topics over the last year. OEIS requested that LURC recommend a process for the assessment of CVI based on these experiences and also requested that LURC assist in convening the study group and managing the study process.

This CVI assessment consisted of four steps:

1. Convene study group and assemble resources
2. Define and describe the CVI issues to be addressed by the assessment
3. Develop and evaluate options
4. Provide a report to OEIS

LURC staff completed the **first step** by compiling studies, examples, and other readily available resources informative to CVI issues and the assessment process; coordinating meetings, communications, and staff participation from OEIS, DEP and LURC; and recruiting qualified experts willing to participate in the study.

The study group addressed the **second step** – defining and describing the CVI issues - during the first meeting of the group, though the scope and nature of these complex issues continued to be discussed and refined throughout the process. LURC staff provided an initial “concepts and issues” paper prior to the first meeting of the study group which served as a basis for discussion to define and describe CVI issues.

The **third step** – developing and evaluating options for addressing CVI issues – was the principal endeavor of the study group. The study group brainstormed options at its first meeting, further described and refined these options through e-mail communications and

conference calls, and then worked on evaluating the options in a systematic manner at its final meeting and through subsequent e-mail communications.

For the **fourth step** LURC staff took the lead in drafting this report for OEIS, however the content is the product of the entire study group. The initial draft was circulated for comments among all participants and the final draft is the result of revisions based on those comments.

The study group has not made specific recommendations and this report leaves any policy choices or preferences to others. However, the study group's report includes only options it concludes merit consideration.

This study and report is understood by the study group to be part of the OEIS report conducted pursuant to LD 1366 and is not separate or independent from that report.

## **2.1. Participants**

Three experts in the fields of landscape architecture and visual resource assessment participated in the study group. The three are the only experts that have been pre-qualified by LURC and MDEP to serve as neutral peer reviewers of visual impact analyses submitted with wind power applications for review by these two agencies. They served as volunteers without compensation and did not represent any particular interests in the process. The three participating experts are:

- Terry DeWan, Terrence DeWan & Associates, Yarmouth, Maine
- James Palmer, Scenic Quality Consultants, Burlington, VT
- David Raphael, Land Works, Middlebury, VT

Other participants in the CVI assessment were Jeff Marks, OEIS; Samantha Horn-Olsen, LURC; Hugh Coxe, LURC; Marcia Spencer-Famous, LURC; Fred Todd, LURC; and Mark Margerum, MDEP.

## **2.2. Study Group Meetings and Communications**

The study group convened for two meetings and held one conference call as well as e-mail communications as follows:

### **November 16, 2011 - Meeting**

Discuss CVI Assessment Objectives

Identify & Describe CVI Issues

Identify & Describe Potential Solutions/ Strategies to Address CVI Issues

December, 2012 – E-mail communications  
Re: Developing an Evaluation Matrix

December 29, 2012 – Conference Call  
Re: Refining the Evaluation matrix

**January 18, 2012 - Meeting**  
Evaluation of Potential Solution/ Strategies

February, 2012 – E-mail communications  
Re: Draft Report

## 3. Potential Options

### 3.1. Introduction

Cumulative visual impact (CVI) can result from seeing the accumulation of more than one wind energy project in a relatively concentrated area such that they become a dominant feature of that area. CVI can also occur when turbines and associated facilities (i.e., transmission lines and access roads) are dispersed throughout a broad swath of the landscape so that they appear repeatedly as one travels through that landscape. A concentration of turbines may lead to the “**too many here**” problem (from this special place, I will see too many turbines - a few were acceptable, but more will change this from a landscape with turbines to a turbine-dominated landscape). A dispersion of turbines throughout the landscape may lead to the “**everywhere**” problem (everywhere I go in this region I’ll continuously see wind turbines).

Landscape architects and scenic experts identify three types of cumulative visual impacts based on the perspective of the viewer:

1. **Combined**: where a viewer sees multiple wind facilities or groups of turbines from a stationary point, each separated by a minimum distance, within a typical cone of vision ( $45\pm$  degrees).
2. **Successive**: In this model the viewer would see multiple projects from a particular viewpoint, but not within the same viewing arc. I.e., viewers would have to turn their heads and/or bodies a minimum number of degrees to see another wind project.
3. **Sequential**: More than one wind project would be seen as the viewer travels along a linear route (e.g., hiking trail or scenic highway) or planar surface (e.g., a large water body).

Given the amount of windpower development proposed by the Wind Energy Act (WEA), some commentators feel that if wind projects are separated to reduce cumulative visual impacts, then the result will be to have projects scattered almost everywhere throughout

the state to meet the WEA goals (wind sprawl). When LURC asked for public comment about whether windpower development should be concentrated or dispersed, the general consensus was that when siting multiple wind developments within LURC jurisdiction, concentrating in a few appropriate locations may be more desirable than spreading broadly across the landscape, in order to minimize the footprint and increase the efficiency of transmission lines and access roads. However there was no consensus as to how to do that with multiple projects, over multiple years, across a large landscape. Additionally site design, turbine design, color or other visual mitigation tools play a role in minimizing CVI.

### **3.2. Solutions and Strategies**

The study group developed the options for addressing CVI issues set out in the sections below through an initial brainstorming meeting, and primed by the following initial set of questions:

- Given what we know today, is there likely to be a CVI problem to solve?
- What is the nature of the problem?
- Can it be defined in a way that is objective?
- What are the value judgments inherent in discussing this problem?
- What aspects of the problem seem to have the most significant consequences/ are the most important to address?
- Do the existing rules/ laws help or hurt in dealing with this problem?
- Are there solutions available? What are they?
- Is clustering the best way to address CVI at the large landscape level?
- Is there anything this legislature could implement?
- Are there other solutions that could be implemented with an additional year or two of study?
- How would clustering work on multiple projects, over multiple years across a large landscape?
- How to address proactive clustering that would designate some areas that would absorb relatively intense development in order to keep that development from occurring elsewhere.

The study group further described and refined these options through e-mail communications and conference calls, and then worked on evaluating the options in a systematic manner based on the feasibility and importance of the option. For this evaluation the study group looked at feasibility in terms of whether significant barriers are likely to exist due to political, financial, or technical considerations and whether, if implemented, the strategy is likely to be practical, accepted and lasting. The study group looked at importance in terms of whether the strategy would address aspects of CVI that have the most significant consequences.

The study group identified and described a fairly large and diverse set of options – what the group termed *potential solutions and strategies*. Group members felt that with more

time and resources they may well have developed more potential solutions and strategies. The group found that there were very few examples, from wind power permitting and regulatory efforts, to inform the group and few studies or reports that specifically address cumulative visual impacts from any type of development. Most of the potential solutions and strategies the group includes in this report are adapted from other development review models or variations on existing regulations but are informed by the experts' experiences with wind power projects.

Limitations on time and resources also constrained the study group from digging deeply into the options it did identify. The study group conducted an evaluation of some of the potential solutions and strategies, but for most options did not have time for more than a cursory discussion of the strengths and weaknesses. The study group also recognized the need for public input into the issues.

The potential solutions and strategies are set out in the next sections with a description of the strategy and, in some instances, comments about the feasibility or importance of the option. All options set out in the report were determined by the study group to merit consideration but not all were discussed in depth during the evaluation meeting due to time and resource limitations. The report does not rank or score the options and provides evaluative comments only for those options the study group discussed in greater detail.

A copy of the evaluation matrix, which does include some simple scoring of some of the options, is included in the appendix, but more for purposes of providing a tool for possible future evaluation than as a record of the evaluation conducted by the current study group. For this report, and at this stage in the process, the study group believes the content of their comments, rather than an incomplete scoring record, is more indicative of the opportunities and barriers that may be associated with the various potential solutions and strategies the group identified.

The options are grouped by the type of approach offered by the potential solution or strategy. **Threshold analysis** approaches generally look at providing a method and/ or criteria for indicating when the accumulation of development has crossed some unacceptable threshold. **Cluster** approaches generally look to pre-determine (or proactively plan) where a certain amount of development could be accommodated and, conversely, where it could not. The **Other** approaches category includes options that do not fit either the threshold or cluster category but which may have some ability to reduce the impact on visual resources from cumulative wind power development (and in many instances from individual projects).

### 3.2.1. Threshold Analysis Approaches

1. Establish a system for identifying landscape types in the area surrounding a project.



*Description:* Define and describe common landscape types and the characteristics of each. Establish parameters for determining what area around a proposed project constitutes the “surrounding area” and establish a system for inventorying and analyzing the surrounding area to determine what landscape types are present.

*How it addresses CVI:* Provides a system to evaluate the baseline conditions of a landscape and to evaluate, in a systematic fashion that is consistent from project to project, the amount of change that occurs to a landscape due to the accumulation of impacts from development.

*Comments/ information:* The WEA’s second evaluation criterion is “The existing character of the surrounding area.” Though we use the 8-mile limit to establish the study area, this criterion is sufficiently vague that there could be little consistency in applying this criterion among projects. (It may be helpful to include an example of what this would look like, e.g, from the Forest Service<sup>1</sup> or from an application). A definition of ‘landscape type’ should also be provided (see Forest Service publication). Landscape could be topographic or based on land use. The process for establishing the system might be a regulatory negotiation. A model to consider might be an existing UMaine graduate thesis (McMann) that looks at physiographic features and establishes a common vocabulary. (However, this is a rather coarse look at landscape types, since it covers the entire state). Maybe the law could specify that landscape type be evaluated at the application level. How much change is acceptable within each landscape type (i.e., what is its visual carrying capacity)? How does a change in one landscape type (either adjacent or farther away) affect the inherent characteristics of any particular landscape type (see #2 below)? Then there’s the issue of viewer sensitivity relative to types...

**2. Establish a process for deciding how much shift in landscape type is acceptable over time from one or more projects.**

*Description:* Using the common landscape types, establish a process for determining how much shift from one landscape type to another landscape type - for instance from managed industrial forest to developed - due to visual impacts from one or more wind power developments in the surrounding area is acceptable and over what period of time. The degree to which the landscape type shifts from the visual impact of wind power development, and the timeframe in which the shift occurs, are factors in determining whether the impact is acceptable.

*How it addresses CVI:* Provides a system to compare the baseline conditions of a landscape and to evaluate, in a systematic fashion that is consistent from project to

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<sup>1</sup> USDA, Forest Service. 1995. *Landscape Aesthetics : A Handbook for Scenery Management*. Rev. ed, Agriculture Handbook 701. Washington, DC: USDA, Forest Service.

project, whether the amount of change that will occur to a landscape exceeds an established threshold.

*Comments/ information:*

This could be similar to the system used in Angus, Scotland and may be analogous to the US Forest Service's Recreational Opportunity Spectrum (ROS). This is a good planning procedure that would be applicable to any visual impact analysis (VIA) and could be a basis for reviewing other types of projects with visual impacts. A very useful tool that does not need to start from scratch. It would be highly durable but would require some regular update. It may not be feasible to achieve consensus about how much is too much but this could be used to establish regulatory limits.

**3. Better identify in existing law which types of cumulative impacts (e.g. combined, successive, sequential), if any, the primary siting authority may consider in individual permit proceedings.**

*Description:* This recommendation proposes carefully identifying questions about how the existing law applies when considering visual impacts, particularly impacts from other projects, as part of a review of an individual project. To the extent possible, written guidance should explain the effect of the law for each of these questions.

*How it addresses CVI:* The purpose of this is to address the fact that applicants and regulators do not have a clear and consistent interpretation of how the law currently addresses CVI. For this reason this is seen as being an important option.

*Comments/ information:* Would this be done on a case-by-case basis or as a general opinion? Is this a staff or AG function? OEIS could ask LURC and DEP to comment based on experience. LURC Commission may already have a sense of unreasonable thresholds but that does not mean it is supported in existing law and the commission has not articulated it. The issue for the applicants is that they do not know in advance how the reviewing authority will react – or what is acceptable.

This may be a good opportunity to discuss the concept of 'tipping point', as described in the Scottish Tourism Study. At some point XX% of the people will agree there are too many turbines, or that they are seen in disarray, or that they are simply incompatible with the landscape. This may best be done with a series of photographs/simulations that illustrates the difference between acceptable and unacceptable visual impacts and CVIs.

**4. Create a matrix or checklist to quantitatively assess impacts on a single resource from one or more projects.**

*Description:* A tool for creating a baseline evaluation of a scenic resource and for identifying and quantitatively assessing and tracking any visual impacts to that resource from any project.

*How it addresses CVI:* Provides a method for assessing impacts to a particular scenic resource over time and across projects.

*Comments/ information:* This could also be used in individual permitting processes. This should start at a baseline before any projects. This approach could be applied to other types of impact. One benefit is consistent treatment across all projects. We may want to reference the Hassell methodology as a starting point for such an evaluative matrix. However, if it is to be considered, the parameters need to be verified rather than simply accepting the values presented in Hassell.

**5. Establish (measurable/ quantifiable) thresholds of cumulative impacts (levels at which the cumulative impacts become unreasonable) on classes of scenic resources for a region.**

*Description:* This strategy looks to identify classes of resources in a given region or within the state and establish impact thresholds, from one or more project, for the class as a whole. It would allow for some level of measurable impact to that class of resource from one or more project, but only up to a certain threshold.

*How it addresses CVI:* This strategy would protect against over-burdening any one type of resource from visual impact so that there would not be an irreversible commitment of resources by resource class.

*Comments/ information:* The key task in developing this strategy would be to establish thresholds for classes – things such as % of remote ponds that can be impacted, miles of Appalachian Trail that can see turbines, etc. LURC has some criteria that may be applicable (such as remoteness to a project). This may include identifying classes of scenic resources beyond those designated in the WEA - e.g. remote ponds below the Great Pond size, scenic byways in addition to their scenic turnouts, etc. Consider how people's perception of wind power project may change over time, as they become more used to seeing them (or become tired of seeing them) and other factors come into play (price of oil?). If this strategy is considered, there should be some way of fine-tuning the threshold at some point in the future to take into account the possibility of changing attitudes and sensitivities.

**6. Require cumulative impact to be addressed in VIAs (and surveys if conducted) for all permitting projects. Include a description or analysis that estimates the cumulative impacts to the scenic resources over time from one or more projects in the surrounding area.**

*Description:* Current rules do not require Visual Impact Analyses to address cumulative visual impact. Reviewing agencies could amend their rules to require some analysis and discussion about the accumulation of visual impacts from multiple wind power projects over time for a given area. Such analyses could be described in guidelines or rules of the reviewing authority to ensure uniformity from application to application, and should be

reasonably specific about the analysis techniques to be used and the geographic extent of the analysis.

*How it addresses CVI:* This could address CVI by providing useful information for tracking cumulative visual impacts and assessing the impacts over time and across multiple projects. It also could be used to encourage or require that applicants design projects to minimize visual impact or with greater awareness of the effects of cumulative visual impacts.

*Comments/ information:* Should be addressed early in any application process. Requiring submissions not currently required by the reviewing authorities raise issues about the standards for any new submission requirement. There would need to be a good definition of what is “cumulative.” Would the requirement extend beyond the 8 miles for visual impact analysis set out in the current law? This would be particularly appropriate if evaluating sequential CVI. What about looking backward in time (impacts from prior existing projects), not just forward? How would this account for the fact that people can shift their level of acceptability – any threshold may change as people acclimate to the presence of wind turbines? As part of this should the agencies require intercept surveys that address this issue, using photosimulations and descriptive questions to test public reaction? There would have to be a clear methodology established to guide the preparation of a CVI section in a VIA.

**7. Establish a process for other-project mitigation for visual impacts to make it possible for projects to come in under the Unreasonable Adverse threshold by mitigating visual impacts accumulated by other prior projects. This approach would only include direct scenic-mitigation and not "compensation."**

*Description:* This approach would allow a proposed wind power project, that might not be able to meet permitting criteria because of the cumulative visual impacts (or primary visual impacts) it would create, to mitigate visual impacts previously created (by prior projects) as a way of lessening the overall cumulative visual impacts to the area.

*How it addresses CVI:* The proposed project would still create some visual impacts that would contribute to the overall accumulation of visual impacts in the area, but by mitigating or reducing existing impacts from other projects in the area, the total accumulated visual impacts would stay below the undue adverse impact threshold.

*Comments/ information:*

The WEA does not currently permit this so it would require a law change. This could be a fund to correct prior mistakes or issues resulting in direct mitigation of overall visual impacts. This would not be site design changes. This is not part of the tangible benefits that compensate communities for impacts from hosting a wind project. Examples of impacts that might be mitigated include fixing poorly designed road cuts, undergrounding power lines, retrofitting lighting systems with radar based lighting (such as OCAS). This

method would likely work better with a well defined process such as Transfer of Development Rights.

### 3.2.2. Clustering Approaches

**8. Establish a procedure to identify areas that can reasonably accommodate a high concentration of wind energy development (i.e., cluster) and develop more restrictive CVI standards elsewhere (cluster)**

*Description:* This would be a landscape level planning effort that considers physical and cultural features to identify areas that have the capacity to reasonably accommodate relatively high concentrations of wind power development. Differentiated scenic standards would be developed for the areas that are identified for concentrated development and those areas where wind power development is determined to be less appropriate.

*How it addresses CVI:* Avoids the “sprawl” issue of potentially having wind projects spread throughout vast areas of the state in a way that they appear to be almost everywhere one looks or travels. Also would facilitate the efficient use of infrastructure related to wind power production, such as transmission lines, and reduce the visual impacts from the proliferation of such infrastructure.

*Comments/ information:* The expedited area set out in the WEA does this to some extent but not at the level that some commentators felt would more effectively address CVI issues. Several commentators have noted that the process of identifying appropriate and inappropriate locations would be a resource intensive effort, requiring significant data gathering and analysis, and substantial stakeholder input. This clustering concept also raises issues of fairness due to regional overload, and the need for localized benefits to offset the accompanying impacts. Another factor to consider is the quality of the wind resource and the relationship between strong wind and high scenic quality.

**9. Set initial limit on pace and/ or location of development. Re-evaluate those limits after some designated period of time.**

*Description:* This technique would designate appropriate and inappropriate locations and define acceptable rates of development for those areas. The designations and the rates of development would be re-examined, and possibly revised, in the future in order to accommodate changed circumstances or changed public perceptions.

*How it addresses CVI:* This would avoid wind power sprawl by initially steering certain amounts of development to certain areas but would do so only for a designated period of time before reevaluating the locations and the rates.

*Comments/ information:* An example of this might be a policy that calls for no more than X megawatts within Y region over the next 15 years. The appeal of this approach is that

it recognizes and plans for changed circumstances in the wind power market as well as changes in public perceptions.

**10. Allow regions, counties, or other entities to voluntarily identify cluster areas and create a quasi Transfer of Development Rights program**

*Description:* Similar to the other clustering concepts described above but allows for a more localized determination of which areas are appropriate for concentrated wind power development. Regions or jurisdictions could self-select if they want to host wind energy development but would be subject to state review and standards. Protected areas would compensate areas that take a greater share of the wind power development through a transfer program.

*How it addresses CVI:* This would avoid wind power sprawl by steering development to certain areas based on the local interest or willingness to absorb those visual impacts.

*Comments/ information:* Communities or regions that determine that the benefits of hosting wind energy development outweigh any negative impacts could make themselves available for development. This may reduce some of the political hurdles to siting wind power. Again, in order to be considered, the region or other entity would have to have a minimum level of wind to quality. Access and availability of transmission facilities would also be a consideration. The issue is how to transfer compensation to areas that are impacted. In a traditional Transfer of Development Rights (TDR), the developer is allowed additional density for protecting somewhere else. The logic for wind requires protected areas to compensate areas that take their share of the development. This might be calculated on a county or even township basis (i.e., what is each county's share of the state goal?). Is a county willing to tax itself to pay another county to take its share of wind energy development?

### **3.2.3. Other Approaches**

**11. Camouflage technology**

*Description:* The use of techniques that reduce visual contrast of wind energy facilities with the surrounding landscape so that the facilities are less easily distinguished from their surroundings.

*How it addresses CVI:* Not specific to CVI but may help reduce visibility of any project.

*Comments/ information:* May include the application of color paint or film patterns to break up the large mass and straight lines of wind turbines. However, it may be difficult in Maine's landscape because it changes color significantly with the seasons..

This may be a consideration if turbines no longer have to be painted white, using radar-based lighting systems. However, they will still be visible... This may be more effective when discussing impacts on landscapes greater than a certain distance (e.g., 3-5 miles).

#### **12. Radar-based night lighting**

*Description:* An aviation lighting safety system that relies on radar detection to activate the warning lights. Lights are inactive except when aircraft approaches. This may eliminate the need for high contrast colors (white).

*How it addresses CVI:* Not specific to CVI but may help reduce night-time visibility of any project due to aviation safety lighting.

*Comments/ information:* FAA recently evaluated this technology and appears to be in the process of approving it for use in wind power development.

#### **13. Change public expectations**

*Description:* Through outreach assist the public to acclimate to the presence of wind power facilities in landscapes.

*How it addresses CVI:* Not specific to CVI but may reduce negative reaction to changes in the landscape due to wind power development.

*Comments/ information:* Commentators suggest that historically people have adapted to change in the landscape including the addition of man-made elements. In particular people need to understand “what’s in it for them.”

#### **14. Post-occupancy evaluation to gather more data**

*Description:* Conduct studies after a wind project has been completed to assess the actual visual impact and to determine the accuracy of the visual impact assessment submitted with the application.

*How it addresses CVI:* Not specific to CVI but would provide information about actual visual impacts from a particular project and, in combination with other studies, could provide information about the cumulative impact from multiple projects over time.

*Comments/ information:* This could be a condition of approval with the requirement that the developer conducts the study or it could be conducted independently. We are starting to develop a good understanding of public reactions, based upon photosimulations / intercept studies.

#### **15. Study funded by legislature**

*Description:* This would be an appropriation by the legislature to undertake a study or studies to better understand CVI and to develop policies to address CVI. This option looks at funding options for any one of a variety of studies that could be useful in addressing CVI – it does not make a recommendation about a specific type of study.

*How it addresses CVI:* This would not need to be specific to CVI – it could look at visual impacts from wind power development generally - but depending on the study could address CVI issues.

*Comments/ information:* The commentators recognized that in lean budget times the legislature would need to consider CVI an issue of high priority in order to appropriate funds for a study.

#### **16. Study funded by mitigation fees**

*Description:* This fund would be collected from developers to offset impacts from the development and would be used specifically to undertake a study or studies to better understand CVI and to develop policies to address CVI. This option looks at funding options for any one of a variety of studies that could be useful in addressing CVI – it does not make a recommendation about a specific type of study

*How it addresses CVI:* This would not need to be specific to CVI – it could look at visual impacts from wind power development generally - but depending on the study could address CVI issues.

*Comments/ information:* It would require a law change to collect mitigation fees.

#### **17. Mitigation funds to install Radar-based night lighting system on older projects**

*Description:* This fund would be collected from developers to offset impacts from the development by reducing night lighting impacts from prior projects.

*How it addresses CVI:* Not specific to CVI but may help reduce night-time visibility of any project due to aviation safety lighting.

*Comments/ information:* It would require a law change to collect mitigation fees.

#### **18. A process for local jurisdictions to designate locally significant scenic resources to be considered under the WEA.**

*Description:* The current definition in law for protected scenic resources does not account for locally significant scenic resources such as sites identified in a Comprehensive Plan or Scenic Inventory that considers the preferences and values of the whole community.



Including locally significant scenic resources under the protections of the WEA would provide for more local input in the permitting process.

*How it addresses CVI:* Not specific to CVI but by providing some protection for locally significant scenic resources this may address cumulative visual impacts.

*Comments/ information:* This would require a change in the law and would need clear definition. Right now there are SRSNS that are arguably of only local significance (i.e., most of the listed historic sites are explicitly of only local significance). Significance of recreation resources could be defined as the geographic catchment of its users (i.e., international, national, state, regional or local) or the quality and exceptionalness of its landscape character/attributes. This might be extended to revisit the methodology used in the Maine's Finest Lakes Study and the Maine Wildlands Lakes Assessment.

**19. Establish a process for identifying situations where scenic impacts may exist beyond the 8 mile limit designated in current law.**

*Description:* This would provide a mechanism for extending the distance for visual impact analysis beyond 8 miles. This would occur when, because of topography, turbine placement, site conditions or other factors, visual impacts may occur beyond 8 miles and evaluation of that potential impact is warranted.

*How it addresses CVI:* Not specific to CVI but an evaluation of the impacts of a single project could contribute to addressing CVI issues.

*Comments/ information:* The 8 mile limit in the law seems to be based on the visual acuity of turbine elements (e.g., width of the blade, nacelle or tower) and does not necessarily capture the range of visual impact under certain conditions. This threshold relates to the recognition of individual turbines being installed 5 years ago. It is not based on the larger turbines being used today or the impact of viewing many turbines as a project unit from above. The process could be based on observations of existing projects under different lighting/weather conditions from a variety of distances and comparisons of actual project visibility to the photosimulations prepared for the applications.

**20. Establish a process to add additional classes of SRSNSs or to adjust the existing SRSNS classes.**

*Description:* Current law defines Scenic Resources of State or National Significance (SRSNS) but experience with permitting projects to date suggests the definition may not capture the range of scenic resources valued by the general public. This option suggests a process in which the classes of protected resources are re-examined and that additional scenic resources be included under the WEA if warranted.

*How it addresses CVI:* Not specific to CVI.

*Comments/ information:* Commentators suggested the current definition may be too static in some instances and that other scenic resources may need to be included. Examples include (1) Scenic Byways in addition to their turnouts, (2) new classes of scenic resources, such as protected wetlands, and (3) BPL exercising its rule making authority to revise its list of trails and Public Reserved Lands that are SRSNSs.

**21. Develop additional guidance in interpreting the Act to add clarity and predictability to the procedure based in part on precedent and experience in Maine.**

*Description:* Certain provisions in the WEA relating to visual impacts have been difficult to understand for applicants and difficult to administer by reviewing authorities. This option suggests identifying all such provisions and then developing guidance or rule changes to clarify those provisions.

*How it addresses CVI:* Not specific to CVI.

*Comments/ information:* For example, the landscape's scenic quality is not mentioned as an important attribute for most sites on the National Register of Historic Places. Another example is that a state park and its beach are SRSNS, but the body of water may not be part of the state park and may not be a SRSNS in its own right. It might be advisable to get direct input from LURC Commissioners and BEP Board Members, both current and past, to discuss other areas of confusion.

**22. Update the designation studies and the role of scenery in the designation).**

*Description:* Some of the scenic resources defined in the WEA are based on existing inventories of those scenic resources. Some of those inventories have not been reviewed or updated recently (i.e., Rivers, Lakes, Coastal areas). Some existing designations do not necessarily concern scenic quality (e.g., historic sites, national natural landmarks).. This option suggests they should be updated to ensure that the resource information is current.

*How it addresses CVI:* Not specific to CVI.

*Comments/ information:* Examples include great ponds, scenic rivers and streams, scenic viewpoints in coastal areas.

## **4. Appendices**

- 1. Resolve 93 (LD 1366)**
- 2. Concepts and issues paper**
- 3. Evaluation matrix**

## **Resolve, To Clarify the Expectation for the 2012 Assessment of Progress on Meeting Wind Energy Development Goals**

**Sec. 1 Expectations for assessment. Resolved:** That, when the Governor's Office of Energy Independence and Security, referred to in this resolve as "the office," undertakes its 2011 annual assessment of progress on meeting the wind energy development goals pursuant to Public Law 2007, chapter 661, Part A, section 8, as amended by Public Law 2009, chapter 642, Part A, section 9, it shall consider the following specific issues.

1. In its examination of the experiences from the permitting process, the office shall specifically examine:

A. Whether statewide permitting standards should be applied to wind energy development, including, but not limited to, noise standards, visual standards, setback requirements and decommissioning plans;

B. The criteria used during the permitting process to consider the visual impact of an expedited grid-scale wind energy development, the permits issued and any recommended changes to the criteria, including, but not limited to, changes to the criteria that require the primary siting authorities to consider insignificant the visual impacts greater than 8 miles from a scenic resource of state or national significance as defined in the Maine Revised Statutes, Title 35-A, section 3451, subsection 9;

C. The quality of submitted decommissioning plans and recommendations for mechanisms to provide financial assurance for funding the decommissioning; and

D. The time required for completing the permitting process, including the time required for conducting environmental surveys and preparing and submitting the applications and the associated costs.

2. In its examination of the status of this State and each of the other New England states in making progress toward reducing greenhouse gas emissions, the office shall specifically evaluate the accuracy of the estimates generated by state agencies and wind energy developers for greenhouse gas reductions that are a result of wind energy development in this State and make recommendations for a standardized protocol, if necessary.

3. In developing its recommendations regarding the wind energy development goals established in Title 35-A, section 3404, subsection 2, the office shall consider the number of wind turbines necessary to meet the goals, market conditions, development trends, emissions goals, siting policies, cumulative impacts and other factors that may indicate it is necessary to amend the wind energy development goals.

4. In developing its recommendations regarding identification of places within the State's unorganized and deorganized areas for inclusion in the expedited permitting area established pursuant to Title 35-A, chapter 34-A, the office shall also consider whether places should be removed from the expedited permitting area, including, but not limited to, mountain area protection subdistricts, as described by the Department of Conservation, Maine Land Use Regulation Commission Rule Chapter 10.

Notwithstanding Public Law 2007, chapter 661, Part A, section 8, as amended by Public Law 2009, chapter 642, Part A, section 9, the assessment submitted in 2012 is due February 1, 2012. Following receipt and review of the report, the Joint Standing Committee on Energy, Utilities and Technology may submit a bill to the Second Regular Session of the 125th Legislature; and be it further

**Sec. 2 Additional considerations. Resolved:** That, to the extent resources are available, the office shall include the following in the annual assessment of progress on meeting the wind energy development goals pursuant to Public Law 2007, chapter 661, Part A, section 8, as amended by Public Law 2009, chapter 642, Part A, section 9, in the assessment submitted in 2012:

1. Recommendations for the method by which permitting authorities should consider the cumulative impact on natural resources at the state or regional level, including but not limited to mountain areas and to scenic resources of state or national significance as defined in the Maine Revised Statutes, Title 35-A, section 3451, subsection 9;

2. The economic effects of wind energy development on the tourism industry, to the extent data are available;

3. In collaboration with the Office of the Public Advocate, an evaluation of the costs associated with transmission upgrades for the purpose of transmitting wind energy; and

4. The implications of the intermittency of wind power for regional markets and the grid, including capacity charges, the forward capacity market and electricity price volatility; and be it further

**Sec. 3 Use of existing data and stakeholder input. Resolved:** That, when completing the assessments under sections 1 and 2, the office and the Office of the Public Advocate may draw on existing state data and studies rather than new analyses, including, but not limited to, those developed for the New England Wind Integration Study published by ISO New England in December 2010, the state climate action plan pursuant to the Maine Revised Statutes, Title 38, section 577 and progress evaluation in Title 38, section 578, the State of Maine Comprehensive Energy Plan 2008-2009 and any reports from the Department of Economic and Community Development, as well as on analyses by the Federal Government, nonprofit organizations and other parties. The office and the Office of the Public Advocate may also draw on input from stakeholders and interested parties to complete the assessments; and be it further

**Sec. 4 Health effects. Resolved:** That, to the extent that resources are available, the Department of Health and Human Services, Maine Center for Disease Control and Prevention shall conduct an analysis of the research on health effects from wind turbines, including effects from noise, and provide a report to the Joint Standing Committee on Energy, Utilities and Technology by February 1, 2012. The report must include recommendations for making the information in the report easily accessible to the public.

The Land Use Regulation Commission (LURC) has reviewed six grid-scale wind energy projects and in the process has faced CVI issues on multiple occasions. These project reviews prompted LURC to seek public comment on CVI issues and to engage in a series of discussions on CVI topics over the last year. Based on these experiences and the information gathered, LURC identified several concepts and issues.

### **Types of cumulative impacts**

Cumulative Visual Impact (CVI) can result from the accumulation of turbines in a relatively concentrated area such that they become a dominant feature of that area. CVI can also occur when turbines are dispersed throughout a broad swath of the landscape so that they appear repeatedly as one travels through that landscape. These types of cumulative impacts occur at separate ends of a continuum of development density types (concentrated  $\Rightarrow$  dispersed).

A concentration of turbines may lead to the “**too many here**” problem (from this special place, I will see too many turbines - a few were alright but more will ruin the scenery of this place). A dispersion of turbines throughout the landscape may lead to the “**everywhere**” problem (everywhere I go in this region I’ll see wind turbines).

Landscape architects and scenic experts identify three types of cumulative visual impacts based on the perspective of the viewer:

4. **Combined**: where a viewer sees multiple wind facilities or groups of turbines from a stationary point, each separated by a minimum distance. I.e., the viewer looks out at an arc of  $45\pm$  degrees.
5. **Successive**: In this model the viewer would see multiple projects from a particular viewpoint, but not within the same viewing arc. I.e., viewers would have to turn their heads and/or bodies a minimum number of degrees to see another wind project.
6. **Sequential**: More than one wind project would be seen as the viewer travels along a linear route (e.g., hiking trail or scenic highway) or planar surface (e.g., a large water body).

### **Concentration versus dispersion**

Given the amount of windpower development proposed by the Wind Energy Act (WEA), some commentators feel that if wind projects are separated to reduce cumulative visual impacts, then the result will be to have projects scattered almost everywhere throughout the state to meet the WEA goals. When LURC asked for public comment about whether windpower development should be concentrated or dispersed, the general consensus was that when siting multiple wind developments within LURC jurisdiction “concentrating in a few locations is more desirable than spreading broadly across the landscape,” in order to minimize the footprint and increase the efficiency of transmission lines and access

## Cumulative Visual Impacts - Concepts & Issues

roads. However there was no consensus as to how to do that with multiple projects, over multiple years, across a large landscape.

### **Clustering**

The LURC commissioners felt the best way to address CVI at the large landscape level is by clustering the development in “appropriate” locations and steering development away from “inappropriate” places. While site design, turbine design, color or other visual mitigation tools play a role in minimizing CVI, clustering is seen as the primary mechanism by which the cumulative effects of wind energy development on scenic resources across a large landscape (such as the existing expedited area) may be mitigated.

However, the clustering concept raises difficult and important **issues** such as:

- How would clustering work on multiple projects, over multiple years across a large landscape?
- Does LURC/ DEP/ State have the time or resources to figure out how to cluster projects?
- Does LURC/ DEP/ State want to take on a large **proactive clustering** effort - identifying locations for clustering and implementing policies and practices that accomplish that?
- Does the expedited area, as set out in the WEA, already identify locations for clustering (or act as the de facto clustering mechanism)?
- If not, does LURC/ DEP/ State have the authority to identify locations for clustering, or does it need to seek authority?
- What clustering tools are currently available?
- If new or different tools are needed, by what process can the reviewing authority get them (e.g. request to legislature, rulemaking, proposed legislation, etc.).
- If proactive clustering is not feasible, but projects can be denied based on their cumulative impact, such denials may have the unintended consequence of further dispersion of projects.
- Proactive clustering would necessarily result in creating some “sacrificial” areas – areas that would absorb relatively intense development in order to keep that development from occurring elsewhere. Such denser concentrations may have substantial negative impacts to those areas receiving the additional development. Among other things, this may raise fairness or social justice concerns.
- A proactive clustering approach that identifies appropriate areas through a landscape level analysis may have limitations in terms of resources that would be required to conduct the analysis and develop tools, and the effectiveness of the tools in achieving the desired result.
- A landscape level analysis to identify appropriate and inappropriate locations, would have to be done at a less than site level of detail, and thus would not provide a very precise evaluation.

Potential Solution/ Strategy	Feasibility - Hi, med, low				Durability*	Issues addressed	Importance		Applicable to Individual Projects
	Political	Financial	Technical				Consequences addressed		
<b>Threshold Analysis Approaches</b>									
Establish a system for identifying landscape type [in the area surrounding a project]	Med	Med	Med		Hi	1, 2, 4	One way to identify "regions"		
1 Establish a process for deciding how much shift in landscape type is acceptable over time from one or more projects (Angus model? Analog to ROS?)	Med	Med	Med		Med	1, 2, 4			
2 Better identify in existing law which types of cumulative impacts (e.g. combined, successive, sequential), if any, the primary siting authority may consider in individual permit proceedings.									
3 Identify which types of cumulative impacts (e.g. combined, successive, sequential) are most significant and consider law changes to allow the primary siting authority to consider these in individual permit proceedings.									
4 Create a matrix or checklist to quantitatively assess impacts on a single resource from one or more projects (which could also be used in individual permitting processes)									
5 Establish (measurable/ quantifiable) thresholds of cumulative impacts (levels at which the cumulative impacts become unreasonable) on classes of scenic resources for a region. (This may include identifying classes of scenic resources beyond those designated in the WEA - e.g. remote ponds below the Great Pond size, scenic byways, etc.)	Low	Med	Hi		Hi	1, 2, 3, 4, 5			



Potential Solution/ Strategy	Feasibility - Hi, med, low				Issues addressed	Importance		Applicable to Individual Projects
	Political	Financial	Technical	Durability*		Consequences addressed		
6 Require cumulative impact to be addressed in VIAs (and surveys if conducted) for all permitting projects. Address early in any application process and include a description or analysis that estimates the cumulative impacts to the scenic resources over time from one or more projects in the surrounding area.	Med	Hi	Hi	Hi	1a, 1b, 3, 5			Yes
7 Establish a process for other project mitigation for visual impacts (The WEA does not currently permit this) to make it possible for projects to come in under the Unreasonable Adverse threshold by mitigating accumulated visual impacts (e.g., poorly designed road cuts, underground power lines, retrofitting OCAS systems). This approach would only include direct scenic-mitigation and not "compensation" of one form or another.	Low	Hi	Hi	Med				
<b>Clustering Approaches</b>								
8 Establish a procedure to identify areas that can handle high concentration and develop CVI standards elsewhere (cluster)	Med	Med	Med	Med				
9 Set initial limit on pace and/or location of development (e.g. "no more than __ MW within X region over the next 15 years"). Re-evaluate those limits after some designated period of time.	Med	Med	Med	Med		Allows local governments to plan		
10 Allow regions, counties, or other entities to voluntarily identify cluster areas (sort of TDR)	Med	Med	Med	Med				
<b>Other Approaches - not necessarily limited to CVI</b>								
11 Camouflage technology								

Potential Solution/ Strategy	Feasibility - Hi, med, low				Importance		Applicable to Individual Projects
	Political	Financial	Technical	Durability*	Issues addressed	Consequences addressed	
12 Radar-based night lighting							
13 Change public expectations							
14 Post-occupancy evaluation to gather more data	Hi	Hi	Hi				
15 Study funded by legislature							
16 Study funded by mitigation fees							
17 Mitigation funds to install OCAS system on older projects							
18 A process for local jurisdictions to designate scenic resources to be considered under the WEA (such as sites identified in a Comprehensive Plan or Scenic Inventory that considers the views of the whole community).							
19 Establish a process for identifying situations where scenic impacts may exist beyond the 8 mile limit (this threshold relates to the recognition of individual turbines, but may not apply to viewing many turbines as a project unit from above). Base the process on observations of existing projects under different lighting/weather conditions from a variety of distances and comparisons of actual project visibility to the photosimulations prepared for the applications.							
20 Establish a process to add additional classes of SRSNSs (such as locally designated ones), or to adjust the existing SRSNS classes (e.g., make the Scenic Byway the SRSNS, not the rest stop; make it possible for BPL to revise the trail and Public Reserved Lands).							

Potential Solution/ Strategy	Feasibility - Hi, med, low				Importance		Applicable to Individual Projects
	Political	Financial	Technical	Durability*	Issues addressed	Consequences addressed	
21 Develop additional guidance in interpreting the Act (e.g., discussion re: historic resources that rely upon their landscape setting; discussion re: dealing with waterbodies that abut state parks; etc.) to add clarity and predictability to the procedure, based in part on precedent and experience in Maine							
22 Update the designation studies (i.e., Rivers, Lakes, Coastal areas).							

\*"Durability," in this context, is a measure of how practical and accepted the strategy is likely to be, and if it is likely to last.

Issues

1. Single location overload
  - a. Single resource impacted by multiple projects
  - b. Multiple resources impacted by one or more projects
2. Regional or statewide overload
3. Encroachment on special or iconic places even if not within 8 miles
4. Irreversible commitment of resources – by resource class
5. Impacts on linear resources - trails, water routes