

William Cundiff

From: Chad Pepin [chad.pepin@gmail.com]
Sent: Sunday, January 23, 2011 5:51 PM
To: areynolds@douglasma.org
Cc: William Cundiff
Subject: Cape Cod Commission Minimum Performance Standards
Attachments: 1_20_11_CCC_Packet.pdf

Hello Ms. Reynolds and Mr. Cundiff:

In light of the recent discussion of Wind Turbine setbacks, what a "safe zone" is and which manufacturers safety information is relevant, I'm attaching a timely dialog between the Cape Cod Commission and The Assembly Of Delegates which is unfolding right now. This document contains a draft proposal of changes, as well as the complete meeting minutes, and some actual accident data which reinforce the absolute need for adequate setbacks.

As you may be aware, the Cape Cod Commission and the Assembly of Delegates are currently grappling the issue of appropriate standards for the regulation of industrial wind energy projects such as the one that the Town of Douglas is currently contemplating in partnership with APW.

I thought that the Planning Board and ZBA might be interested in the discussion of some of these concerns with the Commission since Douglas is weighing many of the same issues. I'd ask that you please forward a copy of this document to members of both boards. The dialog touches on the topics of noise, shadow flicker, catastrophic failure and even the comparison the the Hull Turbines which are used as an example in the Douglas Project.

Although no Minimum Performance Standards have yet been adopted, the Commission's Joint Planning and Regulatory Committee recently forwarded a recommendation to the Members for the adoption of a minimum setback provision of 3000 feet and/or the requirement of an independent noise evaluation by an acoustic expert approved by the Commission. Numerous attendees at the most recent meeting argued that the 3000 foot setback remained too lenient.

In addition, it has been strongly urged that the Commission consider requiring all developers to provide a Property Value Guarantee to residents and property holders. As we're sure that the Planning Board can appreciate, it could be reasonably be argued in the context of your own project that such guarantees should be offered to nearby residents such as Blueberry Hill and to the owners of local businesses such as Webster Campground.

The proposed MPS would also address a number of other issues, including proximity to recreational facilities, roads, homes and businesses and the like. It may be worthy of note, even though the Douglas Woods variance would be grandfathered, that the Douglas project would be in violation of several of these provisions to the MPS if they were adopted, as proposed.

Best Regards,

Chad Pepin



CAPE COD
COMMISSION

Memorandum

DATE: JANUARY 13, 2011

TO: CAPE COD COMMISSION

FROM: RYAN CHRISTENBERRY, PLANNER

RE: REVISED MINIMUM PERFORMANCE STANDARDS & THRESHOLD FOR WIND ENERGY CONVERSION FACILITIES (WECF)

On November 17, 2010 the Barnstable County Assembly of Delegates voted to remand proposed minimum performance standards for wind energy conversion facilities (WECF) back to the Cape Cod Commission (CCC) for further review. The Assembly report recommended the CCC consider more restrictive performance standards for land-based wind turbines and possibly a threshold for Development of Regional Impact (DRI) review by the Commission.

As directed by the Assembly of Delegates, a joint meeting of the Commission's Planning and Regulatory Committees was held on January 3, 2011 to review a proposed threshold and corresponding minimum performance standards for wind energy conversion facilities (WECF).

The proposed threshold and standards presented at that meeting were revised based on the discussion and comments by committee members. A second joint Planning and Regulatory Committee meeting was held on January 10, 2011 to incorporate additional revisions. The joint committee made a motion to recommend the amended standards and threshold to the full Commission for review and consideration at the January 20, 2011 CCC meeting.

The proposed threshold and standards are provided here for your review, along with draft minutes of the 1/3/11 joint Planning and Regulatory Committee meeting, as well as the materials provided the joint committee's at both the January 3rd and January 10th meetings.

The following packet contains (in order);

- ✓ Proposed Threshold and Standards
- ✓ Draft minutes from January 3, 2010 joint Planning and Regulatory committee meeting

- ✓ Summary of wind turbine accidents from Caithness Windfarm Information Forum
(Note: the Caithness Windfarm information only provides instances of accident and not numbers of turbine installations, making it difficult to determine the probability of occurrence for any of the events documented.)
- ✓ Sample Shadow Flicker map
- ✓ Literature Review
- ✓ Proposed Outline for Technical Bulletin 11-001

DRAFT

**Proposed Amendments to Enabling Regulations and Regional Policy Plan
for January 20, 2011 Cape Cod Commission Meeting**

Proposed Threshold

{DRI Enabling Regulations, Section 3(o)} Construction of any land-based wind energy conversion facility (WECF) greater than 65 feet in height, including meteorological towers, measured from the natural grade of the site to the blade tip at its highest point.

Proposed Minimum Performance Standards for Energy

MPS E1.7 – Clear Area

All WECFs shall maintain a Clear Area surrounding the base of the turbine equal to at least 1.5 times the height of the WECF, or the WECF manufacturer's fall zone, setback, or clear area specification, whichever is greater. The Clear Area setback shall be measured from the base of the turbine.

MPS E1.8 – Noise

All Applicants for a WECFs shall perform a noise study, and fund a Cape Cod Commission approved consultant's review of the noise study, as outlined in Technical Bulletin 11-001. All WECFs with a maximum generating capacity equal to or greater than 1MW shall maintain a setback of 3,000' from the nearest-receptor, or residentially zoned parcel, unless the applicant can demonstrate through the noise study, to the satisfaction of the Cape Cod Commission, that there are minimal impacts to occupants within the reduced setback. All DRIs shall, after consulting with the Commission's noise consultant, prepare a plan which specifies reduced operating procedures, including decommissioning plans, that address noise complaints that may arise during operation of the WECF.

MPS E1.9 – Shadow Flicker

All Applicants for a WECF shall conduct a study of shadow flicker on receptors which will be affected by the proposed WECF. All DRIs with shadow flicker effects affecting receptors for more than 10 hours per year shall require the Applicant to submit a mitigation plan which specifies operational controls, landscaping, or other means that mitigate shadow flicker events to less than 10 hours per year for review and consideration by the Commission.

MPS E1.10 – Decommissioning

Any WECF that has not been operational for more than 120 consecutive days shall be dismantled and removed from the site by the owner, operator, and/or other parties as designated by the decommissioning plan unless a written waiver is obtained for good cause shown from the Cape Cod Commission's Executive Director. The Applicant shall also provide security in a form and amount satisfactory to the Cape Cod Commission. The security shall cover over the life the WECF the cost of decommissioning and removing any abandoned or damaged WECF. This security shall be in place and payable to the Town or

Commission on demand for the life of the WECF. All WECF DRI decisions shall contain a written decommissioning plan.

MPS E1.11 – Municipal WECF Waiver

Because of the procedural, legal and political safeguards applicable to town appropriations and the use of town-owned land, Minimum Performance Standards E1.8 – E1.10 shall not apply to one Municipal WECF 100 KW or less on a single parcel.

Proposed changes to other sections of RPP

HPCC 2.3 – Avoid Adverse Visual Impacts: New Development shall be sited and designed to avoid adverse impacts to visually sensitive areas, including those protected by HPCC 1.1 and 1.2. Visual impact assessments may be required as part of the project review. Development proposed adjacent to scenic roads or vistas shall preserve distinctive features of the scenic resource including tree canopy, wooded road edges, stone walls, winding road character, and scenic views. Development adjacent to or within scenic vistas shall be clustered and designed to limit the visibility of the new development.

Definitions

(Note: All definitions to be added to RPP. Those added to Enabling Regulations only denoted with *)

WECF* - All equipment, machinery and structures utilized in connection with the conversion of wind to electricity. This includes, but is not limited to, all transmission, storage, collection and supply equipment, substations, transformers, site access, service roads and machinery associated with the use. A wind energy conversion facility may consist of one or more wind turbines.

Clear Area - Area surrounding a WECF to be kept free of any structure designed for human occupancy, as well as any road or public recreation area.

Shadow Flicker - Alternative changes in light intensity caused when rotating turbine blades come between the viewer and the sun, causing a moving shadow.

Meteorological (or “met” or “test”) Tower* – Tower used for supporting anemometer , wind vane and other equipment to assess the wind resource at a predetermined height above the ground.

Municipal Wind Energy Conversion Facility - Any WECF proposed, owned and operated by a municipality.

Height of a WECF - The distance from the pre-development natural grade of the site of the proposed WECF to the highest point of the structure, including any moving part which is a component of the WECF.

Road - A public or private way, other than a driveway servicing only the property which is proposed as the site of the WECF.

Receptor - A dwelling, or any non-residential structure which is occupied during daylight hours.

Minutes
Joint Planning and Regulatory Committee Meeting
January 3, 2011
Cape Cod Commission Office
3225 Main Street, Barnstable Village

Commission Members Present: Royden Richardson (Regulatory Committee Chair), Peter Graham (Planning Committee Chair), Elizabeth Taylor (Regulatory Committee Vice Chair), Mario DiGregorio, Michael Blanton, Joyce Brookshire, Richard Roy, Roger Putnam, John McCormack, Jr., and John Harris

Commission Staff Present: Paul Niedzwiecki (Executive Director), Attorney Jessica Wielgus (Commission Counsel), Attorney Kristy Senatori (Chief Regulatory Officer), Page Czepiga (Regulatory Officer I), Attorney Elizabeth Enos (Regulatory Officer II), Sharon Rooney (Chief Planner), Ryan Christenberry (Planner II), Patty Daley (Technical Services Manager/Chief of Staff), Heather McElroy (Natural Resources Specialist), Anne Cooke (Administrative Assistant) and Andrea Adams (Senior Regulatory Planner)

Others Present: Liz Argo (Orleans), and Carl Freeman (Orleans)

Minutes Summary: The Commission Planning and Regulatory Committees met jointly to discuss draft Development of Regional Impact (DRI) thresholds and draft Regional Policy Plan Minimum Performance Standards (MPS) for wind energy conversion facilities (WECFs). The Committee agreed to meet again in a special joint meeting on Monday, January 10, 2011 at 10:00 AM at the Commission's office to continue the discussion.

Documents Used/Received:

1. Meeting Agenda
2. 12/18/10 staff Memo with attachments on proposed draft WEF threshold and draft MPS
3. Attachment to Memo: Literature review
4. Attachment to Memo: Tabular outline of draft guidelines for WEF DRIs as a Technical Bulletin
5. Revised draft language showing comparison/changes to threshold and MPS versus prior Assembly of Delegate submission (*Distributed at meeting*)

Mr. Richardson opened the Joint Planning and Regulatory Committee (Joint Committee) meeting at 11:05 AM.

Mr. Niedzwiecki said the Commission had considered wind energy standards in the past that triggered Commission review based on some other Development of Regional Impact (DRI) threshold. He said testimony heard before the Assembly of Delegates included concerns about

on-shore and smaller scale wind energy conversion facilities (WECFs). He said the Assembly was not satisfied with a proposal for a Technical Bulletin; there should be a DRI threshold. He said the scale of on-shore turbines made them inherently regional in nature. Mr. Niedzwiecki said the Assembly also discussed a Cape-wide District of Critical Planning Concern (DCPC) for on-shore WECFs to try to address some of the concerns. He suggested threshold and standards would be a better method than a DCPC to address the concerns so as not to be a deterrent to alternative energy development. He said many Towns do not have the technical capacity to deal with the issues WECFs present. He said the new threshold and standards being presented today clarify what was previously sent to the Assembly. He hoped this would lead to more rational WEF siting process. He said the proposed threshold and standards related to the resources the Commission is charged with protecting. He said there was no expectation the Joint Committee would take definitive action today, as some time was needed for public discussion and comment. He hoped this could be brought back to the Assembly in late January or early February. He noted the Town of Falmouth had sent a letter to the County Commissioners seeking a Cape-wide DCPC nomination.

Ms. Christenberry noted the Assembly had sent the standards back in November 2010, and that the Minutes of the Assembly meeting indicate a concern that the standards were not specific enough, and a desire for a Commission WEF threshold. She said the intent was to clarify what had been submitted to the Assembly, and to propose a new WEF threshold. Ms. Christenberry said the new language included a threshold and four new Regional Policy Plan Minimum Performance Standards (MPS).

Mr. Richardson asked for questions or discussion.

Ms. Christenberry noted the first item on the sheet showing the revised language and comparing what had been previously submitted to the Assembly was a proposed threshold for WECFs.

Ms. Taylor questioned whether the proposed threshold would require Commission review of WEF of 100 KW or less or exempted them from Commission review. She said the proposed threshold was not clear as drafted.

Mr. Blanton said there should be a definition for commercial agricultural uses.

Ms. Christenberry said this could be discussed. She noted the handout included a proposed definition for commercial agricultural uses taken from Massachusetts General Laws, Chapter 40A (MGLs, Chapter 40A).

Ms. Taylor said key issues were how much (%) of the site was being used for *commercial agriculture* versus the WEF and whether or not the WEF was to supply power to something connected to the *commercial agricultural use*, as opposed to selling power to the grid.

Mr. Putnam said the Commission's threshold should also include whether or not there was a local WEF bylaw in place.

Ms. Christenberry said the question of whether or not to exempt from Commission review those WEF where a Town has a WEF bylaw had been discussed. She said the difficulty is that the bylaws vary from Town to Town or Towns don't have a bylaw.

Mr. Putnam said his point that the proposed threshold would exempt from Commission review projects that were for municipal or commercial agricultural uses. He said threshold should acknowledge that there might still be Town bylaws that control WEF for even these uses.

Mr. Blanton said the bylaws vary, so the Commission must look at the regional perspective, regional impacts, and craft a region-wide threshold.

Mr. Niedzwiecki said the Town bylaws were developed at a time when the WEF were at a smaller scale, and may be inadequate to deal with newer and larger facilities. He said 65 feet is the average height of the tree canopy plus 20 feet.

Ms. Christenberry said a 100 KW WEF is the size of the Country Garden facility in Barnstable. She said these would be smaller than the WEF in Falmouth which was 1.5 Megawatts (MW). She said the local bylaws might be sufficient to address the impacts from a 100 KW WEF.

Ms. Taylor questioned whether the Country Garden WEF was developed under the MGLs Chapter 40A exemption for agricultural use.

Ms. Christenberry said the Commission did not review this WEF.

Mr. Niedzwiecki said Barnstable permitted a second WEF at Peck's Marine. He said it may depend on the particular turbine design, in that the Peck's Marine facility had thrown a blade. He said this was an area of technical review that could be worked into the Commission's review. He noted the Country Garden turbine was in a dense residential neighborhood without an incident.

Mr. Richardson, noting the way the proposed threshold had been structured questioned whether or not the Assembly had the same concerns over the difference between a municipal WEF and a private WEF or other types of WECFs. He suggested the standard needed written that any WEF of a certain size, height and energy output would be reviewed regardless of the proponent, private or public, agricultural or not, etc.

Mr. Niedzwiecki said the exemptions in the proposed threshold are based on certain factors and past practice. He noted agricultural parcels tend to be larger, thereby potentially increasing setback. He noted agricultural uses tend to be energy intensive thereby a WEF would make sense. He said 100 KW WEF are consistent with other land-based installations where there do not seem to be problems. He said the municipal exemption looks to Town wastewater facilities where WECFs might make sense. He also noted the exemption as drafted only allows one 100-KW facility per parcel, so installations of more than one 100 KW turbine on a parcel would be reviewed by the Commission.

Attorney Wielgus said the Commission Act does not require the Commission to exempt agricultural uses the same way that MGLs Chapter 40A does. She said the Commission staff has suggested some exemptions by responding to feedback received to date. Attorney Wielgus said Ms. Taylor's points about the percentage of the site was being used for commercial agriculture versus the WEF and whether or not the WEF was to supply power to something connected to the commercial agricultural use, as opposed to selling power to the grid were important considerations.

Ms. Taylor asked if the Commission was a Special Permit Granting agency within the context of MGLs. Chapter 40A(c).

Attorney Wielgus said no, the Commission could craft the language appropriate and was not bound by MGLs. Chapter 40A.

Ms. Brookshire said the threshold language was not clear, and should be reworded to make it clear what projects would or would not be subject to Commission review.

Mr. Niedzwiecki said the threshold had two exceptions: municipal WECFs or those for commercial agricultural uses. He noted the Commission also needed to define what constituted a commercial agricultural use. He noted it would also allow only one 100-KW turbine per parcel.

Ms. Brookshire expressed concern that this would not address potential facilities in Eastham, given the size of the parcels left in Town. She suggested even a municipal turbine might need Commission review.

Mr. Niedzwiecki said perhaps the threshold exemptions should be removed.

Ms. Brookshire said removing the exemptions would be very restrictive.

Mr. Putnam said this was a good thing.

Mr. Richardson said the keys points in the proposed threshold were those out by Mr. Niedzwiecki. He said another issue was the size of the site on which a WEF was proposed.

Mr. Niedzwiecki said the Town's bylaws would still be in effect. He said staff would draft new language with an exemption built in, and a different new threshold with one or two rebuttable presumptions.

Ms. Brookshire said it could work like a Limited DRI review, where a few issues could be included in the review, such as noise, fall zone, setbacks and shadow flicker.

Mr. Richardson asked for a synopsis of the requirements in local WEF bylaws.

Mr. Niedzwiecki said Commission staff could assemble a list of which Towns had WEF bylaws, and a summary of similar bylaw requirements.

Ms. Adams noted that the Commission would still review any WEF that was required to submit an Environmental Impact Report under the Massachusetts Environmental Policy Act, and there was also the possibility of a Discretionary Referral.

Mr. McCormack asked if the Country Garden WEF, if larger than 100 KW, would be subject to Commission review under the staff's proposed draft threshold?

Ms. Christenberry said yes.

Mr. Niedzwiecki said if the Country Gardens WEF was 100 KW, and was connected to a *commercial agricultural use*, it might be exempt under the current draft language.

Ms. Christenberry said the definition of *commercial agriculture* was also important, and would affect whether or not the Commission reviewed a WEF.

Ms. Taylor asked if the Commission would need to come up with a definition that was different than that in MGLs. Chapter 40A?

Mr. Niedzwiecki said the Commission could adopt the state's definition or craft a new one. He said another item the Commission staff would provide to the Committee members was a proposed definition of *commercial agricultural use*.

Mr. Richardson recognized a member of the audience to make a comment.

Ms. Liz Argo noted there are companies marketing a 250 KW machine that is on the same sized tower as a 100 KW wind turbine. She said this is the next generation of WEF and a way for the private market to capture more of the available clientele.

Mr. Graham said the draft threshold needed to be clarified. He said the exemptions for *commercial agricultural uses* or municipal WECFs was troubling, in that these installations may still have negative impacts on important viewscapes.

Mr. Richardson said Town Boards also have a responsibility to bring projects to the Commission's attention via the Discretionary Referral route.

Mr. Niedzwiecki said it might be difficult for a Town Board to refer a project, which is one of the benefits of a regional threshold.

Mr. Richardson asked for comments on the proposed Minimum Performance Standards (MPS).

Ms. Christenberry said the first MPS related to a fall zone or setback for safety. She said one of the questions is whether the setback should be from residential structures, the property line or any occupied structure.

Mr. Richardson said suggested it might be advisable to think about setbacks from all structures, like a factory.

Mr. Niedzwiecki said another setback to consider might be from *residentially zoned property*.

Mr. Putnam said the setback should be *from any property that can be developed by right*. He said that addresses the potential future use of any parcel.

Ms. Brookshire asked what was the setback of the Hull, MA turbine from the school?

Ms. Argo said for Hull WEF #1, the setback was about 400 feet from the school and over 1,000 feet from the first residence. She said for Hull WEF #2, a 1.8-MW installation, the closest residence is 630 feet away.

Mr. Graham asked what the industry standard for setbacks are? He suggested against reliance on manufacturer's data.

Ms. Christenberry said 1.5 times tip height would result in a more conservative setback figure than industry standards.

Mr. Blanton asked whether a setback of 1.5 times tip height is as recommended by the state?

Ms. Christenberry said yes, as recommended in guidance from the Massachusetts Clean Technology Center.

Mr. Putnam asked how far a failed WEF would throw a blade, and how far a rotating WEF would throw ice?

Ms. Christenberry said sensors in the WEF stop the rotation when ice is on the blades. She said blade throw could be any distance based on weather conditions.

Mr. Putnam said the Commission's MPS for setbacks should account for the worst-case scenarios such as catastrophic failure resulting in blade throw.

Ms. Argo said that based on the instances on record, a setback of 1.5 times tip height would be conservative setback even in the cases where there was a blade throw.

Mr. Graham said he was troubled by references to the *manufacturers' recommended fall zone*. He suggested the Commission should distance itself from any particular manufacturer.

Mr. Niedzwiecki said there may be instances where the manufacturers' recommended fall zone might be larger than 1.5 times the tip height. He said the proposed MPS would then allow the Commission to adopt that larger fall zone.

Mr. Richardson suggested it would be helpful for the Committee to have an idea of how many WEF failed, and if the fall zone had figured into this.

Mr. Niedzwiecki said Commission staff could provide some data on blade and ice throw incidents.

Ms. Brookshire said the proposed MPS should clarify that the fall zone could be larger than 1.5 times tip height depending on the manufacturers' fall zone.

Mr. Blanton said the setback should be from the property line as opposed to a structure.

Ms. Christenberry discussed the draft noise MPS. She said the proposed setback for noise would be 3,000 feet for all WEF of greater than 1 KW. She also said the noise study would be funded by the Applicant but reviewed by a third party. She said based on the study, the noise setback could be reduced.

Ms. Taylor questioned whether this would keep pace with the industry. She suggested the WEF may be at 80 feet, but double the energy output.

Mr. Niedzwiecki said this was part of working on how to classify the WEF for purposes of Commission review. He said some issues may be becoming less important, such as catastrophic collapse, but with a potential for an increase in other impacts. He said a Technical Bulletin could handle some of these issues.

Mr. Richardson recognized a member of the audience to make a comment.

Mr. Carl Freeman said the issues for the Commission to consider in its regulations were hub height, blade length and noise.

Ms. Brookshire asked what the setback of the Falmouth WEF was from the nearest residence? She said there had been noise concerns.

Ms. Christenberry said she believed it was 1,600 feet.

Mr. Niedzwiecki said a 3,000 foot setback for noise was rebuttable through a noise study. He said this would allow the Commission to consider different factors in different projects, such as a smaller WEF on a larger parcel.

Ms. Christenberry noted the value of a third party reviewed noise study, which presently does not exist in terms of regional regulation.

Mr. Niedzwiecki said WEF are similar in some respects to cell towers, in that the Commission has a third party cell review the Applicant's coverage information.

Mr. Putnam said the MPS should include a definite to be exceeded number of decibels. He noted the Falmouth WEF where there have been a significant number of complaints about audible and infrasound.

Mr. Niedzwiecki said this is still being discussed at the Town level. He said there was no consensus on what the decibel number should be at this point. He suggested this could be incorporated into a Technical Bulletin. Mr. Niedzwiecki said there were other factors to consider, including ambient/background noise, and that noise affects different people in different ways or not at all.

Mr. Putnam said there were also questions about radio interference.

Mr. Niedzwiecki said the standards needed to be flexible, so they could evolve as technology and information evolved. He noted that an emerging issue with WEF was one of economic justice given where they have been located relative to Census Tract data. He suggested it was key for the Commission to craft standards soon so that events would not overtake the Commission. He said the standard would allow the Commission to tailor the review to the project before it.

Mr. Richardson said it was important for the standards to remain flexible to account for changes in technology. He said specialists in the field would provide more information. He questioned whether WEF interfered with radio transmission.

Mr. Niedzwiecki said the issue was whether the Commission and staff could craft language to provide responsible regulation that remained current, or could be updated. He expressed confidence that the standards could remain flexible.

Mr. Blanton noted that it might be advisable not to tie the standard to a specific decibel level to account for variation in WEF technology and other factors.

Mr. Graham said the phrase *disinterested peer review* should be removed from the draft MPS. He said the language should *require a Commission approved consultant's review of the Applicant's noise study*. He said this would give the Commission the ability to review the study.

Ms. Brookshire raised the example of the Provincetown cell tower, where the Commission had a cellular consultant to review the Applicant's data.

Ms. Christenberry said the intent was to capture a situation similar to a wireless tower DRI review, where a consultant hired by the Commission using funds provided by the Applicant, reviews the Applicant's data and provides feedback to the Commission members.

Mr. Richardson asked for comments on the draft shadow flicker MPS.

Mr. McCormack asked why 30 hours was chosen as the cutoff for a requirement to limit shadow flicker?

Ms. Christenberry said shadow flicker mapping typically describes the potential range of shadow flicker a particular ring of area/properties around a WEF will receive in a given year. She said the range of shadow flicker relates to the location and duration of sunlight. She said the amount of shadow flicker experienced on a particular piece of property could be a little as 15 minutes a day for one day a month in the winter months over a year's span. She said staff could provide a sample shadow flicker map.

Ms. Taylor questioned if the desired limit was less than 10 hours per year that 10 hours should be the threshold.

Ms. Christenberry said the draft standard could be changed.

Mr. McCormack related his experience with the Country Gardens WEF and shadow flicker; in that the amount of shadow flicker could vary by the time of year, by parcel and could be a little as a few minutes a day.

Ms. Argo said 30 hours per year was not a very high amount of shadow flicker impact, given it was over 365 days. She said 10 hours per year was an extremely strict limit, and could result in the WEF being economically infeasible. She asked how this figure had been arrived at?

Mr. Putnam suggested that the limit should be zero shadow flicker impact. He said no person should be subjected to any amount of shadow flicker. He said the MPS should require that no property should be affected by shadow flicker.

Ms. Christenberry said the MPS required WEF that produced greater than 30 hours per year of shadow flicker would be required to submit a mitigation plan. She said one of the mitigation options in this plan could be turning the WEF off. She said requiring no shadow flicker impact to any property could result in WECFs being infeasible.

Mr. Richardson said there was also a benefit to alternative energy sources.

Ms. Brookshire said the MPS should describe an allowable range, and that beyond that range, there would be mitigation.

Ms. Christenberry said this was the intent of the draft language. She said the mitigation proposal could include turning the turbine off.

Mr. Freeman said most of the studies are performed assuming 365 days of sun. He said the other factor is the sun's angle. He noted the sun is lower in the sky in the winter, which may increase the amount and duration of shadow flicker. Conversely, he said the number of cloudy days in the winter might be greater, reducing shadow flicker. Mr. Freeman said 30-50 hours per year was the accepted range of hours of flicker. He said it may be only a few minutes of impact per year, and that it may also not affect a person.

Mr. Blanton asked what the other types of mitigation might be?

Ms. Christenberry noted the models assume a barren, unobstructed landscape. As such, a mitigation strategy might include vegetation planting. She said the topography would also need to be considered.

Ms. Brookshire noted the Hull turbine has few shadow flicker impacts to the school.

Ms. Argo said the owner of the Country Gardens WEF created her own shadow flicker mitigation plan to address concerns expressed by one abutter. She noted the cases of Hull and Portsmouth where there is shadow flicker, but the residences in question are not occupied during the times of the day when the shadow flicker occurs. She concurred it was a case-by-case basis.

Mr. Harris asked what the Country Gardens WEF mitigation plan was?

Ms. Argo said it is turning the WEF off for a particular part of the day on Saturdays in winter months when the shadow flicker moves off the site.

Attorney Wielgus said she said having the MPS specify what the mitigation would be would be helpful to Commission members in the case of weighing testimony and trying to make a decision on a project.

Mr. Richardson asked for comments on the draft decommissioning MPS.

Ms. Christenberry said this was a new standard, not proposed previously. She said it was based on comments received. She noted the length of the WEF not being operable and the requirement for security.

Ms. Brookshire asked how this could be enforced?

Attorney Wielgus said it could be specified the Commission's decision, perhaps prior to issuance of a Certificate of Compliance by the Commission. She said the Commission members could determine what an acceptable amount of money would be.

Mr. Blanton suggested it include an escalator to account for erosion in the value of the monies in escrow at the end of its usable life.

Ms. Taylor suggested it include an automatic annual increase, such as being tied to the Consumer Price Index.

Ms. Argo said decommissioning is a standard industry practice and as such should not be a burden.

Mr. Putnam said there are ways of accommodating an automatic escalator. He said the last sentence should be changed so removal of the WEF is the key. It should not be for the life of the WEF, so the security remains in effect until the installation is fully removed.

Mr. Blanton said it should also account for revegetating the site.

Attorney Wielgus said this would have to be specified.

Mr. Harris said there could be cases where the WEF was off-line for maintenance. He suggested the language should account for this by stating *120 consecutive days*.

Mr. Richardson agreed with Mr. Harris.

Mr. Richardson asked for comments on the proposed changes to the Community Character MPS HPCC2.3.

Ms. Rooney described the proposed changed language to account for WECFs.

Ms. Brookshire suggested the MPS language should be changed to *visual impact assessments shall be required as part of project reviews*.

Ms. Rooney said Ms. Brookshire's change would mean this MPS would apply to all DRIs. She said this was not necessary in certain cases, such as industrial buildings in industrial areas.

Ms. Christenberry suggested keeping may be required gives the Commission members flexibility to require an impact assessment.

Ms. Brookshire noted her experience with the Provincetown cell tower where a visual impact assessment was key.

Ms. Christenberry suggested the language could be changed, to be specific to wind turbines, where WEF would automatically be required to do the assessments.

Ms. Rooney said the need for a visual impact assessment on a project would probably be captured in the pre-application meeting. She questioned whether it would be necessary for all DRIs. She suggested describing a list of certain DRI types could also be problematic, in that some type of development might be missed.

Mr. Putnam suggested tying it back to whether or not the project complied with local zoning.

Ms. Rooney said the experience to date with the Ocean Management DCPC was that an Applicant would create a visibility map, and map sensitive areas, so that the Commission could judge whether or not it should be in the review.

Ms. Adams emphasized that the standard as drafted allowed the Commission members to require a visual impact assessment on all DRIs as the Commission members felt appropriate.

She emphasized this gave the Commission members more authority and the flexibility to respond to issues on all different types of DRIs.

Mr. McCormack said the language was appropriate as drafted.

Mr. Blanton said having that flexibility was crucial.

Mr. Putnam asked if staff had considered vertical spindle WEF in drafting the thresholds and standards?

Ms. Christenberry said the definition of WEF captured that concern.

Mr. McCormack asked about next steps?

Mr. Richardson said the Commission staff was going to provide some additional feedback.

Attorney Wielgus suggested the Committee move expeditiously to get something before the full Commission and to the Assembly in the near future.

The Commission members discussed the possible follow up meeting dates.

The Commission members agreed to meet again on January 10, 2011 at 10:00 AM at the Commission's office to continue discussion of the draft WEF thresholds and draft MPS.

2. Adjourn

Mr. Blanton moved to adjourn the Joint Committee meeting. Mr. DiGregorio seconded the motion. The Committee members voted unanimously to adjourn. Meeting adjourned at 12:37 PM.

Respectfully submitted,

Royden Richardson
Regulatory Committee Chair

Date

Respectfully submitted,

Peter Graham
Planning Committee Chair

Date

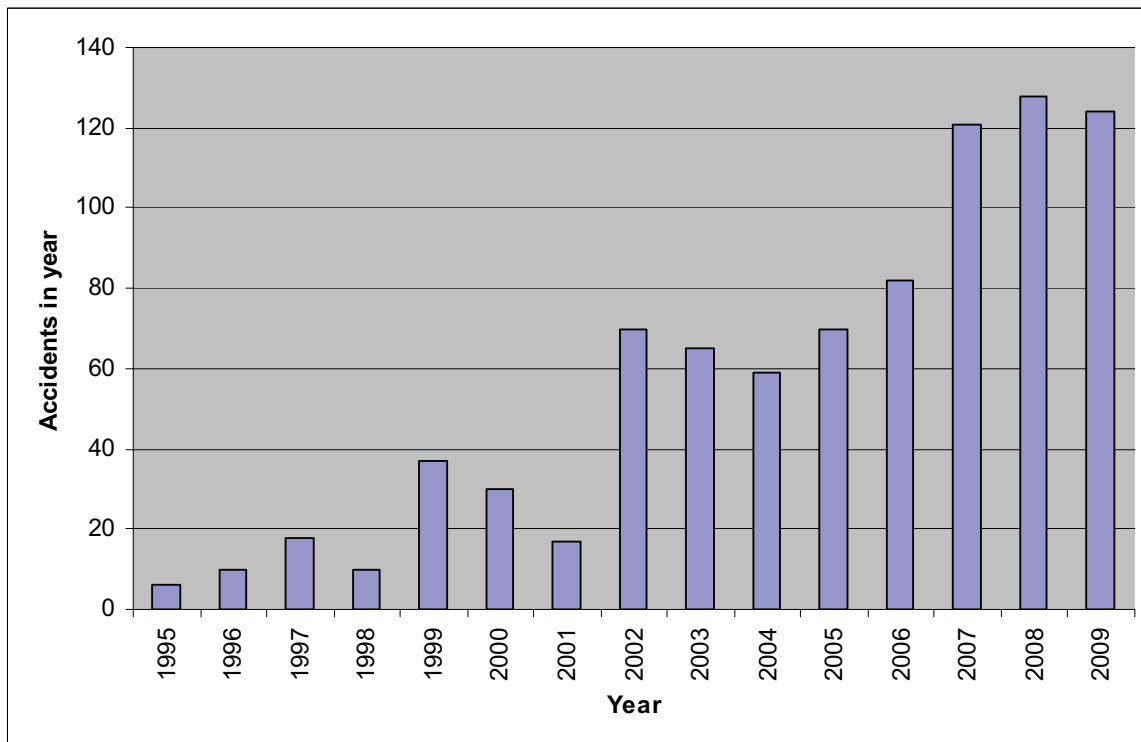
Summary of Wind Turbine Accident data to 30 September 2010

These accident statistics are copyright Caithness Windfarm Information Forum 2010. The data may be used or referred to by groups or individuals, provided that the source (Caithness Windfarm Information Forum) is acknowledged and our URL www.caithnesswindfarms.co.uk quoted at the same time. Caithness Windfarm Information Forum is not responsible for the accuracy of Third Party material or references.

The accompanying detailed table includes all documented cases of wind turbine related accidents which could be found and confirmed through press reports or official information releases up to 30 September 2010. CWIF believe that this compendium of accident information may be the most comprehensive available anywhere.

Data in the detailed table is by no means fully comprehensive – CWIF believe that it may only be the “tip of the iceberg” in terms of numbers of accidents and their frequency. However, the data gives an excellent cross-section of the types of accidents which can and do occur, and their consequences. With few exceptions, before about 1997 only data on fatal accidents has been found.

The trend is as expected – as more turbines are built, more accidents occur. Numbers of recorded accidents reflect this, with an average of 16 accidents per year from 1995-99 inclusive; 48 accidents per year from 2000-04 inclusive, and 105 accidents per year from 2005-09 inclusive. Indeed over the past three years (2007-09) the average has been 124 accidents per year.



This general trend upward in accident numbers is predicted to continue to escalate unless HSE make some significant changes – in particular to protect the public by declaring a minimum safe distance between new turbine developments and occupied housing and buildings (around 2km in Europe), and declaring “no-go” areas to the public, following the 500m exclusion zone around operational turbines imposed in France.

Detailed data is presented chronologically. It can be broken down as follows:

Number of accidents

Total number of accidents: 945

By year:

Year	70s	80s	90-94	95-99	00	01	02	03	04	05	06	07	08	09	10*
No.	1	9	17	81	30	17	70	65	59	70	82	121	128	124	71

**2010 to 30 September 2010 only*

Fatal accidents

Number of fatal accidents: 65

By year:

Year	70s	80s	90-94	95-99	00	01	02	03	04	05	06	07	08	09	10*
No.	1	8	8	7	3		1	4	4	3	5	4	9	5	3

**2010 to 30 September 2010 only*

Please note: **There are more fatalities than accidents as some accidents have caused multiple fatalities.**

Of the 71 fatalities:

- 50 were wind industry and direct support workers (maintenance/engineers, etc), or small turbine owner /operators.
- 21 were public fatalities, including workers not directly dependent on the wind industry (e.g. transport workers).

Human injury

74 accidents regarding human injury are documented.

By year:

Year	70s	80s	90-94	95-99	00	01	02	03	04	05	06	07	08	09	10*
No.			2	3	4	1	2	2	2	6	10	14	15	7	6

**2010 to 30 September 2010 only*

61 accidents involved wind industry or construction/maintenance workers, and a further 13 involved members of the public or workers not directly dependent on the wind industry (e.g. transport workers). Five of these injuries to members of the public were in the UK.

Blade failure

By far the biggest number of incidents found was due to blade failure. "Blade failure" can arise from a number of possible sources, and results in either whole blades or pieces of blade being thrown from the turbine. A total of 199 separate incidences were found:

By year:

Year	70s	80s	90-94	95-99	00	01	02	03	04	05	06	07	08	09	10*
No.			3	32	4	6	15	13	15	12	16	22	20	25	16

**2010 to 30 September 2010 only*

Pieces of blade are documented as travelling up to 1300 meters. In Germany, blade pieces have gone through the roofs and walls of nearby buildings. This is why CWIF believe that there should be a minimum distance of at least 2km between turbines and occupied housing, in order to adequately address public safety and other issues including noise and shadow flicker.

Fire

Fire is the second most common accident cause in incidents found. Fire can arise from a number of sources – and some turbine types seem more prone to fire than others. A total of 152 fire incidents were found:

By year:

Year	70s	80s	90-94	95-99	00	01	02	03	04	05	06	07	08	09	10*
No.			1	5	3	2	24	17	15	14	12	21	17	16	5

**2010 to 30 September 2010 only*

The biggest problem with turbine fires is that, because of the turbine height, the fire brigade can do little but watch it burn itself out. While this may be acceptable in reasonably still conditions, in a storm it means burning debris being scattered over a wide area, with obvious consequences. In dry weather there is obviously a wider-area fire risk, especially for those constructed in or close to forest areas and/or close to housing. Two fire accidents have badly burned wind industry workers.

Structural failure

From the data obtained, this is the third most common accident cause, with 107 instances found. "Structural failure" is assumed to be major component failure under conditions which components should be designed to withstand. This mainly concerns storm damage to turbines and tower collapse. However, poor quality control, lack of maintenance and component failure can also be responsible.

By year:

Year	70s	80s	90-94	95-99	00	01	02	03	04	05	06	07	08	09	10*
No.		1	1	13	9	3	9	7	4	7	9	13	9	16	6

**2010 to 30 September 2010 only*

While structural failure is far more damaging (and more expensive) than blade failure, the accident consequences and risks to human health are most likely lower, as risks are confined to within a relatively short distance from the turbine. However, as smaller turbines are now being placed on and around buildings including schools, the accident frequency is expected to rise.

Ice throw

31 incidences of ice throw were found. Some are multiple incidents. These are listed here unless they have caused human injury, in which case they are included under “human injury” above.

By year:

Year	70s	80s	90-94	95-99	00	01	02	03	04	05	06	07	08	09	10*
No.				9			2	2	4	4	3		3	4	

**2010 to 30 September 2010 only*

Ice throw has been reported to 140m. Some Canadian turbine sites have warning signs posted asking people to stay at least 305m from turbines during icy conditions.

These are indeed only a very small fraction of actual incidences – a report* published in 2003 reported 880 icing events between 1990 and 2003 in Germany alone. 33% of these were in the lowlands and on the coastline.

* (“A Statistical Evaluation of Icing Failures in Germany’s ‘250 MW Wind’ Programme – Update 2003, M Durstwitz, BOREAS VI 9-11 April 2003 Pyhänturi, Finland.)

Additionally one report listed for 2005 includes 94 separate incidences of ice throw and two reports from 2006 include a further 27 such incidences.

Transport

There have been 64 reported accidents – including a 45m turbine section ramming through a house while being transported, a transporter knocking a utility pole through a restaurant, and a turbine section falling off in a tunnel. Transport fatalities and human injuries are included separately. Most accidents involve turbine sections falling from transporters, though turbine sections have also been lost at sea, along with a £50M barge. Two turbine sections fell from main roads in Scotland.

By year:

Year	70s	80s	90-94	95-99	00	01	02	03	04	05	06	07	08	09	10*
No.							4		3	6	6	19	10	11	5

**2010 to 30 September 2010 only*

Environmental damage (including bird deaths)

80 cases of environmental damage have been reported – the majority since 2007. This is perhaps due to a change in legislation or new reporting requirement. All involved damage to the site itself, or reported damage to or death of wildlife. 31 instances include confirmed deaths of protected species of bird.

By year:

Year	70s	80s	90-94	95-99	00	01	02	03	04	05	06	07	08	09	10*
No.			1			1	1	7	1	6	5	10	21	13	14

**10 to 30 June 2010 only*

Other (miscellaneous)

173 miscellaneous accidents are also present in the data. Component failure has been reported here if there has been no consequential structural damage. Also included are lack of maintenance, electrical failure (not led to fire or electrocution) and planning "accidents" where towers have been installed closer than permitted to housing, etc. Construction and construction support accidents are also included, also lightning strikes when a strike has not resulted in blade damage or fire. A separate 1996 report** quotes 393 reports of lightning strikes from 1992 to 1995 in Germany alone, 124 of those direct to the turbine, the rest are to electrical distribution network.

** (Data from WMEP database: taken from report "External Conditions for Wind Turbine Operation – Results from the German '250 MW Wind' Programme", M Durstewitz, et al, European Union Wind Energy Conference, Goeteborg, May 20-24, 1996)

By year:

Year	70s	80s	90-94	95-99	00	01	02	03	04	05	06	07	08	09	10*
No.			1	12	7	4	12	13	11	12	16	18	24	27	16

**2010 to 30 September 2010 only*

Caithness Windfarm Information Forum
30 September 2010

MWCC Gardner, MA: Flicker Envelope

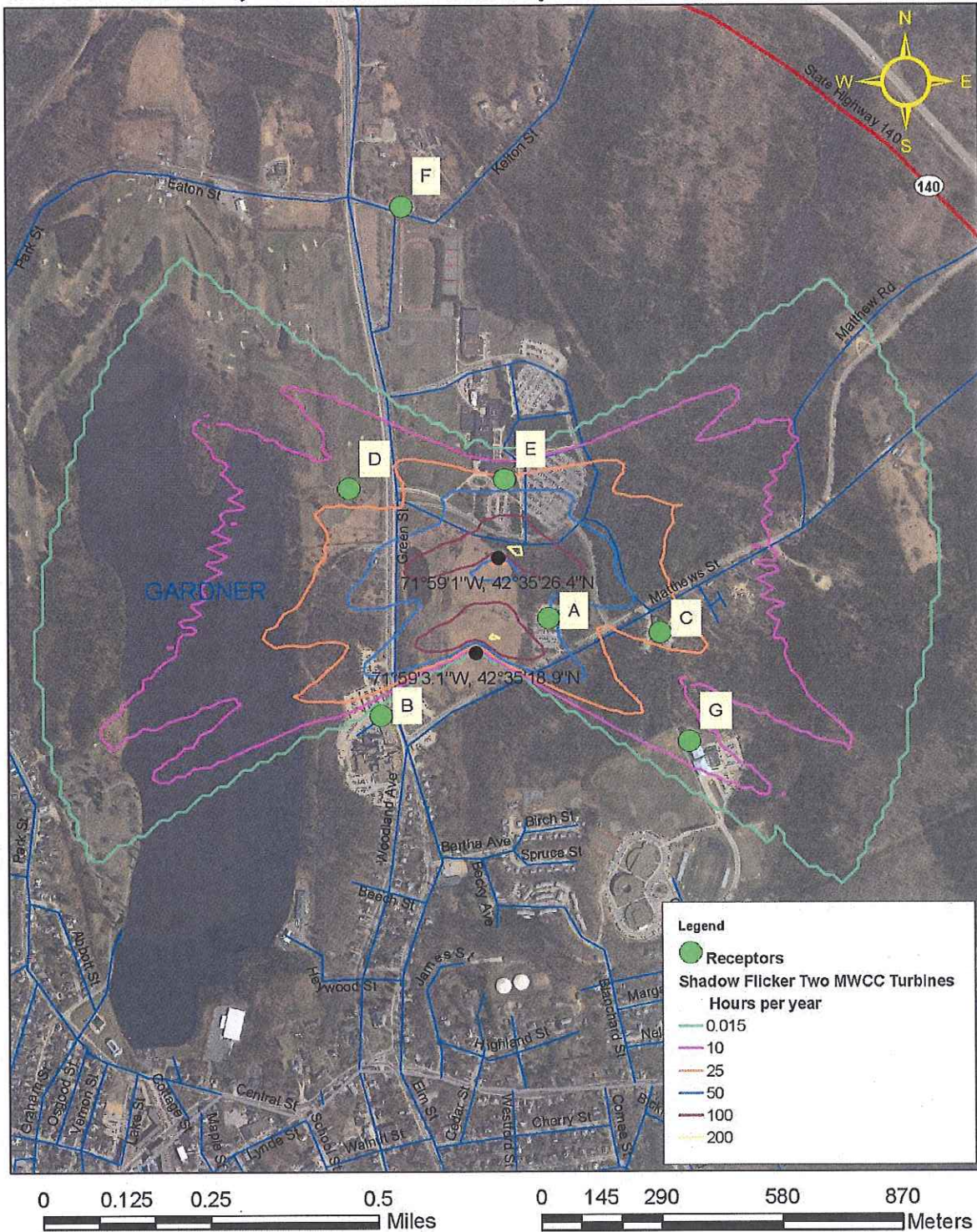


Figure 3: This figure shows an orthophotograph of MWCC turbine site with isolines showing estimated shadow flicker in hours/year. Regions inside the purple line feature expected values for shadow flicker duration of at least 10 hour per year. Receptor A (Courthouse) shown on the map above, features an expected value of 53 hours and 7 minutes (value found in Table 4).

Joint Planning & Regulatory Committee Meeting
January 3, 2011
Land-Based Wind Threshold & Standards
Literature Review

The information listed in this literature review is not intended to be a comprehensive summary of the materials researched by, and submitted to, Cape Cod Commission staff to date on this topic. The studies and information represented here were the most informative in developing the proposed standards and threshold.

Journal Articles, Reports, Studies & White Papers

1. Rogers, Manwell and Wright (2002, amended 2006). Wind Turbine Acoustic Noise, UMASS Amherst RERL.
2. Colby, Dobie, Leventhall, Lipscomb, McSunney, Seilo, et al. (2009). Wind Turbine Sound and Health Effects: An Expert Panel Review. American Wind Energy Association, Canadian Wind Energy Association.
3. Hoen, Wiser, Cappers, Thayer and Sethi (2009). The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis. Berkeley National Laboratory – Environmental Technologies Analysis.
4. Public Health Impacts of Wind Turbines, Minnesota Department of Health – Environmental Health Division, May 22, 2009.
5. Punch, James and Pabst, Wind Turbine Noise: What Audiologists Should Know, p. 20. Audiology Today. Jul/Aug 2010.
6. Cummings, Wind Farm Noise: 2009 in Review. Research, public concerns, and industry trends. Acoustic Ecology Institute, February 2010.
7. Salt & Hullar, Responses of the Ear to Low Frequency Sounds, Infrasound and Wind Turbines. Washington University School of Medicine, Dept. of Otolaryngology. June 2010.
8. Simple Guidelines for Siting Wind Turbines to Prevent Health Risks. Presented at Noise-CON 2008 in Dearborn, Michigan by George Kamperman and Richard James of Kamperman Associates, Inc., and E-Coustic Solutions, respectively.

Webinars

1. Midsize Wind Turbines for the U.S. Community Wind Market. U.S. DOE/EERE Technical Assistance Program webinar, April, 2010.

2. Understanding the Impacts of Wind Turbine Sound. Mark Bastasch, CH2M Hill; Jim Cummings, Acoustic Ecology Institute; Ken Kaliski, Resource Systems Group, July 13, 2010.
3. Wind Power's Impact on Grid Reliability, Backup Supply, and Fossil Fuel Use in New England. NEWEEP, October 26, 2010.

Industry Information

1. Utility Scale Wind Energy & Sound, American Wind Energy Association online fact sheet, www.awea.org. (accessed May 5, 2010).
2. Wind Power Myths vs. Facts, American Wind Energy Association online fact sheet, www.awea.org. (accessed May 12, 2010).

Other

1. Massachusetts Senate bill – 2260 “Wind Energy Siting Reform Act”, 2010.
2. Jackie Wildes-Beebe, Wellfleet Board of Selectmen, open letter re; proposed Wellfleet wind turbine, March, 2010.
3. Falmouth Board Health Wind Turbine Noise Regulation (DRAFT), October 19, 2010. Submitted by Christopher Senie.
4. McNamara, Draft Falmouth, MA ARTICLE XXXIV Wind Turbines (§ 240-166), November 18, 2010.
5. MassDEP Noise Control Regulation (310 CMR 7.10).
6. Martha’s Vineyard Commission, Island Wind DCPC Planning - DRAFT Regulations, December, 2010.
7. Public Testimony - August 19, 2010 Cape Cod Commission meeting (public hearing)
8. Public Testimony – October 20, 2010 Assembly of Delegates Committee on Government Regulations meeting (public hearing)
9. Public Testimony – November 3, 2010 Assembly of Delegates Committee on Government Regulations meeting (public hearing cont’d).
10. Public Testimony – November 17, 2010 Assembly of Delegates Meeting

DRAFT Outline
**Guidelines for Compliance with Wind Energy Conversion Facility Projects as
Developments of Regional Impact**
Technical Bulletin # 10-002

Introduction

Purpose

Definitions

Applicability of Standards

Application Requirements

MPS – Clear Area

 Fall zone

 Manufacturer specifications

MPS – Noise (note: MVC has draft sound regs - through DCPC- we can use to add specifics)

 Setbacks

 Developing a noise study

 Audible sound limits

 Ambient noise levels

 Amplitude modulation

 Tonal sounds

 Low frequency sound limits

 Sound measurements

 Sensitive receptors

 Prevailing winds

 Seasonal factors

 Mitigation

 Operational controls

 Waivers

MPS – Shadow Flicker

 Developing a shadow flicker study

 Degree of Impacts

 Operational Controls

 Mitigation

MPS – Decommissioning

 Abandonment

 Bonding (or another form of surety?)

MPS – Visual Impacts Assessment

Special Regulations

 Monitoring and maintenance

 Dimensional requirements

 Open space

 Historic resource buffers

 Lighting and signage

 Scenic landscapes and vistas

 Habitat Protection/Mitigation

 Avian and Bat monitoring requirements

 Hazardous materials

 Proliferation

Appendix: Definitions, goals and standards

