

# IMPACT REPORT FOR IIN // MARCH 2018 //







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"CHCM's mission is to develop and produce, highly effective, yet environmentally responsible solutions, to empower consumers and safeguard against the threat of deadly infection"

- CEO John Cunningham

### **1. CEO STATEMENT**



We are facing a sea change moment when it comes to bacterial infections and anti microbial resistance (AMR) on a global scale. In the past twelve months the World Health Assembly, the United Nations, numerous medical bodies and even the World Bank have been alerting us to an impending crisis.

The World Bank has utilised the phrase, "A tragedy of the Commons" referencing when a community has squandered a limited shared resource by pursuing short term vested interest for private benefit – in this case antibiotics and anti microbials.

The threat they are all referencing is anti microbial resistance (AMR) or evidence that harmful bacteria are evolving and adapting and thus becoming increasingly resistant to antibiotics and anti-microbial products. The reasons behind this are well documented and refer to the misuse and overuse of antibiotics. (e.g. injecting livestock with antibiotics to increase the weight; Or over subscription of antibiotics when they are not required) The most famous or notorious of these AMRs are Methicillin Resistant Staphylococcus Aureus or MRSA and Sepsis. (These are responsible for more deaths in the UK each year than prostate, bowel and breast cancer combined. Sepsis alone affects 30 million people world wide, is the leading cause of death in US hospitals and annual deaths globally are estimated at 5.3 million - 44,000 in the UK alone).

The international medical community led by the World Health Assembly (WHA) is calling for increased awareness of this threat. (NB. 44% of people in the UK have never heard of Sepsis.) In fact, the WHA made Sepsis a Global Health Priority in a special resolution in May 2017. The WHA recommendations are based around the need to focus on prevention with increased hygiene levels and greater vigilance. MRSA and Sepsis often combine as MRSA causes the infection and Sepsis is deadly when the immune system overreacts to that infection, sending the body into septic shock. The message is clear stop the infection – stop Sepsis.

#### A GLOBAL VILLAGE

Against this backdrop the World Bank is calling for action on Anti Microbial Resistance (AMR) in general. Classifying the problem as part of the "commons" and therefore its status as a "global public good", it underlines the "critical responsibility of public authorities, especially national governments, in protecting the public good."

The third current global initiative is the UN Sustainable Development Goals (SDG) program. The new 'Goals' are unique in that they call for action by all countries, developed and underdeveloped to promote prosperity while protecting the planet. They recognize that to be truly sustainable tackling poverty must go hand-in-hand with strategies that build economic growth and address a range of social needs including education, health, social protection, and job opportunities, while managing climate change and environmental protection.

What these respective calls to action (Sepsis and MRSA, AMR and the SDGs) have in common is an acknowledgement that with globalisation the world is increasingly an integrated international community. Thus all three programs while independently initiated overlap significantly.

They all call for a united and coordinated response – as the issues are interconnected and cannot be solved unilaterally.

With increased globalisation there is no possiblity of isolating the threat – i.e 5% of the world's population are walking around with MRSA on their skin.

Coach House CM Holdings (CHCM) is ideally placed to be in the



vanguard of these initiatives. CHCM has developed a patented suite of antimicrobial products that kills through a mechanical action rendering it impervious to any evolution or adaptation of these pathogens. The product is long lasting (tested up to 48 Hours) and through surface modification creates a physical barrier that microbes cannot survive on or penetrate. The product has had particular success against Staphylococcus aureus and has been successfully trialled against over 140 different microbial threats. The mechanical nature of the product also has the added environmental benefit that it does not rely on any harsh or toxic chemicals.

CHCM is committed to driving the increased adoption of its products on a global scale in a coordinated and holistic counter to a very real and immediate threat. By pursuing a policy of protection through prevention CHCM is targeting the reduction of infection rates globally thus making a very real contribution to the greater good.

#### ORGANISATIONAL SUMMARY

Coach House CM Holdings is a UK based company specialising in the development and manufacture of an environmentally friendly antimicrobial product with incredible performance power. The patented product kills 99.999% of surface bacteria on contact and provides long lasting protection against recontamination. The management and R&D team have decades in the clean tech sector and will bring this experience, expertise and fierce commitment to bear in delivering the mission statement of the company "Protection Through Prevention". The management has spent the past three years developing the technology, following an applications based strategy and meeting the criteria laid out by the EU and US regulators. The development of the technology will continue in parallel but the company is now ready to launch and move into commercial operation.

### COMMITMENT TO SOCIAL AND ENVIRONMENTAL PURPOSE

CHCM's primary raison d'etre is to provide genuinely disruptive and environmentally responsible solutions to positively impact the safeguarding of the world's population against the threat of deadly infection. CHCM's primary social and environmental objectives are:

#### **PROTECTION THROUGH PREVENTION**

The reduction of pathogen linked infection rates across all environments, (including healthcare, industry, households, sporting environments, agriculture and public amenities) on a global scale.

To significantly reduce the amount of toxic chemicals in the environment

CHCM is committed to raising the profile of the increasing bacterial threat and promoting better hygiene, increased vigilance and greater awareness of the innovative solutions available.

CHCM's strategy is to remain flexible in its approach but will prioritise initially the following sectors:

- Households
- Healthcare
- · Mould and Mildew Treatment and Remediation
- · Sports Environments Including Artificial Turf
- Agriculture and Agribased Developing Economies

#### THE IMPACT INVESTMENT NETWORK (IIN)

The management of CHCM is committed to making a positive contribution socially, economically and environmentally - or another way to put this could be Impact. CHCM sees huge synergy in its mission and the ethos of the Impact Investment Network (IIN) and its members. The attraction of IIN membership for CHCM is manifold. The membership group offers the opportunity to compare notes on development with like minded enterprises. The breadth of the sectors covered offers the prospect of partnerships, stakeholder involvement and investment. For a company at our stage of development we will be looking at further investment to tackle exponential growth relative to the sheer scale of the market - To be able to secure Impact Investors specifically would best fit our company profile. Finally, the opportunity to work closely with the IIN team to better realistically quantify and communicate our 'impact' to our investors and stakeholders alike will be invaluable to our development as a company.

the Eff

John Cunningham, CEO, CHCM Holdings Plc



### **2. SOCIAL PURPOSE AND CONTEXT**







#### THE CHALLENGE

The World Bank in its March 2017 Report *Drug-Resistant Infections* - A *Threat to our Economic Future* is predicting that by 2050 drug resistant infections could cause economic damage on a par with the 2008 financial crisis. A separate report by former Goldman Sachs Chief Economist Jim O'Neill puts the number at \$100 trillion by the same date.

The overuse and misuse of anti microbial drugs has led to the emergence of drug and chemical resistant "super-bugs" With no new class of antibiotic discovery in 30 years, and resistant superbugs on the rise, the UK government and the World Health Organisation (WHO) are advocating that currently prevention is the best policy.

"We really are facing – if we don't take action now – a dreadful postantibiotic apocalypse. I don't want to say to my children that I didn't do my best to protect them and their children," – Sally Davies CMO UK Govt

Deaths from infections such as Sepsis and MRSA are at record levels (over 6 million fatalities world wide each year) and the focus is currently on the best way to halt the spread of these life threatening conditions. On average Sepsis kills 44,000 people a year in the UK alone and is estimated to cost the NHS £2.93 billion annually. In the USA Sepsis kills 258,000 people every year and is costing hospitals over \$24 billion annually. (Global Sepsis Alliance)

MRSA (methicillin-resistant Staphylococcus aureus) is a staph bacterial infection that resists many antibiotic treatments. This type of infection, as well as many others can result in sepsis.

Sepsis is a life threatening disease that results from the overreaction of the immune system to an infection. The body releases chemicals into the bloodstream which results in inflammation throughout the entire body instead. On May 26th 2017 the World Health Assembly (WHA) and the World Health Organisation (WHO) made sepsis a global health priority.

Prevention has been identified as a key part of the WHA and WHO resolution for tackling sepsis. It has also been cited by the UK government for fighting the spread of bacteria based infection across the board. The solution lies with improved processes (greater attention to hygiene and cleanliness) and innovation and a new wave of anti-microbial products with which to carry out the new strategy.

#### // A Solution

CHCM has developed a genuinely disruptive anti microbial product that is non toxic, does not rely upon harsh chemicals and kills 99.999% of bacteria. The product can be applied in a versatile array of techniques (spraying/wiping, foaming, fogging and electrostatics) and cleans and protects most surfaces from harmful bacteria.

The traditional mode of action to combat transmission of harmful microorganisms on surfaces is to attack the germs with varying degrees of poisonous chemicals. These poisons are designed to target and destroy a microbe's outer membrane (and then its internal DNA). After the poisons are applied on a surface to achieve an "instant kill", the surface is once again susceptible to recontamination after the product evaporates. Frequent application of such disinfectant products degrades surfaces such as plastics, metals and composites and dries skin to the point of pain and cracking. Individuals applying such chemicals subject themselves to toxic fumes and skin burns, thus making skin & respiratory protection equipment a necessity.

CHCM Protectants are very different. While every bit as effective as their highly toxic counterparts, all CHCM products are water-based, odourless, non-toxic and safe for use around children and pets.

When applied to targeted surfaces, CHCM products form a mineralenhanced, mechanically bonded layer capable of providing instant antimicrobial action and lasting protection. CHCM products kill pathogens on contact and then stay in place, greatly extending the window of protection to hours, days and more (depending on product, surface & method).

While virtually "invisible" to humans, CHCM mechanically modified surfaces become unsuitable environments for sustaining pathogenic microbial life. Microbes that are unfortunate enough to come in contact with a CHCM modified surface, exhaust themselves, wither and die.

#### CHCM'S MISSION - PROTECTION THROUGH PREVENTION

The mission of CHCM is to be pro-active rather than re-active.

The board of CHCM is resolutely committed to impact – on health, on a socio–economic level and environmentally. The company is further committed to the premise that progress in this way must be sustainable and economically viable if it is to be successful. By working in partnership with the IIN and other stakeholders CHCM is determined to fulfil its mission to provide innovative, genuinely disruptive and environmentally responsible solutions to empower consumers and safeguard the world's population against the threat of deadly infection.

In the long term, new antibiotic discoveries will be required to treat infections that have already taken hold in the body. Until those remedies are developed, a real gap exists, accentuating the importance of prevention as the only currently viable method of protection.

CHCM is targeting prevention and pursuing a strategy of intervention rather than reaction. By redirecting focus to the surfaces infectious microbes rely on for survival, (rather than the ever-evolving microbes themselves), CHCM is able to dramatically turn the tables. By mechanically modifying surfaces and thereby blocking the microbe's ability to attach, the extent of the microbe's chemical resistance becomes inconsequential. If a microbe cannot adhere to a surface to grow and reproduce, it cannot survive.

While the approach of CHCM is applicable throughout the developed world, it is perhaps even more pertinent to the developing world. The poorer countries are often most at risk from infection, owing to lack of infrastructure, amenities, and access to medicines widely available in the West. Prevention is the best and most practical way forward in this type of environment. By targeting this sector through the Sustainable Development Goals (SDG) Agenda we aim to give governments in the developing world the tools to hit their targets.

#### CONTEXT

CHCM has developed a suite of anti-microbial products that are ready for market, and we are targeting Healthcare, Households, Hospitality and sport and leisure organisations and facilities.

By providing CHCM product to the following target sectors we are:

- Removing harsh chemicals from the environment
- Providing a blanket barrier offering long lasting protection on all surfaces against harmful bacteria
- Targeting Primary and Secondary infections
- Improving the wellness of the people using or frequenting these environments.

# CHCM products have been designed to target specific sectors and so it is key to quantify each one from an impact point of view.



#### HEALTHCARE

#### Problem/Threat

The lethal threat of secondary infections (e.g. MRSA and Sepsis) within hospitals and clinics is well documented. Global access to effective anti-microbials is a major problem. Currently over 700,000 deaths worldwide, including 214,000 neonatal sepsis deaths, are attributable to resistant bacterial pathogens each year. (The Lancet 2016) In the UK 300,000 people every year contract MRSA of which 5,000 die. In the US the death toll is 20,000 every year.

CHCM KILLS 99.999% OF BACTERIA UNDER EN 1276::2009 CONDITIONS // Solution

The CHCM suite of products includes Surface Cleaners and Disinfectants, as well as Hand Sanitisers and Anti Mould and Mildew products. The formulas are environmentally friendly and can offer protection for up to 48hrs. The CHCM formula has been tested successfully against over 140 different microbes and is proven to kill 99.999% of bacteria under EN 1276:2009 conditions. With its mechanical kill mode of action CHCM products are not vulnerable (in the same way as chemical based products) to the ever evolving anti microbial resistant bugs and will continue to present a solid layer of defence for up to 48 hours.

#### HOUSEHOLDS

#### General

For households the CHCM suite of products provide a range of anti microbial protection for all surfaces, bathrooms, kitchens etc. By using CHCM products customers are able to automatically reduce the amount of harmful chemicals in the home while providing superior protection against bacterial threats.

According to the US Environmental Protection Agency (EPA), the air inside a typical home is on average 2 to 5 times more polluted than the air just outside. The EPA attributes this statistic largely to household cleaning agents. With the CHCM product suite containing no environmental contaminants and producing no harsh fumes – by switching products the impact would be immediate.

#### MOULD REMEDIATION

#### Problem/Threat

When a structure becomes infested with mould, complete remediation is often the only option available to home owners (or insurance companies, Estate Agents or Managers). As well as the threat to the building itself there is a very real threat to the inhabitants of a contaminated building.

In 2007 WHO released an official report on Indoor Air Quality – Dampness and Mould. The review recognised the most important effects of Mould were,

"increased prevalences of respiratory symptoms, allergies and asthma as well as perturbation of the immunological system" ... and concluded that .... "The most important means for avoiding adverse health effects is the prevention (or minimization) of persistent dampness and microbial growth on interior surfaces and in building structures."

According to the research company Sustainable Homes, mould is a major issue in the UK afflicting between 5–24% of all buildings, of which 598,000 homes are classified as severe.

#### // Solution

The CHCM Anti Mould and Mildew product is a proven treatment that not only eliminates the existing colonies, but protects against recontamination as well. Inhabitants report improvement in respiratory, health and/or well-being almost immediately post-treatment.

To meet the criteria for fungistatic success as defined by the EPA, AMP Surface Cleaner M&M was tested against A. niger ATCC 6275 to confirm its ability to resist mould and mildew growth. 10 independent carriers (tiles) were treated with AMP from two different lots of AMP Surface Cleaner M&M (total of 20 samples), and challenged with the test microorganism for an incubation period of 7 days. After the incubation period, observations for growth were made and confirmed visually & microscopically.

AMP Surface Cleaner M&M prevented fungal growth on 20 out of 20 treated tiles. AMP Surface Cleaner Mould & Mildew meets the EPA Pesticide Assessment Guidelines for fungistatic success.



AMP SURFACE CLEANER M&M PREVENTED FUNGAL GROWTH ON 20/20 TREATED TILES

#### **ARTIFICIAL TURF AND SPORTS' ENVIRONMENTS**

When we consider our own or our children's participation in contact sports, our first thoughts are always towards the risks associated with bone breaks, ligament damage and concussions. Infectious diseases are not at the forefront of our minds. However, according to the latest clinical report from the American Academy of Pediatrics (September 2017) this mentality needs to change,

"Organised sports participation, however, can result in the acquisition of a variety of infectious diseases and conditions. Physical contact among athletes, sharing of equipment (such as worn personal protective equipment or braces plus towels, drinking vessels, showers, and locker rooms), and contact with athletic surfaces (mats, artificial turf, dirt, grass, and gym or weight room equipment) can all be responsible for transmission of infection."

The report identifies Staphylococcus Aureus (MRSA) as a major threat.

"Community-acquired methicillin-resistant S aureus (MRSA) is a cause of outbreaks of skin infections among high school and collegiate athletes participating in contact sports, particularly among football players and wrestlers, and is associated with significant morbidity"

"Wrestling mats, artificial turfs, and football training equipment have been documented with MRSA colonization"

(NB. In the UK alone there are 6,435 separate gym facilities with over 9.2 million members)

#### **ARTIFICIAL TURF**

Indoor and outdoor turf can be a breeding ground for infectious microbes. Skin with the slightest cut or scratch is susceptible to infection when coming into contact with contaminated surfaces, such as turf. The Centre for Disease Control (CDC) in the US has categorised American football as 'High Risk' for MRSA and Staphylococcus aureus infection citing synthetic turf as a contributing factor. (Breaks in the skin are how the MRSA typically infects and turf burns and abrasions are a common cause) Professional teams go to great lengths to ensure the health of their athletes, yet Staph and MRSA infections persist, resulting in the loss of valuable playing time, the ending of lucrative playing careers, amputations and in many cases death.

The global market in artificial turf currently stands at \$2.24 billion and is expected to double (\$4.5 bn) in the next ten years. Contact sports make up 61% of this market place but other applications and a major expansion in APEJ countries are set to account for this rise. Climate change is a key contributor here as people seek alternatives to grass both from an aesthetics point of view as well as reliability and maintenance.

#### // Solution

In tests the CHCM Anti Microbial Turf cleaner and protectant was found to eradicate microbes completely. A PRODUCT pre-soak spray followed by an electrostatic application is recommended for maximum penetration of crumb layer and adhesion to all surfaces of turf blades. The CHCM anti microbial formula is proven to be particularly effective against Staphylococcus aureus, and through its mechanical action provides a long lasting protection against the threat posed by this strain of bacteria. By applying the CHCM product onto Artificial Turf, sporting organisations can mitigate against MRSA and other bacterial threats. However the protection offered by CHCM product doesn't stop there. Indirect transmission (passing on harmful bacteria through contact with an inanimate object) is perhaps one of the

other bacterial threats. However the protection offered by CHCM product doesn't stop there. Indirect transmission (passing on harmful bacteria through contact with an inanimate object) is perhaps one of the most common causes for MRSA to spread. If one considers that approximately 5% of the world population carries MRSA on their skin, the threat is omnipresent. This is then exacerbated by confined spaces such as gyms, changing rooms, plus the immediate proximity of contact sports and shared equipment. CHCM is able to offer a fully comprehensive solution for disinfecting changing rooms, bathrooms, showers, gym/yoga/ wrestling mats, general admission areas, etc. The goal being to create more 'safe' areas thus mitigating the risk of infection.



BY APPLYING THE CHCM PRODUCT ONTO ARTIFICIAL TURF, SPORTING ORGANISATIONS CAN MITIGATE AGAINST MRSA AND OTHER BACTERIAL THREATS.

### **3. WHO BENEFITS?**



#### 1. CHCM CUSTOMERS

CHCM products are targeting a significant reduction in the spread or communication of infectious disease and other illnesses with the potential to do this on a global scale. Infections can be passed directly and indirectly – i.e through direct contact with bacteria or an infected person or by touching a third party item with which an infected person has had contact. By utilising the CHCM product suite, customers can ensure that harmful bacteria are unable to survive either on skin or surfaces (toys, tables, door knobs, walls, light switches etc...) thus preventing onward transmission.

CHCM product tests have demonstrated efficacy on over 140 strains of infectious bacteria, viruses, fungi and algae. With its environmentally friendly nature and incredible product performance, CHCM's potential impact on consumers is significant.

Many household cleaners or disinfectants contain one or more of a hazardous grouping of ingredients – Parabens, Triclosanns or Phthalates. Parabens are used as preservatives and antimicrobials but have been connected with breast cancer, hormone disruption, reproductive toxicity and skin irritation. The EU has banned five of the compounds from the group thus far but the most commonly used remain in products on the market

Triclosan can be used as an antimocrobial in cleaning products. It has been banned from hand soaps in the US whilst its use in the EU is increasingly restricted. Widespread use of triclosan has also been identified as potentially contributing to bacterial resistance to anti microbials.

Phthalates are used in products that require synthetic fragrances and have been linked to hormone disruption and cancer.

CHCM products contain none of the above ingredients. The product's mechanical mode of action both mitigates the risks of harmful chemicals and other pollutants and provides a longer lasting protection than other competitors.



#### 2. THE ENVIRONMENT

Even after passing through water treatment plants, traces or chemical compounds from household cleaning products make their way into our natural waterways. CHCM products do not rely on harsh or toxic chemicals as we focus on the 'mechanical kill', so these environmental hazards will automatically be phased out.

In addition, CHCM has specially formulated a non-toxic antimicrobial protectant for plants to promote and support organic farming practices. Farmers are able to grow robust and healthy produce that is eligible for organic certification – without the use of dangerous chemicals and pesticides. The CHCM Plant Protectant is a botanically-charged, water-based solution with enhanced bonding capabilities. Unlike traditional pesticides that are easily removed by evaporation or rain, HND Plant Protectant forms an "invisible" and breathable protective layer that remains active and in place until removed by light oxidation or leaf expansion. As the components are broken down in this manner, they are neutralized and are no longer detectable.

Small aphids and nuisance insects avoid plants treated weekly with HND Plant Protectant. When plants infested with aphids are sprayed with HND Plant Protectant, the aphids leave in search of a different plant more suitable to their liking. Plants treated with HND Plant Protectant are also more resilient and able to defend themselves against infection from certain fungal diseases such as Powdery Mildew, Brown Spot and Coffee Rust or Roya. Growers report incredible success at not only preventing infection but curing it as well.

HND Plant Protectant leaves no trace chemical residue on harvested plants or the surrounding environment in which they are grown.



#### 3. GOVERNMENTS

In March 2017 the World Bank released a report entitled Drug Resistant Infections - A Threat to Our Economic Future. In its Executive Summary it stated

"putting resources into Anti Microbial Resistance (AMR) containment now is one of the highest-yield investments countries can make."

The Report characterises containment of AMR as a "Global Public Good" and refers to the

*"critical responsibility of public authorities, especially governments, in protecting this good".* 

According to the Report, if the threat posed by AMR is allowed to proceed unchecked, we could be looking at a return to the days before anti microbials were introduced – a spike of 80% in infection rates world wide. To the global economy this represents among other things a return to the financial crisis of 2008 for impact. GDP would be 3.8% lower by 2050 in the high AMR model. This equates to annual losses of over USD\$3.4 trillion by 2030 ramping up to USD\$6.1 trillion by 2050.

For the global economy this is a disaster but for for the lower income countries the impact is far more severe and longer lasting. The Report points to the fact that this catastrophe would not be like a normal financial down turn in that the underlying reasons for the economic slump would mean that it was unlikely to be a "cyclical recovery". The necessary development of new drugs and vaccines will take decades – and success is not guaranteed. This represents a massive investment and one that poorer countries are unable to afford. CHCM aims to position itself as the first line of defense against the threat of AMR by halting the indirect transmission of harmful bacteria, and therefore reducing primary and secondary infections. The overwhelming instruction from the medical community is that prevention is the best way forward. CHCM is aiming to be in the vanguard of this effort and particularly with regard to the developing world. With it's "mechanical kill" and non toxic nature it offers a safer and more effective solution than many of its competitors. In many developing countries the economy is agri-based and there is less separation between the population and its agricultural infrastructure resulting in increased opportunity for the transmission of harmful bacteria. We believe that CHCM's solution of providing a physical and long lasting means of antimicrobial protection, without harsh-chemical side effects, is the best way forward.

# CPP

#### 4. UNIVERSITIES AND OTHER EDUCATIONAL ESTABLISHMENTS

For the past two and a half years CHCM has been in partnership with the University of Liverpool in developing it's proprietary anti-microbial formula. Through the Open Innovation Hub for Anti-microbial Surfaces (OIHAS), CHCM has developed the technology and investigated its efficacy and applications. As CHCM goes forward it will maintain strong engagement with academia by investing in further technology development and establishing a testing program with the University. The partnership with the University, as well as its relationship with other educational establishments, will be essential to the sustainability of the company.



#### 5. HM PRISONS

HMP Berwyn is the first of the UK government's publicly run Super Prisons with a capacity of 2,106 inmates. With nine more scheduled to follow, it is the flag ship for the government's new initiative with the emphasis based more on rehabilitation than punishment. The Prison is focused far less on punishing the transgressor for their crimes and far more on providing the inmate with the skills to succeed in the outside world upon their release. CHCM is in discussions with Interserve and the Ministry of Justice to partner in this initiative and install an Anti Microbial manufacturing facility in HMP Berwyn. CHCM is a perfect partner in this case as the product is user friendly, easy to handle does not rely upon hazardous chemicals – or contain alcohol.

For CHCM the partnership will provide a domestic manufacturing and sales base from which to target the UK and European market place. The beneficiaries would be customers who would benefit from CHCM having a manufacturing base in the UK; and inmates who will learn transferable skills, gain a sense of worth and identity from having purposeful work, and give them something to show from their time away. As the business grows we would look at employing ex-prisoners who would have already gained experience of the company and its processes.

CHCM is in discussions to supply Berwyn manufactured products to the Ministry of Justice and Interserve for large-scale internal use. This opportunity to close the circle and create a genuinely self sustaining model is an attractive one.

CHCM participation in this program will have significant impact. In a speech two years ago David Cameron stated that 46% of adult prisoners reoffend within a year and that rises to 60% for those incarcerated for less than twelve months. He also quantified this by saying that the cycle of re-offending was costing the UK economy £13 billion per year. There is also a human and social impact. According to government statistics, in 2015 there were on average 590 instances of self harm and 360 assaults per week in the UK prison system and 'self inflicted' deaths occurring at a rate of one a week. By providing real jobs and thus a sense of purpose we hope to impact these numbers in a meaningful and positive way. By supporting this initiative CHCM is also staying true to - and extending - its mantra of "Protection through Prevention".



#### 6. THE UN SUSTAINABLE DEVELOPMENT GOALS AGENDA

On January 1st 2016 the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development officially came into force. These SDGs were officially agreed to by World Leaders in September 2015, and to date 193 countries have signed up to the initiative. Essentially the UN led SDGs are a call to action to all nations to promote prosperity while protecting humanity and the planet. CHCM will be engaging with governments to assist them to meet their goals within the framework of the SDG agenda. CHCM is targeting the following:

2. Zero Hunger

- 3. Good Health and Well Being
- 8. Decent Work and Economic Growth
- 9. Industry Innovation and Infrastructure
- 11. Sustainable Cities and Communities

### **4. ACTIVITIES AND OPERATIONS**

CHCM undertakes a range of activities in the execution of its business model that are inextricably linked with the company's social and environmental objectives. Implementing a preventative strategy through our innovative product suite, CHCM is looking to play a significant role in tackling a genuine and substantial threat to the life of people all over the world.

The CHCM Management team is responsible for setting out and delivering the corporate goals and objectives. It is a dynamic group with vast experience in the sector and an excellent skill set incorporating marketing, sales, operations and technical know how.

#### **CHCM MANAGEMENT TEAM**



#### ohn Cunningham CEO

John's primary responsibility is the strategic implementation of the company goals and objectives. He has 20 years expertise in geopolitics and clean tech project development. He is a start up specialist with a successful track record in raising funds for and the development of disruptive technology. His work has targeted developing clean and sustainable solutions across eclectic industries including Plastics, Automotive, Renewables and Bio Extraction. He has considerable international experience having instigated and led tech projects in Africa, the US and Europe.



#### Nikki Dudley, COO

Nikki is an experienced tech start up specialist with a background in operational analysis, financial planning and marketing strategy. An expert in digital marketing Nikki is responsible for implementing the global vision of the company. In her previous company as VP Operations Nikki was a key part of the leadership group that took a start up enterprise into multi million dollar revenue inside 3 years. With her science background and business acumen she is uniquely qualified to take the company forward.



#### Logan Merchant, CTO

Logan heads up the technical division covering the operation, design, procurement, construction, installation and commissioning of the company technology and equipment. A specialist in prototype engineering including composite research and development he has worked on a number of applications and innovations (from inception) which have resulted in IPR. Logan is responsible for technology oversight and support for all teams and licensees in the field.



#### Michael Cunningham OBE, Chairman

Mike is an ex RAF Group Captain and FSTE 100 Director. He has been involved in technology development and appraisal since 1990 when he was one of the first people invited into the FSU to review their technology for commercial applications. Since then he has devoted his energy into funding and developing new clean technology and raising the profile of key environmental issues. He has lectured regularly at Cambridge University and has co-hosted Environmental Symposiums in partnership with the University. Mike has travelled extensively and has consulted to various governments on a variety of topics across the MENA region.

#### Matt Merchant, Founder and Senior Technical Advisor

Matt is the founder of the company and the developer of all technology on which the company is based. Internationally renowned for his innovative and technological solutions to humanitarian problems, Matt is well travelled and has consulted at government level around the world. Matt has extensive knowledge of materials processes and is a graduate of the Hawkeye Institute of Technology, Institute for Physical Research and Technology. He holds degrees in Automotive Engineering, Material Science, Conservation Resource Management, and Agricultural Management, and his work to date has already resulted in generating significant IPR. The combination of Matt's innovative and genuinely disruptive technology and his dedication to humanitarian causes encapsulates and underpins the ethos of CHCM.

#### **KEY ACTIVITIES INCLUDE:**

- The ongoing development and verification of a proprietary and patented process for the production of genuinely disruptive antimicrobial products. Partnerships with Universities and specifically the Open Innovation Hub for Anti-microbial Surfaces (OIHAS) at Liverpool University to further develop and refine the performance parameters of our products.
- Implementation of a strategy to meet the regulatory requirement of targeted applications and markets.
- Engagement with partners to develop opportunities and issue licences to distribute CHCM technology to new markets in the developed and developing world.
- Sales Raising the profile of the company and its product suite to targeted customers in clearly defined sectors. Demonstrating the versatility and superior performance characteristics of the various products. Customers to be supplied from the US or through co-packers until Berwyn comes on line in January 2019.
- Lobbying Working with Universities, NGOs and Governments to raise awareness of the threat posed by superbugs, MRSA, sepsis and other bacteria thereby creating 'smart' customers.

 Prisons - Establishing partnerships with Prisons (HMP Berwyn initially) to revolutionise the current system of 'prison as punishment' and work towards rehabilitation within a sustainable and economic business model. This establishes an early stage manufacturing facility for the company and provides a manpower resource that would otherwise take years to establish. This model supports the new initiative of HMG,

#### ANTI MICROBIAL PRODUCTS

In order for any microbe to grow and reproduce, adhesion to a surface is mandatory. With this basic, yet critical principle in mind, CHCM AMP takes a radically different approach from today's "reactionary" chemical solutions. Rather than chemically targeting the ever-evolving microbes, CHCM's instead mechanically modifies the surfaces microbes rely upon for survival. AMP coating not only makes surface adhesion impossible, resulting in microbial death, but the non-toxic and alcohol-free AMP formulas demonstrate extraordinary longevity – lasting hours, weeks or months depending on application.

CHCM has been painstaking in its development of the technology. While much of the initial work and testing has taken place in the US, verification of the product and its capabilities was carried out by a respected institution in the UK/Europe. For this purpose we started a partnership with Liverpool University and its renowned Open Innovation Hub for Antimicrobial Surfaces (OIHAS). This collaboration started with the basics i.e. Firstly there was a need to establish (to EU standards) that the product was in fact anti-microbial by nature. From there different applications were trialled and the measurement of its performance against various bacteria calculated. All of this has been carried out and documented by Liverpool University over the past three years. (These results can be made available upon request.)

This testing program has enabled CHCM to verify that the AMP product is EN1276: 2009 compliant and proven to kill 99.999% of bacteria. It has been successfully tested against 140 types of bacteria, viruses, fungi and algae. These include E Coli, Ebola, C Diff and Staphlycoccus Aureus (MRSA).

CHCM has five main target areas for its anti microbial products.

- Households
- Healthcare
- · Mould and Mildew Treatment and Remediation
- · Sports Environments Including Artificial Turf
- Agri-based Developing Economies

As referenced previously it is difficult to quantify "Impact" as the potential scope and scale of the market is colossal, and CHCM is just moving into commercial operation.

#### optimism, confident they have acquired the skills to survive back in the community. CHCM produces two different protective coating systems designed to impact the two applications described below.

trains and educates the inmates, gives them a sense of pride

and purpose - and enables them to look on their release with

#### To illustrate some facts on the Healthcare sector:

In consultation with local experts and expat professionals, CHCM undertook a review of consumption practices in a medium-sized private hospital in a country of the Arabian Gulf. These numbers have been reconciled with a similar-sized unit in the NHS of several European Countries. Thus we know:

A 250 bed hospital will require support staff of 2,000 and a community of dependents of around the same number. Anti-microbial products (AMP) could be used for the following functions:

- · Daily Hand Sanitizer usage
- Electrostatic spraying of Wards, Theatres and support areas on a daily basis and accommodation weekly
- Cleaner and disinfectant throughout the Hospital daily and accommodation weekly
- Anti mould treatment throughout the Hospital on a daily basis and accommodation weekly

Assuming the above treatments this one hospital would require 4,500 litres per day of CHCM products – or 1,642,500 litres a year. It is unrealistic to assume 100% take up of product but even one of these applications would lead to over 400,000 litres per year – and that's just one medium sized hospital.

In the EU in 2013 there were 2901 registered Hospitals, in the US the number is 5,534 and in the CIS there were 10,880 hospitals registered in 2013. The Healthcare system in the GCC alone is forecast to rise to \$71 billion by 2020 according to a 2016 Report by Alpen Capital.

In addition and highlighting the need for lobbying and education, the Save Lives Clean Hands initiative of the World Health Organisation (WHO) now has over 19,000 hospitals from 177 countries signed up to prevent sepsis. (May 5th is the official awareness day) However, of these hospitals only 979 are African. If you then consider that between them, Nigerian and South African hospitals make up 664 of them leaving ten countries in Africa with no registered facilities at all – you get some idea of the scale of the problem.

#### CERARMIX

Cerarmix is a metallic ceramic and polymer nanocomposite with unusually exceptional physical attributes. It is incredibly resistant to abrasion and corrosion, can withstand extreme temperatures and claims impressive compression tensile and flexural strength. Cerarmix can be used as a coating to repair existing infrastructure or in the 'original' manufacturing of individual parts and components, with both methods resulting in enhanced performance and product life time extension.

The material's exceptional strength not only adds longevity to any material but can give more lightweight materials and frameworks

a structural strength. The Cerarmix coating can be sprayed over existing substrates and/or buildings to provide a waterproof, fire resistant, fade proof exterior coating or cladding.

CHCM operations are currently based around key field trials with potential clients in the following industries:

- Transport
- Storage
- Pipes and Cladding
- Modular Housing Units

### **5. STAKEHOLDERS**



#### **CONSUMERS: COMMERCIAL & HOUSEHOLD**

While CHCM consumer stakeholders are found across a wide variety of segments that differ greatly, a common core benefit is shared by them all: superior protection. By using AMP, schools, hotels, public facilities, athletic organizations, etc are able to offer cleaner, safer and healthier environments for all who enter their doors by exponentially extending the window of surface protection efficacy against infectious microbes. Individual consumers are able to offer the same benefit to members of their family. By using Cerarmix, roads, bridges, ships and pipes can be built or reinforced to be safer and stronger, and to extend their structural life expectancy. Three Consumer Stakeholders of particular impact are highlighted below:



#### **HEALTHCARE INSTITUTIONS, PROFESSIONALS & PATIENTS**

Risk of secondary infection is a major threat to all patients receiving any type of medical procedure. An average of 20% of all surgery patients contract infections, including Staph and MRSA, as a result of a hospital stay. Current technology is unable to adequately protect surfaces, operating rooms, tools, garments, linens and skin for the extended period required to safeguard patients from infectious bacteria. By incorporating AMP products into hospitals, and thereby bolstering the efficacy of antimicrobial protection on everything from bedding, scrubs, instruments, hard surfaces and skin, secondary infection rates can be significantly reduced. By treating patient rooms, operating rooms, common areas and textiles as a routine preventative measure, hospitals will be able to better protect patients, their family members and its staff.



#### AGRICULTURE

Farmers large and small can better protect their crops against environmental stressors, such as destructive moulds, rust and other diseases as well as small nuisance and chewing insects without the use of toxic pesticides. Growers who had previously lost hope in their disease ridden crops have been able to save their livelihoods by incorporating the AMP material into their farming practices. AMP plant formula can replace many other pesticidal & fungicidal chemicals, and does not interfere with organic farming. Plants grown with just AMP are healthier, larger and show no trace chemical residue, which allows farmers to command a higher price on their premium finished products.



#### **TRANSPORTATION & INFRASTRUCTURE**

Tankers, hulls and pipes reinforced with Cerarmix boast exceptionally high ratings in strength, durability and corrosion resistance. This structural superiority results in much safer transportation of oil and toxic chemicals with little risk of leaks and spills. Pumps and fittings, bridges, building panels and other structures coated or cast with Cerarmix far outlast and outperform those engineered with traditional materials, equating to huge monetary savings to businesses, governments and communities.



#### ACADEMIA, GOVERNMENT & RESEARCH INSTITUTIONS

Both AMP & Cerarmix provide exciting research opportunities for students, professors and agencies across many fields of study. Partnerships with the likes of Liverpool University, Louisiana State University, Chapas University, private research institutions, clinics and government agencies are vital to the forward progress of discovery and product implementation. The collaboration between CHCM and researchers around the world is critical for the continued maximization of impact in fields such as healthcare, agriculture, infrastructure, education and more, and is to the mutual benefit of all stakeholders. From a Government perspective CHCM will work in partnership to raise awareness of the issues, educate the population, and provide a solution to the threat from microbial infection. In addition, by pursuing the above initiatives CHCM will assist in helping Governments to attain their Sustainable Development Goals.



#### ENVIRONMENT

All products manufactured by CHCM carry the lowest toxicity rating available and are safe for use around children and pets. CHCM products look to replace harmful chemicals found in other household or comparable cleaning agents. These chemicals commonly pollute the air, soil and water, resulting in environmental damage and chemical-exposure related illnesses. CHCM products pose no such threat to the earth or its inhabitants. CHCM products better protect people from illness, plants from pests, and surfaces from harmful microbes without negatively impacting the environment in any way. By utilizing AMP products instead of other pollutants, human and environmental exposure to hazardous chemicals can be greatly reduced.



#### SHAREHOLDERS

Current shareholders are comprised of founders, management and investors, all of which who are closely involved or regularly updated on the progress of research, discovery and product development. CHCM shareholders are committed to bringing an excellent product to market while keeping its potential social, economic and environmental impact top in mind.

#### STAFF



The staff is crucial to the success of implementing the strategy of the business. The staff are all highly intelligent committed individuals who have many years experience in delivering cleantech projects. The staff are all vested in the business and are highly passionate regarding the social and environmental targets of the company. CHCM is dedicated to providing a supportive environment for all staff reinforcing the company values and goals.



Coach House CM (CHCM) is committed to disclosing information about its environmental and social impact through an annual impact report and ongoing communication with its stakeholders.

As outlined previously, CHCM's vision and business model is inextricably linked with its social, environmental and economic outcomes for a range of beneficiaries. The company's social and environmental goals are embedded within CHCM's business and strategic planning processes at all levels of the organisation.

#### **CURRENT MANAGEMENT**

Coach House CM Holdings PLC was established to develop and build a product suite based on a genuinely disruptive anti microbial technology. The product is environmentally sound, effective and innovative. The mechanical action aspect of technology gives it huge versatility when it comes to market meaning there are very few sectors to which it cannot supply. The management team owns 90% of the company with a proportion of that equity set aside for targeted fund raising.

As CHCM is at an early stage of development, forward projections for the number and location of Sales and Licences are uncertain. It is also difficult to accurately measure 'impact'. CHCM is committed to measurement and monitoring of the environmental benefits realised as its products are used in the market, and will work with IIN to set and measure progress against additional aggregate environmental benefit targets in future impact reports.

#### **FUTURE COMMITMENTS**

CHCM is a recently established company in the start up of its commercial operations. While clearly the successful ramp up of the business is the clear priority, the company fully commits to verifiable impact monitoring and regular reporting protocols.

Specifically, CHCM is committed to expand its operations in the following key areas:

- Understanding the Environmental Footprint of Coach House CM Holdings' Products and Operations.
- CHCM prevents bacteria from adhering to treated surfaces and therefore stops any attempt to colonise in its tracks. It is long lasting (tested up to 48hours) and environmentally friendly.

As the company has only recently entered commercial operations, management has not been able to ascertain or measure the environmental impact of its operations. However CHCM undertakes to establish a protocol to accurately measure the net environmental and social impact of its operations. This will require undertaking a more comprehensive evaluation of the CHCM footprint to stand alongside its environmental and socioeconomic benefits. To this end CHCM plans to undertake the following actions:



# Establish a model to quantify the specific benefits for customers purchasing CHCM products;

#### Specifically:

- 1. Quantifying the effects of displacing harsh chemicals in CHCM target environments from households and other clients. This to include:
  - Monitoring environmental waste; reduction in volume owing to longer lasting efficacy; improved air quality inside treated buildings.
  - Monitoring and measurement for the impact of the reduction of bacterial infections from target environments, again from a Wellness standpoint and an economic impact.
  - Monitoring and reporting on the Wellness of those persons utilising the remediation service - Before and After.
  - Monitoring in partnership with government agencies on the impact of CHCM products on enabling them to meet their SDG agenda.
  - Monitoring and measurement of the Plant Protectant product including efficacy against pests and fungal diseases. In addition assessing the improvement in the appearance and quality of plants as described by growers in various trials.
  - Survey customers to more accurately understand the selling points of the product and to gain feedback on its performance and application.
- 2. Set QuantifiableTargets for CHCM's Future Impact
  - CHCM will develop forward projection scenarios for the usage of its products in its target market sectors and applications. These projections would help to establish a framework for the setting of quantified targets for the company within its mantra and commitment to the environment. By setting these formal targets it will facillitate easier monitoring of the company's performance with relation to its Impact objectives.

- 3. Investigate expanding the parameters of the range of benefits and Impact of the technology and assess the means to quantify these effects.
  - CHCM will look into a feasibility study to assess 'indirect impact' of the operations and products of the company. This will include but not be limited to:
  - A wider look at the impact of the Plant Protectant on crop growth and pest management as well as the efficacy of the product against specific fungal diseases.
  - Conduct a Wellness study into those frequenting treated buildings or living with Mould and its associated effects
  - Working with Liverpool University and other academic or industrial partners to assess implications for other technologies.
- 4. More Effective Environmental Management and Reporting Systems
  - CHCM will look into methodology to improve its processes for data collection and analysis. CHCM will also look into establishing standard operating procedures as required with a view to adopting a certified environmental management system for compliance e.g. ISO 14001.
  - The Evidencing of the Social Impact will come under the remit of the CEO and Operations.

### 7. OTHER SUSTAINABILITY AND REPUTATIONAL ISSUES

# While CHCM has not yet commenced full commercial sales it has existing products ready to be sold into the market place.

It has potential customers trialling product now in the UK and Ireland, China and Central America, and is set to begin trials in the MENA region in Q4 of this year. CHCM's product suite is a superior alternative to existing toxic chemical based products and its mechanical kill action prevents infectious microbes from developing an evolutionary defense, resulting in so called "superbugs" with antimicrobial resistance. The potential impact of the technology is enormous with huge socio-economic benefits for governments and communities both in the developed and developing world. All updates can be viewed on our website www.chemholdings.com.



#### **CHCM PIPELINE**

The beating heart of CHCM is its R&D team, and while the company is continually developing and improving the anti microbial technology there are other technologies in the pipeline. For the purposes of this report we have led with our anti microbial product, but as mentioned above and detailed on our website we also have a product called Cerarmix<sup>™</sup>.

#### CERARMIX™

CerarMix<sup>™</sup> is a metallic, ceramic and polymer nanocomposite with unusually exceptional physical attributes (see specifications). In addition to its unmatched hardness and durability, CerarMix<sup>™</sup> is incredibly resistant to abrasion and corrosion, can withstand extreme temperatures and boasts impressive compression, tensile and flexural strength. CerarMix<sup>™</sup> can be used as a coating to repair existing infrastructure or in the manufacturing of individual parts and components.

CerarMix<sup>™</sup> is derived from a series of proprietary manufacturing processes, that when cured promote the formation of extremely long, silica-reinforced polymer chains; otherwise known as silicon carbide - one of Earth's hardest combinations of compounds, next to diamond. Cured CerarMix<sup>™</sup> is a safe and stable thermoset which is not adversely affected by chemicals, moisture, fire or heat, and resists mildew and mould. Steel corrodes and Cement crumbles. Two of the most frequently used building materials on earth, are subject to deterioration over time, resulting in structural failure of bridges, pipelines and pipework, toxic storage containers and more. According to OECD statistics the EU spends 3.1% of its GDP on infrastructure, and the total costs of repairing/replacing the US infrastructure is estimated to exceed \$3.6 trillion. With astronomical maintenance costs and a lack of adequate funding, infrastructure is often left in place far longer than its original design intended. For example in the past 30 years 9,000 significant pipeline related incidents have taken place in the US alone. This has resulted in 548 deaths, 2,576 injuries and over \$8.5 billion in financial damages. Over 9 million gallons of crude has spilt from pipelines in the US since 2010 over 50% of which date back to the 1960s and 1970s.

Cerarmix follows the CHCM mantra. Instead of waiting for metals, cements and other materials to fail, often with catastrophic effects – Including loss of life, economic hardship or environmental pollution, CHCM offers a barrier to exponentially reinforce and safeguard structures against failure – Protection through Prevention....

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