



Environmental Consideration Policy

Introduction

Titanium Fireworks as a company, and a team of directors, recognises the importance of our activities on the environment around us and The Planet as a whole.

Wherever possible we will take measures to avoid causing a negative impact, but where it cannot be avoided, we are committed to a long-term policy of Carbon Offsetting our footprint annually through an accredited approved Worldwide scheme.

As a display company our responsibilities are even greater than the bulk of our competitors, which is why we are constantly striving to find ways to control and reduce any detrimental effects we may bring upon the environment.

Titanium Fireworks constantly strive to obtain our supply of goods from ethically responsible suppliers. Our suppliers are reviewed annually and are known to us having built up personal relationships over a number of years.

Eliminating the use of plastic in fireworks

Titanium Fireworks therefore do not knowingly source fireworks that contain plastic units and have passed this standard on to our various suppliers in China. Where we have historic existing stocks of fireworks that could contain these units, we ensure that they are only used in situations where the resulting debris can be collected and disposed of in an environmentally acceptable manner.

A number of firework manufacturers, especially in continental Europe, still produce the majority of their aerial shells and Roman Candle units with plastic cases. Upon firing, these cases naturally fall back down to the ground either as intact hemispheres, shards of plastic or other pre-formed shapes. In the case of the former, they are relatively visible, and therefore can easily be collected and disposed of, provided they land on solid ground. As a company we rarely use these shells or candles and would only ever consider doing so in consultation with the client and where we were confident that we would be able to collect and dispose of any plastic.

Eliminating the use of single use plastic in our supply chain

There is a lot of equipment that we use to protect our product prior to firing from the weather to allow it to perform safely during the show. We ensure from our suppliers that any plastic we deploy in our shows is not "single use" and is made from recycled or reclaimed materials.

Recycling of materials

With the constant increase in the demand for computer and electrically fired displays, our use of copper wire has increased vastly in the last five years. It is now our policy that all copper wire, from both igniters and bell-wire extensions is now collected and separated for recycling. We have also had systems in place at our facility for separating waste from pyrotechnic devices for recycling wherever possible.

Waste recycling

When the lorries from each display return to our factory, we separate everything that can be recycled. Hazardous waste is always brought back from sites and disposed of either in-house or taken away by a local specialist company.

On our displays all cardboard boxes used to pack fireworks in are broken down and flat-packed, where they are returned to the factory and re-used. Those packing boxes that can not be practically reused by us are taken away and we have a bi-weekly contracted collection of recyclable materials with a local supplier. All staff are taught what can be recycled and the importance of this task is emphasised, and spot checks are made of disposal areas to ensure that items are being correctly separated.

Transport

Following ongoing research into racking systems, we have managed to **reduce** the volume of space needed for firing equipment on our vehicles by around 20% in recent years. In practical terms, this means that a display that once may have needed three van sized vehicles will now only need two. The challenge facing us now is to reduce the weight of the equipment used. The first step taken has been to replace steel scaffolding tubes used on our racks with aluminium. The second was to explore ways to reduce the weight of the timber frames, while maintaining strength.

By the hazardous nature of the industry, we are not in a position to use public methods of transport when working on displays or deliveries. However, in the case of meetings and site visits, we will travel on public transport whenever practical.

Over many years, our logistics department has developed excellent relationships with a number of local vehicle hire companies. This way we can always ensure we use locally sourced and appropriate vehicles for the jobs.

We also maximise efficiency when transporting larger crews through the increasing use of people-carriers, rather than a fleet of cars.

Debris left after firing

One of the most common concerns for both us and our clients is the issue of clearing up firework debris. We are constantly looking at new ways to increase the efficiency and speed of this essential, but often tedious task. In the bulk of displays where everything is packed away on the night, the task is made even more difficult by lack of light. In some displays, clients will employ a clean-up team, sometimes of volunteers, who comb the surrounding area for the inevitable debris the following day. In any case, it is now our standard practice to equip each of our teams with rakes, brooms and bin-bags to collect obvious debris. We have also recently been testing the effectiveness of various leaf-blower and vacuum units that are appropriate for the scale of work.

It is important to note that the vast majority of what is left over after firing is completely inert and degradable cardboard that will naturally rot away and pose no hazard to animals or the environment.

Noise

Since the Firework Act was implemented in 2004 it has been illegal in the UK to have a firework display after 11pm, with the exception of November 5th, Diwali, Chinese New Year and New Year's Eve. We will always use fireworks suitable to the surrounding environment and take due consideration of neighbours, livestock, pets and wild animals. Where the situation calls for it we will only fire low- noise varieties of fireworks and design the shows to avoid any fireworks that are of an overly percussive nature.

It is an unavoidable consequence of all fireworks that sound and light are produced and while we are always considerate of surroundings there will always be these products of the show. We fully support the RSPCA advice for pet owners and strongly believe that a well designed, professionally fired show with appropriate safety distances is far less of intrusion and nuisance than certain elements of society using retail fireworks without any consideration or adherence to laws.

Pollution

There is an ongoing discussion within the firework industry regarding the use of perchlorate and other metal compounds that make fireworks produce the wide range of dazzling colours and effects that people know and love. Some are concerned about the possibility of these chemicals contaminating the soil and water around display sites. Numerous authorities and manufacturers around the world are spending a great deal of time and resources collecting data on the real effects on the environment and, if necessary, finding possible alternatives.

With that said, all fireworks used in our displays have been approved by the Health and Safety Executive of the United Kingdom (HSE). All fireworks are authorised and classified by the HSE and appear on their List of Classified Fireworks and Explosives, (LOCEF). In addition, any pyrotechnic device imported by us or any of our suppliers since 2016 (which is over 99% of products in our inventory in 2020) has been marked as CE Standard.

Carbon Offsetting

As a company we accept that our displays and our travel to and from them creates a carbon footprint. We took a decision as a company in 2018 to retrospectively offset our estimated carbon footprint for the previous year and we are committed to keep doing this in the future.

A copy of our certificates is below:

2021 Carbon Offset Certificate





This certificate acknowledges that

Titanium Fireworks Ltd


offset 98 tCO₂e

through verified carbon reduction projects
and planting 98 trees in the United Kingdom

1 June 2020

Helping to combat climate change
and sustain our environment for future generations




John Buckley
Managing Director, Carbon Footprint Ltd
www.carbonfootprint.com



This certificate acknowledges that

Titanium Fireworks Ltd

offset

80 tonnes

of carbon dioxide emissions

through supporting projects around the world, which reduce carbon emissions through avoidance measures and clean / renewable energy generation

helping to combat climate change

and sustaining our environment for future generations

1 June 2019

Case Study into the Carbon Emissions Produced by Firework Displays

Fireworks and pyrotechnics are explosives and function by self-sustaining exothermic chemical reactions. The raw materials used in fireworks can vary significantly, however if one can simplify the process it can be described as,

Oxidant + Fuel = Products + heat

When fireworks burn several gaseous and solid products are formed. Solid products from the combustion of fireworks may be present as particulate matter in the atmosphere or drop rapidly to the riverbed within a few hours if fired close to water. Some relevant research has been undertaken by the Disney Corporation at the deposits of heavy metal salts into Lake Buena Vista from the nightly firework displays held over 25 years. The conclusions that they drew were that while there was a significant deposition of metal salts in the lake for some hours immediately after the displays, these levels quickly dropped as the deposits sink to the bottom and are absorbed in to the muddy substrate. There was no variation of identified flora and fauna in the lake or change to the biochemistry of the lake from when the research began.

Most of the metal salts have low toxicity, they tend to be in a high oxidation state and often relatively insoluble and those that are soluble are also low toxicity.

All pyrotechnics and explosives function by converting the chemicals they contain into combustion by-products and in so doing generate gas, heat, light, sound or a combination of all these products. While it must be the case that environmental effects should be considered at all stages of the planning process and in particular at the manufacturing stage, it is clear there is no compelling evidence of the effects of fireworks causing environmental or human health problems if used properly.

The amount of gaseous and solid products produced from the combustion of pyrotechnic compositions is very low in comparison to many other industries, and also in comparison with the combustion products from aircraft or the internal combustion engine used to transport people to the display.

As an example, the New Year's Eve display in London can be calculated that fireworks contributed less than 0.3% of the total environmental impact of the event; the remainder being almost entirely the transport of the audience to the display.

Gaseous products from fireworks include carbon dioxide, carbon monoxide, sulphur dioxide, nitrogen oxides, water vapour and nitrogen. In a typical firework display of 250kg of net explosive content fired over ten minutes the rates of production of these gasses is approximately:

Carbon dioxide 68g/s

Carbon monoxide 29g/s

Sulphur dioxide 2 g/s

Nitrogen oxides 7g/s

Nitrogen 22 g/s

Given that these are formed in a large volume of air over a period of time and are subject to immediate dilution by wind, the potential human harm or environmental effects are extremely low, by way of comparison, the ten minute display we fired on the River Thames and London Eye last in 2017 for the Mayor of London's New Year's Eve display created 32.5kg of CO₂, this is equivalent to, 160 miles in a medium sized car, or 0.2 trees to plant to carbon offset for the display itself.

By comparison, Edinburgh's Hogmanay Display in the same year produced 20Kg of CO₂ or a car journey of 90 miles. The Cowes Regatta display produced the equivalent of a car journey of 50 miles or less than 20 minutes run time for a 60KVA diesel generator.

From the examples above you will see that even the very largest firework displays produce VERY small amounts of CO₂. Given this form such a small percentage of the event as a whole, typically less than 0.2%, by removing the firework element from the display, you will still have 99.8% of the carbon footprint to offset, or in other words do not hold the event at all.

An important study to establish the effects of fireworks on the environment was conducted by the Disney Corporation at their Disney World Site in Florida, specifically an environmental impact study was undertaken at six lakes around the park including lake Buena Vista in Epcot, where a large firework display is fired every day, and has done so for many decades. After extensive study of the sediments at the bottom of the lake at various depths, it was concluded that fireworks activity does not appear to contribute to the eutrophication of water bodies. Fireworks contain almost no phosphorus, which is frequently the growth limiting nutrient for

aquatic plants. The study did demonstrate that a principle environmental impact of firework activity is the deposition of selected metal salts. It is acknowledged that the lake was subject to substantial firework loading over several decades, which for most other displays may only ever occur once a year. While there was a deposition of metal salts in the sediment, these metals are deposited in largely insoluble forms, resulting in no significant impact to the flora and fauna of the lake environment.