Making composting toilets desirable: Tackling resistance to sustainable sanitation practices

Khyati Dharamshi
Bryony Dyssell
Rafael Lerena
Annabel Zedde

London School of Economics and Political Science
PB403 Psychology of Economic Life
Summative coursework
December 2019

Course convenors: Dr. Fred Basso & Prof. Saadi Lahlou
Other teachers: Dr. Liora Moskovitz, Mr. Maxi Heitmayer

TABLE OF CONTENTS

BACKGROUND

Safe sanitation is not only classified as a basic human right, but it also strives to mitigate the effect of poor sanitation practices on the environment (Beyene, Hailu, Faris, & Kloos, 2015; WHO, 2018). According to the latest estimates from the WHO/United Nations Children's Fund (UNICEF) Joint Monitoring Programme for Water Supply and Sanitation (JMP), around 32% of the world's population – 2.4 billion people – still lack improved sanitation facilities, and 663 million people still use unsafe water sources (WHO/UNICEF Joint Water Supply and Sanitation Monitoring Programme, 2014). This information is disturbing given the normality of flushing toilets within developed countries, but it also hints at the enormity of the issue given the number of individuals engaging in harmful sanitation practices.

Our perception is that poor sanitation practices incorporate most current sanitation practices, including water-flushing toilets, open defecation and centralised sewage systems. The combined effect of these practices is the wasting of water (a valuable finite resource), the contamination of freshwater sources and soil, the degradation of wildlife ecosystems and, as outlined above, human health implications (Irish Aid, 2007; WHO, 2018). The use of clean water for the flushing of toilets is the largest form of water waste in domestic consumption and it is estimated that human beings flush away approximately 70 litres of freshwater per person per day through toilet use (Branstrator, 2014; Zaied, 2018). This leads one to question how water-flushing sanitation practices are still considered viable in terms of resource responsibility, energy use, and sustainable infrastructure.

For the first time in history, human use and the pollution of freshwater has reached a level where water scarcity will potentially limit food production, ecosystem functionality, and the urban supply of drinking water in the decades to come (Jury & Vaux Jr., 2007). However, for those not interested in the detrimental effect on the environment, it is also highlighted that the conventional method of moving human excreta with water from toilet-systems to waste treatment plants is costly. With water demand increasing at twice the rate of population growth, technologies to promote the sustainable use of water are crucial for the longevity of the resource. True to this, the United Nations has set a list of Sustainable Development Goals (SDGs) to reach by 2030, with clean water and sanitation being included as SDG six (Branstrator, 2014; UN, 2019).

With the SDGs in mind, an international group of planners, architects, engineers, ecologists, biologists, agronomists and social scientists came up with an approach to sanitation that not only saves water and does not pollute the environment, but also returns the nutrients in human excreta to the soil: ecological sanitation (Langergraber & Muellegger, 2005). It is a sustainable, closed-loop system that reduces the gap between sanitation and agriculture, and does not allow for the wasting of clean water (i.e. a dry system). Human excreta are treated as a resource and the nutrients contained within it are able to be recycled back into agriculture (Langergraber & Muellegger, 2005). This is how dry, composting systems first appeared as a viable solution.

Composting toilets (CTs) are designed for the benefit of both human and environmental wellbeing. They contain and eliminate pathogenic material in human excreta so that individuals are not exposed to harmful diseases, and they allow for the elimination of waste as the excreta are turned into a renewable resource (Del Porto & Steinfeld, 1999). The decomposition of waste is dependent on the system remaining aerobic and well ventilated, as well as the suitable application of a carbon source to assist the decomposition process (see Appendix A). In other words, you add wood shavings, sawdust, leaves or dried grass to a ventilated system and let the excreta do the rest (Del Porto & Steinfeld, 1999). Similar to this, researchers have also found a way to convert human waste into a renewable energy source. The system utilizes a natural, biological process to break down human waste into a dehydrated, odourless, compost-like material. A microbial energy production system is then used to convert the compost-like material into biodiesel or heat energy (Ulsan National Institute of Science and Technology, 2016). HomeBioGas is a start-up using a similar system to convert human waste into cooking fuel (Kart, 2018).

CTs, in their various shapes and forms, are a simple technology that can instantly reduce water waste, as well as allow for the further use of excreta as a renewable resource. Whilst improvements in sustainable sanitation solutions and in composting technologies have been made, little to no action to implement these toilets has been undertaken in the public or household domains (Andersson, Dickin, & Rosemarin, 2016). Regardless of the fact that CTs are a solution to some of the negative environmental externalities of current sanitation practices, barriers have given rise to resistance by consumers in adopting such practices. In this essay, we are going to identify some of the behavioural and psychological barriers giving rise to the rejection of adopting CTs and, in addition, we will propose possible solutions to tackle this problem.

1. INTRODUCTION

Literature suggests that CTs are an effective means to decreasing the negative externalities associated with current sanitation practices (Langergraber & Muellegger, 2005). Not only do they mitigate the use of sewage systems – which are prone to leaking and infiltrating clean water and soil sources – but they significantly reduce domestic water consumption, the degradation of wildlife and health risks associated with human contact with excreta (Irish Aid, 2007). Added benefits include the fact that the excreta can be used as a resource (i.e. compost) in agriculture, as well as a renewable energy source (i.e. biogas) (see Background for further information).

However remarkable CTs appear on paper, it is apparent that consumers and policy makers are yet to accept them as a viable option for a number of reasons (Andersson et al., 2016; Branstrator, 2014; Cheng et al., 2018; Esrey, Andersson, Hillers, & Sawyer, 2001). From a policy perspective: there are regulations in place pertaining to plumbing that currently do not allow for CTs in buildings within the United States of America (USA); preference and subsidies are given to the more 'hygienic' water-flushing systems; attitudes towards the financing of CTs are skewed in comparison to more mainstream systems (they are perceived to be more costly); and present bias gives rise to CTs only being viewed as an alternative sanitation system in times of urgency or disaster (Branstrator, 2014; O'Donoghue & Rabin, 1999; Wang & Sloan, 2018). Consumers are also failing to adopt CTs for their own reasons: religious and cultural norms give rise to dry toilets being viewed as unclean (Ahmed & Ahmed, 2017); immediate responses tend to be those of disgust; and social representations exist more globally regarding sanitation practices i.e. what 'normal' sanitation looks like (Ahmed & Ahmed, 2017; Wang & Sloan, 2018).

The negative associations outlined above only touch the surface of the resistance to CTs. There is a vast body of literature outlining what they are, how they are operated and maintained, and the conditions for optimal use (Balzer, 2012; Cheng et al., 2018; Jenkins, 2005). Even with the availability of literature, individuals are not actively engaging with it and making the necessary behaviour changes. Literature broadly addresses resistance to CTs, and it has been established that psychological barriers comprise a large portion of the existing resistance to sanitation behaviour changes (Branstrator, 2014).

This essay aims to address what can be done to counter the resistance to CTs. We have chosen to focus on behaviour and attitudinal changes towards CTs given that water-flushing sanitation systems comprise the largest proportion of domestic water consumption and the positive externalities associated with such systems (see Background). We acknowledge that the treatment of sewage with chemicals, the use of toilet/tissue paper and various other non-sustainable components of sanitation could have been addressed. Our target audience is the national government of a developed country (i.e. the UK) and our solutions will revolve around policy-level interventions. This essay will address the following: in section 1, an introduction to CTs; section 2 focuses on understanding resistance to CTs; section 3, possible solutions; and section 4, a discussion looking at limitations and our conclusion of the topic.

2. UNDERSTANDING RESISTANCE TO COMPOSTING TOILETS

2.1. LACK OF KNOWLEDGE AND INERTIA

After 150 years of "throwing water on [human excreta] and chucking it down the pipes", implementing a different system of sanitation is a challenge. We tend to think that water-flushing systems are the only appropriate practice in developed nations and that few other solutions exist because of little to no exposure to alternative strategies (Saillet, 2014). This lack of awareness and knowledge of CTs is an important barrier in the acceptance of CTs, in spite of its benefits. CTs have been overlooked by researchers, professionals and the sanitation community since the early 1970's (Anand & Apul, 2014). It is, therefore, necessary to create awareness about CT technologies - particularly those that are new and allow for usual deterrents, such as smell, to be abolished - so that the public is better able to adapt to alternative sustainable sanitation practices (Nasri, Brun, & Fouché, 2017).

One also has to consider the impact of past experiences with excreta and prior knowledge of sustainable options as research suggests that these are key determinants of the willingness of someone to adopt a dry sanitation system (Kira, 1995; Warner, 2004). This is connected to the psychological concept of inertia, which can be defined as the persistence or attachment to behavioural patterns, even though there are better alternatives and incentives for change (Polites & Karahanna, 2012). Inertia is further conceptualized to have behavioural, cognitive and affective constituents (Barnes, Gartland, & Stack, 2004; Oliver, 1999; Oreg, 2003; Piderit, 2000).

Behavior-based inertia implies that behavior or a habit simply continues because an individual has always done it without putting in much, or any, thought. This could indicate the presence of a subconscious habit (Polites & Karahanna, 2012). Cognitive based inertia indicates that individuals consciously continue to follow a system, even when they are cognizant of the fact that there are more effective, efficient ways of doing things than the one they currently practice (Kim, 2009, p. 528; Rumelt, 1995). This stream is also termed as "mental inertia" as people "tend to keep making similar decisions despite the presence of new information" (Barnes et al., 2004; Polites & Karahanna, 2012; Rumelt, 1995). Lastly, affective-based inertia prevails when individuals continue to follow a system, a habit or a behavior because change is stressful. This stems from the fact that they feel comfortable continuing a certain behaviour or they have a strong emotional attachment with their current practices (Barnes et al., 2004; Rumelt, 1995).

Studies also suggest that individual differences in training, education, traditions, and rituals can cause inertia (Fredrickson & Iaquinto, 1989). Applying this logic to the rejection of CTs, inertia has been observed on an individual level, as well as through religious or cultural associations (Barnard et al., 2013; Hueso & Bell, 2013; Patil et al., 2014). The implications of this will be discussed in the limitations section of the paper, with reference being made to the Total Sanitation Campaign (TSC) implemented in rural India (Hueso & Bell, 2013).

2.2. DISGUST

Moving towards what was initially perceived as a more innate resistance factor, Darwin (1998) suggests that disgust is one of the six most basic, universal emotions, and that the facial expression associated with disgust is recognisable across cultures. It is suggested in the literature that faeces play a distinct role in disgust given the likelihood that it arouses the most intense reaction from human beings. Interestingly, when the excrement is in our own body, we do not produce a disgust response, but as soon as it leaves the body, it becomes disgusting (Rozin & Fallon, 1987). It is proposed that this is one of the reasons humans approve of conventional, water-flushing systems: the disgust response is short lived given the quick removal of excreta from sight. Commodity fetishism is one explanation (this will be discussed in more detail shortly) as it has led to humans being removed from the rest of the sanitation process too, contributing to the shortened disgust response (Hudson & Hudson, 2003; Marx, 1976).

Although the attitude towards faeces outlined above seems to be universal, Rozin and Fallon (1987) have shown that infants under the age of two have no aversion to faeces at all. Research has shown that they will play with it and, in some instances, even eat it. Then, until the age of four, children are suspicious but not disgusted, by faeces until, finally, from the age of eight, they have a strong aversion to excrement (Rozin & Fallon, 1987). With this information in mind, it was concluded that disgust is learnt and developed from the inborn sense of distaste (Nunhuck, 2003).

Moreover, Rozin and Fallon (1987), suggest that disgust is a defensive emotion that guards us against the recognition of our animality and, perhaps ultimately, of our own mortality. Humans cannot escape the evidence of their animal nature. In every society people must eat, excrete, engage in sexual intercourse, and eventually die and decompose. To counter this fact, most cultures have found rituals, technologies and customs that operate to distinguish humans from animals (Haidt, McCauley, & Rozin, 1994). It is proposed that conventional toilets - ones that use water to flush away excreta - are an example of the technologies we have for such purposes.

It would appear that this connection between disgust and faeces is something that we learn from a very early age and this learnt behaviour acts as a strong barrier to the worldwide use of CTs (Rozin & Fallon, 1987). To use them, people will have to be in close proximity with faeces. Hence, not being used to the process, and not understanding that the maintenance and operation of the system is fairly simple, people understandably express resistance attitudes and choose to maintain the status-quo (Samuelson & Zeckhauser, 1988).

2.3. SOCIAL REPRESENTATIONS

Social representations are the shared practices, values, metaphors and imagery that aid us in making sense and directing ourselves in the social world. These representations communicate social norms in symbolic form (Moscovici, 1981). Throughout history, the ability to separate oneself from excreta has been a symbol of social status or status quo. This can be viewed as a product of class divisions through historical influence and their consequential social representations. Therefore, ‘properly’ disposing of excreta was a sign of a developing culture, as well as an indication of social and economic welfare. “For centuries, class distinctions separated the odour, dirt and smell of the Unwashed Masses from those privileged” (Van der Ryn, 1978). This mentality has given rise to societies where individuals feel no personal responsibility for their

discarded waste. Developed nations have adopted water-flushing toilet systems that are now a social norm and expectation of privileged culture (Branstrator, 2014).

Individuals prefer not to talk about sanitation as there are numerous unwritten rules and taboos about it. They actually want to be mentally and physically separated from perceived trouble and nuisance associated with excrement (Dellström Rosenquist, 2005). Nevertheless, the desire to be separated from excreta not only arises due to historical perspectives. Disgust, as mentioned earlier, forms part of this taboo. It is a response dependent on proximity, and, as a means of defending the self and creating boundaries against contamination, human beings have adopted conventional toilets. This has led to the perception of faeces being disgusting, especially in instances where we are faced with touching, smelling, or seeing it (Haidt et al., 1994).

Continuing along this line of thinking, there are societies that currently exist where defecating is viewed as a taboo (Freud, 1940). Similar cultural and religious norms to those outlined above influence our attitudes towards human excreta. The idea of cleansing involves usage of water and reducing exposure to faeces as far as possible. Human beings' attitudes towards their own waste is an explanation for why people are resistant to the idea of CTs. The acceptance of CTs is also difficult when washing with water after defecating is mandated by cultural and religious traditions (Warner, 2004).

The design of standard sanitation technologies is based on these social representations: that excrement is a burden, it is a disgusting waste-product that is only suitable for disposal, and to be in contact with it or to not use a conventional flush-toilet is a sign of dirt and poverty (Esrey et al., 2001). Therefore, these social representations that act as barriers could potentially be deconstructed in order to implement CTs efficiently.

2.4. COMMODITY FETISHISM

"Flush and forget" (Jain, 2016). Once the faeces are effortlessly flushed away - out of sight and no longer in close proximity - the excreta become undesirable, but are no longer viewed as disgusting (Durham, 2011). As was touched on earlier, this is linked to the idea of commodity fetishism: humans are removed from the 'invisible' processes involved in the removal of excreta from toilets,

giving rise to changes in attitude towards it when no longer in sight (Hudson & Hudson, 2003; Marx, 1976).

In our desire to distance ourselves from our own waste and excrement in order to build a clean and perfect living environment, we have detached ourselves from the process and the problems that are behind the toilet. With the help of technology, we have constructed the fantasy that we can separate ourselves from the consequences of defecating, as if, once we excrete, in one second, we magically forget that we did it (Hudson & Hudson, 2003).

This desire of distance is facilitated by the fetishization of the toilet as a commodity where the process of what happens after defecating remains obscured and unconsidered (Hudson & Hudson, 2003). We forget, or wilfully ignore, what is behind the toilet and avoid taking into account the whole process and the negative implications of existing sanitation practices (see Background). We are seeing them or not, and the desire for elimination as total separation is always dissatisfied. This fetishization has crucial consequences on our collective attitudes to address the ongoing processes of environmental destruction our planet is suffering.

Viewing CTs as a process will reduce the distance between our own waste and its disposal. By visibly witnessing the human excreta deposited in the earth and used to grow vegetables brings awareness that it's all part of the same cycle, thus, making the sanitation process de-fetishized. (Penner, 2016). Penner also refers back to Marx's prediction that "ecological destruction would inevitably follow from the transition from a circular economy…to one in which our waste is flushed immediately out of sight" (2016). The former process speaks to the reuse of "humanure" as a fertilizer utilized in agriculture. The latter speaks of the conventional water-flushing systems we have been criticising. Once flushed away, the process is out of sight: a very clear example of commodity fetishism in practice (Penner, 2016). Because humans are not connected to the process behind current sanitation practices, they do not fully understand the detrimental effect they are having on the environment and this is why commodity fetishism is one of the largest barriers to the acceptance of CTs (Hudson & Hudson, 2003).

3. SOLUTIONS TO TACKLE RESISTANCE TO COMPOSTING TOILETS

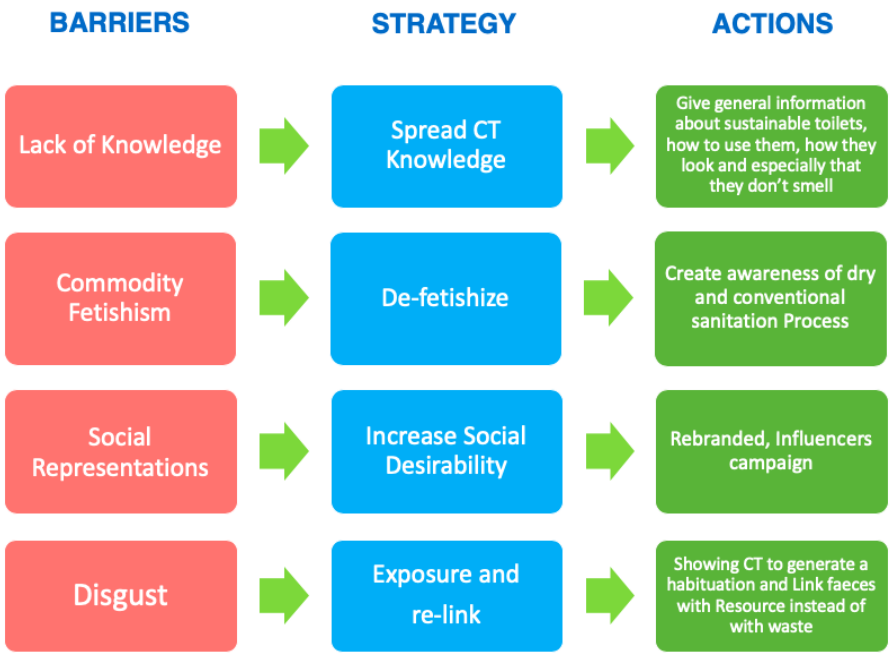


Figure 1: Overview of the Solution Framework

3.1. CAMPAIGN

In section 2, we tried to grasp the underlying reasons giving rise to resistance towards CTs. One suggestion to tackle these issues is the creation of a government-led campaign to: generate a greater knowledge and awareness of CTs; change the narrative surrounding CTs so that they are more socially desirable; expose people to a sustainable sanitation option; and de-fetishize water flushing toilets so that people are made aware of the water-wasting with each flush. The idea is that the campaign would be present both online and offline (see Appendix B).

Our first suggestion is to create billboards that people could see in the subway to reach the largest number of people on a daily basis as they commute to work. Applying this to London, the Underground is likely the best installation as it is estimated that 1.35 billion people use the tube yearly (TfL Community Team, 2019). This way, we could tackle the problem of disgust by exposing people regularly to CTs. Exposure Therapy is when individuals are exposed regularly to an object that creates disgust (Craske, Treanor, Conway, Zbozinek, & Vervliet, 2014). This

technique has shown to be effective to reduce disgust in different contexts (Rachman, Shafran, Radomsky, & Zysk, 2011; Smits, Telch, & Randall, 2002; Steinglass et al., 2012).

When creating the billboards, the first step towards making CTs more socially desirable would be to use another name. We would like to propose "ecological toilets" (ETs). Indeed, the way people respond to a specific message can depend on how the message is presented (Pelletier & Sharp, 2008). We suggest that using "ecological" instead of "composting" will create more engagement. We would also promote the best design already existing on the market to show the audience that sustainable toilets can be attractive.

Moreover, the billboards will give general information about ETs, how to use them, how they look and, especially, that they don't smell (see Appendix A) (Angie's List, 2017). Research suggests that increasing knowledge through campaigns is efficient in generating specific behaviours (e.g. Breitbart, Greinert, & Volkmer, 2006). On top of that, we would like to add information concerning gains and losses. Indeed, according to Tversky and Kahneman's (1981) landmark study, people tend to avoid risky behaviour when a decision is framed in terms of its associated benefits. Thus, the campaign would give information on the amount of saved water every time an individual uses an ET. It will also give information on how to take care of the compost (i.e. you only have to remove waste once a month) and how it can be a resource (i.e. to generate energy). The ultimate goal is to make people perceive their excrement as a resource and not as waste.

Additionally, we would use a humorous slogan. Indeed, many researchers have demonstrated that humour in advertising significantly enhances attention and positive affect (Eisend, 2008). Another promising strategy when trying to advertise CTs can be drawn from general marketing practices, such as selling cars and soaps. CT could be promoted as a home improvement and not just a health or ecological intervention. For example, soaps are endorsed to make hands smell, look and feel good, rather than being just hygienic. Thus, creating a demand for sanitation products on an equal footing as other products in the market (Curtis & Cairncross, 2003).

The idea is then for the campaign to go online, hopefully with the help of influencers on platforms such as Instagram or YouTube. The desired effect is that the entire campaign will de-fetishize the current commodity, create awareness of CTs and create a demand for the product, such that the price is able to decrease.

3.2. COMPOSTING TOILETS IN PRACTICE

Experts in ecological sanitation have found that attitudes can change for the better when exposed to an alternative waste disposal system, and apprehension towards human excrement could disappear when people witness a well-managed toilet system (Winblad, 1998). Moreover, past experiences with excreta and knowledge of sustainable options could determine the willingness of someone to adopt a CT (Kira, 1995; Warner, 2004).

For these reasons we are proposing to mount CTs as a disruptive installation in public places. Installations are specific settings constructed with deliberate intention, to funnel society members into expectable behaviours, and are also essential in the reproduction of culture through practice (Lahlou, 2017).

Installations do not openly control what people experience but, in practice, they normalize and support what they do for a wide range of routine activities by offering an envelope for "appropriate" behaviour. Therefore, these proposals would modify not only the objective material but in the long term, when the practices become embodied, it would also affect the competences layer (Lahlou, 2017).

3.2.1. SCHOOLS

As mentioned earlier, Rozin and Fallon (1987) have shown that disgust regarding faeces is learnt and developed by children before the age of eight. Indeed, studies have shown that early childhood is a time when developmental changes are happening that can have profound and lasting consequences for a child's future (Goodnow & Bethon, 1966). For this reason, we propose implementing CTs in pre-schools and primary schools, targeting children before they are socialised into the disgust response to faeces.

By using CTs every day at schools and explaining to them how to use them and the reason why it is important to use them, we could tackle the lack of knowledge barrier whilst generating a habituation process in a safe environment for children (Farel, 1977). Individuals are socialized into

cultural proficiencies by being routed into experiencing suitable practices within local installations (Lahlou, 2017). Therefore, with the collaboration of teachers as tutors, they could learn by doing.

In doing so, we could deconstruct some social representations related to toilets and children could build a more natural relationship with their own waste. Moreover, as it happens in relation to other environmental practices, they could also teach their parents the importance of using dry sanitation systems to reduce water usage. After the use of CTs is viewed as an appropriate practice and embodied by subjects, these individuals become part of the societal reproduction process, and they act as helpers and vigilantes who contribute to regulate other people's behaviour – in this case, their parents – through the social layer (Lahlou, 2017).

3.2.2. PUBLIC AREAS

The progressive installation of CTs in public locations is another solution that we want to propose. This solution, which also implies a modification of the material layer, could have a significant effect if we apply it in places where millions of people circulate every day. Hence, by showing people that using CTs is not actually disgusting because they do not smell and are clean, we can address the psychological barriers.

Nevertheless, even when installations attempt to channel behavior, agents still have free will when making their way through installations as they are able to choose the installations they engage with and there is flexibility when participating within the installation bounds (Lahlou, 2017). For this reason, in order to tackle the lack of knowledge and to induce people to choose to use CTs, we can plan the installation to have educational signs about the dry sanitation process and highlighting the relevance of using such toilets instead of conventional ones. For instance, we can show the number of litres of water saved if they use a CT in order to incentivize them to choose for the environmental option (see Appendix B).

An experiment shows the success of such an action: in 2007, Bronx Zoo – the largest urban zoo in the United States – completed a project installing CT restrooms for the 2 million visitors received annually (Clivus Multrum, 2010). This initiative resulted in saving a total of 1 million gallons of water each year. Our proposal is to multiply this experience in other places around the world.

3.3. COMPOSTING TOILETS IN HOUSEHOLDS

Our third solution looks to tackle the implementation of CTs in households. We propose tapping into the social regulation layer of Installation Theory through the implementation of incentives and subsidies (Lahlou, 2017). Current sanitation practices in the UK are governed by building or state regulatory bodies (Branstrator, 2014; WooWoo Waterless and Composting Toilets, 2019). Given the previous lack of political motivation and failures by the state to make CTs acceptable in households, regulations have tended to side with current sanitation practices, to the detriment of the environment. However, given the current political climate and narratives regarding environmental sustainability, we suggest that now is the time to propose government-level intervention so that CTs are made more desirable. British media surrounding the December 2019 General Election suggests that the environment is one of voters' top priorities (Shukman, 2019).

This paper proposes addressing the issue of household CT implementation with the assistance of a UK government scheme, similar to the UK feed-in tariffs or the smart export guarantee (SEG) programme that were designed to encourage the installation of renewable energy generators of electricity i.e. solar panels (Government Digital Service (GDS), 2015; "About the Smart Export Guarantee (SEG)", 2019). The feed-in tariff had two components: a generation tariff and an export tariff. The generation tariff refers to a set amount the government paid you per unit of electricity generated. The export tariff refers to the set amount one could receive for additional units generated (GDS, 2015). The SEG is similar to the export tariff component: registered electricity suppliers offer a tariff per unit of surplus electricity exported back to the national grid.

With this information in mind, and applying an adapted way of thinking to our case, it is proposed that consumers are incentivised to install CTs through a tariff system. It will be advertised that households can receive a tariff per CT they install and, if they are able to generate their own energy or biogas, there will be the opportunity to receive a set amount per unit.

It is noted that, although the UK has not yet incentivised the use of CTs, it is outlined in Part G of the Building Regulations for the UK that CTs not connected to an energy source (other than for ventilation) should meet building regulation requirements (Ministry of Housing, 2016). This inclusion in an official government publication speaks to the earlier point surrounding current

political narratives. We believe that the time is right to implement the above scheme and that political motivations encourage its success in increasing the use, and acceptability, of CTs.

4. DISCUSSION

4.1. LIMITATIONS

4.1.1. CULTURAL AND RELIGIOUS PRACTICES

One of the limiting factors when considering behaviour and attitudinal changes towards CTs are the cultural and religious norms involved in different sanitation practices around the world. It is because of this that the scope of this essay was narrowed to focus only on the implementation of CTs in developed countries. We felt that applications of our proposed solutions in developing countries, such as India, would have failed given that the changes involve acceptance that water is no longer part of the sanitation system. This is problematic given that washing after defecation is often mandated by culture or religion (Warner, 2004).

When looking at the case of the TSC, it was noted that, even when subsidised and given the funds to build pit latrines, the social norms associated with open defecation - a sanitation practice widely adopted in rural India - could not be deconstructed. Given the sensitive nature of addressing cultural and religious norms, it is imperative that one proceeds with caution as respect for practices deemed sacred should be a priority (Bhatt et al., 2019; Busienei, Ogendi, & Mokua, 2019). With this in mind, and given the highly influential nature of such norms in shaping individual behaviour, one runs the risk of offending individuals following certain practices where water is imperative in the process (Vyas & Spears, 2018). The CT in itself may be viewed as something that does not meet the standards of the religious practices. Trying to challenge people's perceptions of CTs may be viewed as undermining the religion.

Research has been performed looking at the role of religion on other environmental issues (i.e. Hope & Jones, 2014). This particular study looked at Muslim, Christian and Secular participants and, interestingly, the notion of urgency came up regarding climate change. They viewed the concept as something not requiring immediate attention and one could argue that the same rationality may be applied to CTs. Muslim participants made salient that they attempt to minimise contact with human excreta and, thus, use water to avoid engaging in a practices requiring closer

contact (Duncker, Matsebe, & Moilwa, 2007). Due to the perception of faeces as an impurity, it is also prescribed that water must be used to cleanse parts of the body exposed to such (Hooi & Hamzah, 1995). It is, thus, completely understandable that those following such a religion would be hesitant to utilise a CT (Hooi & Hamzah, 1995; Warner, 2004). We acknowledge that this has not been addressed in this essay given the contentious and sensitive nature of changing cultural and religious norms.

4.1.2. WILLFUL IGNORANCE

As humans, we fear cognitive dissonance (Festinger, 1962). As is the case with many behaviour changes related to environmental sustainability, we opt to ignore information that will lead to a conflict in our behaviours and values. We suspect that this may be the case for the CT: even when individuals are flooded with information about the negative environmental externalities of water-flushing toilets and the added benefits of CTs, they will ignore it to ensure that their current behaviours - the use of water-flushing toilets - are not conflicting with the information they have been given (Ehrich & Irwin, 2005).

We also wish to point out that the notion of a CT is not novel. Information has been readily available and literature has been published on the benefits of engaging in such practices. Extensive literature also exists on the water-wastage associated with conventional toilet systems (see Background) (i.e. Zaied, 2018). The issue lies in the fact that we do not want to be reminded of the disconnection between our values and actions. The result is that we avoid engaging and acknowledging information that will trigger or remind us of the cognitive dissonance that exists in most human beings today (Festinger, 1962).

4.1.3. DISCONNECT BETWEEN KNOWLEDGE AND BEHAVIOUR

Increased knowledge does not necessarily give rise to changes in behaviour (Barker et al., 2008; Kelly & Barker, 2016). We are hoping that by flooding people with information and defetishising existing water-flushing systems, people are more inclined to adopt new practices, but we acknowledge that it is a lot easier said than done. Research exploring increased knowledge and

information in relation to health-related behaviour changes suggests that, even when individuals become informed and better-educated on a topic (i.e. the health risks associated with a poor diet), a range of factors prevent the change from happening (Barker et al., 2008).

This can be linked to research regarding the knowledge-action gap: a phenomenon that appears to have stumped researchers for decades and can be observed cross-culturally (Kollmuss & Agyeman, 2002). This is particularly apparent when trying to encourage conservation and sustainable behaviours, such as the use of CTs. Though research has not specifically been performed to assess the success of behavioural changes for CTs, other studies looking at recycling, litter control and energy efficiency have shown that, despite widespread awareness of the detrimental environmental effects, human beings are still not engaging in environmentally friendly behaviours (Kennedy, Beckley, McFarlane, & Nadeau, 2009; Pelletier & Sharp, 2008).

This is not promising for the purposes of our paper and we acknowledge that this is a limitation. We expect that one of the underlying causes for the above disconnect between knowledge and action is due to wilful ignorance (a previously outlined limitation) and the fact that we, as human beings, are afraid of cognitive dissonance. This is difficult to overcome at the level we are proposing and changes of this sort are beyond the scope of our essay. It is advised that future research looks into the behaviour-intention gap that exists when looking at sustainable practices.

4.2. CONCLUSION

The research question of this essay was: *what can be done to counter the resistance to composting toilets?* Our paper suggests that increased knowledge about CTs, making them socially desirable, exposing people to them and de-fetishizing current sanitation practices could reduce the resistance to CTs. These solutions would help tackle the psychological mechanisms creating resistance towards them, i.e. disgust and social representations. These are partial solutions that should form part of a project that reformulates humanity's relationship with excrement (Kawa, 2016). Instead of viewing human excreta as waste, we need to move towards a new way of thinking ecologically and view it as a resource, as a means to generate energy or enhance agricultural development. Finding better ways of reconnecting with our waste has the potential to push us toward a different way of thinking and, hence, collaborate to overcome the ecological crisis.

5. REFERENCES

About the Smart Export Guarantee (SEG). (2019, October 4). Retrieved from https://www.ofgem.gov.uk/environmental-programmes/smart-export-guarantee-seg/about-smart-export-guarantee-seg

Ahmed, K., & Ahmed, S. S. (2017). Socio-cultural acceptability of urine diverted composting toilets: A review of literature for possible adoption in peri-urban areas as a sustainable sanitation solution. *AIP Conference Proceedings*, *1919*(1), 020043. doi:10.1063/1.5018561.

Anand, C. K., & Apul, D. S. (2014). Composting toilets as a sustainable alternative to urban sanitation – A review. *Waste Management*, *34*(2). doi:10.1016/J.WASMAN.2013.10.006

Andersson, K., Dickin, S., & Rosemarin, A. (2016). Towards "sustainable" sanitation: challenges and opportunities in urban areas. *Sustainability, 8*(12), 1289. doi:10.3390/su8121289.

Angie's List. (2017, February 17). *What is a composting toilet and does it work?* Retrieved from https://www.angieslist.com/articles/what-composting-toilet-and-does-it-work.htm

Balzer, A. (2012). Sustainability of the Composting Toilet. *Undergraduate Honors Theses, 282*. Retrieved from https://scholar.colorado.edu/honr_theses/282

Barker, M., Lawrence, W., Skinner, T., Haslam, C., Robinson, S., Inskip, H., . . . Cooper, C. (2008). Constraints on food choices of women in the UK with lower educational attainment. *Public Health Nutrition, 11*(12), 1229-1237. doi:10.1017/S136898000800178X.

Barnard, S., Routray, P., Majorin, F., Peletz, R., Boisson, S., Sinha, A., & Clasen, T. (2013). Impact of Indian Total Sanitation Campaign on Latrine Coverage and Use: A Cross-Sectional Study in Orissa Three Years following Programme Implementation. *PLOS ONE*, *8*(8), e71438. https://doi.org/10.1371/journal.pone.0071438.

Barnes, W., Gartland, M., & Stack, M. (2004). Old Habits Die Hard: Path Dependency and Behavioral Lock-in. *Journal of Economic Issues, 38*(2), 371-377, doi:10.1080/00213624.2004.11506696.

Beyene, A., Hailu, T., Faris, K., & Kloos, H. (2015). Current state and trends of access to sanitation in Ethiopia and the need to revise indicators to monitor progress in the Post-2015 era. *BMC Public Health, 15*(451). doi:10.1186/s12889-015-1804-4.

Bhatt, N., Budhathoki, S. S., Lucero-Prisno, D. E. I., Shrestha, G., Bhattachan, M., Thapa, J., … Pokharel, P. K. (2019). What motivates open defecation? A qualitative study from a rural setting in Nepal. *PLoS ONE*, *14*(7). https://doi.org/10.1371/journal.pone.0219246

Branstrator, J. (2014). *The Barriers to Adopting Composting Toilets into Use in Urban and Suburban Locations in The United States*. Open Access Theses. 304.

Breitbart, E. W., Greinert, R., & Volkmer, B. (2006). Effectiveness of information campaigns. *Progress in Biophysics and Molecular Biology, 92*(1), 167-172. doi:10.1016/j.pbiomolbio.2006.02.023.

Busienei, P. J., Ogendi, G. M., & Mokua, M. A. (2019). Open Defecation Practices in Lodwar, Kenya: A Mixed-Methods Research. *Environmental Health Insights*, *13*. doi:10.1177/1178630219828370.

Cheng, S., Li, Z., Uddin, S. M. N., Mang, H.-P., Zhou, X., Zhang, J., … Zhang, L. (2018). Toilet revolution in China. *Journal of Environmental Management*, *216*, 347–356. doi:10.1016/j.jenvman.2017.09.043.

Clivus Multrum. (2010). *Green Building Gallery – The Bronx Zoo*. Retrieved from http://www.clivusmultrum.com/green-building-bronx.php

Craske, M. G., Treanor, M., Conway, C. C., Zbozinek, T., & Vervliet, B. (2014). Maximizing exposure therapy: an inhibitory learning approach. *Behaviour research and therapy*, *58*, 10–23. doi:10.1016/j.brat.2014.04.006.

Curtis, V., & Cairncross, S. (2003). Water, sanitation, and hygiene at Kyoto - Handwashing and sanitation need to be marketed as if they were consumer products. *BMJ (Clinical research ed), 327*(7405), 3-4. https://doi.org/10.1136/bmj.327.7405.3

Darwin, C. (1998). *The Expression of the Emotions in Man and Animals (Eds.)*. New York, NY: Oxford University Press.

Dellström Rosenquist, L. E. (2005). A psychosocial analysis of the human-sanitation nexus. *Journal of Environmental Psychology, 25*(3), 335-346. doi:10.1016/j.jenvp.2005.07.003.

Del Porto, D., & Steinfeld, C. (1999). *The Composting Toilet System Book: A Practical Guide to Choosing, Planning and Maintaining Composting Toilet Systems*. Concord, MA: Center for Ecological Pollution Prevention.

Duncker, L. C., Matsebe, G. N., & Moilwa, N. (2007). *The Social/Cultural Acceptability of Using Human Excreta (faeces and urine) for Food Production in Rural Settlements in South Africa*. Report to the Water Research Commission, No TT 310/07. Pretoria: CSIR Built Environment Unit.

Durham, D. (2011). Disgust and the Anthropological Imagination. *Ethnos*, *76*, 131–156. https://doi.org/10.1080/00141844.2010.547941

Ehrich, K. R., & Irwin, J. R. (2005). Wilful Ignorance in the Request for Product Attribute Information. *Journal of Marketing Research*, *42*(3), 266–277. https://doi.org/10.1509/jmkr.2005.42.3.266

Eisend, M. (2008). Explaining the Impact of Scarcity Appeals in Advertising: The Mediating Role of Perceptions of Susceptibility. *Journal of Advertising, 37*(3), 33-40. doi:10.2753/JOA0091-3367370303

Esrey, S. A., Andersson, I., Hillers, A., & Sawyer, R. (2001). *Closing the loop: Ecological sanitation for food security.* Mexico: Swedish International Development Cooperation Agency.

Farel, P. B. (1977). Habituation: Perspectives from Child Development, Animal Behavior, and Neurophysiology. Thomas J. Tighe , Robert N. Leaton. *The Quarterly Review of Biology, 52*(4), 453–454. https://doi.org/10.1086/410271

Festinger, L. (1962). Cognitive Dissonance. *Scientific American*, *207*(4), 93–106. Retrieved from JSTOR.

Fredrickson, J. W., & Iaquinto, A. L. (1989). Inertia And Creeping Rationality In Strategic Decision Processes. *Academy of Management Journal*, *32*(3), 516–542. https://doi.org/10.5465/256433

Freud, S. (1940). Totem and Taboo: Resemblances Between the Psychic Lives of Savages and Neurotics. Library of Alexandria.

Goodnow, J. J., & Bethon, G. (1966). Piaget's tasks: The effects of schooling and intelligence. *Child Development, 37*(3), 573–582.

Government Digital Service (GDS). (2015, February 4). *Feed-in tariffs: get money for generating your own electricity*. Retrieved from https://www.gov.uk/feed-in-tariffs

Haidt, J., McCauley, C., & Rozin, P. (1994). Individual differences in sensitivity to disgust: A scale sampling seven domains of disgust elicitors. *Personality and Individual Differences*, *16*(5), 701-713.

Hooi, Y., & Hamzah, H. (1995). *The design of public toilets in Kuala Lumpur from the aspects of culture, behaviour and the social habits of users*. Paper presented at the International Symposium on Public Toilets. Hong Kong: Urban Council.

Hope, A. L. B., & Jones, C. R. (2014). The impact of religious faith on attitudes to environmental issues and Carbon Capture and Storage (CCS) technologies: A mixed methods study. *Technology in Society*, *38*, 48–59. https://doi.org/10.1016/j.techsoc.2014.02.003

Hudson, I., & Hudson, M. (2003). Removing the Veil?: Commodity Fetishism, Fair Trade, and the Environment. *Organization & Environment*, *16*(4), 413–430. https://doi.org/10.1177/1086026603258926

Hueso, A., & Bell, B. (2013). An untold story of policy failure: The Total Sanitation Campaign in India. *Water Policy*, *15*(6), 1001–1017. https://doi.org/10.2166/wp.2013.032

Irish Aid. (2007). *Environment, Water and Sanitation*. Retrieved from https://www.irishaid.ie/media/irishaid/allwebsitemedia/20newsandpublications/publicationpdfsenglish/Environmental-key-sheet-11-water-sanitation.pdf

Jain, N. (2016, April 7). Flush and Forget? India's sanitation crisis. *WaterAid*. Retrieved from https://washmatters.wateraid.org/blog/flush-and-forget-indias-sanitation-crisis

Jenkins, J. (2005). *The Humanure Handbook.* Grove City, PA: Joseph Jenkins, Inc.

Jury, W. A., & Vaux, H. J., Jr. (2007). The emerging global water crisis: Managing scarcity and conflict between water users. Advances in Agronomy, 95. doi:10.1016/50065-2113(07)95001-4.

Kart, J. (2018, November 19). HomeBioGas Toilet Does Double Duty, Converting Waste to Cooking Fuel. *Forbes*. Retrieved from

https://www.forbes.com/sites/jeffkart/2018/11/19/homebiogas-toilet-does-double-duty-converting-waste-to-cooking-fuel/#2ffafa89152a

Kawa, N. C. (2016). What happens when we flush? *Anthropology Now, 8*(2), 1-10. doi:10.1080/19428200.2016.1202580.

Kelly, M. P., & Barker, M. (2016). Why is changing health-related behaviour so difficult? *Public Health*, *136*, 109–116. https://doi.org/10.1016/j.puhe.2016.03.030

Kennedy, E., Beckley, T., McFarlane, B., & Nadeau, S. (2009). Why We Don't "Walk the Talk": Understanding the Environmental Values/Behaviour Gap in Canada. *Human Ecology Review, 16*(2), 151-160. Retrieved from www.jstor.org/stable/24707539

Kim, S. S. (2009). The integrative framework of technology use: An extension and test. *MIS Quarterly, 33*(3), 513-537.

Kira, A. (1995). *Culture and behaviour of public toilet users.* Paper presented at the Proceedings 1995 International Symposium on Public Toilets, Hong Kong.

Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, *8*(3), 239–260. https://doi.org/10.1080/13504620220145401

Lahlou, S. (2017). *Installation Theory: The Societal Construction and Regulation of Behaviour*. London: Cambridge University Press.

Langergraber, G., & Muellegger, E. (2005). Ecological Sanitation - A way to solve global sanitation problems?. *Environment International, 31*(3), 433–44. doi:10.1016/j.envint.2004.08.006.

Marx, K. (1976). *Capital: A Critique of Political Economy (Vol. 1)*. Chicago: Charles H. Kerr. Original work published 1867.

Ministry of Housing. (2016, March 9). *Sanitation, hot water safety and water efficiency: Approved Document G*. Retrieved from https://www.gov.uk/government/publications/sanitation-hot-water-safety-and-water-efficiency-approved-document-g

Moscovici, S. (1981). "On Social Representations." In Social Cognition: Perspectives on Everyday Understanding, edited by J. P. Forgas, 181–209. London: Academic Press.

Nasri, B., Brun, F., & Fouché, O. (2017). Evaluation of the quality and quantity of compost and leachate from household waterless toilets in France. Environmental Science and Pollution Research, 26(3), 1–17. doi:10.1007/s11356-017-0604-z.

Nunhuck, A. (2003). Shit scared. *BMJ*, *326*(Suppl S6). https://doi.org/10.1136/sbmj.0306204

O'Donoghue, T., & Rabin, M. (1999). Doing It Now or Later. *American Economic Review*, *89*(1), 103–124. doi:10.1257/aer.89.1.103.

Oliver, R. L. (1999). Whence Consumer Loyalty? *Journal of Marketing* (63), 33-44. doi: 10.2307/1252099.

Oreg, S. (2003). Resistance to Change: Developing an Individual Differences Measure. *Journal of Applied Psychology, 88*(4), 680-693. https://doi.org/10.1037/0021-9010.88.4.680

Patil, S. R., Arnold, B. F., Salvatore, A. L., Briceno, B., Ganguly, S., Jr, J. M. C., & Gertler, P. J. (2014). The Effect of India's Total Sanitation Campaign on Defecation Behaviors and Child Health in Rural Madhya Pradesh: A Cluster Randomized Controlled Trial. *PLOS Medicine*, *11*(8), e1001709. https://doi.org/10.1371/journal.pmed.1001709

Pelletier, L. G., & Sharp, E. (2008). Persuasive communication and proenvironmental behaviours: How message tailoring and message framing can improve the integration of behaviours through self-determined motivation. *Canadian Psychology/Psychologie canadienne, 49*(3), 210–217. https://doi.org/10.1037/a0012755

Penner, B. J. (2016). Pee Bale Politics. In J. Brennan (Ed.), *Re:development: Voices, Cyanotopes & Writings from The Green Backyard*. London: Silent Grid.

Piderit, S. K. (2000). Rethinking Resistance and Recognizing Ambivalence: A Multidimensional View of Attitudes Toward an Organizational Change. *The Academy of Management Review, 25*(4), 783-794. doi:10.5465/AMR.2000.3707722.

Polites, G., & Karahanna, E. (2012). Shackled to the Status Quo: The Inhibiting Effects of Incumbent System Habit, Switching Costs, and Inertia on New System Acceptance. *MIS Quarterly, 36*(1), 21-42. doi:10.2307/41410404.

Rachman, S., Shafran, R., Radomsky, A. S., & Zysk, E. (2011). Reducing contamination by exposure plus safety behaviour. *Journal of Behavior Therapy and Experimental Psychiatry, 42*(3), 397–404. https://doi.org/10.1016/j.jbtep.2011.02.010

Rozin, P., & Fallon, A. E. (1987). A perspective on disgust. *Psychological Review, 94*(1), 23-41. doi:10.1037//0033-295X.94.1.23.

Rumelt, R. P. (1995). Inertia and Transformation. In C. A. Montgomery (Ed.), *Resource-Based and Evolutionary Theories of the Firm: Towards a Synthesis* (pp. 101–132). https://doi.org/10.1007/978-1-4615-2201-0_5

Saillet, R. (2014, July 23). Composting toilets: a growing movement in green disposal. *The Guardian*. Retrieved from https://www.theguardian.com/lifeandstyle/2014/jul/23/composting-toilets-a-growing-movement-in-green-disposal

Samuelson, W., & Zeckhauser, R. (1988). Status quo bias in decision making. *Journal of Risk and Uncertainty*, *1*(1), 7–59. https://doi.org/10.1007/BF00055564

Shukman, D. (2019, November 6). General election 2019: How big an issue is climate change for voters? *BBC News*. Retrieved from https://www.bbc.co.uk/news/science-environment-50307304

Smits, J. A. J., Telch, M. J., & Randall, P. K. (2002). An examination of the decline in fear and disgust during exposure-based treatment. *Behaviour Research and Therapy, 40*(11), 1243–1253. https://doi.org/10.1016/S0005-7967(01)00094-8

Steinglass, J., Albano, A. M., Simpson, H. B., Carpenter, K., Schebendach, J., & Attia, E. (2012). Fear of food as a treatment target: Exposure and response prevention for anorexia nervosa in an open series. *International Journal of Eating Disorders, 45*, 615-621. doi:10.1002/eat.20936.

TfL Community Team. (2019, November 4). *Tube trivia and facts*. Retrieved from https://madeby.tfl.gov.uk/2019/07/29/tube-trivia-and-facts/

Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, *211*(4481), 453–458. https://doi.org/10.1126/science.7455683

Ulsan National Institute of Science and Technology (UNIST). (2016, May 31). Turning human waste into next generation biofuel. *ScienceDaily*. Retrieved from https://www.sciencedaily.com/releases/2016/05/160531131113.htm

United Nations (UN). (2019). *Water and Sanitation - United Nations Sustainable Development*. Retrieved from https://www.un.org/sustainabledevelopment/water-and-sanitation/

Van der Ryn, S. (1978). The toilet papers. White River Junction, VT: Chelsea Green Publishing Company.

Vyas, S., & Spears, D. (2018). Sanitation and Religion in South Asia: What Accounts for Differences across Countries? *The Journal of Development Studies*, *54*(11), 2119–2135. https://doi.org/10.1080/00220388.2018.1469742.

Wang, Y., & Sloan, F. A. (2018). Present bias and health. *Journal of Risk and Uncertainty*, *57*(2), 177–198. doi:10.1007/s11166-018-9289-z.

Warner, W. S. (2004). Cultural influences that affect the acceptance of compost toilets : psychology, religion and gender. As, Norway: Jordforsk, Norwegian Center for Soil and Environmental Research.

WHO/UNICEF Joint Water Supply and Sanitation Monitoring Programme. (2014). *Progress on Drinking Water and Sanitation: 2014 Update*. Geneva: World Health Organisation.

Winblad, U. (1998). *Ecological sanitation*. Stockholm, Sweden: Sida.

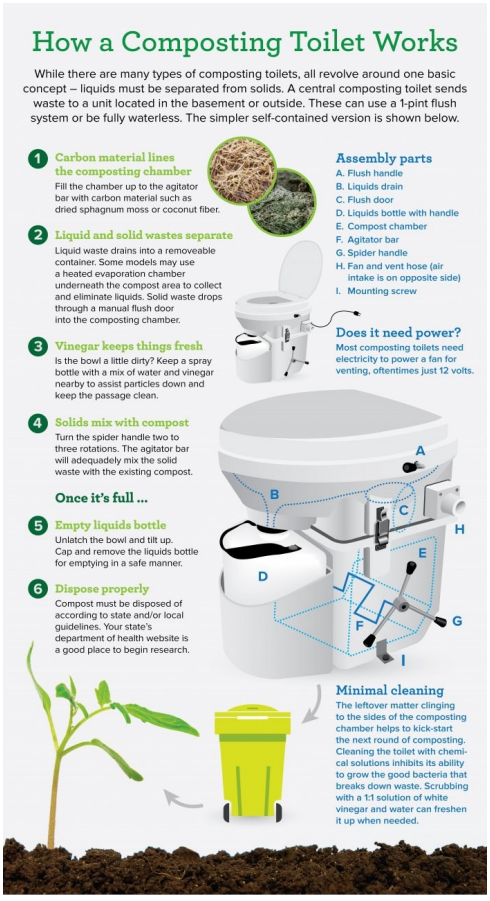
WooWoo Waterless and Composting Toilets. (2019). What about building regulations? Retrieved from https://www.waterlesstoilets.co.uk/building-regulations

World Health Organisation (WHO). (2018). *Guidelines on sanitation and health*. Geneva: World Health Organisation.

Zaied, R. A. (2018). Development of water saving toilet-flushing mechanisms. *Applied Water Science*, *8*(2), 53. doi:10.1007/s13201-018-0696-8.

6. APPENDICES

6.1. APPENDIX A



Source: Angie's List (2017, February 17)

Source: Angie's List (2017, February 17)

6.2. APPENDIX B


SAVE 9
LITERS
PER FLUSH
SAVE WATER!
How a Composting Toilet Works
While there are many types of composting toilets, all revolve around one basic concept – liquids must be separated from solids. A central composting toilet sends waste to a unit located in the basement or outside. These can use a 1-pint flush system or be fully waterless. The simpler self-contained version is shown below.
1 Carbon material lines the composting chamber
Fill the chamber up to the agitator bar with carbon material such as dried sphagnum moss or coconut fiber.
2 Liquid and solid wastes separate
Liquid waste drains into a removeable container. Some models may use a heated evaporation chamber underneath the compost area to collect and eliminate liquids. Solid waste drops through a manual flush door into the composting chamber.
3 Vinegar keeps things fresh
Is the bowl a little dirty? Keep a spray bottle with a mix of water and vinegar nearby to assist particles down and keep the passage clean.
4 Solids mix with compost
Turn the spider handle two to three rotations. The agitator bar will adequately mix the solid waste with the existing compost.
Once it's full ...
5 Empty liquids bottle
Unlatch the bowl and tilt up. Cap and remove the liquids bottle for emptying in a safe manner.
6 Dispose properly
Compost must be disposed of according to state and/or local guidelines. Your state's department of health website is a good place to begin research.
Assembly parts
A. Flush handle
B. Liquids drain
C. Flush door
D. Liquids bottle with handle
E. Compost chamber
F. Agitator bar
G. Spider handle
H. Fan and vent hose (air intake is on opposite side)
I. Mounting screw
Does it need power?
Most composting toilets need electricity to power a fan for venting, oftentimes just 12 volts.
Minimal cleaning
The leftover matter clinging to the sides of the composting chamber helps to kick-start the next round of composting. Cleaning the toilet with chemical solutions inhibits its ability to grow the good bacteria that breaks down waste. Scrubbing with a 1:1 solution of white vinegar and water can freshen it up when needed.


NEW DESIGNS
Reinventing the toilet experience
https://www.trone.paris/en