

**4.2 Viewpoint 4 - Repower 5MW (80 turbines)**

**Repower 5MW radials**

The visual impact of the turbines is comparable to the impact described for the Siemens 2.3 in terms of coverage; however, the turbines are higher and appear more visible.

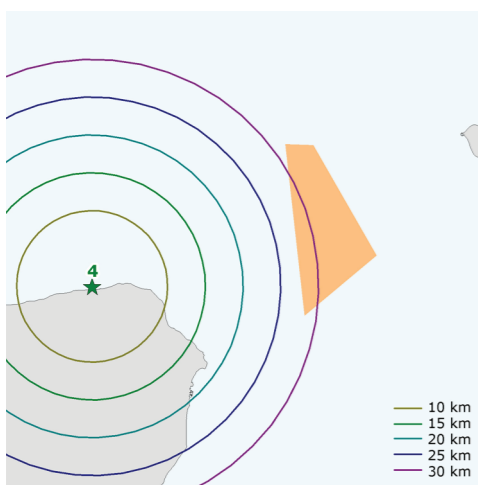
The bigger distance between the turbines gives a lighter expression, compared to the Siemens turbines, but nevertheless the turbines appear more visible due to their height and result in a larger visual impact.

The transformer platform is not visible due to the distance.



**Repower 5MW arcs**

The visual impact of the turbines placed in arcs is comparable to the impact of the radial layout as described above.



## 5. VISUALIZATIONS FROM FERRY

### 5.1 Viewpoint 5 - Siemens 2.3 MW (174 turbines)

#### Siemens 2.3 MW radials

The turbines can be seen from a very short distance at sea, in this case from the ferry between Anholt and Djursland.

From this angle it is possible to see all the way through the wind farm since the turbines stand in straight lines. This way the geometry is easily recognisable.

The transformer platform is visible behind the turbines. The visual impact of the platform is small due to its size and the scale of the turbines.

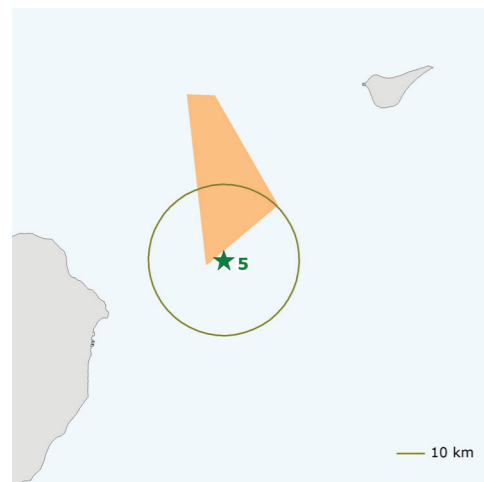
*Closest visible turbine on this visualization is at a distance of 1832 meters.*

#### Siemens 2.3 MW arcs

The turbines in the arc layout are placed a bit further to the north east, and the layout is more compact. Therefore the wind farm covers a smaller part of the horizon. From this position the wind farm appears like one unit, since the turbines are spread evenly.

Even though the wind farm appears like one unit it is difficult to recognise the geometry of the layout. In this case the transformer platform appears like a single element outside the wind farm. The visual impact is still relatively small due to the size of the platform.

*Closest visible turbine on this visualization is at a distance of 3564 meters.*



**5.2 Viewpoint 5 - Repower 5MW (80 turbines)**

**Repower 5MW radials**

From this viewpoint the geometry in the layout is very clear which gives a calm and homogenous impression, even though the distances between the turbines are large.

The turbines are clearly bigger compared to the Siemens 2.3. There are fewer turbines and the distance between them is larger.

The transformer platform is visible behind the turbines. The difference in scale between the transformer and the turbines is considerable and the transformer does not appear dominant.

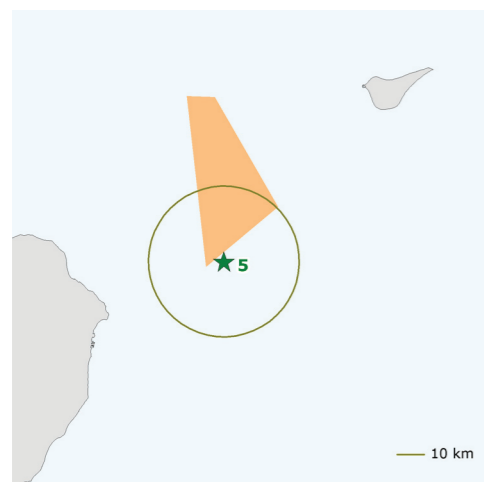
*Closest visible turbine on this visualization is at a distance of 1462 meters.*

**Repower 5MW arcs**

Seen from this viewpoint the border of the layout is well defined, whereas the turbines seem more scattered in the centre of the layout, due to the larger distance between them.

The visual impact of the turbine is equivalent to the impact in the radial layout.

*Closest visible turbine on this visualization is at a distance of 3558 meters.*



## 6. VISUALIZATIONS FROM FORNÆS

### 6.1 Viewpoint 6 - Siemens 2.3 MW (174 turbines)

#### Siemens 2.3 MW radials

The visual impact of the wind farm seen from this point on the coast of Djursland is estimated to be large. The horizon is covered with turbines which makes a great impact compared to the unspoiled view of the sea which is one of the values today.

The visualization does not show the whole extent of the wind farm - however, the wind farm will cover most of the panoramic view seen from this point.

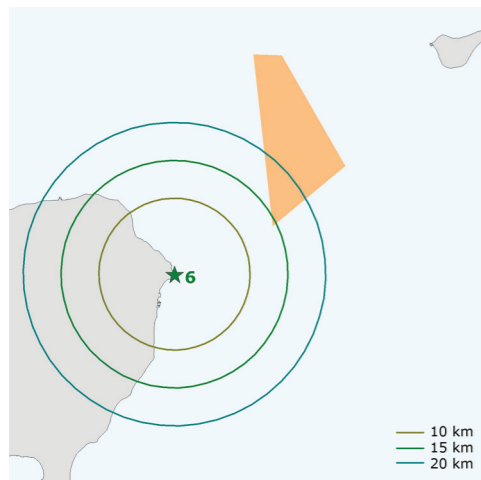
The layout of the turbines results in views through the farm in some sections, which makes the geometry recognisable. However, it also divides the farm visually.

The transformer platform is visible as a small bow in front of the turbines, but does not appear dominant.



#### Siemens 2.3 MW arcs

The visual impact does not differ significantly from the impacts described for the radial layout above.



**6.2 Viewpoint 6 - Repower 5MW (80 turbines)**

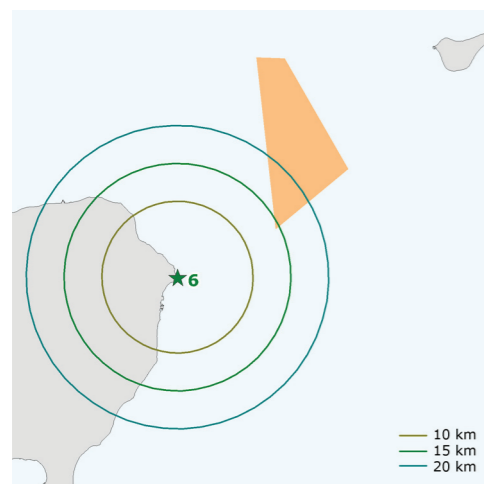
**Repower 5MW radials**

The visual impact of the turbines is comparable to the impacts of the Siemens 2.3. The larger turbines appear more dominant. However, the larger distance between the turbines, and the smaller amount of turbines, gives the wind farm a lighter expression.



**Repower 5MW arcs**

The visual impact does not differ significantly from the impacts described for the radial layout above.



## 7. VISUALIZATIONS FROM GRENAA

### 7.1 Viewpoint 7 - Siemens 2.3 MW (174 turbines)

#### Siemens 2.3 MW radials

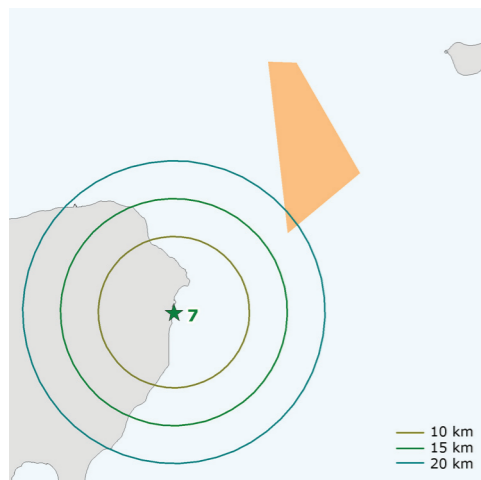
Seen from the harbour in Grenaa behind the Kattegat Center, the wind farm is very visible, since the turbines cover most of the horizon.

However, the landscape in this area is less sensitive towards visual changes due to the existing element in the foreground. These elements attract some of the visual attention making the wind farm seem less dominant.



#### Siemens 2.3 MW arcs

The visual impact differs slightly from the impacts of the wind farm in the radial layout, since the turbines appear a bit smaller due to the larger distance to the southern part of the farm. Therefore the impact is somewhat smaller.



**7.2 Viewpoint 7 – Night, Siemens 2.3 MW (174 turbines)**

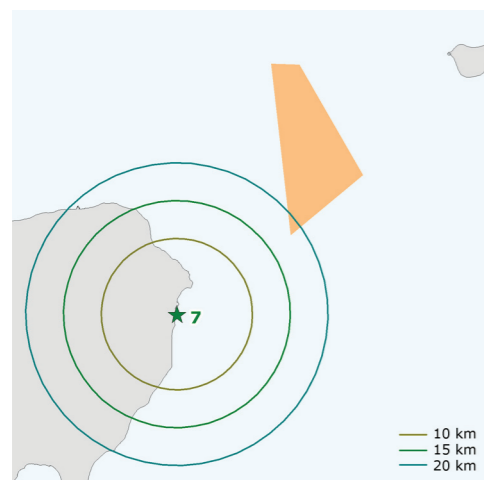
**Siemens 2.3 MW radials**

Seen from the coast of Djursland the lights are more visible than seen from Anholt, due to the shorter distance.

The lights on the turbines can be seen from the harbour but they are not estimated to result in a large visual impact due to the existing conditions on the harbour where the environment is influenced by other elements. Under some conditions the street lights will be turned on at the harbour making the turbines appear less dominantly.

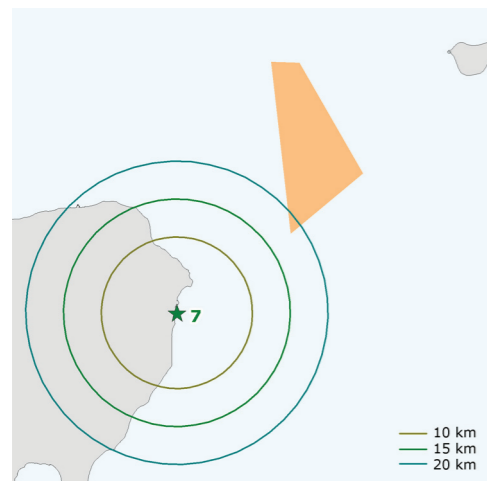
Seen from other points on the harbour with less elements in the foreground, the turbines may appear more dominant.

The transformer platform is not visible from this viewpoint and is not estimated to be visible from Grenaa at night.



**Siemens 2.3 MW arcs**

The impact of wind farm in the arc layout is comparable to the impacts of the wind farm in a radial layout during night.





### 7.3 Viewpoint 7 - Repower 5MW (80 turbines)

#### Repower 5MW radials

The visual impact from the larger turbines is large. As in the case of the Siemens 2.3 they cover most of the horizon.

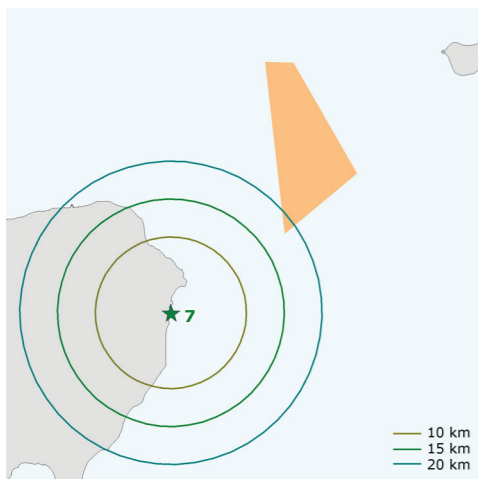
The larger distance between the turbines results in more open space giving a lighter expression – however, it also makes the turbines look more scattered rather than as one unit.



#### Repower 5MW arcs

The visual impact of the wind farm in the arc layout is comparable to the impact of the radial layout. However, the impact is slightly smaller due to the larger distance to the turbines in the southern part of the wind farm (right hand side of photo).

Compared to the Siemens 2.3 the impact is larger due to the size of the turbines which makes them appear closer.



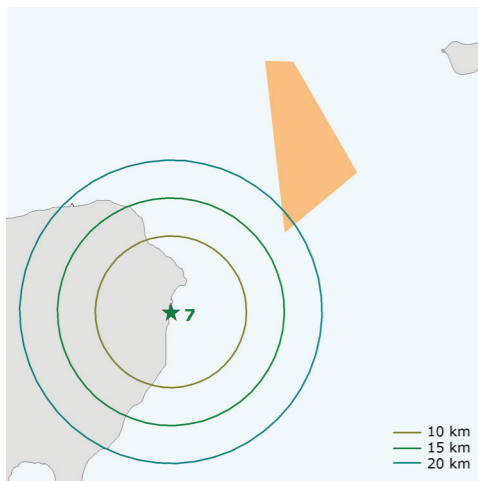
#### 7.4 Viewpoint 7 – Night, Repower 5MW (80 turbines)

##### Repower 5MW radials

Seen from the coast of Djursland the lights are more visible than on Anholt, due to the shorter distance.

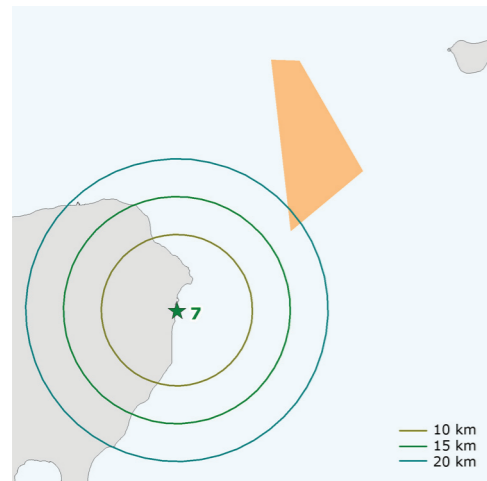
The only visible element at night are the lights, whereas you can see the whole of the turbine at day – as a result the two turbines look nearly the same during night, which makes the number of turbines decisive in terms of visibility. As a consequence the Repower turbines may seem less dominant compared to the smaller turbines due to the fewer number of turbines and thereby fewer lights. However, the wind farm as a whole may seem more dominant due to the stronger blinking lights. All in all the wind farm consisting of larger turbines is estimated to appear more dominant.

The transformer platform is not visible from this viewpoint and is not estimated to be visible from Grenaa at night.



**Repower 5MW arcs**

The impact of the wind farm in the arc layout is comparable to the impacts of the wind farm in the radial layout during night.



## 8. SUMMARIZED IMPACTS

The visual impacts are summarized in the following.

### 8.1 General

#### Weather conditions

The weather conditions are an important factor in estimating the visual impacts, since the turbines may not be visible under poor weather conditions. This fact reduces the visual impact in certain periods. However, it is estimated that a wind farm of this size still results in significant visual changes of the landscape even though the impact decreases under some weather conditions.

#### Layouts

The wind farm is covering a large part of the horizon seen from the coasts of Djursland and Anholt resulting in a large visual impact - especially when the wind farm is viewed from the most sensitive and open landscapes along the coasts. The visualizations do not show the whole extent of the wind farm - however, the wind farm will cover most of the unspoiled panoramic views in particular seen from the western beaches at Anholt and from the open coastal landscapes on Djursland, for instance at Fornæs.

The layouts differ in degree of impact. The turbines in the arc layout are placed further east in the southern part of the project area which locates them a bit closer to the coast of Anholt and further away from Grenaa compared to the radial layout. This fact is not seen as a significant factor in estimating the overall visual impact. However, the smallest impact is in general seen using the arc layout since it covers a smaller area, seen from the coasts of Djursland and Anholt.

#### Turbines

The visual impact also highly depends on the choice of turbine. By choosing a smaller turbine the wind farm will appear more compact since it is necessary to place a larger number of turbines in order to create the same power. By choosing a larger turbine the expression of the wind farm may appear lighter since there is a larger distance between the turbines. However, the turbines appear closer to the coast due to the height.

There are different regulations regarding lighting of the turbines determined by the height. By choosing a turbine at a total height of more than 150 it may be required to use stronger white blinking lights. This way the wind farm consisting of larger turbines may appear more dominant.

### 8.2 Djursland

The coastal landscapes all the way from Bønnerup to Grenaa are sensitive towards visual impacts due to their qualities regarding geology, characteristic landscapes, recreational and cultural value. A very important part of the experience of the coastal landscape is the relation to the sea. Apart from a relatively small location around Bønnerup where you can see some existing turbines on the harbour, the actual view of the sea is unspoiled. In Grenaa the landscape is in some areas dominated by buildings and large elements on the harbour which implies that the area is less sensitive towards visual changes. However, the overall visual impact on the coastal landscape between Bønnerup and Grenaa is large.

Table 8-1 Overall significance of the visual impacts on Djursland.

Impact	Intensity of effect	Scale/geographical extent of effect	Duration of effect	Overall significance of impact
Visual impact on the landscape on Djursland	Large	Regional	Long term	Significant

### 8.3 Anholt

The landscape on Anholt is also very sensitive towards visual impacts from elements on the sea. The island is characterized by unique sandy beaches, dunes and cliffs. On the small island the relation to the sea plays an important role in the experience of the landscape.

Table 8-2 Overall significance of the visual impacts on Anholt.

Impact	Intensity of effect	Scale/geographical extent of effect	Duration of effect	Overall significance of impact
Visual impact on the landscape on Anholt	Large	Regional	Long term	Significant

### 8.4 Seascape

The impact on the seascape is estimated to be moderate rather than significant, even though it's possible to view the turbines from a very short distance. The reason behind this is that the seascape is considered to be less sensitive towards visual changes due to the larger scale at sea. Furthermore the sensitivity is measured by estimating the importance of the view which is being changed. From a point on shore the whole horizon can be changes dramatically, whereas it's different at sea, because the viewer is constantly moving. This way the visual impact may seem less dominant.

Table 8-3 Overall significance of the visual impacts at sea.

Impact	Intensity of effect	Scale/geographical extent of effect	Duration of effect	Overall significance of impact
Visual impact on the seascape	Large	Regional	Long term	Moderate

Table 8-4 Summarized effects and significance.

Impact	Overall significance of impact	Significance rating for the assessment
<b>VISUAL IMPACT</b>	Significant	3
<i>Impacts on the landscape on Djursland</i>	Significant	3
<i>Impacts on the landscape on Anholt</i>	Significant	3
<i>Impacts on the seascape</i>	Moderate	3

## 9. REFERENCES

- /1/ Birk Nielsen, *Fremtidens havvindmølleplaceringer 2025 – en vurdering af de visuelle forhold ved opstilling af store vindmøller på havet, Energistyrelsen 2007*
- /2/ Danish Nature & Environment Portal, <http://kort.arealinfo.dk/>
- /3/ <http://extra.geus.info/web/nm-grundvand-gjerrild-klint.htm>
- /4/ <http://www.gonaturgeografi.dk/2jordensoglivetshistorie/feltarbejde/karlbyklint/>
- /5/ <http://www.naturcenterfjellerup.dk/karlby.htm>
- /6/ <http://www.blst.dk/Landskab/GeologiskeInteresser/RegionMidtjylland/39.htm>
- /7/ <http://www.visitdjursland.com/international/en-gb/menu/turist/inspiration/beaches/beaches.htm>
- /8/ Rambøll 2009, "Method for Impact Assessment (May 2009)"
- /9/ DMI (Danmarks Meteorologiske Institut) (2007): *Sigtbarhedsstatistik 1996 – 2006. Rapport til Energistyrelsen.*

## 10. APPENDIX

Appendix 1: EMD International A/S 2009, Visualization of the offshore wind farm Anholt, Denmark



