

# Out with the bang

Examining the case for alternatives  
to traditional fireworks

Dani Payne  
Niamh O Regan

**SMF**

**Social Market  
Foundation**

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## CONTENTS

Acknowledgements	4
About the authors	4
Foreword	5
About this report	6
Executive summary	8
Chapter One – Introduction	13
Chapter Two – The desire for policy reform	18
Chapter Three – Fireworks regulation in other countries	22
Chapter Four – The growing use of alternatives	26
Chapter Five – The opportunity for alternatives in the uk	38
Chapter Six – Recommendations	44
Endnotes	47

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## FOREWORD

Fireworks have always been a big part of our national celebrations, lighting up the sky and bringing people together. This report takes a closer look at the serious impacts that traditional fireworks can have on our communities, the environment, and those who are most vulnerable.

While fireworks are still popular, it's becoming clear that things need to change. The loud, sudden explosions don't just frighten animals—they can also cause distress for many people, especially those with conditions like PTSD, anxiety, or sensory sensitivities. Additionally, fireworks contribute to environmental damage through pollution and litter.

Public opinion is shifting. Our national poll shows that nearly 85% of people want tougher rules on fireworks, reflecting a growing call for a more responsible way of celebrating. Around the world, countries are starting to use alternatives like drones, light shows, and quieter fireworks, proving that we can celebrate in ways that are kinder to animals, safer for people, and better for the environment.

This report points us in the right direction. It offers practical steps for reducing the harm fireworks cause, without taking away from the joy they bring. By making these changes, we can create safer, more inclusive, and environmentally friendly celebrations.

Now is the time to embrace these changes, for the sake of our communities, our environment, and future generations. This report shows us how we can move forward.

**By Andrew Pakes MP**

## ABOUT THIS REPORT

This report seeks to understand the potential for alternatives to fireworks being used more widely in the UK. In particular, it presents:

- A cross-country comparison of fireworks regulations, and how they relate to or impact on animal welfare
- New polling on public attitudes towards fireworks and their alternatives
- A comprehensive analysis of alternatives to fireworks and how they have been used successfully in different markets, providing insights into the feasibility, popularity and impact of increasing use in the UK.

Throughout the report we refer to various different types of fireworks and their alternatives. For ease, we provide brief summaries of the different types below.

	Definition
<b>Fireworks</b>	<b>A combustible object, usually gunpowder based, which when ignited causes a visual display.</b>
Category F1 fireworks	This is the lowest category of fireworks. These are sometimes called indoor or handheld fireworks. They are defined in the Pyrotechnic Articles (Safety) Regulations 2015 as: “fireworks which present a very low hazard and negligible noise level and which are intended for use in confined areas, including fireworks which are intended for use inside domestic buildings”. Examples include sparklers and party poppers.
Category F2 fireworks	“Fireworks which present a low hazard and low noise level and which are intended for outdoor use in confined areas”. Examples include small rockets and roman candles.
Category F3 fireworks	“Fireworks which present a medium hazard, which are intended for outdoor use in large open areas and whose noise level is not harmful to human health”. Examples include large rockets and multi-shot cakes.
Category F4 fireworks	This is the highest level of fireworks, and are only allowed to be used by professionals. “Fireworks which present a high hazard, which are intended for use only by persons with specialist knowledge and whose noise level is not harmful to human health”. Examples include ariel shells.
<b>Alternatives to fireworks</b>	<b>A broad term used in this report to describe any object or display which fulfils a similar purpose to fireworks displays, but does not include the use of fireworks. For example, things that allow groups of people to gather and observe moving lights, such as illumination displays.</b>
Drone displays	A drone display, also known as a drone light show or drone art, is a performance where multiple drones are programmed to fly in a synchronized pattern to create images in the sky.

Illuminations	An illumination display is a light-based entertainment or celebration that uses lights as a major feature or decoration. This can include laser light shows.
Quiet fireworks	These are fireworks designed to have lower noise levels than standard fireworks. However, even when named as “silent” fireworks, it is important to note that no fireworks can be truly silent when used. These can be considered as an alternative to “traditional” firework displays, but not fully an alternative to fireworks as they are still technically fireworks.



## EXECUTIVE SUMMARY

Fireworks have become part and parcel of British winters, and used to mark many celebrations and festivals in an ever-diversifying country. However, they can cause serious upset and harm to all types of animals. This report outlines how we can minimise the impact of these celebrations on animals, while not taking away the enjoyment that many people derive from them.

### **Fireworks come with significant animal welfare and environmental impacts, and public opinion favours stronger restrictions**

- Our new nationally-representative poll of adults in Great Britain found that, although fireworks are broadly popular with the public, this varies significantly by age and region. Overall, 75% of the public report liking fireworks. They are least popular with older members of the public, with only 62% of those aged 65 and over reporting they like fireworks. They are also less popular in Scotland (72%) and Wales (55%) than in England (77%).
- Yet traditional fireworks have significant animal welfare impacts on companion animals, farm animals and wild animals.
  - There is a growing body of evidence suggesting that sudden intermittent bangs and squeals do not just cause immediate distress and risk of injury to animals, but can have negative long-term effects on behaviour and wellbeing.
  - Bursts of bright light late at night are also disruptive.
- Traditional fireworks also have a negative environmental impact, increasing levels of fine particle matter and worsening air pollution.
  - The resulting pollution and litter produced by fireworks can be harmful to animals, as well as the environment.
- Despite their widespread use and broad popularity, our polling found that the British public – even those that report liking fireworks – are largely in favour of stricter regulations.
  - Only 15% are satisfied with the status quo: 7% think fireworks should be banned completely, 44% think private displays should be banned, and 34% think there should be greater restrictions on when fireworks can be used.

### **There are growing calls for stricter fireworks regulation, to limit their impact on both humans and animals**

- Current fireworks regulation is primarily focused on ensuring public safety, with regulations on product types, restrictions on sales, time and place of use. Whilst legislation pertaining to products applies to the whole of the UK, usage regulation (such as the times fireworks can be used and sold) is a devolved matter.
- Legislation on fireworks explicitly includes considerations of animal welfare. For example, fireworks should not be set off near livestock or horses in fields, or close to buildings that house animals. However, campaigners argue it does

not go far enough, is difficult to actually enforce, and are insufficient to adequately protect animals from firework harms.

- Animal welfare groups, politicians and civil society organisations have called for reforms to fireworks policy. The lasting impact of fireworks on animals is a key driver, but there are also concerns about public safety, anti-social behaviour and late-night noise disruption, and distress to vulnerable persons, such as those with post-traumatic stress disorder.

### **Fireworks legislation in other countries is being tightened, sometimes motivated by animal welfare, but more often by public safety**

- In recent years, many countries have considered or implemented stricter fireworks legislation, often motivated by public safety concerns.
- Countries with strong animal welfare records, such as the Nordics, tend to have stronger fireworks regulations, but they are not alone.
- Scotland, for example, recently made it illegal to use any fireworks other than Category 1 fireworks (such as party poppers and sparklers) in any public place, and all fireworks are banned for use for events in venues that can hold a thousand or more people.
- Restrictions and regulations on fireworks can be broken down into six main categories:
  - Restrictions on noise (EU, UK, New Zealand)
  - Restrictions on date, time and/or place of use (e.g. Germany, the Netherlands)
  - Restrictions on date and time of sale (e.g. New Zealand, the Netherlands)
  - Restrictions on consumer firework type or category that can be sold (e.g. EU, India, Japan)
  - Bans on consumer fireworks (e.g. Hong Kong, Australia, Ireland)
  - Ban on all firework usage, even professional.

### **There are now alternatives to traditional fireworks, including quiet fireworks, drones, laser shows and illuminations, which have both welfare and economic benefits**

- Alternatives to fireworks, such as, drones, laser shows and illuminations, are becoming more popular in the UK. Quiet fireworks are also now commonly used in council-organised displays. They are sold by licensed fireworks shops and some supermarket retailers.
  - Centre Parcs, a chain of popular holiday resorts, decided in 2021 to stop their regular fireworks displays at all of their parks. They replaced their displays with illuminations, creating walkways lined with light displays, out of consideration for wild animals.
- Alternatives have been used in a range of countries including Hong Kong, the Netherlands, and Japan. These initiatives usually occur at a city or municipality level, not through national or federal legislation.

- In some countries alternatives to fireworks bring significant economic benefits through tourism. In Japan, arguably the global leader in illumination displays, people visit from all over the world to attend illumination festivals. In 2019, one festival in one city alone attracted over 17 million visitors and contributed approximately 92 billion yen (approximately £795 million in GDP in real-terms) to the local economy. Similarly, drone displays in Hong Kong are popular with tourists.
- Alternatives themselves are also not without risk, and we do not know how they impact animal behaviour and wellbeing. Drones are not silent, particularly when moving *en masse*, and laser and light shows do not avoid the issues of bright lights late at night either. On balance, however, existing but limited evidence suggests that they are better for animal welfare and the environment than traditional fireworks.

### **Use of alternatives in the UK will have to increase significantly in scale and sophistication to win the public over, and to realise the economic benefits seen abroad**

- The scale and quality of our alternative firework displays in the UK are not yet comparable to those in Japan and Hong Kong.
- For example, in Hong Kong, one display at a festival used 1,000 drones to create images including a bun tower, a dragon, a Chinese gate and a boat on the sea. In comparison, only 400 drones were used in the display for Queen Elizabeth II's Platinum Jubilee Celebrations and London's New Year's Eve display in 2022.
- The exact cost of the drone element of these displays in the UK is not available, but basic drone show packages start at £5,000, increasing with length, personalisation and complexity.
- The relatively unsophisticated displays are not always met with positive feedback, especially when used to replace traditional fireworks displays. Improving the quality of our displays would likely be critical for public acceptance, but would require upfront investment.
- A review of regulations governing the use of alternatives may also help new companies enter the market, although this should be undertaken cautiously to ensure no unintended adverse impacts on animal welfare or health and safety. Drones, for example, are heavily regulated and only a handful of companies in the UK have appropriate authorisation for mass displays.

### **Where alternatives are used, they are most commonly in addition to traditional fireworks, not a complete replacement**

- Despite the growing popularity of alternatives, there is no convincing evidence that these are replacing traditional fireworks. In the UK, around 14 million people attend official fireworks displays each year, and 10 million people buy their own fireworks.
- Alternatives are more commonly used in addition to traditional fireworks, sometimes as part of the same display or celebration. In Japan, for example, illuminations and traditional fireworks are both popular and culturally significant, but they serve different purposes. Illuminations are predominantly

displayed during the winter months. Fireworks, on the other hand, are mainly used during the annual Hanabi festivals, which take place during summer.

### **Alternatives to traditional fireworks could take greater prominence in the UK, even if not as a complete replacement of traditional displays**

- Our polling found that 91% of Britons are open to partial replacement of traditional fireworks with 'alternative' displays, such as lasers, drones, or silent/quiet fireworks.
- 61% of the British public think that these alternatives would be just as fun to watch as traditional fireworks. Of those who have actually attended an alternative display in the past, this rises to 66%.
- While alternatives have been welcomed in other countries, use of alternatives in the UK is not widespread and examples have often come about because of initiatives from individual companies or councils. There is scope for alternatives to take greater prominence.

### **Recommendations**

Given the cultural significance of fireworks, and the lack of global examples where alternatives have successfully replaced traditional displays, an outright ban of fireworks is neither desirable for the public, nor feasible. However, there are ways that fireworks legislation can be reformed to encourage the use of alternatives and to minimise the negative impact of fireworks on animal welfare, the environment, and vulnerable persons. We propose modestly strengthening a small number of the existing interventions on fireworks sale and use, and bringing legislation in England in line with other parts of the UK and parts of the world.

Given the public's desire for greater restrictions, reducing the noise level of consumer fireworks and the type of consumer fireworks that can be purchased would likely be welcomed by many, and will have a positive impact on animal welfare and concerns regarding anti-social noise disruption.

**Recommendation 1:** Reduce the maximum decibel level of all traditional fireworks from 120 dB to 90 dB, as is the case in New Zealand

**Recommendation 2:** Limit sale of consumer fireworks to Category F1 and F2, and only to specialised/licensed shops

**Recommendation 3:** Follow the example of Scotland, and allow local councils to designate "fireworks-free zones" in areas where fireworks are likely to have a greater impact on animals, the environment and vulnerable persons.

Greater restrictions on fireworks use would likely lead to greater uptake of alternatives naturally. However, policymakers should also encourage their use by:

**Recommendation 4:** When fireworks-free zones are in place, local councils should organise their own alternative displays and draw on examples from other countries, such as Japan, to harness the economic opportunity that high-quality displays can yield in terms of tourism.

**Recommendation 5:** Local councils should also explore opportunities to incorporate the use of drone displays, light shows, and “quiet fireworks” into traditional displays. This will help introduce them and their use to the public, which our polling indicates will in turn increase their popularity.

**Recommendation 6:** Given the economic potential of alternatives, and given the benefits to animals and the environment, Government should review regulations surrounding alternatives to fireworks, such as drone displays. Reviewing regulation for companies that are wishing to invest in higher quality displays would be positive, particularly as it would allow new companies to enter the market and push up quality through greater competition.

## CHAPTER ONE – INTRODUCTION

Fireworks are used globally to mark significant cultural events, from Independence Day in the United States in July each year, to celebrations during August in Japan in which people dress in traditional costumes and firework displays are widespread.<sup>1</sup> Fireworks are an essential part of Chinese New Year celebrations,<sup>2</sup> and also play an important symbolic role in many religious occasions, such as during Eid, signifying the end of Ramadan.<sup>3</sup>

From the end of October to the end of February, fireworks season across the UK takes off in earnest. Bonfire Night in November usually marks the start of celebrations, continuing through to Diwali, New Year's Eve, and culminating in Lunar New Year. Figures from the British Pyrotechnics Association suggest that around 14 million people attend official fireworks displays in the UK each year, and the British Fireworks Association estimate that 10 million people in the UK buy their own fireworks.<sup>4</sup>

However, we are beginning to better understand the negative animal welfare and environmental impact of fireworks. There have been many historic attempts by advocacy organisations and activists to persuade the British public to stop using fireworks, and for government to impose greater restrictions on fireworks use. Despite our increased understanding of their impacts, these attempts have largely been unsuccessful. Millions of Britons still flock to the shops each year to purchase fireworks for their own private displays, or attend public community events. Alternatives to traditional fireworks such as lasers, illuminations, drones and silent/quiet fireworks have been developed, however they are not used *en masse* in the UK as they are in some other countries abroad.

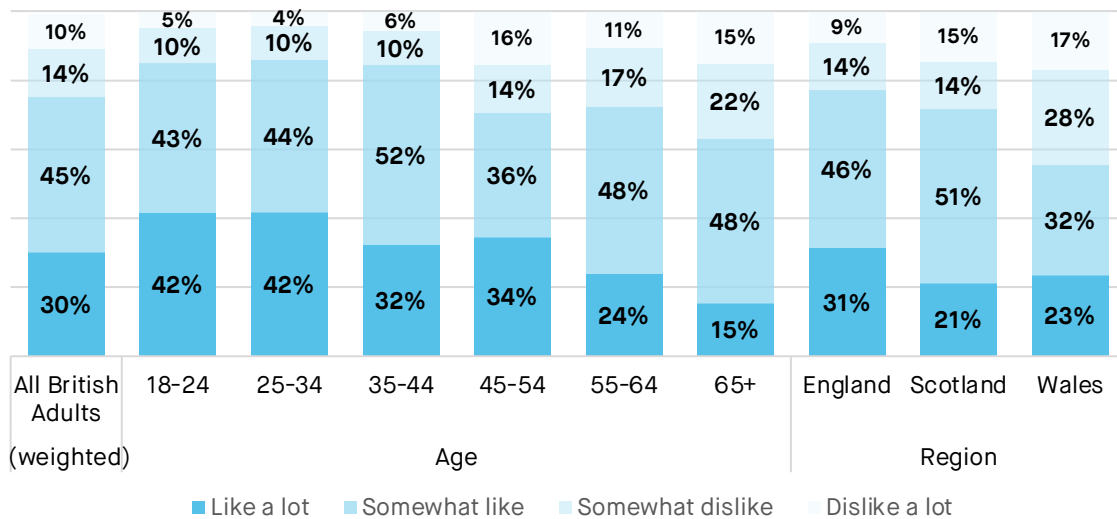
Given the popularity of traditional fireworks it is unlikely that the British public will willingly give up these annual celebrations, and encouraging a reduction is difficult without offers of exciting and high-quality alternatives. This paper seeks to examine the opportunities to increase use of alternatives compared to traditional fireworks in the UK. We look globally at fireworks regulations and uptake of alternatives to identify lessons that we can learn from other countries, such as those with stricter fireworks regulations (New Zealand, Australia), and those with particularly impressive use of alternatives (Japan, Hong Kong).

### **People in Great Britain tend to like fireworks, but they are less popular with older Britons and those in Scotland and Wales**

Despite their widespread use and cultural importance, public attitudes in Great Britain towards fireworks are mixed. Our nationally-representative poll revealed that 1 in 4 (24%) adults in Great Britain somewhat dislike fireworks, or dislike them a lot. Young people were much more likely to report liking fireworks a lot or somewhat, with 85% of 18–24-year-olds reporting this versus only 63% of those 65 or older. Fireworks were more popular with those in England than those in Scotland or Wales. 77% of those in England like fireworks a lot or somewhat, falling to 72% in Scotland and 55% in Wales (Figure 1). Whilst our polling did not extend to children, previous polling shows that they too have mixed views towards fireworks. 41% of children in

the UK do not think it is acceptable to let off fireworks in your back garden. Again, those in Scotland are more concerned about the impact of fireworks: 19% of children in Scotland decided not to have a fireworks party because they scare animals, compared to 16% of children in the UK.<sup>5</sup>

**Figure 1: How much, if at all, do you like or dislike fireworks?”, by age and region.**



Source: Focaldata Omnibus Survey, June 2024

Mixed attitudes towards fireworks may be in part due to the growing body of evidence of their negative impacts on the environment, animal welfare, and vulnerable persons, as well as concerns about public safety and anti-social behaviour. Whilst this was not something we explored in our polling, previous polling has found that 21% of people in the UK consider the control of fireworks to be an important issue related to animal welfare.<sup>6</sup>

**Fireworks can have detrimental impacts on animal welfare**

The quality and quantity of scientific literature on the impact of fireworks on animal welfare is mixed. Studies are more prevalent for companion and farm animals, which are easier to study than wild animals. The literature on the impact on wild animals is sparse, partly due to the transient nature of the events being difficult practically to study.<sup>7</sup> However, the studies that do exist overwhelmingly conclude that fireworks pose significant risks to companion animals, farm animals and wild animals.

Owners will likely be familiar with the impact fireworks can have on companion animals. Numerous studies have found that fireworks can cause stress and fear in companion animals, and the loud bangs can also cause auditory issues if in close proximity. A 2019 study, for example, found that 52% of dogs were negatively impacted by fear of fireworks, with recovery taking up to one day for 10% of dogs and up to one week for 12%.<sup>8</sup> Another study in the same year, carried out in New Zealand, found that 74% of domestic animal owners reported that their pets were frightened of fireworks, and some had been physically injured as a result of them.<sup>9</sup>

The noise levels of fireworks are of particular concern to animal welfare. Whilst the human threshold for noise-induced pain is between 75 to 80 decibels, fireworks can

produce noise of up to 190 decibels. Given their more sensitive hearing, companion animals can suffer from tinnitus, hearing loss and long-term hearing damage caused by fireworks, as well as experiencing stress and fear.<sup>10</sup> Studies have estimated the prevalence of noise sensitivity in dogs to be between 23-32%, with a fear of fireworks being a common form of noise sensitivity.<sup>11 12</sup>

The impact on equines is also well-studied. A survey in the UK and the US found that 22% of owners reported that their horses showed unusual behaviour during firework displays. Anxious behaviours could last even until the next day, after the displays had ended, or longer.<sup>13</sup> Horses, when trying to escape the bangs out of fear, can also injure themselves in the process.<sup>14</sup> Data from the British Horse Society shows that there have been 1,468 incidents due to fireworks since 2010, including 49 fatalities and 317 injuries. Given the exposed nature of their housing, it can be harder for owners of equines and other farm animals to protect animals in their care from fireworks, especially without prior notice of displays. 85% of equestrians surveyed were not informed prior to domestic displays occurring, and almost half (47%) were not informed about public displays.

Evidence also shows the impact that fireworks can have on farm animals. Unexpected loud noises can cause stress in livestock.<sup>15</sup> Studies have found them to cause an increase in the heart rate of pigs, and in the respiration rate of lambs.<sup>16 17</sup> Stress responses in sheep is of particular concern when displays coincide with lambing season. Stress can cause ewes to abort their lambs, or cause lambs and mothers to become separated, which can lead to starvation or hypothermia.

Studies on the impact of wild animals are less common, although the existing evidence does indicate possible harms. Multiple studies, for example, have found both short and long-term impacts on wild birds.<sup>18</sup> One study, focusing on greylag geese, found evidence of a “substantial physiological response” to New Year’s Eve fireworks consistent with a stress response. Heart rates of the geese increased by 96%, and body temperature also increased, taking several hours to return to normal levels.<sup>19</sup> Another study in the Netherlands observed birds flying significantly higher during New Year’s Eve than usual, and concluded that the birds were fleeing *en masse* from fear of the fireworks.<sup>20</sup> Similarly to livestock and horses, when birds flee from fireworks there are risks both in terms of injuries incurred during their escape, but also risks disruption to their breeding, causing offspring to die from neglect when the parents are scared away from the nest.<sup>21</sup> In Spain, the cancellation of firework festivals due to COVID-19 resulted in an increase in breeding success of certain birds.<sup>22</sup> Whilst not focusing specifically on fireworks, one study found that chicks exposed to anthropogenic noise were smaller and had poorer body conditions than those that were not.<sup>23</sup>

### **Firework use also has known detrimental impacts on the environment**

The negative environmental impacts beyond disturbance to wildlife are also becoming better understood. Over half (52%) of the British public feel that private firework displays are bad for the environment, and 44% felt that public displays were bad for the environment.<sup>24</sup>



Fireworks cause pollution, releasing many harmful gases such as sulphur dioxide, carbon monoxide, carbon dioxide, as well as other polluting particles.<sup>25</sup> Both fireworks and bonfires have a negative (albeit short-lived and localised<sup>26</sup>) impact on air quality, with one study finding that air pollutants can be 2-8 times higher during a fireworks event.<sup>27</sup> A recent study carried out in the United States found that there was, on average across the country, 42% more pollutants in the air during July 4<sup>th</sup> celebrations due to fireworks use.<sup>28</sup> Even the use of smaller pyrotechnics such as hand-held sparklers have been linked to air pollution.<sup>29</sup> As well as being damaging for the environment, this can have a negative impact on human health; one study in India found that 48% of those surveyed living in residential areas experienced respiratory issues during Diwali festival, although the sample size was relatively small (252 people).<sup>30</sup> In addition to concerns regarding harmful gases and particulates, fireworks also release a range of heavy metals into the soil, air and water.<sup>31</sup>

### **Concerns regarding public safety are often at the forefront of stricter regulation and legislation**

Whilst the impact on the environment and domestic and wild animals is a concern for many, often legislative decisions to restrict the usage of fireworks have been primarily in response to public safety concerns. Northern Ireland and the Republic of Ireland have some of the strictest restrictions on fireworks globally. This has been due to concerns over fireworks being used as weapons.<sup>32</sup> Similarly, in Hong Kong, fireworks were banned following riots in the 1960s which used firework materials to manufacture home-made bombs. Whilst legislation was relaxed the following decade, stricter laws than present in other countries remain.<sup>33</sup>

Concerns regarding fireworks, or parts of fireworks, being used as weapons is at the extreme end of public safety concerns, and is not common in the UK. However, there are many other safety concerns regarding less serious or unintentional harm, especially when fireworks are used by non-professionals, or are used recklessly. The British public also identify safety as a key concern regarding the use of fireworks, particularly the use of fireworks by private individuals as opposed to organised firework displays. A survey by the Office for Public Safety and Standards found that almost half (49%) thought that private use of fireworks by individuals of the public was unsafe. Of those who had attended a private display within the last three years, 36% had been concerned for the safety of children during the display and 21% had been concerned about their own safety.<sup>34</sup> Concerns were often regarding inexperienced and untrained individuals lighting fireworks in unsafe conditions, such as in small gardens or at an angle that may hit someone, and potential resulting injuries.

This concern over safety is shared globally. A longitudinal study in India found that 35% of fireworks-related injuries were faced by children (age 5 to 14), and that almost all (92%) children who sustained injuries were unsupervised at the time. Injuries related to fireworks were usually caused by individuals misusing fireworks (41%), but device failure/malfunction was also common (35%) and clustered within certain types of fireworks such as flares and fountains. Over the period of the study (a decade), fireworks-related injuries had decreased, which the authors attribute to greater community awareness following public safety campaigns.<sup>35</sup> In the US, relaxed

regulation in Michigan around consumer firework sales, allowing the public to purchase and use 'off ground' fireworks such as roman candles and rockets, was followed by an increase in injuries. One emergency department studied saw both the frequency and severity of fireworks-related injuries increase significantly, with the mean number of fireworks-related cases almost doubling post legislative reform.<sup>36</sup> In the UK, over 500 children are taken to hospital around Bonfire Night each year. Children are more likely to be injured at private displays, and boys are more likely to be injured than girls.<sup>37</sup> Injuries suffered can also be significant: one study in the UK found that over a decade almost 2 in 5 (39%) patients who experienced burns and trauma caused by fireworks required surgery.<sup>38</sup>

The risk of accidental fires starting due to firework use should also be considered, and in some countries or regions at higher risk of wildfires this has been a major motivation for stricter legislation. A study in the US found that, in a 37-year period, over 11,000 wildfires were started due to fireworks.<sup>39</sup> Last year (2023) in Montreal, Canada Day fireworks were cancelled due to concerns regarding more than one hundred wildfires which were already burning.<sup>40</sup> Similarly, in 2021, multiple cities in Oregon, US, and several areas in Washington State banned Fourth of July fireworks due to wildfire concerns.<sup>41</sup>

Wildfires are rarer in the UK, and accidental fires caused by fireworks have traditionally been less of a concern than some of the other negative impacts of fireworks, largely because the majority of our fireworks use is concentrated in winter months. However, fireworks can and are still used outside of the traditional fireworks season and wildfires are becoming more common in the UK. Since 2010 over three thousand fires in England have been recorded as being caused by fireworks. Of these, six hundred occurred outdoors.<sup>42</sup> This may become a more pertinent concern as warmer and drier weather increases the risk of wildfires in the UK. In 2022, an exceptionally hot and dry summer, there were more than 44,000 wildfires, 72% more than the previous year.<sup>43</sup>

As well as public safety concerns, anti-social use of fireworks is often cited as a concern by the British public, with 55% saying that private displays disturb the peace and quiet in their area and 20% having experienced anti-social behaviour relating to fireworks. This was a particular concern for private displays but also featured when questioned about public displays. Despite existing laws aimed to limit anti-social use of fireworks, respondents to the Office for Public Safety and Standards inquiry into fireworks noted that they felt that police were often unable to enforce existing legislation.<sup>44</sup>

Whilst reasoning behind increased regulation differs across countries, in the UK the noise level of fireworks has tended to attract the most attention. Concerns of anti-social behaviour often relate to noise levels late in the evening, for example. When thinking of animal welfare, the sudden loud bangs of fireworks are one of the most pertinent concerns for domestic, farm and wild animals, and perhaps one of the easiest aspects to change about displays given the existence of lower-noise alternatives.

## CHAPTER TWO – THE DESIRE FOR POLICY REFORM

Fireworks policy in the UK is both national and devolved. Sale of fireworks and product safety policy is under the purview of Westminster, however policy relating to fireworks use is devolved. Current fireworks policy in the UK primarily stems from the 2003 Fireworks Act, which came about following public concern about fireworks use.<sup>45</sup> The subsequent 2004 Fireworks Regulations made “provisions in relation to fireworks to minimise the risk that fireworks will be used with harmful consequences for people, animals or property”.<sup>46</sup>

The resulting policy is that maximum noise level of fireworks for public use is limited to 120dB, to buy fireworks you must be aged 18 or over, and fireworks can only be sold by licensed vendors, with the exceptions of days preceding celebrations with traditional fireworks usage (e.g. Bonfire night, Diwali, New Year’s Eve, Chinese/Lunar New Year).<sup>47</sup> On these days fireworks can be sold by unlicensed traders, such as supermarkets.<sup>48</sup> Additionally, fireworks cannot be set off between 11pm and 7am, with exceptions for the specific nights of the year referenced above, when they can continue to be used until 1am<sup>i</sup>. They cannot be discharged in the street or in other public places.<sup>49</sup> It is an offence to cause unnecessary suffering to any domestic animal, and government advice is that fireworks must not be set off near livestock or horses.<sup>50</sup> Further legislation in 2015 put strict rules in place regarding labelling, traceability and firework safety information.<sup>51</sup> For Category 4, or professional fireworks, different rules and restrictions apply. These can only be bought by professionals with a licence, and can only be sold by licensed vendors, irrespective of the time of year. Unlike fireworks for personal use, professional fireworks in the UK also do not have a set noise limit.<sup>52</sup>

However there have been concerns that the existing regulations are not effective, particularly when it comes to animal safety. The RSPCA, for instance, has argued that restrictions are not sufficiently protective or enforceable.<sup>53</sup> A report by Redwings, the largest horse welfare charity in the UK, also concluded that the Animal Welfare Act 2006 doesn’t protect animals from the harm caused by fireworks. They noted that there is currently no precedent of the Act being used following the death or injury of an animal caused by fireworks; a panel of experts stated that “the Act could [not] realistically be used to hold someone to account in such cases”.<sup>54</sup>

### **There have long been calls for changes to fireworks policy in England**

With increasing awareness over the dangers of fireworks to human and animal health, there are growing calls from across society for meaningful changes to fireworks policy. The lasting impact of fireworks on animals is a key driver, but there are also concerns about public safety, anti-social behaviour, late-night noise disruption, and distress to vulnerable persons, such as those with post-traumatic stress disorder (PTSD). Demands for changes tend to focus on public access to fireworks rather than professional fireworks usage, which may be because private fireworks use is seen as more unruly, or more irresponsible.<sup>55</sup>

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<sup>i</sup> On Bonfire night/5<sup>th</sup> November the extension in usage is until midnight.

Unsurprisingly, animal welfare organisations are among those who have called for greater controls on fireworks. The primary demands include: reducing noise level of publicly-sold fireworks to 90dB; restricting unlicensed firework use to specific dates; requiring licences for all public and private displays outside of traditional dates; making it mandatory to notify the public of displays outside traditional dates; better labelling of fireworks e.g. including noise labelling, and strengthening enforcement of regulations.<sup>56</sup> The British Veterinary Association has also backed these aims, with a little more than half of vets reporting that they have seen an increase in domestic animals with phobias such as fireworks.<sup>57</sup>

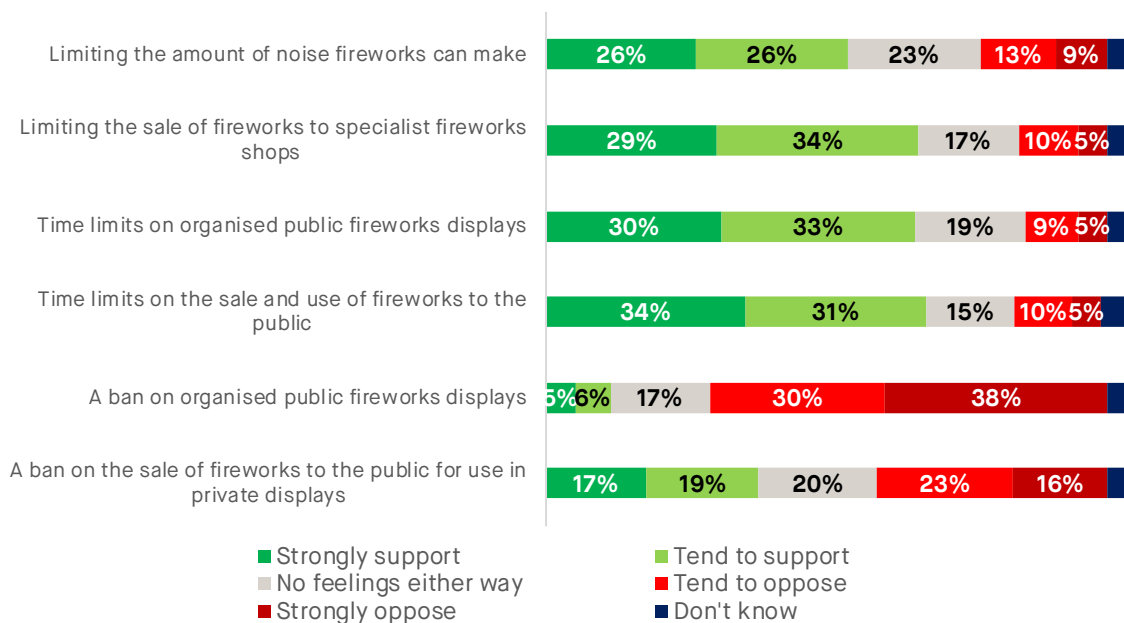
However, animal welfare organisations are not alone in calling for reforms to fireworks policy. Veterans' charity Help for Heroes has called for tighter restrictions, to help limit the impact of fireworks on veterans with PTSD. The public have also voiced their demands for changes to fireworks policy through the petitions process. Parliament's petitions website details 45 petitions relating to changes to fireworks policy. Between 2017-2019, petitions relating to fireworks had received around 750,000 signatures in total, and parliament held three debates on the misuse of fireworks.<sup>58</sup> The four fireworks petitions with the highest number of signatures all concerned restricting the sale of fireworks so that the public would not be able to buy them, and for fireworks to only be used for licensed displays. Three of the next four most signed petitions concerned changes to the noise limits of fireworks, either calling for a review and reduction of what was available, or calling for quiet fireworks only.<sup>59</sup>

In 2019 the Petitions Committee launched an inquiry on fireworks. This was in part due to the public interest in fireworks policy, but also because they felt that government responses to the petition had left the public dissatisfied, frustrated and ignored.<sup>60</sup> The inquiry itself received 332 pieces of written evidence and held four oral evidence sessions. Evidence was submitted from range of people and organisations including those with health conditions and disabilities, carers, veterans, animal rights and welfare organisations and fireworks retailers. The conclusion of the report was that the restrictions that are currently in place fail to adequately protect people and animals from harm, and are difficult to enforce, owing to the transient nature of fireworks. While their conclusions did not recommend an outright ban on fireworks, which could have significant economic consequences, it advocated for a review of current fireworks policy including the decibel limit, the packaging, permission systems, as well as giving local authorities more power to tackle the issues with fireworks.<sup>61</sup>

Research from the Office for Product Safety and Standards on consumer behaviours and attitudes towards fireworks found that the majority Britons enjoy fireworks displays, but most prefer public displays to private ones. They also found that while there is not significant support for an outright ban on fireworks, there is support for some stricter controls. Many would support stricter time limits on sale (65% support), restricting sale to specialised shops (63%) and limiting the noise of fireworks (52%).<sup>62</sup> This is in line with our own polling, which found that only 15% of the British public think that fireworks regulation should stay as it is now. The remaining 85% was in support of greater restrictions, including a full ban (7%), a ban

on private/consumer use (44%), or only allowing both private and public displays at certain times of year (34%).

**Figure 2: Support or opposition to fireworks regulations in Great Britain**



Source: Office for Product Safety and Standards, 2020

**Support for change seems to be gaining prominence**

In addition to public petitions and campaigns, some of the push for change has come from parliamentarians. Between the 2019 and the 2024 general elections, 144 written questions were asked about fireworks.<sup>63</sup> Two backbench Labour MPs have sought to bring in new fireworks regulations. In 2022 Labour MP Sarah Owen tabled the Misuse of Fireworks Bill, which called for the prohibition of use of “noisy fireworks” (greater than 90db) by the public. However, the bill did not make it through parliament before the end of the Session.<sup>64</sup> More recently, Judith Cummins MP also brought in a Bill concerning the maximum noise limits of fireworks that can be sold to the public.<sup>65</sup> Proposals in the Bill included reducing the maximum noise limit to 90dB. However, parliament was dissolved before the Bill could be read for a second time. The motivation for both Bills came from persistent use of fireworks after 11pm, and the distress that fireworks use has caused to vulnerable people, and domestic animals.

Several councils have now also passed local level policies that restrict the use of loud fireworks either at council displays, or on council-owned land. Sunderland City Council for example has a Quiet Fireworks Policy which means that those who use council owned land for an event are only allowed to release quiet fireworks, and to aid in this local fireworks suppliers are encouraged to stock quieter fireworks.<sup>66</sup> Rushcliffe Borough Council meanwhile, voted in 2021 to stop using loud fireworks at their events, while Hexham Council decided in 2023 that they would use quieter fireworks out of consideration for animals and people with noise sensitivities.<sup>67</sup> Other councils, such as Wyre Forest District Council and Stockport Metropolitan Borough

Council meanwhile ask display organisers to consider the use of quiet fireworks in their displays.<sup>68</sup>

While the law on registered/unlicensed shops has not changed, some supermarkets shops have taken calls for change into their own hands. Co-op have not sold fireworks in any of their supermarkets since 2017, Sainsbury's similarly stopped selling fireworks in 2018, and Waitrose have not sold fireworks since 2019.<sup>69</sup> While Asda, Tesco and Aldi continue to stock fireworks, they have all increased their range of lower-noise products in response to public demand.<sup>70</sup>

### However, not everyone is convinced by the case for greater regulation

Calls for changes to fireworks policy are far from universal, and there is resistance from some quarters. Responses to the Petitions Committee's fireworks inquiry also included written evidence from some who felt that the effect of fireworks on vulnerable persons and/or animals is overstated, largely anecdotal and not borne out by evidence.<sup>71</sup> Responses also highlighted the relatively low number of noise complaints regarding fireworks as opposed to, for instance, domestic arguments or barking dogs.

Fireworks retailers have also objected that the tighter restrictions would have a substantial negative effect on their business, but also on local community fireworks displays.<sup>72</sup> This concern was echoed by responses to the Petitions Committee fireworks inquiry from community groups and smaller councils who explained that their own fireworks displays were only possible because amateurs could purchase fireworks too.<sup>73</sup> These displays often serve as fundraisers and try to promote community cohesion. Organisers of these feel this would be difficult to replicate if there were stronger restrictions on sale.<sup>74</sup> Fireworks retailers and proponents have also argued that the issues with anti-social use of fireworks come from a minority of fireworks users, rather than an issue with fireworks themselves.

## CHAPTER THREE – FIREWORKS REGULATION IN OTHER COUNTRIES

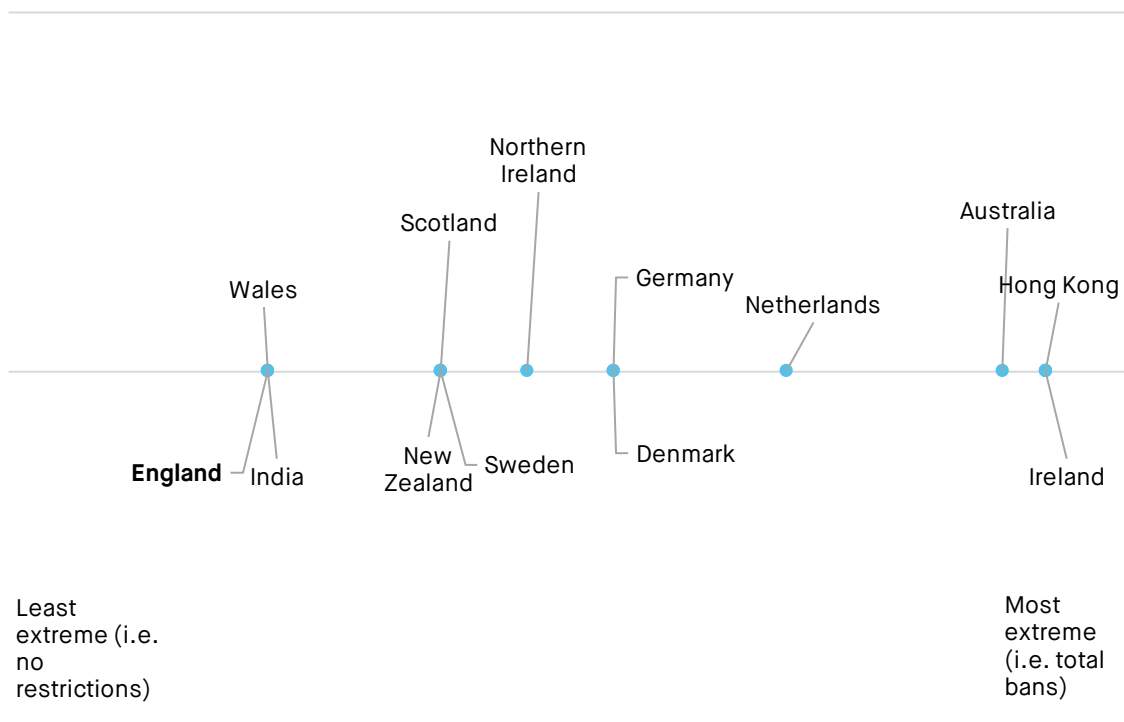
### Regulations on fireworks use and sale vary between, and sometimes within, countries around the world

Regulation and legislation regarding fireworks vary hugely around the world. Even within the UK, Northern Ireland and Scotland have stricter legislation regarding use and purchase of fireworks than England. Restrictions can broadly be divided into five main categories of intervention, starting with what we think are low intervention measures, graduating to the highest level of intervention (total bans) on fireworks:

1. Restrictions on noise (EU, UK, New Zealand)
2. Restrictions on date, time and/or place of use (e.g. Germany, the Netherlands)
3. Restrictions on date and time of sale (e.g. New Zealand, the Netherlands)
4. Restrictions on consumer firework type or category that can be sold (e.g. EU , India, Japan)
5. Bans on consumer fireworks (e.g. Hong Kong, Australia, Ireland))
6. Ban on all firework usage, even professional. We were unable to find examples of any countries or regions that have completely banned fireworks.

Based on these restrictions we have created a gradient of intervention, the higher up the gradient a country is, the more interventions there are on firework purchase and usage from across the six categories.

**Figure 3: Gradient of fireworks interventions in different countries, from least interventionist to most**



Source: SMF

### **The majority of countries have restrictions on who can purchase and use fireworks, but with varying levels of strictness**

All countries that we analysed had some forms of restrictions on who could purchase and use fireworks. In Hong Kong<sup>75</sup>, Ireland<sup>76</sup>, Australia (except for the Northern Territory and Tasmania)<sup>77</sup>, and large parts of China<sup>78</sup>, purchase and use is only allowed by licensed professionals. In Hong Kong this is largely due to public safety concerns and follows a previous complete ban on fireworks that was lifted in 1975.<sup>79</sup> Illegal use of fireworks can result in a prison sentence of up to 12 months and a \$200,000 fine (approximately £20,000).<sup>80</sup> Australia brought in their ban for public use in 2009. While restrictions fall short of a complete ban in Tasmania and the Northern Territory, they are still heavily restricted. Exact penalties for illegal use vary by state, from fines of up to AUD \$1,000 (approximately £530) to a prison sentence in New South Wales, to fines of up to AUD \$96,000 (approximately £50,000) and a five-year prison sentence in Victoria.<sup>81</sup> In China, legislation varies by individual cities, but bans on public use are increasingly common and often invoked due to concerns regarding air pollution and public safety.<sup>82</sup> Japan attempted to ban fireworks completely in the Edo Period (between 1603-1868), however this was never successfully enforced due to their popularity.<sup>83</sup>

In other countries legislation is less strict. Sweden allows consumer purchase of fireworks, for certain types and under certain rules. Firecrackers have been banned since 2002, and heavier rockets since 2014. Skyrockets are allowed to be purchased, however anyone who wishes to purchase or use these fireworks must apply for a permit and undertake mandatory safety training first. Similarly, in Czech Republic, in some circumstances (for Category F3 fireworks where the purchaser is between 18-21 years old), a certificate of professional competence is required. To obtain a certificate, purchasers must not have a criminal record, must be deemed medically fit, and then undertake mandatory training.<sup>84</sup>

All countries had restrictions on the minimum age for purchasing fireworks, most commonly outlawing sale of higher category fireworks to children under the age of eighteen. In the Czech Republic, Ireland, Germany, and the Netherlands, younger individuals may purchase lower category fireworks such as sparklers.

### **Restrictions on where and when fireworks can be used or purchased are also common**

As well as restrictions on who can purchase and use fireworks, many countries have restrictions on where and when they can be purchased or used. Scotland, New Zealand, China, the Netherlands, Germany, India, Australia, Denmark and, more recently, some parts of Japan, all have restrictions on when fireworks can be sold throughout the year. Most commonly, purchase of fireworks is restricted to during and around festivals and celebrations. In Germany, for example, F2 fireworks can only be sold and used around New Year's Eve. Municipalities retain powers to place greater restrictions, and some cities such as Berlin and Munich have implemented fireworks-free zones.<sup>85</sup> In New Zealand, the sale of fireworks is limited to four days up to and including the 5<sup>th</sup> November.<sup>86</sup> In Japan, consumer use of fireworks in public places, such as parks, is common, and they can be used throughout the year. These are hand-held fireworks, classified as "toys". However, due to concerns about noise



disturbance late at night and litter, some municipalities have recently introduced restrictions on when and where fireworks can be set off, creating fireworks-free zones like in Germany.<sup>87</sup>

As well as restrictions on the time of year fireworks can be purchased and used, many countries have restrictions on the times of day that they can be purchased and used. Australia, Finland, Germany and the Netherlands have all recently brought in greater restrictions on the times fireworks can be used.<sup>88</sup> In 2015, the Netherlands reduced the number of hours that fireworks could be set off on New Years Eve from 16 hours to 8 hours.

### **Many countries have begun to introduce stricter legislation, based on encouraging evidence from existing restrictions**

Stricter regulations of the use and sale of fireworks is becoming increasingly common globally. Many countries that have implemented additional legislation have reflected positively, and more are considering tightening their own restrictions.

It is important to note that, just as the literature on the impact of fireworks is incomplete and imperfect, so is evidence on the impact of further restrictions. In a paper reviewing the impact of fireworks regulations globally, the Scottish government concluded that “there is a lack of metrics in place to monitor and evaluate the impact of fireworks regulations”, and that it can be “challenging to establish the effects of [regulations] over the long term”.<sup>89</sup> However, of the small number of studies that do exist, there are some signs for optimism. In Australia, for example, tightening of regulations has resulted in a reduction of fireworks-related injuries and offences, particularly in areas with more restrictive regulations. Initiatives in Finland, which mandated certain safety equipment and restricts fireworks usage to specific times, were followed by a decrease in eye injuries. Similar success was also seen in the Netherlands.<sup>90</sup>

Policymakers seeking to tighten regulations on fireworks often have concerns regarding negative public backlash, especially in countries for whom fireworks have cultural and religious importance. In some cases, concerns regarding the risks of fireworks have outweighed public opinion and policymakers have introduced stricter regulations regardless. In China, where fireworks are of particular importance in Chinese cultural traditions, including Lunar New Year, the noise and lights emitted by fireworks is believed to ward off evil spirits.<sup>91</sup> A total ban of fireworks was considered due to concerns about air pollution and fire safety. Whilst this was not permanently enacted at a national level, over four hundred cities enforced local bans in 2017. These restrictions were implemented despite public opinion, with one poll reporting that 80% of people supported the use of fireworks during cultural festivals.<sup>92</sup>

Whilst fireworks are arguably important in British tradition, the cultural connection is not as strong as in China. Perhaps our closest comparator in regard to our cultural affinities with fireworks would be Scotland, where, in 2019, 92% of the public supported greater restrictions on fireworks use and 94% supported further restrictions on purchase.<sup>93</sup> Broad support for greater restrictions led the government to introduce new legislation in 2022.

The use of fireworks was already restricted in Scotland (since 2004) to between 6pm-11pm, with exceptions for certain occasions, and purchase was restricted to 7am-6pm. The 2022 legislation also introduced two new criminal offences, for supplying fireworks to a child, and for attacks on emergency workers using fireworks to be treated as an aggravating factor that can be taken into account in court.<sup>94</sup> As of 2023, local councils were given additional powers to introduce Firework Control Zones. Within these zones it is illegal to use fireworks, including on private property. In the announcement of the Control Zones the Director of Innovation and Strategic Relations at the Scottish Society for Prevention of Cruelty to Animals stated that “[these] restrictions are much needed to prevent unnecessary suffering among pets, farm animals and wildlife”.<sup>95</sup> There were also plans to introduce a licensing system for F2 and F3 fireworks, which would make it an offence to purchase these fireworks without a licence. However, implementation was delayed due to “significant financial pressures”.<sup>96</sup>

## CHAPTER FOUR – THE GROWING USE OF ALTERNATIVES

As described in Chapter One, fireworks are most often used, or used in the highest concentrations, to celebrate around particular holidays, festivals and religious celebrations. Fireworks are for many culturally significant. However, as illustrated in Chapters Two and Three, there are growing concerns about the use and impact of fireworks, and many countries are responding to this by increasing restrictions. Several alternatives to traditional fireworks have emerged, partly in response to these concerns. Alternatives to traditional fireworks include quiet fireworks, laser shows, light shows and drone shows.

Towns and cities across the world are increasingly using alternatives in celebratory displays. However, it is not that they have completely replaced fireworks, but have often been used to accompany them, incorporated into their traditional displays, or to serve different purposes than traditional fireworks. It is also worth highlighting that moves on alternatives seem to come very much at a local or municipal level, rather than being the subject of national-level policy.

### **Quiet fireworks are becoming more popular in shows and easier for the public to buy, although evidence on their effectiveness is limited**

There are no truly silent fireworks – although some may be branded as “silent”, it is more accurate to describe them as “quiet” or “low noise”. In order for fireworks to have any initial lift, and then an explosive visual effect, there will be some noise.<sup>97</sup> It is possible, though, to have *quieter* fireworks. The component of the firework that causes the noise is usually flash powder. This can have a dual purpose of lighting the parts of the firework that produce the colour, and propelling them across the sky.<sup>98</sup> Quiet fireworks usually have a lower amount of flash powder than traditional fireworks.<sup>99</sup> As a result they are less likely to produce a very loud “aerial burst”, or bang. They could instead be more likely to produce a fizzle, while also maintaining the vibrant colour and spectacle that fireworks are known for.

Quiet fireworks are not a new invention and are already regularly used as part of conventional fireworks displays, and are sold by licensed fireworks shops. However, in recent years, quieter fireworks have gained more prominence with the British public. British supermarkets that still sell fireworks have begun to advertise their quieter fireworks options more prominently. Some councils across Britain have opted to move toward quiet fireworks in place of traditional ones for their own displays, while others have called on local fireworks sellers and display organisers to emphasise quieter fireworks.<sup>100</sup>

Quiet fireworks have in part been developed to address some of the animal welfare concerns of traditional firework use, with some being explicitly marketed as ‘dog friendly’, for example. However, the evidence on whether they are sufficiently less harmful to animals is not particularly strong. As mentioned above, they will never be entirely silent. Noise is also not the only aspect of fireworks of concern to animal welfare – sudden and bright lights can also pose harm, as can any associated litter or debris. On balance, the use of quiet fireworks – if the goal is to reduce harm to animals – is preferable over traditional fireworks. However, other alternatives that

may be even quieter or genuinely silent and do not leave risks of litter are worthy of exploration.

**Drones have often been utilised in place of traditional fireworks shows, and have been used in some countries to boost tourism**

Drone shows are perhaps the most commonly found and growing alternative to fireworks. They do not create sudden bangs or loud noises (although are not completely silent either), and there is not the associated risk of litter or debris. The first display of its kind took place in 2012, and since then coordinated drone shows have become ever more popular.<sup>101</sup> In such displays, illuminated drones are programmed with a flight path, which uses the swarm to create particular patterns in the sky and “create complex visual narratives”.<sup>102</sup> Patterns can be used to depict almost anything. If aiming for a “like for like” replacement, drones could be programmed to replicate the flight path of a firework, and use other drones to “burst” from it, mimicking the explosion, although this would be much slower than a traditional firework. What is more common however is drones being programmed to create drone art, which can then move across the sky.

**Image 1: Picture showing the light and drone show for Queen Elizabeth II’s Platinum Jubilee Celebrations, London.**



Source: Chromatic Productions Ltd

**Image 2: Drone art depicting a whale.**



*Source: Greenpeace / Celestial*

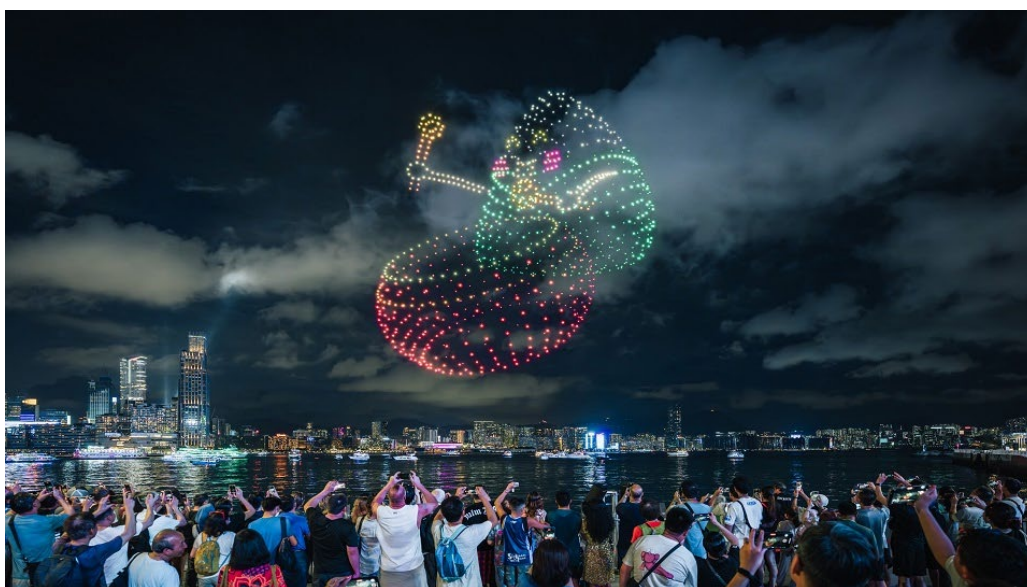
### Case study: Hong Kong – drone displays are popular, but not yet a replacement for fireworks

In Hong Kong, fireworks are considered dangerous goods and have been banned from public sale (and discharge) since 1967, with possession or use of fireworks incurring a jail term of up to 12 months or a fine of \$200,000.<sup>103</sup> Public fireworks displays, however, are incredibly popular. New Year's Eve, Lunar New Year, and Hong Kong National Day are all celebrated with fireworks displays.

Drones have also become a feature of celebrations and festivals. Drones are not totally new to celebrations in Hong Kong, but their use has increased. In early 2024, as part of a new tourism initiative, the Hong Kong Tourism Board announced that they would be expanding the night time entertainment offer in an effort to encourage more overnight guests in the city, which has struggled to recover its tourism following the Coronavirus pandemic.<sup>104</sup> As part of the plan, the Board planned for regular fireworks displays, a revamp to the nightly "Symphony of Lights" laser beam show, and monthly drone shows, starting from May.

The drone shows are often scheduled to coincide with existing or planned festivals. The drones form "intricate patterns of lights and showcase boundless creativity and imagination". The first monthly drone show took place on 11<sup>th</sup> May 2024, to celebrate the Birthday of the Buddha and the Cheung Chau Bun Festival.<sup>105</sup> During the show, 1,000 drones created images including a bun tower, a dragon, a paifang (Chinese gate) and a boat on the sea. The Dragon Boat festival the following month included dragon boats, and the iconic drum that is played while rowing.

#### **Image 3: Drone art depicting a dumpling playing a drum in Hong Kong's Victoria harbour**



Source: Hong Kong Tourism Board, 10 June drone show, 2024

**Image 4: Drone art depicting bun tower in Hong Kong's Victoria harbour**



Source: Xinhua/Zhu Wei via English News.cn

While the intention of the shows was to increase tourism and provide an economic boost, the plan was not without controversy when first announced. In the 2024 budget, HK\$1.1 billion (approximately £109 million) was allocated for tourism events, with each drone or fireworks show expected to cost HK\$ 1 million (almost £100,000). One of the biggest concerns is that regular drone shows by themselves may not be sufficient to continuously draw crowds. Critics highlighted that there is nothing distinctively “Hong Kong” about drones and such regular use would make people accustomed to them.<sup>106</sup> They were concerned that, given similar displays were already available in nearby places, such as mainland China, they would not attract enough tourism to justify the price.<sup>107</sup>

Nevertheless, drone shows have been popular and well-received. Attendees have said that they are novel and unique<sup>108</sup>. One newspaper reported that attendees preferred them to pyrotechnics<sup>109</sup>. They may have had the desired impact on tourism, with museum bookings up substantially compared to the same time periods as last year.<sup>110</sup> Given the shows are still a relative novelty in the calendar, it will take more time to truly see what their impact has been.

Despite their popularity, drones do not look set to disrupt fireworks’ popularity. The drone shows are currently complimenting Hong Kong

fireworks displays, rather than supplanting them, and provide a different attraction to the city.

Drone shows have also become a popular alternative in many US towns and cities for 4<sup>th</sup> July celebrations, which have typically been celebrated with traditional fireworks. Some of this has come from an animal welfare perspective and, in some communities, out of respect for veterans dealing with PTSD. However, a greater motivator is in avoiding forest fires. July has become the peak month for wildfires across the US, when the ground and vegetation is driest.<sup>111</sup> Fireworks and stray sparks from displays substantially increase the risk of a wildfire breaking out.<sup>112</sup>

However, drone shows in the UK have not always been well-received. In 2021 Mercia Merina in South Derbyshire decided to replace their traditional fireworks display with drones, as a “family- and pet-friendly option”.<sup>113</sup> Drone displays can be difficult to organise in the UK, as displays are required to have specific approval from the UK Civil Aviation Authority. However, this display was delivered by FlightShows, one of the only companies with this authorisation in the UK. The free event, attended by over a thousand people, also included performers on stilts wearing LED costumes, fire dances with pyrotechnics, and live music.

Whilst the organisers maintain that the “majority” of attendees enjoyed the community event, social media reactions afterwards expressed some negativity towards the quality of the display compared to traditional fireworks.<sup>114</sup> It is likely that some people will have an initially negative reaction to alternatives, especially when they are used as a complete replacement of fireworks. Our polling, detailed further in Chapter Five, suggests that their popularity may rise as the public get used to the increased use of these displays. However, it is important to note that the scale and quality of displays, both for drones and for other alternatives, could have a bearing on enjoyment. The scale of drone shows in the UK is much smaller than that of other countries such as Hong Kong. The display for Queen Elizabeth II’s Platinum Jubilee celebrations used 400 drones.<sup>115</sup> Similarly the London New Year’s Eve Firework display in December 2022 incorporated the use of 400 drones. By contrast the New Year celebrations in Busan used 1,500 drones to create the iconic blue dragon.<sup>116</sup> The monthly drone shows in Hong Kong use in the region of 1,000 drones per performance.



**Image 5: Drone art depicting blue dragon biting ball in Busan, South Korea**



Source: Gawngali M Drone light show via [busan.go.kr](http://busan.go.kr)

**Laser and light shows are also popular, sometimes as stand-alone displays and sometimes as a replacement for fireworks, and have the potential to bring significant economic benefits**

Less common than drones are laser and light show displays. The set-up and style are largely similar to a fireworks display. There is a dedicated viewing area, where lasers and/or LED filled structures are set up. For laser shows, lasers are beamed through a laser project, which is equipped with different mirrors, prisms and other components that affect how the light from the laser is spread, and what kind of pattern it will create. LED shows usually rely on a structure that is filled with LED bulbs to be set up in a dedicated viewing area. Both are then programmed to light up in different colours, at different speeds, creating a particular pattern.

As with drone shows these can allow for great creativity when it comes to the design of colours and patterns. However, LED shows can be somewhat restrictive as the patterns created depends entirely on the size and shape of the structures they are on.

**Case study: LED-incorporated displays in Amsterdam have provided an alternative way to celebrate the New Year, but efforts are not coordinated**

A typical Dutch New Year's Eve is characterised by the cacophony of fireworks. For most of the year, the purchase and use of fireworks is limited to trained professionals, but there is an exemption for New Year's Eve. Despite the long standing tradition of fireworks in the Netherlands, there have increasingly been calls for regulations on fireworks to become stricter and for their use to be more limited. Public fireworks use is increasingly viewed as a nuisance, contributing to injuries, property damage, anti-social behaviour and distress in animals.

During the first year of the pandemic, the Dutch government imposed a ban on fireworks, concerned about additional pressure on hospitals due to fireworks-inflicted injuries. Since then, some municipalities have continued the ban on the sale and use of fireworks, while others have enacted "firework free" zones. However, as any bans are on a municipal rather than national level, moving one street over can effectively work around the restriction.

Whilst instituting bans on public fireworks usage, many municipalities have begun to organise their own local displays, in efforts to move people away from setting off their own backyard fireworks. Full fireworks displays are still the most popular, but in a minority of cases fireworks shows have been supplemented with or replaced by drones or laser/light shows. In Amsterdam, since December 2020 Museumplein (Museum Square) has played host to a public New Year's Eve display that largely substitutes fireworks for an LED and laser show. Dutch Company Electric Fireworks have created a light show which helps to replicate fireworks and their explosive nature, but without the sound or environmental impact. Shows are accompanied by some real, eco fireworks, as well as lasers, but the main focus of the event has been the light show, and the accompanying music. The show seems to be popular with the public, with 60,000 people attending the first display, and subsequent years also drawing large crowds.

While the event at Museumplein is popular, it has not taken off as the standard even across the whole city, let alone further afield in the country. Other organised fireworks displays in Amsterdam have included alternatives but still primarily use traditional fireworks. From a countrywide perspective, traditional fireworks remain very popular. Fireworks revenue in 2022 was the highest on record, with the Dutch public spending over €110 million on fireworks.<sup>117</sup>

**Image 6: LED light display at Amsterdam Museumplein**



Source: *ElectricFireworks*

A variation on the LED and laser shows has been “illuminated walks” or light trails. These trails usually feature different illuminated immersive installations, light art and walkways lit up in different colours. They are not usually marketed as an alternative to fireworks in the way that drone and laser shows are, as they cannot replicate fireworks in the same way. As illustrated in the below case study, however, they can be incredibly popular, and high-quality displays have the potential to bring in huge economic benefits through tourism.

#### Case study: Japan – illumination festivals and displays are beloved, and a significant tourist attraction, but have not replaced Hanabi (fireworks) festivals

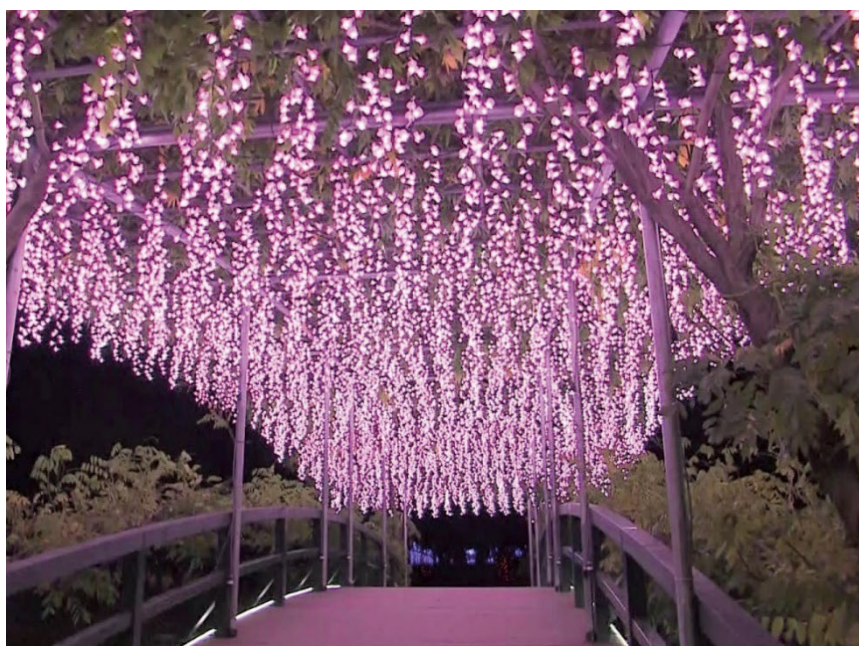
The regulation of fireworks in Japan has an interesting history. In the Edo Period (between 1603-1868) a complete fireworks ban was attempted due to frequent fires, however this was never successfully enforced.<sup>118</sup> Now, Hanabi (fireworks) festivals mark the summer months each year, and organised events, as well as general public use of fireworks, are common.

Under the Explosives Control Act, 1950, fireworks for use at events must receive permission from the local government. Event organisers must obtain a fireworks permit, and those who are setting off fireworks must hold safety qualifications from the Japan Pyrotechnics Association.<sup>119</sup> As well as large, organised displays, it is common for the public to purchase and use fireworks, as in the UK. Commercial fireworks are restricted to hand-held fireworks which, interestingly, are classed as “toys” in Japan and are allowed to be set off in public spaces. Some municipalities have recently introduced further

local regulations for general public use in response to concerns about late night use and litter, restricting when and where fireworks can be set off. There are also minor offences, including lighting them near forests without taking reasonable care.<sup>120</sup>

Illumination festivals and displays are extremely popular in Japan, and contribute significantly to the tourist economy. Illumination displays will often be themed, usually around the natural world, linking to the importance of nature in Japanese culture. For example, the “Garden of Light Flowers” in Ashikaga City has won awards for its displays, featuring a “Miracle Wisteria” decorated with electric lights designed to mimic wisteria.<sup>121</sup> Illuminations have a long history, with some displays running for over four decades such as the Sapporo Snow Festival.<sup>122</sup>

**Image 7: Picture showing the “Garden of Light Flowers” in Ashikaga City**



Source: <https://www.ashikaga.co.jp/season/season08.html>

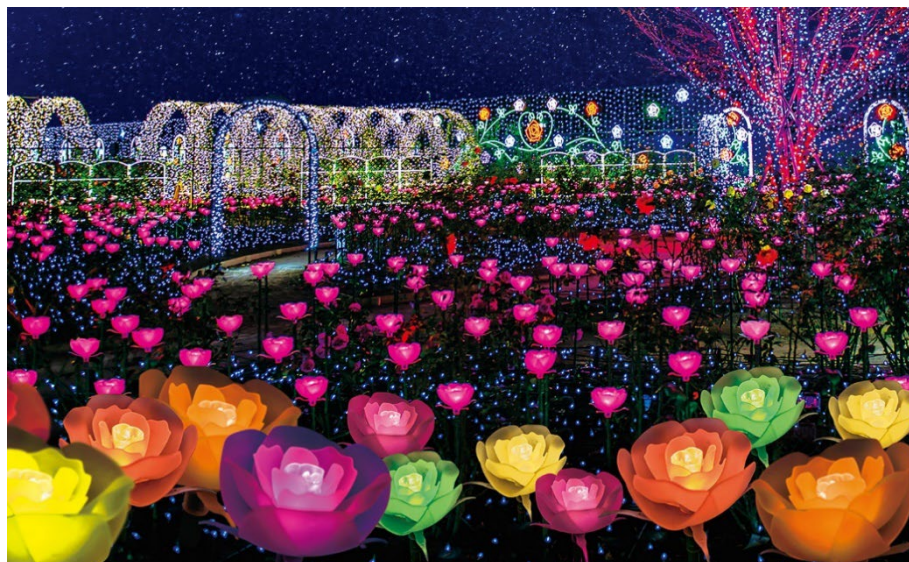
These festivals are not just beloved by locals, but they also attract tourists from all over the world. In 2019 the local government in Osaka published analysis of the attendance to, and economic impact of, a single illumination festival (a period spanning just under two months). Traffic data showed that their Festival of Lights attracted over 17 million visitors, and contributed approximately 92 billion yen (approximately £795 million in 2024)<sup>ii</sup> to the local economy.<sup>123</sup> Smaller illuminations have also been used to rejuvenate local areas and boost tourism. In 2018, for example, Nagano City introduced the Zenkoji Temple illuminations. 141,000 people visited in a period of one month, and there were 7,760 overnight stays by tourists in the area. The majority of

<sup>ii</sup> Converted based on historic conversion rates yen – pounds from 2019, and then adjusted to 2024 real-terms amount.

tourists came from Australia, the United States and Singapore, and 76% were visiting Nagano for the first time.<sup>124</sup>

However, their popularity has not replaced fireworks. Illumination festivals tend to take place in winter, whereas Hanabi (fireworks) festivals are held all over Japan during the summer months and are one of the most significant seasonal traditions.

**Image 7: Picture showing the “Garden of Light Flowers” in Ashikaga City.**



Source: <https://www.ashikaga.co.jp/season/season08.html>

The style of illuminated walk illustrated in the Japan case study above is becoming a more common winter entertainment activity. In the UK, Center Parcs decided in 2021 that it would swap the regular fireworks displays at each of their parks for an Enchanted Light Garden, out of consideration for the wildlife in and surrounding the resorts. The illuminated walks tend to glow rather than flash. They will sometimes be accompanied by music, but this is also usually low level and consistent rather than full of sudden changes and loud bangs. Many other places in Britain have also taken on the idea of illuminated walks, as a draw for the darker winter months, including Kew Gardens, Blenheim Palace and Syon Park.

#### **Use of alternatives is sporadic at best and motivations are mixed**

The case studies presented above show that there is clearly appetite for the use of alternatives, but at the moment, the deployment of alternatives is sporadic. As seen in the previous chapter, regulations over what fireworks products can be sold and who can buy them are decided on at a national level. Policies on when and where fireworks can be lit, however, tend to be at more local level. As such, initiatives to use alternatives to fireworks also usually come from a local or municipal level, rather than being a part of national policy. This does give power to local residents to decide what type of fireworks use best suits their community, but it also means that use of

alternatives to fireworks is very sporadic. As shown in the Amsterdam case study, the use of alternatives is not even a city-wide policy.

The reasoning behind using alternatives is also varied, and not always explicit. In some places it has come from a desire to use new technology, and use the novelty to attract new or larger crowds. In the cases of Japan and Hong Kong, use of alternatives has been in the pursuit of, or resulted in, great economic benefit. As shown in the case of Amsterdam, a large public display has been used in an effort to encourage people to come to safe, organised displays rather than to put on their own (illegal) ones, and a light show happened to be a large part of it. Swaps have also come about as a result of a desire to reduce the pollution caused by fireworks events. In other places, like cities in the US, the decision has come about out of concern for increased fire risk during the summer, when firework usage and wildfire risk are at their height. When animal welfare considerations are the driving force, however, rather than the complete alternatives to traditional fireworks, more often organisers have opted for quieter fireworks rather than using drones or laser/light shows.

## CHAPTER FIVE – THE OPPORTUNITY FOR ALTERNATIVES IN THE UK

Use of alternatives to fireworks is still in its relative infancy in the UK. As shown in the previous chapter, some towns and cities have begun using alternatives as part of, or instead of, traditional fireworks displays. However, many of these examples have come from individual local councils, or companies deciding to change their entertainment offer. The practice of using alternatives is not mainstream, but there is scope for alternatives to play a much greater role.

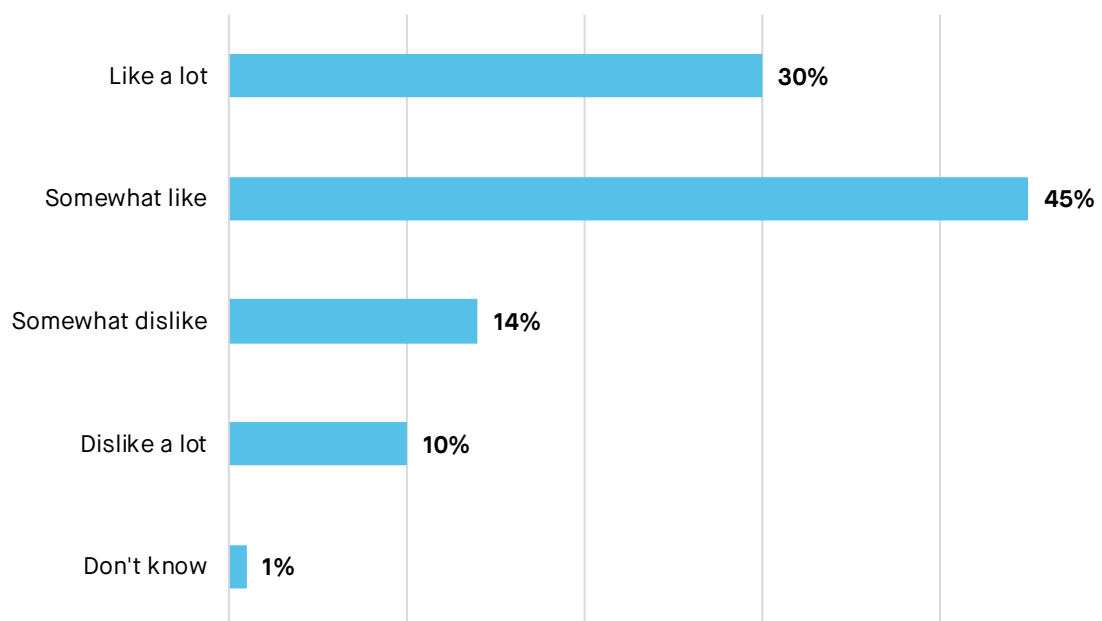
### **Public opinion data indicates that alternatives to traditional fireworks would be welcomed**

Broad public opinion data on fireworks is not extensive, however, surveys on attitudes to fireworks have generally found that while the public largely enjoy fireworks, there is some desire for tighter restrictions. Our polling research found that only 15% of people in the UK want regulations to stay the same – the remaining 85% would like to see some form of stricter legislation. Research from the Office for Product Safety and Standards on consumer behaviours and attitudes towards fireworks found notable desire for change in access. The public broadly supports increased restrictions on time of use, time of sale, and in who can buy fireworks.<sup>125</sup> Noise was also a significant factor for people and 52% felt there should be a noise limit placed on fireworks.<sup>126</sup> Given there already is a noise limit on fireworks (although the public is largely unaware of this), this indicates that the public feel this is still too high and it should be lowered. Similarly, polling carried out in Scotland found that 71% of the public favoured more control on fireworks, with concern for animal welfare and noise disturbance being in the top three reasons for why more control would be favoured.<sup>127</sup> On this basis, alternatives to traditional fireworks which are quieter, and seemingly less of a danger to animals, would probably go down well with the British public.

As shown in the previous chapter, alternatives are already being used and welcomed, but this has come through local or company initiatives to reflect concerns of animal welfare, or to take advantage of the economic opportunity that putting on a display of any sort can bring.

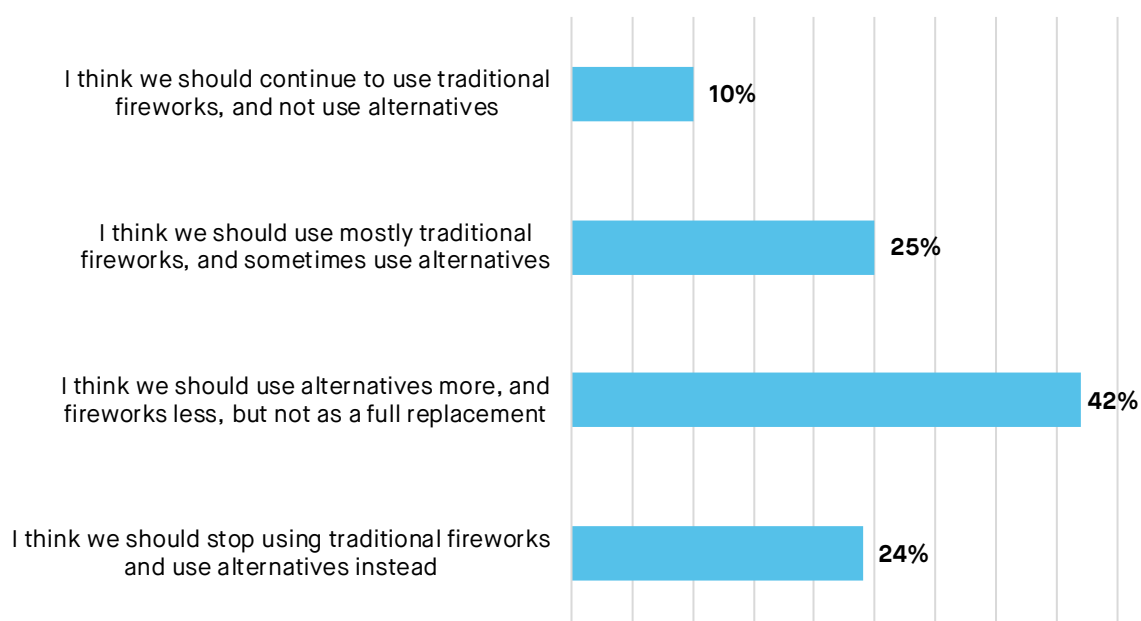
### **The vast majority think alternatives have some role to play in future displays**

As has been reflected in previous studies mentioned above, our polling found that fireworks remain largely popular with the British public, but it is an issue that elicits strong opinions. Threequarters (75%) of respondents like fireworks, leaving a substantial minority who do not.

**Figure 4: Extent to which British public likes or dislikes fireworks**

Source: Focaldata Omnibus Survey, June 2024

Despite their popularity, a majority of respondents also see some sort of a role for alternatives to fireworks in future displays, but there is disagreement over how great this role should be. As shown in Figure 4 below, 66% of respondents favouring use of alternatives either as an increasing part of fireworks displays, or as a complete swap. An additional 25% thought that alternatives should be used “sometimes”.

**Figure 5: How the public feels on use of alternatives to fireworks**

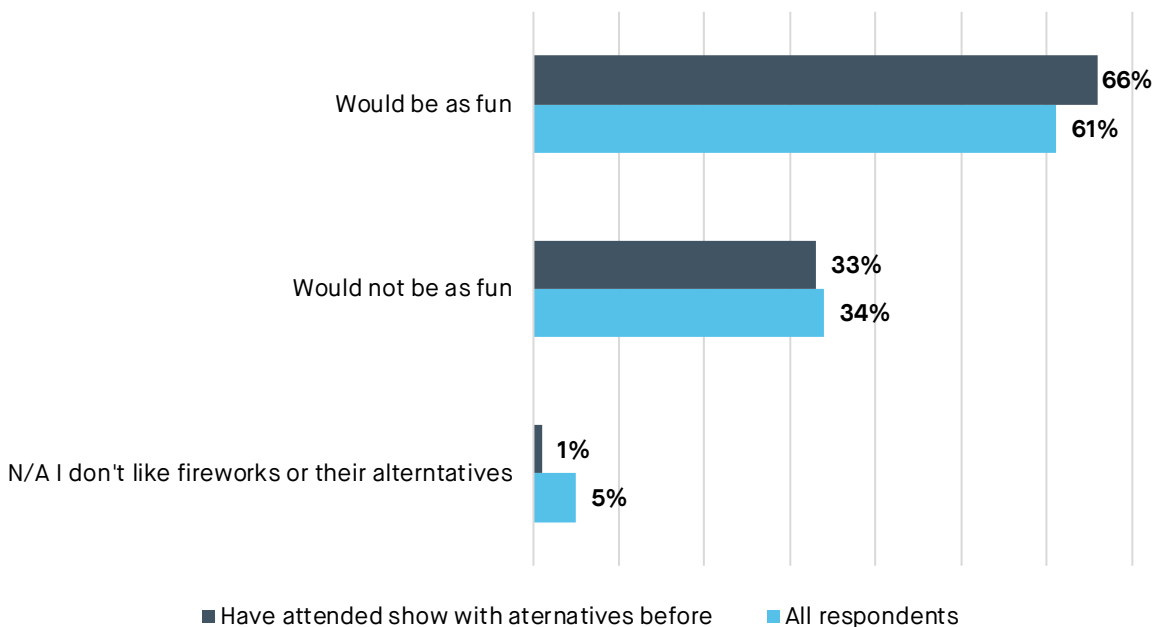
Source: Focaldata Omnibus Survey, June 2024



**And similar numbers think alternatives would provide the same level of entertainment**

While the displays of fireworks alternatives will largely not replicate a fireworks display, a majority feel that they can still provide the same level of entertainment as a traditional fireworks display. 61% of respondents think alternatives, such as lasers, drones, or quiet fireworks, would be just as fun to watch as traditional fireworks.

**Figure 6: Whether displays using alternatives would be as fun as traditional fireworks displays**



Source: Focaldata Omnibus Survey, June 2024

However, this leaves a substantial portion of the public who are sceptical of alternatives' capacity to provide the same level of fun. The relatively high rate of scepticism may be in part due to lack of experience with alternatives, and doubt that they could provide the same level of excitement. For those who have attended a display that has used alternatives, the belief that these displays would be as fun only rises to 66%. Displays using alternatives in the UK are quite likely more limited than in other places, and the alternatives used may not have made as much of an impression and may not have been on the scale as seen in other countries. Larger, more sophisticated displays may therefore generate greater interest among the as yet unconvinced public.

**Use of alternatives presents an economic opportunity**

Evidence from Japan and early evidence from Hong Kong indicates that alternatives to fireworks, particularly if done on a large scale, could create an economic opportunity for the UK. Drone shows are becoming more common as part of celebrations around Europe, but they have not yet taken off in the way they have in Asia. The UK could take advantage of this relative gap in the market, and become a

destination for alternatives such as drone shows, drawing in tourism from neighbouring countries.<sup>128</sup>

The caveat, however, is that for an alternative such as a drone show or an illuminated light show to be impressive and draw crowds, it will likely require substantial initial investment. Several hundred drones, or several thousand lights, will be needed to create a substantial impact. The strictness of regulation surrounding alternatives – especially drone shows – also limits their potential in the UK.

## **Though there is scope for alternatives to grow, there are limits to how widespread they are ever likely to be**

### **Alternatives will likely be reserved for organised displays rather than private events**

There is clearly appetite for alternatives to fireworks in celebrations, however, given the organisational complexity, technical know-how and scale involved in arranging an alternative display, it is unlikely that the more advanced alternatives will be used by the general public in place of individual or garden fireworks displays. Instead, alternatives will most likely be used by public event organisers such as local authorities, as part of their celebrations. Locally organised displays may deter or reduce the need for garden fireworks, but it is no guarantee. As such the problem of so called “nuisance fireworks” will likely persist.

### **But even organised displays may not be able to afford to use alternatives**

Even with community or council-organised displays, the cost of a professional alternative display may be prohibitive. As described in Chapter Two, for smaller councils or community displays, the purchase, organisation and lighting of fireworks is often done by volunteers rather than a specialist fireworks company, owing to the costs involved. Financial pressures on councils over the past number of years have already led to some councils cancelling their planned fireworks displays.<sup>129</sup> A switch to, for example, a drone display, unlike traditional fireworks, cannot really be organised by non-professionals. The cost of a professional drone show is not set but will vary based on the length of the display, the intricacy of the animations and of course, the number of drones required.<sup>130</sup> One UK drone company’s offers a stock wedding show for £7,500, and bespoke drone shows start at £25,000.<sup>131</sup> By contrast, Reaction Fireworks found that a Parish Council typically spends between £3,000-£6,000 for a 15-20 minute fireworks display, with typical Bonfire Night displays in the UK costing £10,000-£20,000, for audiences of around 20,000 people. Councils can spend up to £200,000 on larger fireworks displays.<sup>132</sup> Alternatives to traditional fireworks may become the reserve of larger councils, combined authorities or paid displays, who can afford to commission a drone display.

A further complication is the regulatory environment for use of some alternatives. Drone use in particular needs permission from the Civil Aviation Authority, and use of drones near airports, prisons and military areas can be very restrictive. This may limit where drones can be used, and indeed how many can be used at a time.

### There is little understanding on the impact of these alternatives to fireworks on animal welfare

We have a growing understanding of the impact of traditional fireworks on animals, from poorer air quality to psychological damage and physical injury. This research by and large has not extended to fireworks alternatives, and we know very little about the impact of the alternatives on companion animals, livestock and wild animals.

There are some things we do know about alternatives, and some ways they are clearly more beneficial to animals than traditional fireworks. From an air quality and pollution perspective, laser and light shows and drones are almost certainly better for wild animals. As they do not burst open, they do not release any small particle matter or heavy metals that could poison or irritate wild animals. They also do not create litter that could be inadvertently picked up and eaten by animals. Alternatives like drones, lasers and lightshows are also reusable, while fireworks are single use.

Animals are unlikely to be totally immune from the effects of alternatives, however. Like fireworks, many of the alternatives derive a large portion of their entertainment value from lighting up the night sky, and in the case of lasers, often flashing suddenly. It is potentially easier to protect some farm animals, horses and companion animals from this type of disturbance by keeping them inside, but horses and farm animals who cannot be kept inside and wild animals are still very much at risk. Light pollution in general is known to disrupt the behaviours of animals. Nocturnal animals are particularly affected, with light pollution interfering with nighttime activities for some animals like hunting, navigation, migration and breeding rituals.<sup>133</sup> The impact of more specific light pollution, like a flashing light display such as a laser show on animal welfare, does not seem to be well-studied. A planned laser and light shows in Australia in 2016 raised concerns as the site where the show was due to be projected was inhabited by a protected rock wallaby and was also a nesting area with birds of prey.<sup>134</sup> There were concerns that the show could cause distress among the inhabiting wildlife, resulting in negative impacts on their young.<sup>135</sup> It is unclear, however, the extent to which the light created from these displays are, or could be, harmful to animal welfare and how different any light effect is on them compared to fireworks.

Drones have been found to have negative effects, being disruptive to both aerial and terrestrial wildlife, although birds seem to be particularly affected.<sup>136</sup> Drone use in wild animal observation has been found to trigger stress and negative behavioural responses in animals.<sup>137</sup> Animals have responded to the presence of drones by fleeing from the drone, having increased vigilance, startling birds into flight and sometimes, attacks on the drone itself.<sup>138</sup> These behavioural responses are not universal and some animals have been found to have no response to drone presence.<sup>139</sup> However, other research has found that even when wild animals appear nonplussed they may still have a stress response through an increased heart rate.<sup>140</sup>

There are a number of characteristics that influence the level and extent of disturbance drones cause. Some of the characteristics include the type of drone, drone shape, size, colour, flight pattern, take off distance angle of approach speed and duration.<sup>141</sup> However, the two factors most commonly referenced in the research

appear to be noise from the drones and the approach distance.<sup>142</sup> Lower flying or a reduced distance between the drone and animals have been found to almost always disturb animals.<sup>143</sup>

One of the issues with fireworks sounds is not only the level of noise, but also the suddenness and intensity of that noise. Drone shows are also unlikely to produce these sharper sounds, but they are by no means silent. As with fireworks, drones need to move across the sky, which is achieved through the propellers on the tops of sides of drones spinning fast enough to enable lift off and continued flight. This creates a noise more akin to a buzz or hum, similar to that of bees.<sup>144</sup> The level of noise produced by a drone is affected by numerous factors including propeller size, the speed at which it is flying, and its altitude when measured.<sup>145</sup> With this considered however, drone noise has been found to be disturbing to animals, and is a contributing factor to the stress and behavioural responses mentioned above.. The noise from a single drone used in a display context, when there are other such sounds such, is unlikely to be especially noticeable from the ground. However, a drone show with in the region of 1,000 drones flying at once, will undoubtedly be louder. There is little research on the noise level produced by a drone show, but at a relatively low level, the sound is unlikely to travel in the way the pop and bang of a firework can, and so it could be assumed that it is likely to cause less distress to animals than a fireworks display.

Much of the existing research of the impact of drones on animal welfare has focused on the use of drones as part of wild animal observation and research, rather than the impact of artistic displays.<sup>146</sup> Drones used for artistic displays may well have different effects. As seen in previous chapters drone displays are very colourful by manipulating their lights and may remain flying in formation for a substantial period. The noise impact may also be different. As part of a display there will be a swarm, rather than a singular drone and so the noise affect will be multiplied. Displays are also usually accompanied by music, which may mask the sound of the drones to human ears but could still be noticeable for animals. While we do not know for certain, given displays with alternatives are unlikely to have sudden, high-pitched bangs, we believe that alternative displays will cause less distress to companion animals (including equines), farm animals, and wild animals.

Despite this, when it comes to physical safety, lasers, light shows and drones are likely much safer for most animals than fireworks. As they are all electric rather than pyrotechnic, they are highly unlikely to cause any sort of burns, or risk fire. Drones once again, however, pose a potential safety risk to flying animals, particularly those that may fly at night. Like fireworks, the noise of drones may spook and scare birds from nests, and bird may fly into the drones themselves, potentially causing serious injury.

## CHAPTER SIX – RECOMMENDATIONS

A total ban on fireworks is unlikely to be welcomed by the British public, but there have been repeated calls and evidence for support for greater restrictions on fireworks use. While alternatives have certainly grown in popularity, and may be welcomed by the British public, their adoption on a large scale will take time – and investment – to happen organically. The use of alternatives as part of, or instead of, traditional fireworks in large displays will also not resolve the issues of anti-social use or impacts of sounds fireworks create.

If England were to institute all of the following recommendations, it would bring the country to a medium-level of intervention, similar to what is found in the Netherlands and Germany, and still far off the more extreme and most interventionist practises of banning fireworks.

### **Review fireworks sales permissions to address concerns surrounding private fireworks use**

As evidenced in the fireworks inquiry, the bigger issues with firework use and fireworks noise was not usually a result of community and organised fireworks displays, but the intermittent and random use of fireworks by the public outside of expected occasions. Use of alternatives and designated usage areas are unlikely to change this behaviour, and as such we recommend some changes to fireworks themselves, and the information provided around them.

### **Reduce the maximum decibel level of traditional fireworks (for public sale) from 120 dB to 90 dB**

Alongside restricting fireworks to F1 and F2, the maximum noise level permitted should be reviewed. As discussed previously it is not possible to have entirely silent fireworks, but it is possible to have fireworks with a lower noise level. As shown throughout the report, many of the concerns around fireworks relate to the noise level, and there is desire for this to be more limited. Although fireworks for public sale currently have a maximum noise level of 120db, many do not meet this threshold. Reducing the maximum threshold to be at the 90-97dB mark is therefore not only possible, but already found in many fireworks.

At a lower noise level, fireworks will cause less disruption and shock to people and animals sensitive to the louder and higher-pitched noises currently cause by loud fireworks. However, they can still create some noise that many do enjoy fireworks for and can still create visually striking effects. Exactly how far the noise should be reduced should be determined by government consultation. A decibel limit of 97 dB has been endorsed by the British Veterinary Association and would put us closer to countries such as New Zealand.

### **Limit sale of consumer fireworks to Category F1 and F2**

Firework category is not directly correlated to level of noise emitted by a firework, however there is some relation between the two. F3 fireworks for example are usually regarded to be of “medium hazard” and whose noise level should not be damaging to

human health. By contrast F2 fireworks are of a low hazard and low noise level. This does not guarantee that F2 fireworks will always be quieter than F3, and noise testing by the Office of Safety Standards on fireworks confirmed that F2 fireworks have a wider range of noise levels across firework categories (the widest category for example has a range of 71db to 121db). However, almost all F2 fireworks that were tested had a minimum noise level below those of F3 fireworks. Government should consider limiting the sale of fireworks available to the public to F1 and F2 categories only, and restrict use of F3 and F4 category fireworks for professionals

### **Restrict sale of fireworks to specialised/licensed premises only, for the entire year**

Alongside lower noise limits, firework sales should be restricted to licensed firework shops. As it stands there is currently an exception to this rule, where unlicensed vendors can sell fireworks on set dates throughout the year. Removing this exemption so that fireworks can only be sold by licensed shops year-round would still allow smaller councils and community groups to organise their own fireworks displays. However, it could prevent more sporadic, last-minute fireworks purchases, as well as naturally limit the number and extent of private displays. As found in research by the Office for Public Safety and Standards, most of those who have hosted private fireworks displays buy their fireworks from supermarkets.<sup>147</sup>

Licensed premises could also be required to provide guidance on the safe use of fireworks. Buying from licensed premises should also come with a safety instruction on how to use fireworks safely, and with consideration for neighbours and potential nearby animals.

### **Allow local councils to designate “fireworks-free zones” in areas where fireworks are likely to have a greater impact on animals, the environment and vulnerable persons**

It is clear from the polling and from petitions submitted to parliament that there is substantial support for stricter use of fireworks themselves. Respondents want stricter controls over when and where fireworks can be used, so that they can better prepare. One of the complaints around fireworks usage is that they can effectively be used anywhere, including in gardens and streets.

Many councils will organise fireworks displays as part of Bonfire Night celebrations, and the location of this is usually well-advertised. However, this is not the only time of year when fireworks are used. As discussed throughout the report there are many other occasions which traditionally use fireworks, but these do not always have the benefit of a council- or community-organised display, and so individuals will use their own private fireworks displays. To ensure that there is a space for all celebrations to take place, the council should take note of what has been done in other countries and should establish designated fireworks zones. This will mean that there are known areas where fireworks can be used for different celebrations across the year. Notices can be provided of when celebrations are expected which can help vulnerable people and animal owners who may live nearby to prepare for the fireworks (however, with the reduced firework levels proposed below, we hope there would be less disruption anyway).

Councils can determine which areas are most suited for firework displays by assessing distances from homes, domestic animals, farm animals and wild animal habitats. In addition to permanently designated zones, displays organised as part of community events (e.g. by sports clubs, cultural associations, schools) could be granted permission or a temporary designation to hold a fireworks display, as long as the suitability guidelines set by the council are met. This should ensure that community celebrations are still possible, but it will help owners of domestic and farm animals to better prepare for the outcomes.

### **Capitalise on public interest in alternatives by encouraging their use as part of traditional displays**

It is clear from the public polling that there is appetite for greater use of alternatives at least as part of fireworks displays, if not in total replacement. However, it is also clear that alternatives are not yet particularly widespread, and even where used, are not the primary attraction. The Mayor of London annual New Year's Eve fireworks show has incorporated drones over the past number of years, with 2023/24 celebrations including 600 drones and 430 lights, but this was alongside 12,000 fireworks.<sup>148</sup>

To stimulate further and wider take up of alternatives to fireworks, councils should be encouraged to incorporate alternatives such as drones, lights or lasers into their displays. As part of planning for displays, councils should consider if incorporating drones or lights as part of the display, as a substitute for some of the fireworks, is feasible, in terms of budget and service availability. With this being said, we acknowledge that including alternatives may not be realistic for every council, given financial and regulatory barriers.

### **Review regulations surrounding use of alternatives to maximise economic potential**

As seen from the examples in Chapter Four, there is scope for use of alternatives in the UK to substantially scale up. With this there is strong economic potential for the UK, using creative drone shows or illuminations to draw visitors from other countries, as well as across the UK itself. Alternatives also largely appear to have less of an impact on the environment and animal welfare.

Under current regulations, it will not be possible to reach the full potential of alternatives, for drones in particular. Drones need licensing and permission before their use is permitted and there may be some circumstances where drone use is not permitted, such as for security reasons. It is notable that the number of companies offering organised drone displays in the UK is currently very few. This is bad for competition and for innovation. Reviewing the regulations to make it easier to arrange a drone display may be necessary to help unlock the economic opportunity it provides, including by encouraging new companies to enter the market and invest in innovation to improve the quality of shows in the UK. However, given the lack of available research on the long-term impacts on animals of drone displays, it will be important to keep the impact on animal welfare under review during scaling.

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