

18 Air Quality

18.1 Introduction

Air quality is an important area of the environment, especially from a human interaction point of view, but equally for all air breathing animals. In Guernsey over the last 28 years data on NO₂ (Nitrogen Dioxide) has been collected, initially at 5 sites around Guernsey and since 1995 at 10 sites. These include urban and rural areas and roadside and background areas, which are sampled monthly. This information is directly comparable to that available in the UK, and annual averages are published in the “Guernsey Facts and Figures” booklets. Guernsey also has an ‘Air Quality in Guernsey, Screening and Assessment Document’ which was released in March 2010.

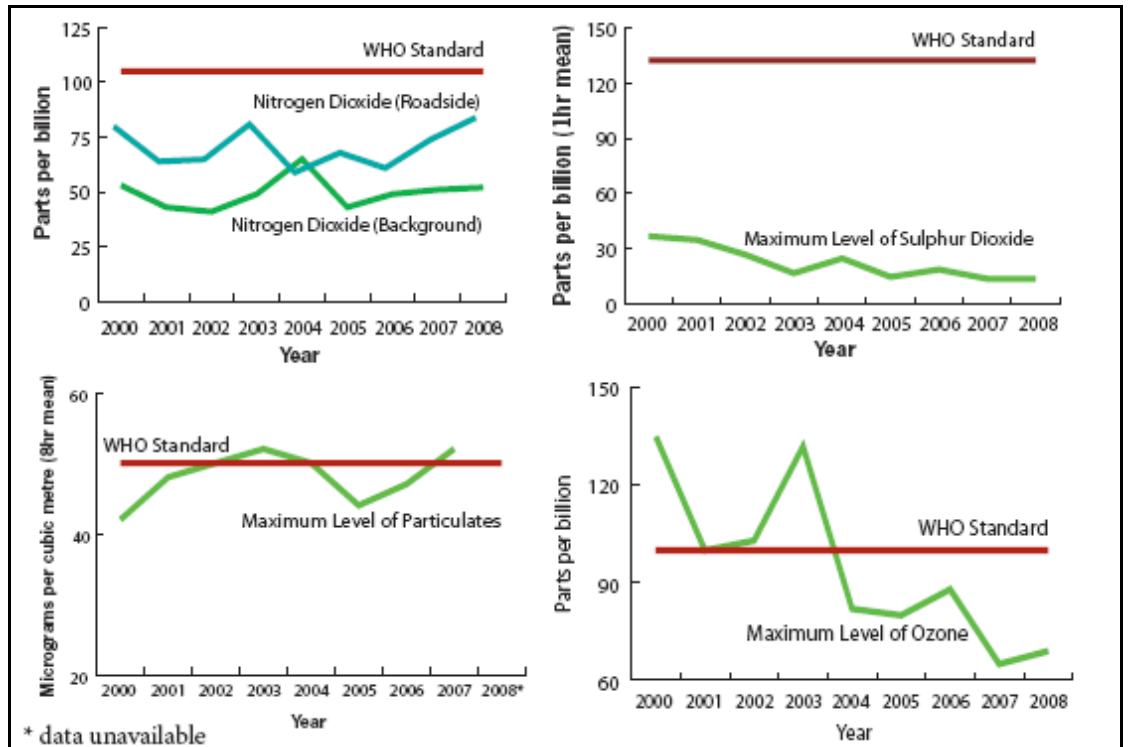
18.2 Baseline Environment

Air quality is adjudged based on a number of factors, mainly the levels of Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂), Ozone (O₃), Carbon Monoxide (CO) and Particulate Matter (PM) in the air that we breathe (DEFRA Air Pollution : What it means for your health 2002). The World Health Organisation (WHO) published global air quality guidelines in 2005 which are designed to support the implementation of countries individual targets regarding air quality. Air quality standards are set by each country to protect public health and the standards will vary according to a nations approach to balancing the health risks and technological feasibility along with various other political and social factors. In the UK the results are averaged out throughout the year for an annual report giving a graph over the previous years of records for the mean and 98th percentile values, and these are then compared to the WHO guideline values. There is also information given on hourly samples over the year at specific sites. Guernsey currently follows the UK standards; however there are plans, within the next year, to introduce an air quality management regime which is to be implemented by Ordinance under the Environmental Pollution Law.

The Information that Guernsey collects is directly comparable to the UK for the aforementioned air quality identifiers, however the annual reporting in “Guernsey Facts and Figures” only gives the annual maximum levels of NO₂, SO₂, PM and O₃. This reported information on its own is not particularly useful for the analysis of air quality in Guernsey and the Bailiwick; however with the additional information from the Health and Social Services Department (States of Guernsey) and the ‘Air Quality in Guernsey, Screening and Assessment Document’ a reasonable assessment of Guernsey’s air quality can be reached. The sampling undertaken in Guernsey has a variety of sources in both urban and rural areas, including roadside and non roadside areas. As can be seen from the figures below, generally Guernsey performs well compared the WHO guidelines, with in 2009 only occasional peaks above general low levels. It is thought that most of Guernsey’s air impurities come

from road travel, especially as Guernsey has a disproportionately high number of cars per capita compared with other nations. However, there are also other sources of pollutants, with part of Guernsey's and all of Sark's electricity being generated by combustions power stations, flights to and from the island, gas and oil burning for home use and dust from construction and building works.

Figure 18.2.1 – Historic Pollutant Levels (image – Guernsey Facts and Figures 2009)



There is no information for the air quality in Bailiwick waters off Island unfortunately. However the main sources of particulates and other impurities are likely to be from marine traffic including the fishing fleet, pleasure craft and heavy vessels such as the car ferry. There is also the possibility that terrestrial influences will be transported out to sea on the wind, so this may also affect air quality in the marine environment. Air travel would also contribute as this takes place above the marine environment, although this would only be a negligible contribution due to the dispersion and height of the planes.

18.3 Potential Effects

The potential effect on air quality both in the marine environment and in the terrestrial environment depends very much upon the lifecycle stage of the deployment. In deployment and decommissioning it is likely that the effects will be negative on air quality, however throughout the operational phase of the devices life there is likely to be a positive effect.

18.3.1 *Deployment*

During the deployment phase there would be an increase in marine traffic in the REA area, whether based in Guernsey or coming from France. This in itself would increase that amount of pollutants being released in the Bailiwick and so would have the effect of net reduction in air quality over the whole area. These pollutants would primarily take the form of increased boat exhaust fumes such as CO, CO₂, and various nitrous oxides (NO_x). These would represent only a small increase in total ambient air quality over the water and possibly land, although the overall significance of this would require monitoring to identify. Of the emissions, Carbon Monoxide and Nitrogen Dioxide are monitored, so only these could be assessed for impact. Should there be land based operations occurring in Guernsey then this may also increase the likely-hood of onshore transport and works occurring. This would also have the potential to reduce air quality.

Should any of the final construction take place on Guernsey, specifically involving industrial practices, then there is a further potential for increased industrial work to impact upon air quality. There is also the possibility of increased dust coming from any onshore work conducted as part of the development such as onshore cabling.

18.3.2 *Operation*

During the operation phase, with everything working well, there will be no adverse effects anticipated on air quality from either wave or tidal devices. In fact it is very likely that there would be a number of positive effects relating from the production of electricity without combustion.

- The introduction of non combustion power can reduce the use of the on island generators, increasing air quality.
- The introduction of “no go zones” around the arrays may reduce boating traffic in the Bailiwick, which in turn could increase air quality.

The amount of reduction of combustion due to reducing the use of on island generators will depend on the amount of electricity produced by the devices, which is dependent on the number of devices deployed and their efficiency against

their rated power in the waters in the Bailiwick, and how much of it comes to Guernsey. If more electricity is exported than comes ashore, and the on island generators continue to be used then there may not be any net benefit to the ambient air quality.

The no go zones created may have an alternative effect, rather than reducing the amount of boating and therefore emissions, it could just cause a displacement of boating activity. If this were to remain in the Bailiwick waters then there would be no benefit, if the boating activity was removed from the Bailiwick then there would be a local improvement in air quality, but no overall improvement.

18.3.3 Maintenance

During the operation phase there is likely to be times when the devices need maintenance, either as part of a regular plan to ensure smooth running of operations, or when something goes wrong and needs rectifying. This would have the potential to reduce air quality due to increased shipping.

18.3.4 Decommissioning

During the decommissioning phase there will once again be increased shipping in the area which would lead to increased emissions from engines.

18.4 Sensitivity of receptors

The main receptor to changes in air quality is the human environment on land. The other receptors are other air breathing animals such as birds in the area and air breathing marine mammals. In humans it has been suggested that the increase in allergies and respiratory diseases such as asthma is linked to an increase of pollutants in the air. This would suggest that humans are sensitive to changes in air quality, and improving air quality may well increase the quality of life for individuals.

There have been few studies performed on how atmospheric pollutants affect natural populations, although there has been relatively extensive work on laboratory tests. However it is important to note that pollutants are naturally dispersed in the atmosphere so field study information is important. General results indicate that in response to increased pollution birds and mammals produce increased mucus. This biological response to the pollution stimulus suggests that there is sensitivity to changes in air quality.

18.5 Potential Significance of Effects

Table 18.5.1 below illustrates the potential significance on the receptors of the different possible effects listed above. There are 4 categories the effect can fall into; Major, Moderate, Minor or None. This relates to the impact that the effect would have on populations of organisms and is calculated by working out the value of the receptor – based on how far reaching the effects are: local, regional or international – and the perceived magnitude of the impact on the receptor.

All of the receptors of air quality impacts are close to the sources of potential pollution. Therefore, the Value of air quality receptors is ‘Local’, as described in chapter 20.

Table 18.5.1 – Significance of Effects

Effect	Device Type	Development phase	Receptor	Significance of effects
Increase in Marine traffic reducing air quality	All	Deployment Maintenance Decommissioning	Human environment, Birds, Mammals	Minor
Increased Industrial work and land transport	All	Deployment	Human environment, Birds, Mammals	Minor
Reduction of the use of on island electricity generation	All	Operation	Human environment, Birds, Mammals	Moderate (positive)
Reduction of boating in the area	All	Operation	Human environment, Birds, Mammals	Minor

18.6 Likelihood of Occurrence

With the potential for reduced use of combustion power stations there is a chance to improve the air quality. However, equally there will be increased shipping traffic during deployment, maintenance and decommissioning. How these interact will affect the overall chances of a net gain or loss in air quality. The overall outcome of net increase or decrease in air quality, under currently measured criteria, is dependent upon the scale and location of the deployment.

Additionally, as it is thought that most of Guernsey's air impurities come from car emissions, the introduction of power from emission free devices would not reduce car use. This means that any reduction would only be minor, unless electric car use becomes popular. If this were to happen then there would be the potential to reduce air impurities. However as it currently stands the likelihood of any significant effects, either positive or negative, are very low.

18.7 Mitigation Measures

There is potential to mitigate certain aspects that could prevent reductions to air quality. While it will not be possible to prevent the increase in marine traffic, it may be possible to minimise the number of trips. It would also be beneficial to base as much of the activity as possible on Guernsey as this would reduce the distance covered and so fuel used by the boats and this would be most easily accommodated for maintenance. However it is important to point out it would be difficult to quantify any effects of mitigation.

18.8 Confidence and Knowledge Gaps

The types of impacts are fairly easy to predict, however the effect that they have on the receptors is largely unknown as the size of the impact is hard to predict. This is due to the intermittent nature of renewables having only some impact on reducing on island generation as well as the amount of boat work for delivering an array of marine renewables being unknown.

18.9 Residual Effects

The effects are foreseen to be minor before mitigation, and so any change for the better would be very small.

18.10 Recommendations for Survey and Monitoring

On land monitoring is currently very good, and so it is important to maintain this monitoring during installation and operation so as there is comparable data to show how marine renewables have affected air quality.

