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Dying to Go Green: The Introduction of Resomation in the United Kingdom

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Abstract: In an age where concern for the environment is paramount, individuals are continuously looking for ways to reduce their carbon footprint—does this now extend to in one's own death? How can one reduce the environmental impact of their own death? This paper considers various methods of disposing the human body after death, with a particular focus on the environmental impact that the different disposal techniques have. The practices of 'traditional' burial, cremation, 'natural' burial, and 'resomation' will be discussed, with focus on the prospective introduction of the funerary innovation of the alkaline hydrolysis of human corpses, trademarked as 'Resomation', in the United Kingdom. The paper situates this process within the history of innovative corpse disposal in the UK in order to consider how this innovation may function within the UK funeral industry in the future, with reference made to possible religious perspectives on the process.

Keywords: UK funerals; ecology; alkaline hydrolysis; resomation; cremation; burial; death; ritual

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1. Introduction

We live in an age that has been manifested with ever-increasing concerns regarding the sustainability of human life on the planet. The negative impact that humanity has on the ecosystem is accordingly at the forefront of global discussions. Increasing pressure through popular discourse consequently prompted the United Kingdom (in May 2019), and other nations around the world, to declare a climate emergency. The last decade has been characterized by increasing cultural-political environmental threats and calls to action. In an age where concern for the environment is paramount, individuals are continuously looking for ways to reduce their carbon footprint. This paper explores how this can now extend to in an individual's death, and how sustainability in death could be achieved through the process of 'resomation'—the alkaline hydrolysis of human corpses. The primary focus of this paper is on the context in the UK. This paper will discuss the innovation of the alkaline hydrolysis of human corpses ('resomation'), the history of corpse disposal in the UK, possible religious perspectives on the 'resomation' process, the environmental credentials of various disposal techniques, and why the opportunity for an additional choice at the end of life in the UK matters. 'Resomation' is not currently available as a post-mortem disposal technique in the UK. Currently, there are three options available at the end of life in the UK: 'traditional' burial, 'natural' burial, and cremation. These will be discussed in Section 2 of this paper, along with 'resomation'.

2. Disposition in the United Kingdom: A Brief History

In order to appropriately situate this discussion, it is necessary to briefly outline the history of the methods used for the disposal of the dead in the United Kingdom. 'Rituals for the dead have been performed since time immemorial' (Cantor 2010, p. 91); nonetheless, how they have been performed and what has been deemed as 'acceptable' practice has varied. This section will focus specifically on the processes of the various corpse disposal techniques, rather than formulating an analysis of the content of any service(s) that may

occur prior to said disposal. Nonetheless, some reference will be made to the reasons that have influenced preference of disposal method.

2.1. Burial

For an extended period of British history, burial was perceived as the sole solution to the complications posed by the physicality of a corpse (Jupp 2006, p. 185). Traditionally, following a death, a corpse would be buried in a grave in the ground, and left to decompose out of 'sight' to the living. Until the nineteenth century, burial was almost the 'universal mode of disposal in Christian countries' (Leaney 1989, p. 118). The process of burial removes the dead from the material realm of the living by placing the corpse underground. Burial does not require any advanced technology, which is perhaps suggestive of its longstanding popularity, being so practical. Aside from the ease of burial, many religious traditions have acted as proponents of burial, particularly those of Abrahamic origin (including Judaism, Islam, and Christianity); such traditions hold the belief that burial prepares the mortal body for a form of immortal resurrection at a later stage. Such traditions, however, have also had practical concerns to consider. For example, traditional Jewish practice taught that bodies had to be buried as soon as possible, however this was primarily because 'the hot climate accelerated the decomposition of dead bodies which were a hazard to health' (Jupp 2006, p. 3). Hence, although there have been strong existential reasons responsible for the practice of burial being deemed as more favorable, it is evident that practicality and functionality have always been prevalent in decision-making regarding the method used for post-mortem disposal. Burial has been the most longstanding method of corpse disposal used in Britain; it was overwhelmingly the most popular method of post-mortem disposal in Britain until 1968, when the cremation rate overtook that of burial for the first time (Cremation Society of Great Britain 2020). This paper will discuss how this change in preference occurred and what the possibilities are for the future of funerary practices in the UK. While the discussion of 'traditional' burial pauses here, the practice will be discussed throughout the paper.

2.2. Cremation

Despite the longstanding and popular tradition of burial noted throughout history, it is possible to trace the use of cremation to some of the earliest human societies. Moreover, the religious traditions of Buddhism, Hinduism, and Sikhism favor the practice of cremation over burial. The origin of cremation as a formal method of disposal has been traced to Greece in around 1000 BC (Cantor 2010, p. 105). Furthermore, the Romans are recorded to have adopted cremation 'toward the end of their Republic' (Cantor 2010, p. 105). During this period, the popularity of cremation increased. Cremation is also referenced in the Bible. Hence, even in these early human societies, the practices of burial and cremation coexisted. However, over the first two 'Christian centuries' cremation lost its place to burial (Jupp 2006, p. 4). This trend continued for an extensive period of time, and many came to associate the concept of cremation with this early period of the Greeks and Romans, prompting cremation to be conceptualized as tainted with notions of paganism. Thus, until the nineteenth century, cremation had not commonly occurred in Europe since the early Christian era; following this early period, cremation was practiced in Europe 'only in exceptional circumstances: in times of pestilence, and as a form of execution.' (Leaney 1989, p. 118; Davies 2017).

Hence, for centuries, religious traditions and cultural norms had condemned the use of cremation (Leaney 1989, p. 118). This mood persisted for a significant period of British history. However, in the late-nineteenth century, a change in this mood began in Britain. The Cremation Society of Great Britain (then, The Cremation Society of England) was founded in 1874 by Sir Henry Thompson, surgeon to Queen Victoria. Inspired by the model of Professor Brunetti's cremator that he witnessed at the Vienna Exposition in 1873, Thompson returned to Britain, and wrote papers advocating cremation. Bringing together his like-minded friends in 1874, a declaration was drawn up and signed by those present,

disapproving of the practice of burial, and proposing a favored alternative process. The proposed alternative would 'rapidly resolve the body into its component elements' and could not 'offend the living'; therefore, the decision was made 'to adopt that usually known as cremation' (Cremation Society of Great Britain 1874). The signing of this declaration constituted membership to The Cremation Society of Great Britain. From the formation of The Cremation Society in 1874, formalized promotion and education of cremation began in Britain.

Significant in the history of modern cremation in the UK is Dr William Price. In 1884, Price was put on trial for attempting to cremate his recently deceased five-month-old son, Iesu Grist (Welsh for Jesus Christ), which was deemed as having committed a 'crime'. Price lit an open-air pyre on the top of a hill in Llantrisant, which attracted the attention of locals who saw the act as pagan, prompting public outrage and consequently his arrest. Despite some negative publicity, Price's arrest and trial signified a turning point in the progress of the introduction and legalization of modern cremation in the UK. Eminently, the judge of Price's trial, Justice Stephen, concluded that 'a person who burns instead of buries a dead body does not commit a criminal act unless he does it in such a manner as to amount to public nuisance by common law' (Queen's Bench Division 1884, pp. 254–56). Price's act was therefore declared *not* illegal (Davies 2015, p. 132). The legal declaration essentially opened the floodgates for the cremationists (advocates of cremation), prompting vast attempts to normalize cremation as a disposal method (Davies 1990, p. 7). Price's trial set precedent. Cremation had, in essence, been pronounced legal by the court; 'if not legal, not illegal provided no sensible nuisance was caused to the public' (Jupp 2006, p. 68). Price successfully cremated his son six weeks later. Following Price's trial, The Cremation Society publicly announced that it was 'prepared to proceed with the cremation of anyone so requesting it' (Cremation Society of Great Britain 1974). The Cremation Society purchased land adjoining a cemetery in Woking, where the Society built the UK's first crematorium for public use. In 1885, the first official cremation at Woking Crematorium took place; this was 'the first legal cremation of modern times' (Jupp 2006, p. 74). The Cremation Society advertised the readiness of Woking Crematorium in the press in 1885 (Jupp 2006, p. 73). The Cremation Act of 1902, an act for the regulation of the burning of human remains, was the first general Cremation Act in the UK (UK Parliament 1902); regulations followed in 1903. The Act, with amendments, remains in force to this day. The Act markedly 'opened the way for cremation to be developed across the UK' (Davies 2015, p. 133).

Britain was the first European country to popularize cremation (Jupp 2006, p. ix), developing the process 'quicker than any other Western society' (Rumble et al. 2014, p. 245). Cremation emerged to the forefront of the funeral industry in the UK for a number of reasons. In particular, sanitary and hygiene concerns were prevalent. Concerns had been increasing regarding the impact that the disposal of the dead can have on the living, particularly in relation to the spread of disease. Furthermore, the funeral industry has progressively come into conflict with the economic necessity of the affordability of the disposal of the dead, which cremation has enabled comparative to burial from around the mid-twentieth century onwards (Davies 2015, p. 347); thus cremation, generally, has helped to reduce the economic cost of funerals (Jupp 2006, p. 185). With regards to economics, however, it is important to note that in its early stages, cremation was not immediately accessible to all; cremation did not become 'more fully democratized until the 1950s and 1960s' (Davies 2015, p. 347).

A further reason necessitating cremation was space. In the 1890s, cemeteries in the UK had become 'landlocked'; these problems relating to land space were exacerbated in 1918 by the 'rapid suburbanization of housing' (Jupp 2006, p. xiv). Responding to these issues, The Cremation Society adopted the motto 'Save the land for the living', followed by the slogan 'Cemeteries or playing fields?' in the 1930s. These actions emphasized the contemporary issues posed by burial and focused on the need for change. With regards to this developing issue, Podoshen highlights an important question to ponder: 'How

will death rituals and traditions change when we run out of space for the earth's bodies?' (Podoshen 2016, p. 317). Currently, Section 25 of the Burial Act 1857 makes it an offence to remove buried human remains without permission from the appropriate authorities in England and Wales (UK Parliament 1857). In England, the only exception to this rule is that London burial authorities have the power to disturb graves that are over 75 years old for the purpose of deepening the grave to allow for further burials. In Scotland, under the Burial and Cremation (Scotland) Act 2016, the consideration for grave reuse is made where interment occurred 100 years ago and the grave appears to have been abandoned (Scottish Parliament 2016). With such limited scope, however, the issue of space for future burials in the UK persists.

In order for cremation to become a well-established cultural phenomenon, The Cremation Society was required to convince the wider population that cremation could function in society in the same way that burial had for centuries. In order for an idea to become normalized, a great deal of education and raising awareness is necessary so that the concept permeates the public consciousness. Gradually, over time, the proponents of cremation achieved this, enabling crematoria to be built across the country and cremators installed within; accordingly, cremation has become a normalized practice, and is the most popular method of post-mortem disposal in the UK. By 1940, nearly 4% of funerals in the UK involved cremation, this reached 50% by 1968, and climbed to 71% by 2000 (Cremation Society of Great Britain 2020). Currently, closer to 80% of deaths in the UK result in cremation. 'For the great majority of the British public of, say, 1880, the thought that by 1980 nearly 65% of the dead would be cremated would have been incredible.' (Davies 2015, p. 131). The Cremation Society of Great Britain remains in existence to this day, continuing to advance public education of cremation.

2.3. Natural Burial

'Natural' burial, also referred to as 'woodland' burial, 'green' burial, and 'ecological' burial, is an environmentally friendly alternative disposal technique to 'traditional' burial. Natural burial emerged in the UK in the early 1990s. The UK's first natural burial site was opened in Carlisle at Carlisle Cemetery in 1993 by Ken West; the site was opened at an unused woodland area of the cemetery. By 2014, there were over 260 natural burial sites in the UK, which was approximately the same as the number of crematoria in the UK at that time (Davies 2015, p. 347). The introduction of natural burial was the most significant shift in practices of corpse disposal in the UK since the introduction of cremation in the 1800s. It has now been a popular alternative, environmentally conscious, disposal method for over 25 years in the UK. In the first five years of the innovation in the UK, 53 natural burial sites were established; between 1998 and 2002, the innovation grew rapidly further, with 71 new grounds established (Clayden et al. 2015, pp. 33–34).

Natural burial is most closely associated with the disposal method of traditional burial; however, it differs in a number of ways. At natural burial sites, 'bodies are strongly preferred not to have been embalmed and to be in easily biodegradable containers', usually a casket or a shroud (Davies 2015, p. 350). Detailed records of the mapping of graves are kept; however, unlike traditional burial, no 'permanent' headstone marker is used to signify the marking of a grave (Clayden et al. 2010, p. 119). Sometimes a marker made of wood is used; however, this is done with the knowledge that it 'too, will decay' (Davies 2015, p. 350). Some natural burial sites therefore 'bear little overt evidence of who is buried where' (Clayden et al. 2015, p. 5). That is not to say that families do not find a way to resist this requirement, perhaps 'breaking the rules' in order to memorialize the placement of their loved one. Nevertheless, families of those who are natural buried are required to accept that in time, the site where their loved one is buried will become an 'anonymous' landscape (Clayden et al. 2015, p. 138); furthermore, that the grave may become inaccessible at some future point due to the natural growth of the landscape (Clayden et al. 2010, p. 119).

With natural burial, 'we find ourselves at the cultural interface between cremation, as a late nineteenth-century technological innovation, twentieth-century popular appropriation,

and the even longer-term British ideal of nature, gardens, parkland, and nature at large, albeit with the latter cultural motif being further intensified by the newer issues of ecology and world survival.' (Davies 2015, p. 351). The introduction and popularization of natural burial demonstrates a significant shift in popular understandings, enabling change within the UK funeral industry. Its introduction significantly emphasized the necessary link between funerals and ecology. The impact that 'traditional' funerals have upon the environment was publicly recognized and actively acted upon. This concern was recognized in the Ministry of Justice's guidance on natural burial, noting that interest in and demand for natural burial had grown, particularly for those concerned about the 'potential environmental impacts of modern funerals' (Ministry of Justice 2009, p. 1).

However, while natural burial is fundamentally innovative, it is familiar. It is not a 'new' technology, rather, it is a 'new' way of doing a long-established practice. Moreover, it is noteworthy that the traditions of Islam and Judaism have utilized aspects of 'natural' burial techniques throughout history, burying their dead in shrouds (Mims 1999, p. 134). With natural burial, 'we find a strong potential for elements of traditional burial to be aligned with increasing doubts over the ecological credentials of cremation.' (Davies and Rumble 2012, p. 3). Nevertheless, there is a stark contrast, of course, to traditional burials in that these would occur within an easily accessible cemetery, burial ground, or graveyard. Often, the attire worn by mourners at the funeral will have to differ somewhat to that worn by mourners attending a funeral that results in traditional burial or cremation. As Davies notes, often mourners and funeral directors have to 'negotiate rough grass, bushes, and trees as they access grave sites off any immediately beaten track', so much so that if it is a wet day 'wellingtons or other rough footwear' would be best suited for the occasion (Davies 2015, p. 357). Hence the practicalities surrounding attending a natural burial starkly differ to a 'traditional' funeral.

Despite the popularity of natural burial, however, the process has not taken over the established disposal methods of traditional burial or cremation in terms of popularity (Clayden et al. 2015, p. 2). Perhaps this is suggestive that there is scope for further innovation. Conversely, it could elucidate that the majority are seemingly content with the 'traditional' options that are already available to them.

2.4. Resomation

2.4.1. What is 'Resomation'?

'Resomation', also referred to as 'water cremation', 'bio-cremation', 'aquamation', 'green cremation', 'flameless cremation', and 'alkaline hydrolysis', is a funerary innovation which utilizes the chemical process of alkaline hydrolysis to accelerate the natural processes associated with decomposition. Throughout this paper, situated in the British context, reference will primarily be made to the process as designed and manufactured by Resomation Ltd. The process differs depending on the pressure and temperature used, however, the outcome is the same. The differing technicalities of the process are therefore dependent on the manufacturer and vessel used. For the purposes of this paper, the process will be referred to as 'resomation', apart from when describing the process as manufactured by a different company to Resomation Ltd.

The resomation process utilizes an alkali-water based solution (95% water: 5% alkali), heated to 150 °C, to speed up the decomposition process of alkaline hydrolysis that a corpse would undergo during burial; see Figure 1. Hence, the process essentially mimics the natural decomposition process, sped up by the use of heat, pressure, and chemicals. During burial, this hydrolysis process would be prompted by bacteria in the soil and its alkalinity. The 'Resomator' is a stainless-steel vessel in which the resomation process occurs; the deceased is placed in the Resomator within a biodegradable shroud or coffin, before water, heat, alkali, and pressure is added to begin the decomposition process. The process, by Resomation Ltd., takes three to four hours to complete and concludes leaving the bones, which can be ground to white 'ash', and a DNA-free residual fluid (see Figure 1), which is treated and returned to the water system. In some alkaline hydrolysis systems, the residual

fluid is used as fertilizer. In all processes, the resultant 'ash' remains can later be returned to the deceased's kin, as with the tradition of cremation.

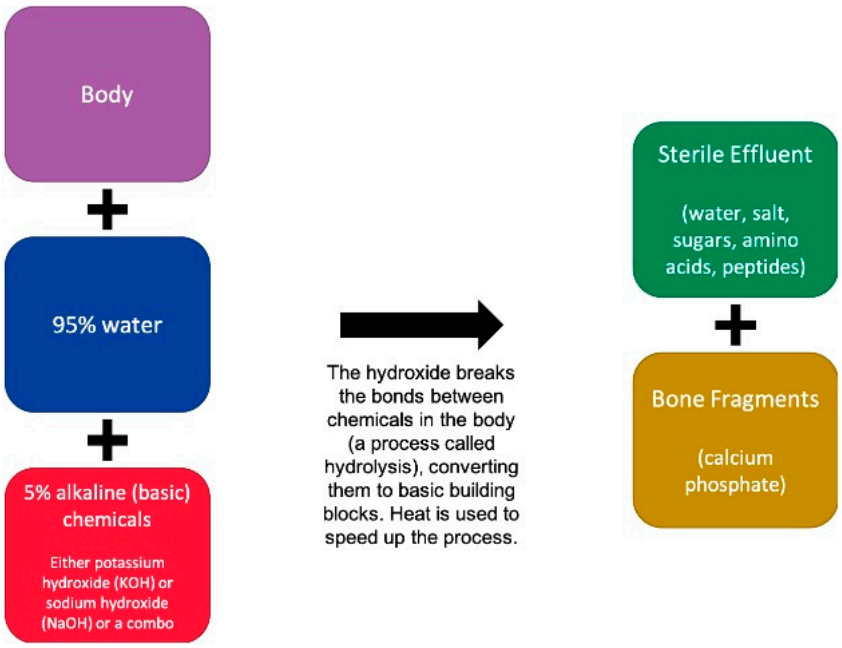

Figure 1. Information graphic summarizing the alkaline hydrolysis process (Cremation Association of North America 2019).

As a chemical process, alkaline hydrolysis was first developed and patented in the United States in 1888 by Amos Herbert Hobson. Hobson developed the process primarily in order to enable the opportunity to produce fertilizer and other by-products from the bones of animals. In the early 1990s, the process was further developed at Albany Medical College by Dr Gordon I. Kaye and Dr Peter B. Webber for the purpose of disposing animal corpses. The researchers at Albany sought 'an effective and inexpensive way to dispose experimental animal remains that contained low-level radioisotopes.' (Olson 2014, p. 672). This developed process was patented in the USA in July 1994. Hence, over the course of time, alkaline hydrolysis has been used experimentally with animal corpses, and, more recently, a number of universities and hospitals in the USA have used the method for the disposition of human bodies donated to medical research; these include UCLA, University of Florida, and Mayo Clinic.

2.4.2. Resomation in the Funeral Industry

The alkaline hydrolysis process first emerged as a method for use on animal carcasses in the USA with Hobson in the 1880s and was further developed at Albany Medical College in the 1990s. The development of the process to be used for human corpses began shortly after. The first commercial single-body alkaline hydrolysis system for human corpses was put into operation at Mayo Clinic in the USA, designed and manufactured by WR^2, in 2005. The process was first used commercially for human corpses in the USA in 2011: Bio-Response Solutions Inc. installed their system at Edwards Funeral Service in Ohio in January 2011; and the first high pressure alkaline hydrolysis system for human disposition, designed and manufactured by Resomation Ltd., was installed at Anderson McQueen Funeral Home in Florida in Summer 2011.

The two leading companies supplying alkaline hydrolysis systems (Supplementary Materials) have had a long-established history working with the technology. Sandy Sullivan, founder of Resomation Ltd., and Joe Wilson, founder of Bio-Response Solutions Inc., were chief operators for Europe and the USA respectively at the now-defunct company WR^2. At the fall of WR^2 in 2006, Sullivan set out to develop a high-temperature system

specifically designed for human disposition; Resomation Ltd. was formed in 2007. Wilson set out to develop a low-temperature system, primarily for disease control, later focusing on a system for human corpse disposal, too; Bio-Response Solutions Inc. was formed in 2006.

The process, under its various names, has been commercially functioning in the US funeral industry for a decade now. Pet systems in the USA are immensely popular; for deceased pets, the process is legal in every state in the USA. At the time of writing, the process for human corpse disposal is legal in nineteen states in the USA. The same is not true in the UK. Nonetheless, resomation is on the cusp of becoming an alternative option for the disposal of human remains in the UK.

Cremation in the UK emerged against the background of changing social and theological attitudes towards death, with funerals being placed in an economic, hygienic, and rational framework (Jupp 2006, p. ix). We are now a century ahead of these times, and a shift in social attitudes has occurred again; now, concerns for the environment impact our daily lives and the span of these concerns is extending. We saw in Section 2.3 that such concerns led to the popular introduction of 'natural' burial, primarily posed as an environmentally friendly alternative to 'traditional' burial. Resomation provides a further possibility to resolve these concerns, primarily posed as an environmentally friendly alternative to cremation.

Although the process of resomation fundamentally differs to that of cremation, the output is similar, and importantly, familiar. Cremation produces ash, which can be returned to the kin to be 'disposed' of. Much the same, the resomation process concludes with the bones which can be ground to white 'ash'. The processes are therefore 'potentially similar in that a body is taken and rendered into powder.' (Davies 2015, p. 116). Moreover, the resomation process would not require any change to the desired funeral service (or lack of service) of the deceased, merely the conclusion of the funeral would differ.

Davies importantly notes that the option of resomation is interesting 'for while it resembles cremation in being an 'industrial process', one in tune, perhaps, with the later industrial revolution, the twenty-first century's appetite for such a process of body-disposal remains to be tested.' (Davies 2015, p. 116). Vitally, Davies notes that 'no innovation exists in isolation' (Davies 2015, p. 352), rather innovation coincides with changes in attitudes; will the contemporary context in the UK be the appropriate backdrop for the innovative introduction of resomation? This is yet to be seen.

2.4.3. Resomation and The Cremation Society of Great Britain

It is significant to note that the innovators promoting the introduction of cremation in the nineteenth century were conscious of potential developments, similar to their own, in the future. The Cremation Society of Great Britain was established with the view to support further innovations in the future. As the 1874 Declaration of The Cremation Society reads:

> *'We, the undersigned, disapprove the present custom of burying the dead, and we desire to substitute some mode which shall rapidly resolve the body into its component elements, by a process which cannot offend the living, and shall render the remains perfectly innocuous. Until some better method is devised we desire to adopt that known as cremation.'*. (Cremation Society of Great Britain 1874)

The statement 'until some better method is devised' alludes that the early cremationists were forwards thinking, understanding that developments may be made, and an alternative suitable method may emerge, prompting the need for similar action to those advances that they had made in order to reintroduce the practice of cremation. In 2008, The Cremation Society formally amended its Memorandum of Association (Cremation Society of Great Britain 2008b), updating the 'objects for which the Society is established', making this component even more potent in the third objective:

> *3. The objectives for which the Society is established are:*
>
> *(1) to promote the practice of cremation for the respectful disposal of bodies and dead persons;*
>
> *(2) to advance public education in the practice and ethics of cremation; and*
>
> *(3) to investigate methods of disposing of the bodies of dead persons which appear to the Society to be superior to cremation and, if the Society thinks fit, to promote such methods and advance public education in their practice and ethics either instead of or in addition to cremation.'* (Cremation Society of Great Britain 2008a)

The Cremation Society has explicitly named resomation as a method which may be promoted in the future, in addition to cremation. As the Society explains in its reasoning for amending its Memorandum in 2008: 'Until the arrival on the scene of resomation [. . .] the Society has never thought that these rival methods held sufficient promise of practical application to justify the Society taking any greater interest in them than to learn about them, and certainly not to support any practical steps to investigate them. The Council of the Society, however, took a different view about resomation.' (Cremation Society of Great Britain 2008a). In 2008, therefore, the Society investigated the legal possibilities of resomation further. The Society concluded that it would not cite resomation by name, however, it certainly appears that the changing of the Memorandum was directly in relation to the prospective introduction of resomation in the UK. The Cremation Society is thus continuing to influence progress in British society by contributing to the public education and development of further innovations in corpse disposal, currently alongside cremation, in twenty-first century Britain.

2.4.4. Obstacles Faced by Resomation: Public Perception and Regulations

Some concerns have been raised regarding the safety of the processing of the residual fluid following resomation due to its alkalinity levels. However, independent reports regarding the process' output consider the residue safe for treatment via the wastewater treatment system in the UK. In 2019, samples from five 'resomations' carried out at a university-based installation were analyzed by experts at Middlesex University, working closely with Yorkshire Water to ensure that the methodologies and parameters used were fitting with the requirements of the UK water industry (Sensi 2020). The results of the study found that the effluent posed 'no concern for sewer systems, wastewater treatment works and their related operations and receiving water quality' (SAIF 2020, p. 10; Sensi 2020). Thus, the residual fluid from the resomation process was deemed suitable to be discharged to the sewer 'for processing for standard water treatment methods' in the UK (Sensi 2020).

Popular concerns regarding the wastewater from the resomation process have interrupted the progress of the introduction of resomation in the UK. In 2017, Sandwell Council's plans to install a Resomator at Rowley Regis Crematorium were put on hold when Severn Trent denied the council a trade effluent to discharge the wastewater from the resomation process. This denial was partly due to a lack of existing standards in the water industry regarding human remains, but also because of concerns regarding the perceived public perception that human remains would be going 'into the water system' (Matthews-King 2017). It has since been demonstrated, through the analysis by Middlesex University, that the residual fluid from the resomation process contains no DNA (SAIF 2020, p. 10; Sensi 2020). Moreover, it is important to note that all disposal techniques interact with the water cycle in some way; however, since resomation uses water, it is understandable that the question of what happens to this water inevitably comes to the forefront of one's mind in a direct way, rather than the less obvious way that the occurrence of seepage in burial might, for example. Thus, concerns regarding the residues from the resomation process seem to permeate most prominently; as a new process, public education to resolve such popular concerns will be necessary to enable its implementation. Public perception will be perhaps the largest obstacle to overcome for proponents of resomation, in a similar way as it was for the cremationists in their nineteenth century efforts to implement cremation. A further

consideration with regards to public perception and popular acceptance of resomation is to examine whether religious traditions in the UK will be accepting of the process as a disposal technique. Is it possible for the practice of resomation to fit within long-established and theologically rooted teachings? This will be explored in Section 3.

Furthermore, the legality of the resomation process is a necessary consideration. The resomation process may be scientifically verified, but if it were to be implemented as a disposal technique in the UK funeral industry, appropriate regulations regarding the process would need to be introduced. As Conway notes, technically, resomation and other innovative techniques are 'currently legal in Britain as long as they do not infringe sanitation laws or offend public decency', hence why the UK's first 'resomations' were legally possible in 2019 (Conway 2016, p. 50). Nevertheless, if introduced within the UK funeral industry, 'detailed provisions would have to be introduced in the longer term' to appropriately safeguard the provision of resomation (Conway 2016, p. 50). Possibilities for legalization include consolidating current disposal laws with the addition of regulations for resomation, or the introduction of a new law concerning resomation as a separate entity to burial and cremation (Conway 2016, p. 234). How resomation may become defined in the law, and how it would be regulated, is still to be established in the UK.

Successfully consolidating public perception of the resomation process and establishing appropriate legislative regulations will be necessary for resomation to become a functioning fourth option for post-mortem disposal within the UK funeral industry.

3. Resomation and Religion

In the UK, religious institutions have overseen funerals and their services for centuries. Funeral services are now conducted by a diversity of religious, spiritual, secular, and humanist providers. Alongside the variety of providers, the UK faces a widening choice of methods for disposing the dead. Resomation has not yet been introduced as a funerary practice in the UK. Therefore, how religious traditions and their leaders in the UK will respond to the innovation and whether they will be accepting of it or not is not concretely known. Even in the USA, where resomation has been a functioning funerary practice for a decade, there have not been many comments made on the acceptability of the process by religious leaders in an overarching way. For example, many leaders within the Catholic Church have written on the resomation process as a funerary practice, detailing their theological stances; however, there has not been a statement from the Vatican on the matter. Nevertheless, it is possible to consider what religious traditions' stances on the process may be based on their teachings regarding the practices of burial and cremation. As Leuta and Green note, 'consultations with different cultural and religious groups are imperative to establish whether this method would be acceptable' (Leuta and Green 2011, p. 4).

Religious traditions differ in their teachings regarding death and their prescription of funerary practices. The 'Abrahamic' traditions of Christianity, Islam, and Judaism have historically taught that the human body should be buried at the end of life in order to prepare the mortal body for a form of immortal resurrection. However, additionally, all Christian denominations, with the exception of the Orthodox Church, permit the practice of cremation. In contrast to the 'Abrahamic' traditions, the 'Eastern' traditions of Buddhism, Hinduism and Sikhism have historically taught that the human body should be cremated at the end of life; in the cases of Hinduism and Sikhism, it is taught that cremation aids the release of the soul from the body. Such cremations traditionally occur on an open-air pyre; however, the Cremation Act 1902 prevents the legal possibility of open-air pyre cremations in the UK. I must emphasize that this is a very generalized summary of religious teachings regarding death and disposal. Inevitably, there are cultural and geographical differences in how death rituals are performed by humanity, and this is true within religious traditions. For example, while most Buddhists are cremated, following the example of the Buddha, the practice of burial is also popular amongst many Buddhists. (Leming and Dickinson 2002, pp. 368–77).

How will religious traditions respond to the prospect of resomation as a disposal technique in the UK? At face value, since resomation has largely been posed as an alternative to cremation with its 'ash' residues, it may be assumed that the religious traditions that practice cremation are perhaps most likely to be accepting of resomation; conversely, that the religious traditions that practice burial are less likely to be accepting of resomation. However, this assumption does not adequately consider the theological reasonings for religious traditions' preference of disposal method. In a technical sense, the practice of resomation lies somewhere between the practices of burial and cremation: in burial and resomation, hydrolysis of the human corpse occurs; and in cremation and resomation, a 'chemical' process occurs—combustion in cremation, and reduction in resomation. Where resomation sits theologically, then, is not necessarily straightforward. To further explore the possibilities of religious perspectives on resomation, understanding how the resomation process compares to the practices of burial and cremation, including how the process treats the body, is important.

While resomation has largely been posed an alternative to cremation, the process mimics the natural decomposition process that occurs during underground burial. However, this process similarity between burial and resomation is unlikely to persuade Islamic or Jewish leaders to consider the use of resomation as an appropriate method of corpse disposal. Although resomation mimics a natural process, it is not 'natural' in the same way as simply burying a corpse in the ground is, because resomation is a technological process. Moreover, the Islamic and Jewish traditions reject the acceptability of the practice of cremation; both traditions have a strong emphasis on the body being laid to rest underground in order to appropriately prepare the mortal body for the immortal life of the soul. With regards to Islamic tradition, it is interesting to note that 'nowhere does the Qur'ān indicate how the dead body ought to be handled' (Halevi 2007, p. 207); the Hadīth is much more prescriptive and details how to treat the dead in a dignified manner. In the 'post-Qur'ānic' tradition, it is taught that after death, the body and the spirit 'dwell jointly, between death and the resurrection, in *al-barzakh*' (Halevi 2007, p. 226) which in this context, refers to the grave. Hence, as Davies notes, Islamic teaching regarding the resurrection of the body is 'very firmly established to the point that the practice of cremation is firmly opposed' (Davies 2017, p. 141). While in cremation the corpse is rapidly 'destroyed', in burial, the corpse is laid to rest enabling 'the perpetuation of the deceased until some future day' (Davies 1990, p. 33); hence, there is a stark contrast in symbolism. The imagined 'self' in death ritual and how this corresponds with theological teachings regarding the afterlife is thus an important consideration. Despite the possibility for the ashes following cremation to be buried and 'laid to rest', the two acts are not deemed as comparable theologically in the Islamic or Jewish traditions; the same conclusion is likely to be true with resomation due to the theological basis for the prescription of burial.

Likewise, while resomation is similar to cremation, it is the act of burning the corpse through the process of cremation that is significant for the theologies of Buddhism, Hinduism, and Sikhism; for this reason, the resomation process may not compare theologically to cremation. For Hindus, for example, the act of burning the corpse aids the release of the ātman ('spirit' or 'soul') from the body (Firth 1997, pp. 36–38, 193; Mims 1999, p. 173) so that it can either be reincarnated (reborn into a different body), have a period in heaven or hell, or is liberated from samsāra (the cycle of birth, death, and rebirth) to achieve moksa (liberation from samsāra). Buddhism and Sikhism also teach about samsāra and the hope to be released from this cycle—mukti (spiritual liberation) in Sikhism, and Nirvana (or enlightenment) in Buddhism—which the process of burning the corpse through cremation aids. The Hindu death rituals, as they occur in the UK, differ with the traditional Hindu funeral in India; this is most clearly demonstrated through the use of an open-air funeral pyre for the cremation in India, and the use of a contained cremator in the UK. Nevertheless, in both contexts, the rituals aim to aid the release of the soul (Firth 1997, p. 71). With resomation, there is no 'release' into the air in the way that there is in the process of cremation through burning. For this reason, the resomation process may not be

capable of aiding the release of the soul in the way that cremation does for such traditions. However, resomation would enable consistency in the Hindu ritual of depositing the ashes following cremation in the Ganga or the Yamuna (or local river or sea) which symbolizes 'the final departure or 'seeing off' of the *ātman* on its journey to the next life' (Firth 1997, p. 90); this could therefore be a theological possibility for resomation. The residual water from resomation could also have theological significance with regards to the journey of the ātman. This analysis is, however, merely speculative and is not derived from theological proclamations from leaders of the religious groups discussed. With regards to practical application, Olson's work is noteworthy. In 2013, Olson conducted interviews at Anderson McQueen Funeral Home and Bradshaw Funeral Services, two funeral homes that provide resomation in the USA, and found that neither funeral home had encountered interest for resomation from the Hindu and Buddhist communities who employ them to perform cremations (Olson 2014, p. 680). This suggests that although the result of resomation and cremation may be similar, in that 'ash' is produced, the processes differ to such an extent that for some traditions the two processes may not be comparable.

In a direct way, thus far, leaders from within the Catholic Church have been the most outspoken regarding the practice of resomation. In 2008, Sr Renée Mirkes wrote the first Catholic moral analysis of the resomation process. Mirkes concluded that resomation is 'in and of itself, a morally neutral action' (Mirkes 2008, p. 695). Mirkes notes that the Catholic Church had forbidden the practice of cremation for over nineteen centuries. However, in 1963, the Catholic Church altered its position on cremation; although burial remains the preferred disposal method for the Catholic Church, cremation became deemed as acceptable when it is performed out of necessity and there is no denial of the Christian dogma regarding the resurrection of the dead and the immortality of the soul (Congregation of the Doctrine of Faith 2016). In 1966, the papal ban on cremation 'was completely lifted, opening the door to Catholic prayers and rites at the place of cremation' (De Spiegeleer 2019, p. 188). Accordingly, Mirkes questions whether resomation could qualify 'in cases of necessity' as a 'moral alternative to Christian burial' in the same way that cremation does (Mirkes 2008, p. 685). Mirkes suggests that if resomation was 'chosen for good reasons (environmental, economic, financial, or psychological) and in a manner that comports with the resurrection of the body, it would be a moral means of final disposition' (Mirkes 2008, p. 691).

Conversely, in 2018, the Missouri Catholic Bishops issued a statement to express their opposition to the practice of resomation. The statement was issued in response to the proposition of the legalization of the resomation process as a method for post-mortem disposal in the state. The Bishops collectively argue that they do not deem the process 'intrinsically wrong', nonetheless, they believe that it 'fails to show due reverence for and respect for the human remains of the deceased by subjecting the soft tissue and vital organs to be flushed into the sewer system' (Catholic Bishops of Missouri 2018). However, as previously noted, all disposal techniques do fundamentally interact with the water cycle in some way, albeit this interaction is more obvious in resomation; as Mirkes notes, 'the flashpoint of indignity with alkaline hydrolysis—specifically, pouring the liquid remains down a drain—is found in similar form in the seepage after burial and in cremation through rain' (Mirkes 2008, p. 694). Moreover, the embalming process, used to preserve the body before disposal, literally 'pours' human body fluids down a drain without any treatment proceeding this action. Despite this, the Catholic Church 'does not forbid embalming' (Mirkes 2008, p. 694), 'nor does it consider embalming disrespectful toward the body' (Lasnoski 2016, p. 235) for essentially the same reason that the Missouri Bishops suggest that resomation should not be used. The Bishops raise their concern because they see the resomation process as 'separating' the component parts of the body, and therefore believe that it does not treat the human body with respect. However, Lasnoski importantly highlights that it is a practical impossibility to remove '100 per cent of the ashes' following a cremation meaning that the body is potentially separated, nevertheless the Church is accepting of cremation; by contrast, resomation 'provides the possibility of retaining the

entirety of the fragmented body—of keeping both the aqueous and the solid remains' (Lasnoski 2016, p. 236). Nonetheless, the notion of the separation of the component parts of the body in the resomation process remains overpowering in the Bishops' theological argument rejecting resomation. Thus, the Missouri Bishops conclude by asking that 'the Catholic faithful' reject the use of resomation unless in a 'situation a dire need' (Catholic Bishops of Missouri 2018). This maintains the position suggested to peers by Mirkes in the conclusion of her moral analysis in that they do not suggest that the process is 'inherently evil', albeit they advise against its use (Mirkes 2008, p. 695). These theological concerns will likely resonate with many believers, including those who do not believe that cremation is the correct way to treat the human body after death. However, as with cremation, the Catholic Church may come to deem the resomation process as theologically acceptable in the future, particularly if the process rapidly increases in popularity across the world.

Theological teachings regarding the end of life are thus inherently linked with choice of disposal method. Funeral rituals are vehicles for meaning and can be strong expressions of belief; the variety of rituals, and their theological significance, in the world's religious traditions is vast. Hence, establishing how religious traditions may respond to the use of the resomation process as a means of post-mortem disposal in the UK involves a number of considerations. As a relatively new field of study, it is important to note that further research in the area of resomation and religion is necessary, which cannot be covered in the scope of this paper.

4. Disposal of the Body: Environmental Concerns

4.1. The UK Context

A recent YouGov Poll found that 27% of British people cite the environment as one of the top three issues facing the country (Smith 2019). Significantly, 45% of those aged between 18 and 24 years old cited the environment as one of their primary concerns, demonstrating that the apprehension amongst young people is even greater still. One only has to watch the news or access social media to ascertain the scale at which concerns for the environment are snowballing; this is not an issue that will quickly become insignificant, rather, it is likely to continue to gain impact, power, and momentum.

The recent awakening in the public cultural-political consciousness regarding the negative impact that humanity has imposed upon Earth has been dubbed by many as the 'Attenborough Effect'. The 'Attenborough Effect' is named after 94-year-old British naturalist and broadcaster, Sir David Attenborough, who has educated the public on the climate crisis through his works and has made multiple widespread calls to action to combat these issues. The 'Attenborough Effect' has chiefly resulted in the 'war on plastic' and the wider social movements surrounding it. As with all human activity, the act of corpse disposal inevitably impacts the environment. However, the impact that corpse disposal has is not necessarily common knowledge. Corpse disposal has become a fundamental environmental issue. This is partly a consequence of the continuously increasing world population; however, primarily the environmental issues of corpse disposal relate to the extent of 'land use, material and resource consumption, waste and emissions' that it involves (Canning et al. 2016, p. 228).

The nature of the environmental repercussions caused by the disposal of a corpse is largely dependent on the method used. Powerfully, Spade emphasizes that: 'You might take solace in the fact that when you die, your days of polluting the planet are over. But the truth is that the method you choose to dispose of your mortal remains has more of a deleterious impact on the environment than you might think.' (Spade 2014). As Iserson notes, 'environmentalists justifiably worry about what body disposal is doing to our soil and air.' (Iserson 1994, p. 554). Importantly, over time, the funeral industry has become increasingly aware of the environmental problems posed by both traditional burial and cremation. The public, too, are slowly becoming aware of the environmental impact of corpse disposal: 'people have become increasingly concerned about the emissions and fuel-use associated with cremation, the use of stone memorials

(often shipped considerable distances from overseas quarries), or the use of formaldehyde for embalming, which has an adverse effect upon groundwater.' (Ministry of Justice 2009, p. 1). With all this considered, it is clear that the funeral industry ought to be tied up with discussions regarding environmentalism. As progress is made in developing public alertness to personal environmental impacts caused in everyday life, and more individuals consequently decide to make environmentally positive changes to their everyday lives in a widespread way, environmentalist charities and pressure groups may then be able to turn their attention more heavily to considering environmentally friendly funeral options. Such groups could then encourage the public not only to make environmentally sound choices throughout their lives, but to make such positive choices right through to the end of their lives in a final choice to lessen their negative environmental impact in their own death.

4.2. Problems with Traditional Burial

The shift from burial to cremation in the UK can largely be interpreted with regards to a popularly perceived need for change. In Section 2, hygiene concerns relating to the practice of burial were discussed; however, concerns for the environment and humanity's impact upon it have been steadily growing for a significant period of time. Dating back to 1962, evidence demonstrates that environmental concerns were gradually arising within the public consciousness, majorly with regards to the issue of diminishing land space. The concerns, which still persist today, focused on the magnitude of space that burial demands, and the increasing lack of space available. In late-April 1962, a BBC radio public-correspondence broadcast the 'Light Programme' focused on the topic of cremation. In response to the topic, R. Norman Reed, from Jersey, argued: 'not only is cremation much more hygienic, but there are other grounds in its favour such as the economy of the land.' (Cremation Society of Great Britain 1962–1985).

The majority of the British deceased now choose to be cremated. Nevertheless, there remains a significant proportion of the population who want to be buried when they die. The concern that cemeteries will become full is edging rapidly close to becoming a reality. However, while concerns regarding diminishing land space are an inherent issue and a legitimately problematic concern, so, too, is the vessel used in disposal. The involvement of a coffin in a burial, and all other current forms of corpse disposal, makes the impact of said disposal on the environment much more problematic. The major problem is that the majority of modern coffins are not expressly biodegradable. This is exceptionally detrimental to the Earth with burial, since the coffin that is buried often 'outlives' the corpse.

Traditional burial ultimately results in thousands of slowly decaying coffins being submerged in the ground; however, cremation burns these materials and consequently releases any toxins into the atmosphere. Which of these has the most negative impact on the environment? There are a number of factors that will affect the answer to this question; nevertheless, what is certain is that the processes of traditional burial and cremation in a non-biodegradable coffin are acutely damaging to the ecosystem. Particularly due to their use of the coffin as a single-use material, the traditional methods of disposal therefore face powerful criticisms from 'multiple sources, all connected by a common environmental concern about the modern way of death' (Sloane 2018, p. 71).

4.3. Problems with Cremation

The environmental problems posed by cremation are primarily caused by the release of nitrogen dioxide (NOx) into the atmosphere. As Litten argues, cremation 'may be 'clean' but it's certainly not 'green'.' (Litten 1991, p. 3). While road traffic is the biggest culprit for the extent of the issue regarding the emission of NOx in the UK, the cremation industry is responsible for 1% of the NOx levels; this percentage could be much higher if the motor industry reduced their pollution. Moreover, it has been found that the mercury amalgam vaporized in crematoria is blamed for up to 16% of UK airborne mercury emissions, which is a considerably large proportion. These statistics are quite shocking and do not appear to be common-widespread knowledge.

Brookes questions how long it will be before the cremation industry get the question 'well if the car industry can reduce their NOx emissions, why can't you?' posed to them (Brookes 2019, p. 30). Facultatieve Technologies Ltd., a company that provides cremation and incineration equipment, carried out tests on cremators and concluded that the average cremation emits 400 mg/m^3 of NOx; with a cremation time of 75-min, around 500 g of NOx is released into the atmosphere, which is approximately the same as a car travelling 2280 miles (Brookes 2019, pp. 30–31). The average NOx emission from a car is 0.137 g/km; compared with the emissions from cremation, this figure is estimated as the equivalent of 3650 cars driving past the crematorium during a 75-min cremation. Therefore, the NOx emissions are comparable to '50 cars a minute, every minute' driving past the crematorium during a cremation, which is quite astonishing (Brookes 2019, pp. 30–31).

Companies such as Facultatieve Technologies have developed 'DeNOx' systems for cremators, in the hope of reducing the negative impact that cremation has on the environment. However, even when funeral professionals have invested in such technology to make crematoria more sustainable, such technology is not necessarily utilized. For example, in 2019, 57.81% of crematoria had heat exchangers fitted; however, of these, 27.59% are shockingly not in use (Cremation Society of Great Britain 2019, p. 27). Even with DeNOx systems and other additional technologies designed to reduce the environmental impact of crematoria fitted, however, the overall negative environmental impact is still significant. As Davies and Rumble vitally note, consequently, what once was regarded 'as sanitary and the social good, namely, the use of cremation to avoid overfilled graves and waste land, is now questioned in terms of crematoria gas emissions, potential harm of the atmosphere and damage to human well-being at large.' (Davies and Rumble 2012, p. 14).

4.4. Is This Reported?

It is important to note that concerns regarding the environment posed by cremation are not something new. Legislation regarding the environmental impact of crematoria was first implemented in the UK under the Environmental Protection Act 1990, with additional legislation following over recent years. Concerns regarding the emissions from crematoria, particularly with regards to the toxins released by mercury (Iserson 1994, p. 251), have been discussed both before this date, and ever since, albeit mostly in private discussions between those within the industry. This is exemplified on a broader scale when one searches various environmentally focused charity websites for information on cremation and its impact: it is virtually non-existent. Furthermore, while the environmental impact of cremation has occasionally been reported in the media, these concerns do not seem to permeate the public consciousness in any meaningful way.

When planning or attending a funeral, the impact that said funeral may or may not have on the environment is probably the last thing on one's mind, if present at all. Although the negative effects of cremation are not *hidden* from public knowledge, such information is not the kind that you tend to simply stumble across. Moreover, those who have sought to highlight the negative impact of corpse disposal do not necessarily have access to every minute detail. For example, an article in *The Times*, which is particularly well-informed, somewhat wittily concludes by expressing that 'however environmentally friendly the procedure, it will still be easily offset by a few dozen mourners travelling by car for your send-off' (Whipple 2017). This statement certainly retains some truth, however, referring back to Brookes' findings, if one opts for cremation, then said mourners would have to travel over 2280 miles in order to 'offset' the environmental impact caused by the cremation itself (Brookes 2019).

Nonetheless, journalists do write and publish articles concerning the environmental footprint of the disposal of corpses, which is important. Such journalism is vital in order to raise awareness in the public consciousness, and moreover to pressure the funeral industry to make much needed changes. An article in *The New York Times* entitled 'Not Even Death Ends Anti-Pollution Crusade' highlights that various groups 'raising cautions about emissions from crematorium smokestacks' had encouraged 'tougher monitoring and

regulation' (Leary 1991). Written in 1991, before public concerns for the environment were truly exacerbated, this is suggestive that more can be done now.

4.5. Resomation, Its Environmetnal Credentials, and the TNO Report

Resomation significantly reduces the negative impact that corpse disposal has on the environment compared with traditional burial and cremation. The resomation process requires 'about 90 kWh of electricity, resulting in one-quarter the carbon emissions of cremation, consuming one-eighth the energy, while costing the consumer roughly the same as cremation.' (Rothstein 2013, p. 262). The Co-operative Funeralcare also validate resomation's environmental credentials, noting a number of environmental benefits, including that resomation has a carbon footprint which is 35% less than cremation. Furthermore, according to Resomation Ltd., the 'process produces no airborne emissions and the solid leftover mercury-containing amalgam is collected and safely recycled.' (Resomation Ltd. 2021).

Unlike cremation and traditional burial, the resomation process does not permit the use of a non-biodegradable coffin. Before being placed in the Resomator, the body is placed in a biodegradable coffin or shroud, made from materials such as silk or wool. This immediately reduces the environmental impact of the process, comparative to other techniques. Refreshingly, the environmental benefits of resomation are cited as the reason that initially inspired Sullivan, founder of Resomation Ltd., to introduce the process for human corpse disposal (Aftering 2018). Proponents of resomation have been compared to proponents of electric cars as reformers, 'offering consumers a similar outcome for much less impact on the environment' than cremation (Sloane 2018, p. 68).

In order to demonstrate the significant differences in the environmental impact of various disposal techniques, analysis from Keijzer and Kok is paramount. The independent TNO report 'Environmental impact of different funeral technologies' analyzed the environmental impact (eco-footprint) of burial, cremation, cryomation, and resomation through a Life Cycle Assessment. In order to evaluate the funeral techniques in a balanced manner, the report considers the processes of cryomation and resomation 'as if these were already fully operational and integrated in the Dutch funeral sector.' (Keijzer and Kok 2011, p. 100). The report calculated that the total environmental impact per body ranged from approximately €85 for burial, €30 for cremation, €10 for cryomation, and €0 for resomation (Keijzer and Kok 2011, p. 4); see Figure 2. The report found that burial has 'much more than' seven times the environmental impact of resomation; comparatively, the environmental impact of cremation is 'about a third of burial' (Keijzer and Kok 2011, p. 36). The report ultimately concludes that burial has the 'largest contribution to climate change, followed by cremation with half the contribution' (Keijzer and Kok 2011, p. 34).

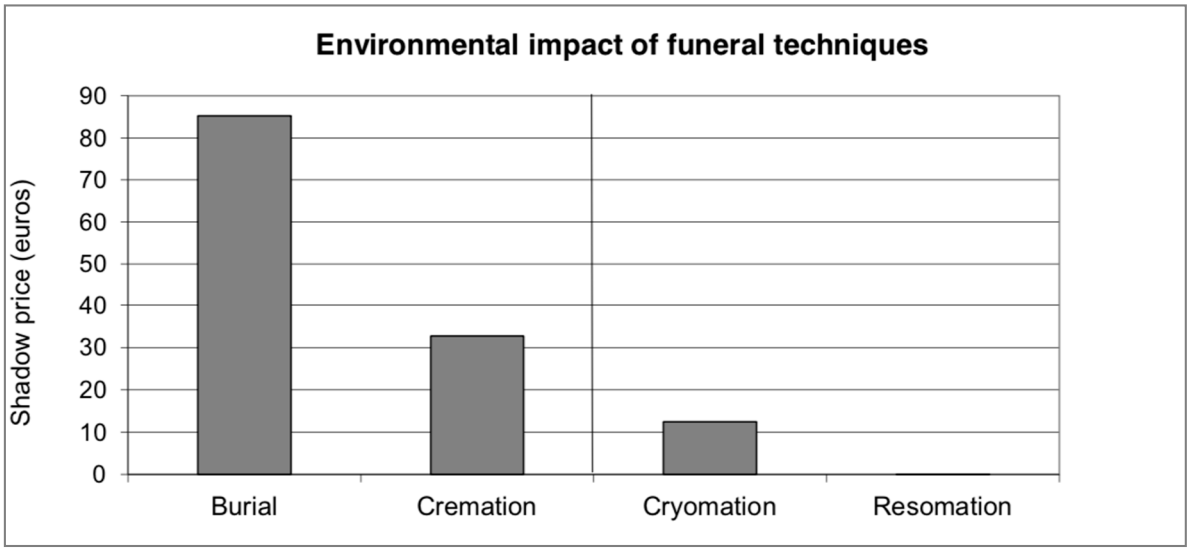

Figure 2. Information graphic depicting the environmental impact of funeral techniques (Keijzer and Kok 2011).

The study considered each technique in its 'average current situation' which meant that 'exotic materials or process, such as coffins of special materials or extremely energy efficient cremation ovens were not considered.' (Keijzer and Kok 2011, p. 12). Hence, in order to utilize this analysis with validity, it is important to highlight that no two burials, cremations, 'resomations', or any other method, will be exactly the same; there are a vast number of factors that will improve or worsen the environmental impact caused. For example, if one were to be buried in a biodegradable coffin or shroud, this would significantly reduce the negative environmental impact of said burial comparative to a burial in a solid wood coffin. Despite this, the report demonstrates that on average, the overall impact caused by resomation is substantially lower than any other technique (Keijzer and Kok 2011, p. 54).

This report therefore elucidates that resomation is significantly better for the environment than other forms of corpse disposal. The only major concern that may be raised with regards to the problems caused to the environment by resomation is the volume of water required to carry out the process. Resomation uses around 1500 L of water in total per corpse during the process, which seems a sizeable requirement. However, according to Waterwise, on average, an individual in the UK uses around 150 L of water every day (Waterwise 2012). Furthermore, if embedded water is taken into account, an individual can consume 3400 L per day, which is astounding. Hence, comparatively, the scale is not so significant. As the TNO report notes, resomation holds an advantage in terms of environmental impact compared to other funeral techniques 'irrespective of waste water composition' (Keijzer and Kok 2011, p. 47). The TNO report concludes that 'the impact of resomation is (probably) the lowest of all funeral techniques.' (Keijzer and Kok 2011, p. 54). Accordingly, the introduction of resomation in the UK would significantly reduce the pollution currently caused by the funeral industry.

As elaborated throughout this section, focus is shifting towards positive action, particularly driven by the increased global cultural-political awareness of humanity's negative impact upon the environment. Positive steps are being taken in order to reduce this impact in the UK, demonstrated by the declaration of a climate emergency in May 2019 (UK Parliament 2019). However, I am skeptical as to whether the funeral industry will enter the UK Government's consciousness with regards to making widespread changes. Realistically, following the declaration of a climate emergency, legislating resomation would enable vital progress; albeit, it has not yet happened. Perhaps, in the next few years, the environmental argument in favor of the implementation of resomation will drive regulatory bodies to become more accepting of this innovative funerary method, and we will see change overcoming the industry.

5. Conclusions: An Additional Choice—Why Does It Matter?

We live in an age with an ever-increasing global population, where we pay for plastic bags, single-use-plastics are on the way to being banned, and concerns over climate change are more compelling than ever before; with all this considered, the introduction of resomation in the UK could be the next piece towards solving the puzzle. If implemented, resomation would enable those who are environmentally conscious to 'leave' the Earth in a way that respects the increasing concerns regarding humanity's impact upon the planet. Other environmentally responsible options are available, such as natural burial; nonetheless, cremation is by-far the most popular disposal method in the UK at present. Hence, with resomation requiring no change to how funeral services would need to be conducted, taking a similar length of time to complete, and the cost to the consumer predicted to be approximately equal to, or less than, that of cremation, it seems like an ideal alternative to the established methods at present.

There is seemingly a lack of demand for innovations within the UK funeral industry; the funeral industry is an industry like no other. This is particularly apparent in the role of the consumer within the funeral industry. The consumer tends to be bereaved. If not bereaved, then grappling with the reality of their own personal mortality. Contextually, a

difficult scenario to navigate. When grappling with the concept of one's own death, and particularly when grieving the death of a loved one, the decisions that need to be made with regards to the end of life inevitably evoke strong emotions. As previously alluded, when planning or attending a funeral, the environmental impact of that funeral is unlikely to be high in the priorities of one's thoughts. Personal beliefs—religious, spiritual, secular, or eclectic—are a major component of funeral planning, and thus need to be taken into consideration. Personal beliefs will dictate the choice of funeral venue (religious or civic building), nature of the funeral service (for example, choosing the focus of the service to be on religious teachings), who leads the funeral service (religious leader, celebrant, friend or family) and disposal method (currently a choice between burial, cremation, and natural burial in the UK). As discussed in Section 3, the influence of personal belief is paramount and will play a major role in establishing the acceptability or unacceptability of resomation as a method of post-mortem disposal in the UK.

A study of individuals involved in arranging an 'at need' funeral found that levels of knowledge of the funeral marketplace tended to be low, however, the option to find out more did not appeal to the participants (The Competition and Markets Authority 2018, p. 5); this is suggestive that individuals felt the need to arrange a funeral as promptly and seamlessly as possible following the death of a loved one. What was important to the participants was locating a funeral director to assist with the arrangements and to fulfil the wishes of the deceased. Perhaps the funeral industry has somewhat capitalized on this, particularly when combined with the notion that the public generally tend not to like outwardly speaking about death, enabling the industry to maintain its longstanding traditions with little scope for change. Research published in 2019 found that less than 10% of British people have planned for their own funeral (Sue Ryder 2019). Understandably, thinking about one's own death seems almost anti-instinctive and can be disconcerting (Mims 1999, p. 317); in essence, the human evolutionary survival instinct naturally prompts anxiety regarding death. This has been further exacerbated by generally declining mortality rates; as life expectancy remains longer in the modern world (World Health Organization 2017), both the experience of death and the necessity to seriously contemplate one's own personal mortality, tend to be delayed.

These issues combined, however, mean that there has not been a great deal of consumer pressure demanding change placed on the UK funeral industry. Fundamentally, the funeral industry is not controlled by consumers in the way that other industries are. In order to prompt change, people are not simply going to begin boycotting funerals, since that would be impractical and wholly insensitive to the life process. Nevertheless, death is arguably a growth business; with this considered, there ought to be more choice for the consumer, and pressure should be put on the funeral industry by lobbying the market leaders and industry to enable more choice. Conversations that funeral directors have with the, often bereaved, consumer ought to allow the scope to explore a variety of options; the more innovative, new 'traditions', emerging within the funeral industry are, however, seemingly more likely to be contained within a brochure that is tucked away in the funeral director's desk drawer that *could* be presented to the customer *if* they specifically ask about them, rather than laid out on the table for all to see. Cremation significantly 'broke the monopoly of the burial tradition and widened consumer choice.' (Jupp 2006, p. 185). The current monopoly of tradition could be broken again. The 'dramatic shift from burial to cremation' marked a 'major social and liturgical change in customary behaviour' (Davies 1990, p. 6). Enabling the introduction of resomation, or any other major change, would require a paradigm shift for many in the industry.

Resomation, under the process' various names, has successfully become established and legalized in multiple states in the USA, provinces in Canada, Australia, Mexico, and South Africa. Following a recommendation from the Health Council of the Netherlands in 2020 (Health Council of the Netherlands 2020), resomation is set to become legally possible in the Netherlands in 2021 (Hart van Nederland 2020). As noted in Section 2.4.4, the legal status of resomation in the UK is central to its introduction and use within the

funeral industry. Currently, the resomation process has no legally binding regulations specifically associated with it. Alternative disposal techniques to the established practices of burial and cremation are technically legal providing that 'they do not infringe sanitation laws or offend public decency' (Conway 2016, p. 50). The existing laws on burial and cremation prescribe the appropriate treatment of corpses, which can be applied to the practice of resomation. Nevertheless, legal regulations of the resomation process will be necessary to 'confirm' resomation as a lawful method of corpse disposal and to safeguard its use (Conway 2016, p. 50). Significant progress has been made in attempts to validate resomation as an appropriate method of corpse disposal which may aid the development of regulations regarding the process. In April 2019 the UK's first 'resomations' took place at a university-based installation; the 'case study' of five samples analyzed the residual fluid following the resomation process, concluding that no DNA is present in the effluent (SAIF 2020, p. 10; Sensi 2020). This prompted Yorkshire Water to grant Resomation Ltd. a trade effluent to discharge wastewater, which set precedent (Resomation Ltd. 2020); resomation is thus increasingly closer to becoming a reality in the UK. How the process will be received by the British public, including key religious leaders, is yet to be seen.

Methods for dealing with the physicality of the dead, and therefore funerary practices and traditions, have varied greatly over time. Moreover, 'death rites relate very largely to established notions of an afterlife' (Davies 2005, p. 57); such notions have heavily influenced customary behavior in funerary practices throughout history. Traditional burial and cremation have existed periodically in the UK, although their histories have differed. Burial has been the most longstanding and largely uninterrupted tradition for centuries. However, in the late-nineteenth century, dismay steadily emerged with regards to the practice of burial and there was a push for the introduction of modern cremation. Cremationists battled for the legalization of cremation in the UK for a substantial period of time, and following the persuasion of the law, the general UK population then had to be convinced of the process. Not only was education on the process and its credentials required, but also the population had to be convinced that a new method of disposal was necessary. Moreover, theological ideologies of the British public had to shift in order to accept the practice of cremation in addition to the normative practice of burial. Hence, the reintroduction of cremation required an altering of the public consciousness, gradually encouraging cremation to become a widespread phenomenon. Cremation is now the most popular method of corpse disposal in the UK and is very much normalized.

Once again, a sense of dismay has emerged regarding practices in the UK funeral industry. Cremation, which has long been seen as the more hygienic and environmentally responsible method of disposal, is coming under contention. Concerns regarding the environmental credentials of cremation have been emerging for over two decades; however, now seems to be the pivotal time at which this concern ought to be greater than ever before. Work has been done within the funeral industry, through government legislation, in attempt to remedy and reduce the problematic emissions from cremation. The 2019 declaration of a climate emergency in the UK made concerns for the environment more prominent than ever before. This declaration ought to make the introduction of resomation much closer to becoming a reality in the UK. However, a process similar to that which the cremationists undertook is necessary in order to enable its introduction, including consultation with British religious institutions. Considering how the time scale of the major change in shifting from burial to cremation spanned and the paradigm shift that this change required, it is hardly surprising that the funeral industry is somewhat rigid as it is not accustomed to change. Nonetheless, there is certainly scope for change, as demonstrated through the introduction of natural burial, and the prospective introduction of resomation.

Times are changing, and traditions are not destined to stick purely by necessity. With popular concerns for the environment continuously increasing on an unprecedented scale not witnessed in recent history, and with many adapting their lives in order to become more environmentally conscious, times could not be more expecting for the introduction of resomation. In the late-nineteenth century, hygiene and sanitary concerns regarding the

disposal of the dead were dominant; the major concern in the twenty-first century is the environment, and not merely in relation to corpse disposal. Perhaps over the next decade, there will continue to be growing numbers of people who dedicate their lives to reducing their environmental impact upon the planet, who begin to seriously consider the most environmentally sound way to deal with their mortal remains. Vitally, the introduction of resomation in the UK would significantly enhance the possibilities for the personal autonomy and choice of the consumer within the funeral industry.

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References

Aftering. 2018. What is Water Cremation? Available online: http://www.aftering.com/how-water-cremation-works-and-why-its-a-21st-century-green-alternative/ (accessed on 9 December 2020).

Brookes, Tony. 2019. NOx in the City. *Pharos International* 85: 28–36.

Canning, Louise, Isabelle Swmigin, and Cathy Vaessen. 2016. Consumer acceptance of radical alternatives to human dispoal: An examination of the Belgian marketplace. In *Death in a Consumer Culture*. Edited by Susan Dobscha. London and New York: Routledge.

Cantor, Norman L. 2010. *After We Die: The Life and Times of the Human Cadaver*. Washington, DC: Georgetown University Press.

Catholic Bishops of Missouri. 2018. Statement of the Missouri Catholic Bishops on the Disposition of Human Remains through Alkaline Hydrolysis. Available online: https://dioscg.org/statement-of-the-missouri-catholic-bishops-on-the-disposition-of-human-remains-through-alkaline-hydrolysis/ (accessed on 2 January 2021).

Clayden, Andy, Trish Green, Jenny Hockey, and Mark Powell. 2010. From Cabbages to Cadevers: Natural Burial Down on the Farm. In *Deathscapes: Spaces for Death, Dying, Mourning and Remembrance*. Edited by Avril Maddrell and James D. Sidaway. Farnham and Burlington: Ashgate.

Clayden, Andy, Trish Green, Jenny Hockey, and Mark Powell. 2015. *Natural Burial: Landscape, Practice and Experience*. London and New York: Routledge.

Congregation of the Doctrine of Faith. 2016. Instruction Ad Resurgendum cum Christo Regarding the Burial of the Deceased and the Conservation of the Ashes in the Case of Cremation. Available online: https://www.vatican.va/roman_curia/congregations/cfaith/documents/rc_con_cfaith_doc_20160815_ad-resurgendum-cum-christo_en.html (accessed on 8 January 2021).

Conway, Healther. 2016. *The Law and the Dead*. Oxon: Routledge.

Cremation Association of North America. 2019. Alkaline Hydrolysis. Available online: https://www.cremationassociation.org/page/alkalinehydrolysis (accessed on 7 December 2020).

Cremation Society of Great Britain. 1874. Available online: https://www.cremation.org.uk/history-of-cremation-in-the-united-kingdom#declaration. (accessed on 30 October 2020).

Cremation Society of Great Britain. 1962–1985. CRE/P/7/D/3 Lectures, promotional activities, and background information: Propaganda and advertisement: Transcripts of miscellaneous television and radio broadcasts. In *Cremation Society Archive*. Durham: Durham University Library Archives and Special Collections.

Cremation Society of Great Britain. 1974. History of Modern Cremation in the United Kingdom 1874–974. Available online: https://www.cremation.org.uk/history-of-cremation-in-the-united-kingdom (accessed on 30 October 2020).

Cremation Society of Great Britain. 2008a. Annual Report 2008. Available online: https://www.cremation.org.uk/annual-report-2008 (accessed on 30 November 2020).

Cremation Society of Great Britain. 2008b. Memorandum of Association, dated 22 June 1922, as amended on 14 October 2004 and 17 June 2008. Available online: https://www.cremation.org.uk/content/files/Memorandum.pdf (accessed on 4 December 2020).

Cremation Society of Great Britain. 2019. *Pharos International: Statistics Issue*. Maidstone: The Cremation Society of Great Britain.

Cremation Society of Great Britain. 2020. Progress of Cremation in the British Islands from 1885–2019. Available online: https://www.cremation.org.uk/progress-of-cremation-united-kingdom (accessed on 2 January 2021).

Davies, Douglas J. 1990. *Cremation Today and Tomorrow*. Bramcote: Grove Books Limited.
Davies, Douglas J. 2005. *A Brief History of Death*. Malden and Oxford: Blackwell.
Davies, Douglas J. 2015. *Mors Britannica: Lifestyle and Death-Style in Britain Today*, 1st ed. Oxford: Oxford University Press.
Davies, Douglas J. 2017. *Death, Ritual, and Belief: The Rhetoric of Funerary Rites*, 3rd ed. London and New York: Bloomsbury Academic.
Davies, Douglas, and Hannah Rumble. 2012. *Natural Burial: Traditional-Secular Spiritualities and Funeral Innovation*. London: Continuum.
De Spiegeleer, Christoph. 2019. Secularization and the Modern History of Funerary Culture in Europe: Conflict and Market Competition Around Death, Burial and Cremation. *Trajecta. Religion, Culture and Society in the Low Countries* 28: 169–201. [CrossRef]
Firth, Shirley. 1997. *Dying, Death and Bereavement in a British Hindu Community*. Leuven: Peeters.
Halevi, Leor. 2007. *Muhammad's Grave: Death Rites and the Making of Islamic Society*. New York: Columbia University Press.
Hart van Nederland. 2020. Resomeren na de Dood Straks Toegestaan, Maar Wat is Dat? Available online: https://www.hartvannederland.nl/nieuws/2020/resomeren-toegestaan-wat/ (accessed on 17 November 2020).
Health Council of the Netherlands. 2020. Admissibility of New Techniques of Disposing of the Dead. Available online: https://www.healthcouncil.nl/documents/advisory-reports/2020/05/25/admissibility-of-new-techniques-of-disposing-of-the-dead (accessed on 30 June 2020).
Iserson, Kenneth V. 1994. *Death to Dust: What Happens to Dead Bodies?* Tucson: Galen Press.
Jupp, Peter C. 2006. *From Dust to Ashes: Cremation and the British Way of Death*. Basingstoke and New York: Palgrave Macmillan.
Keijzer, E. E., and H. J. G. Kok. 2011. *TNO Report: Environmental Impact of Different Funeral Technologies*. Utrecht: TNO.
Lasnoski, Kent J. 2016. Are Cremation and Alkaline Hydrolysis Morally Distinct? *National Catholic Bioethics Quarterly* 16: 233–42. [CrossRef]
Leaney, Jennifer. 1989. Ashes to Ashes: Cremation and the Celebration of Death in Nineteenth-Century Britain. In *Death, Ritual, and Bereavement*. Edited by Ralph A. Houlbrooke. London: Routledge.
Leary, Warren E. 1991. Not Even Death Ends Anti-Pollution Crusade. *The New York Times*, August 27.
Leming, Michael R., and George E. Dickinson. 2002. *Understanding Dying, Death, and Bereavement*, 5th ed. Fort Worth: Harcourt College Publishers.
Leuta, Tsepang, and Chéri Green. 2011. Exploring sustainable burial practices in South Africa: Potential challenges and opportunities. Paper presented at the IERM Convention incorporating National Cemeteries Conference, Durban Exhibition Centre, Durban, South Africa, October 25–27.
Litten, Julian. 1991. *The English Way of Death: The Common Funeral Since 1450*. London: Hale.
Matthews-King, Alex. 2017. Council Plan to Liquefy Bodies in Eco-Friendly Alternative to Cremation Hits Blockage. The Independent, Last Modified 17 December 2017. Available online: https://www.independent.co.uk/news/cremation-councils-death-liquefy-burial-chemical-eco-friendly-a8115321.html (accessed on 17 January 2021).
Mims, Cedric. 1999. *When We Die: What Becomes of the Body after Death*. London: Robinson.
Ministry of Justice. 2009. Natural Burial Grounds: Guidance for Operators. Available online: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/326362/natural-burial-grounds-guidance.pdf (accessed on 30 November 2020).
Mirkes, Sr Renée. 2008. The Mortuary Science of Alkaline Hydrolysis: Is It Ethical? *National Catholic Bioethics Quarterly* 8: 683–95. [CrossRef]
Olson, Philip R. 2014. Flush and Bone: Funeralizing Alkaline Hydrolysis in the United States. *Science Technology & Human Values* 39: 666–93. [CrossRef]
Podoshen, Jeffrey. 2016. Examining death and learning about life. In *Death in a Consumer Culture*. Edited by Susan Dobsha. London and New York: Routledge.
Queen's Bench Division. 1884. The Queen v. Price. *Queen's Bench Division XII*, February 7.
Resomation Ltd. 2020. Successful Study of Water Cremation Completed for Yorkshire Water. Available online: https://resomation.com/news/successful-study-of-water-cremation-completed-for-yorkshire-water/ (accessed on 19 November 2020).
Resomation Ltd. 2021. Saving Our Environment. Available online: https://resomation.com/about/saving-our-environment/ (accessed on 9 December 2020).
Rothstein, Karla Maria. 2013. Reconfiguring Urban Spaces of Disposal, Sanctuary, and Remembrance. In *Our Changing Journey to the End: Reshaping Death, Dying, and Grief in America*. Edited by Christina Staudt and J. Harold Ellens. Santa Barbara: Praeger.
Rumble, Hannah, John Troyer, Tony Walter, and Kate Woodthorpe. 2014. Disposal or dispersal? Environmentalism and final treatment of the British dead. *Mortality* 19: 243–60. [CrossRef]
SAIF. 2020. Water Cremation Gets Green Light. *SAIFInsight*, May.
Scottish Parliament. 2016. Burial and Cremation (Scotland) Act 2016. Available online: https://www.legislation.gov.uk/asp/2016/20/contents/enacted (accessed on 14 December 2020).
Sensi, Jasdip. 2020. Successful Study of Water Cremation Completed for Yorkshire Water. *Funeral Service Times*. Available online: https://www.funeralservicetimes.co.uk/news/2020/03/24/successful-study-of-water-cremation-completed-for-yorkshire-water/ (accessed on 19 November 2020).
Sloane, David C. 2018. *Is the Cemetery Dead?* Chicago and London: University of Chicago Press.
Smith, Matthew. 2019. Concern for the environment at record highs. *YouGov*. Last Modified 5 June 2019. Available online: https://yougov.co.uk/topics/politics/articles-reports/2019/06/05/concern-environment-record-highs (accessed on 4 December 2020).

Spade, Katrina. 2014. How Your Death Affects Climate Change. *HuffPost*. Last Modified 2 February 2015. Available online: https://www.huffpost.com/entry/how-your-death-affects-cl_b_6263152 (accessed on 1 December 2020).
Sue Ryder. 2019. Silence is Deadly: Stigma Attached to 'the D-Word' Means Brits are Missing out on a Better Death. Available online: https://www.sueryder.org/news/stigma-means-brits-are-missing-out-on-a-better-death (accessed on 14 December 2020).
The Competition and Markets Authority. 2018. *Funerals Market Study: Qualitative Research Report 2018*. St Albans: Research Works Limited.
UK Parliament. 1857. Burial Act 1857. Available online: https://www.legislation.gov.uk/ukpga/Vict/20-21/81/contents (accessed on 14 December 2020).
UK Parliament. 1902. Cremation Act 1902. Available online: https://www.legislation.gov.uk/ukpga/Edw7/2/8/contents (accessed on 14 December 2020).
UK Parliament. 2019. The Most Important Issue of Our Time. Last Modified 1 May 2019. Available online: https://www.parliament.uk/business/news/2019/may/mps-debate-the-environment-and-climate-change/ (accessed on 3 December 2020).
Waterwise. 2012. Water—The Facts: Why do We Need to Think about Water? Available online: https://waterwise.org.uk/wp-content/uploads/2019/10/Waterwise-2012_The-Facts_Why-do-we-need-to-think-about-Water.pdf (accessed on 5 December 2020).
Whipple, Tom. 2017. Dying to Go Green? Liquefy Your Corpse. *The Times*, December 18.
World Health Organization. 2017. Life Expectancy, 2000–2016. Available online: https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates (accessed on 4 December 2020).