SocEnv
Society for the Environment

GREENING THE INDUSTRIAL STRATEGY

November 2018

Examples / Case Studies by Chartered Environmentalists

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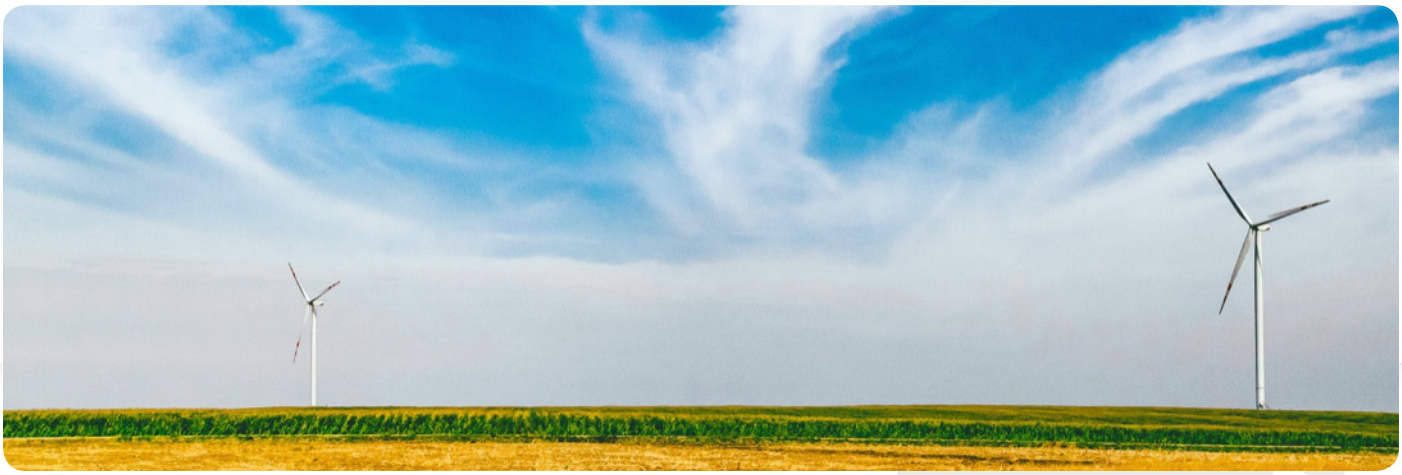


Sustainability
Through
Environmental Professionalism

Please think before you print

Introduction

The contribution of registered environmental professionals to the development of the Industrial Strategy.

Clean growth is a key strand of the UK's Industrial Strategy, released in November 2017 by the Department for Business, Energy and Industrial Strategy. The Industrial Strategy itself will only succeed if it effectively embodies, encourages and implements low carbon, resource efficient growth, with new innovative environmental technologies across the board. To achieve this, it is vital we have environmental professionals competent to deliver.

Chartered Environmentalists are individuals recognised as environmental professionals; verified and registered as competent and committed to high professional standards. Registration as a Chartered Environmentalist demonstrates that an individual has been judged by their peers to be working at the highest possible standards in the environmental profession. They are from no single discipline but have a common skill and competence in the environment. They work across industry, government, education and the public sector, resulting in their collective knowledge being far reaching and cross-disciplinary in nature.

Having Chartered Environmentalists leading and making decisions helps to enhance public trust in environmental services and those responsible for decisions relating to the environment.

In this report five Chartered Environmentalists describe how they are implementing elements of the Industrial Strategy in their work with a case study each. These case studies cover reverse auction platforms in the water sector, opportunities for Parish Councils, 3D printing, bio-mediated infrastructure and sustainable manufacturing innovations. Such diverse work showcases the wide-spread impact of the Industrial Strategy, as well as the breadth of expertise being put into practice by Chartered Environmentalists.

We hope these case studies demonstrate how the Industrial Strategy can be delivered in an environmentally sensitive and value-added way, which will also add to economic growth, employment and the health and wellbeing agendas. The positive contributions Chartered Environmentalists are making and can continue to make in the future are clear, and essential to our futures. We welcome further examples of such work, which we would be pleased to showcase at socenv.org.uk.

Dr Emma Wilcox
CEO of the Society for the Environment

Professor Will Pope HonFSE CEnv
Chair of the Society for the Environment

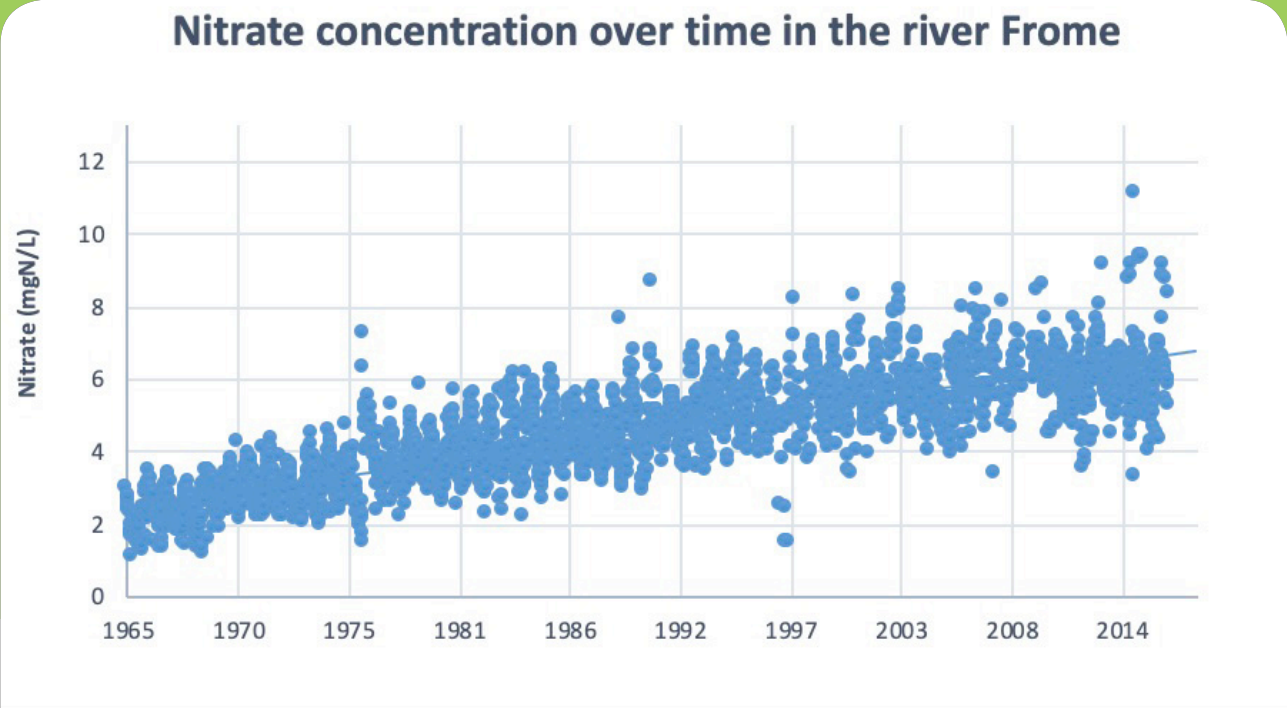
EnTrade - Environmental Improvements at Scale

James Peacock CEnv

Since June 2016, Wessex Water have been working with EnTrade trialling a reverse auction platform to help deliver nitrogen savings through catchment management. This approach invites farmers and others to bid for funding for environmental improvements, to offset capital works that Wessex Water would otherwise have to build.

Poole Harbour is a high-profile site on the South Coast of England, and has some of the highest levels of biodiversity in UK. It is an important bird habitat, protected as a RAMSAR site, a SSSI and as a SAC/SPA.

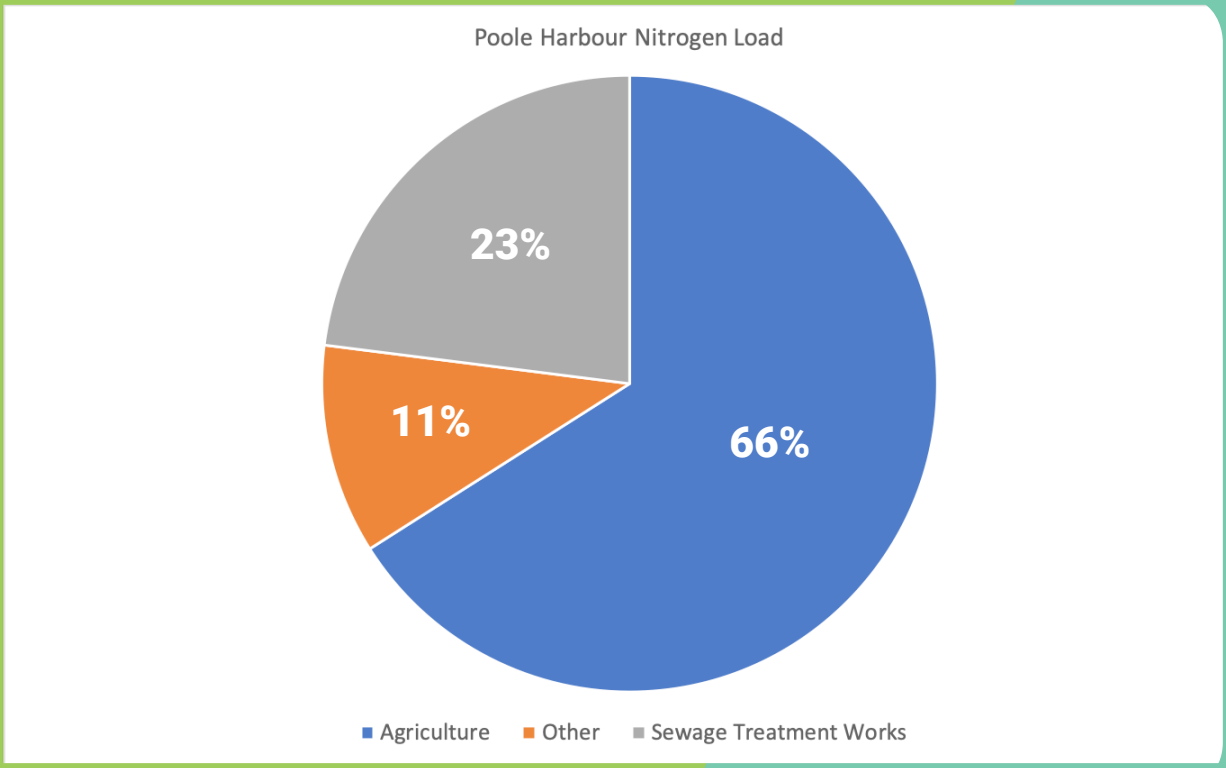
The last forty years have seen a marked increase in levels of nitrate flowing from the catchment, causing eutrophication in the harbour.



Levels of nitrates have been increasing in the Poole harbour catchment for 50 years

Despite significant investment to reduce nutrient inputs from sewage treatment works in the catchment, further reductions are required to protect the harbour. In 2014, the Environment Agency asked Wessex Water build a nitrate treatment plant at our Dorchester sewage treatment works, to reduce our nitrate discharge by 40 tonnes. This work would cost around £6 million to install and £400,000 annually to operate. It would remove less than 2% of the total annual load to Poole Harbour from all sources.

The majority of nitrate losses in the catchment come from agriculture, and therefore this is where the best opportunities for nitrogen reduction are. In the Poole Harbour catchment, Wessex Water estimated that they could achieve the required nitrate saving through working with farmers for 40% of the total cost of a new plant at Dorchester. A reverse auction is the best way to set the price for measures farmers would put in, to deliver this 40 tonne of nitrogen saving, as this approach had never been tried before.



Source of nitrogen in the Poole Harbour catchment – 66% is from agriculture

Through EnTrade, we pay farmers to put in measures to reduce nutrient run-off. One way to deliver nitrogen savings is to grow cover crops over the winter period. Farmers sow cover crops in the autumn after a commercial crop to capture excess nitrogen, and then plough them back in to the land the following spring.

Farmers create an account and tell us where their fields are. During an auction, a farmer selects the type of cover crop they will grow and the date they expect to grow it. The system then takes this information and calculates effectiveness of the measure. EnTrade then ranks the bids based on this effectiveness.

Farmers can adjust their bid at any point throughout the auction, and once closed we can calculate the most cost-effective combination of bids to meet the given target.

EnTrade

Switch Company

Home | My Bids | My Fields | Help | Contact Us | WessexWater\James Peacock

Copy Details From Existing Bid? : Yes No

Select Your Field * : Field 1

Select Your Measure * : Cover Crops following Maize

Select Your Cover Crop * : Oil Radish or Turnip Rape

Estimated Date Of Harvest * : 08/08/2019

Cover Crop Sowing Date * : 14/08/2019

Cover Crop Destruction Date * : 22/01/2020

Method Of Establishment * : Post harvest - Cultivation-drill

Following Crop * : Winter oil seed rape

The black shaded area represents the target area for the auction.

Price (£/Ha) * 130

Total Price (£)	N Savings (kg Of N)	£/kg of N
£ 650.00	303.47	£ 2.14

Your bid is currently successful. Please accept the terms and conditions and click 'Submit bid' to enter your bid in to the auction.

Farmers enter details of their bid, and EnTrade calculates the effectiveness of their bid automatically

EnTrade have now run six auctions with Wessex Water, United Utilities and Natural England. These auctions have included arable reversion, cover crops and buffer strips. In total, EnTrade has received bids for 150 tonnes of nitrogen reduction measures through the platform, from nearly 50 farmers. It has also helped improve the reach of catchment management, improving engagement with more farmers at a reduced cost.

We use farmer-submitted photos and satellite imagery to ensure that farmers have put in the measures. We make the agreed payment once we were satisfied with the evidence. The planting of cover crops by farmers has had an over 90% success rate.

Analysing samples for soil mineral nitrogen (SMN) to validate impact of environmental measures

We have found in our feedback surveys that 90% of farmers who use the system are positive about the system. Farmers like the fact they can tell instantly whether they have been successful, and they like the simplicity of the approach.

Having demonstrated that this approach can work for nitrates, we are now in the process of developing modules for other outcomes – this includes reducing phosphorus and pesticides in catchments and increasing uptake of biodiversity and natural flood management. It could be used to offset impact from industry or net gain requirements of new development, and to bring together different sources of funding for environmental outcomes. In future auctions we will aim to quantify these additional natural capital benefits, which we can enhance by combining further funding from other sources – to achieve truly sustainable catchments.

Greening the Industrial Strategy – EnTrade

Institute of Water

Secure supplies of clean water are essential for a healthy society and a flourishing economy. But two hundred tears of industrialisation and agricultural intensification have left many parts of the United Kingdom with rivers suffering from damaging pollution and low flows. Despite significant investment to date, we still face a major challenge in dealing with this legacy of degradation. One of the biggest challenges – in the UK and in almost every other country in the world – is in dealing with the effects of pollution from agriculture, such as from fertilisers and pesticides. These substances damage ecosystems and add to the costs of water treated for supply.

This 'diffuse pollution' has traditionally been regarded as an almost intractable problem. In many countries I have seen policy makers and practitioners struggling to find ways to make meaningful reductions in the pollutant load entering rivers. However, the innovative thinking by Wessex Water in the development of its EnTrade platform for reverse auctions has demonstrated that pollution can be reduced at significantly lower cost by using markets than by using conventional treatment processes. It has taken open minds and scientific, technical and economic skills working together. And crucially, it has also taken a sound understanding of environmental processes and awareness of the opportunity presented by enhancing natural capital for wider benefit.

The EnTrade concept has the potential to be applied to other challenges, whether from other forms of pollution, flood risk, or offsetting adverse impacts from infrastructure developments. Conventional thinking on emissions mainly focuses on those to the atmosphere; EnTrade has also helped to highlight the benefits of better managing polluting emissions to the land and water environments.

Professor Ian Barker CEnv
Managing Director, Water Policy International

The Industrial Strategy and the Natural Environment

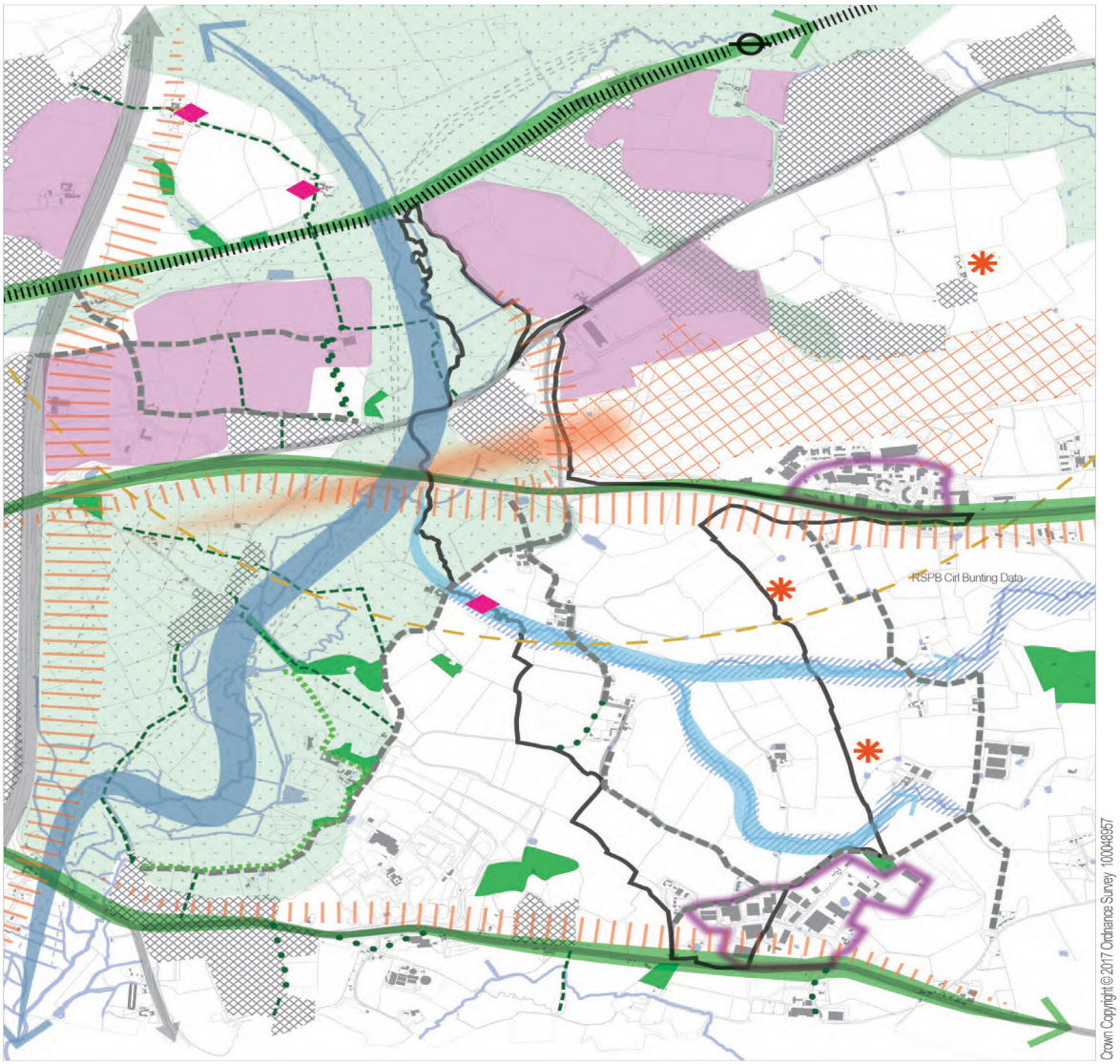
Jenni Reid CEnv MCIEEM

The Parish of Clyst Honiton is located between Exeter and the new Cranbrook Town within the Exeter and East Devon Growth point area. In spring 2017, Clyst Honiton Parish Council (CHPC) appointed Landsmith Associates and Tor Ecology to produce, alongside the Clyst Honiton Neighbourhood Plan (CHNP), a Green Infrastructure Strategy (GIS). The CHNP is being prepared in the context of the East Devon Local Plan 2013-2031 (adopted 28th January 2016).

"Green infrastructure (GI) is a network of multifunctional green space, urban and rural, which is capable of delivering a wide range of environmental and quality of life benefits for local communities." NPPF, 2016.

The Parish of Clyst Honiton forms a narrow wedge from north to south and is surrounded by large scale proposed and recently completed housing and employment development as well as Exeter airport. The purpose of the Clyst Honiton GIS was to produce a series of evidence-based proposals to inform and guide the CHNP policies and it provides a framework for the "locals green vision" to be planned and delivered within the CHNP Area. The strategy was informed by desktop studies, site visits and past stakeholder and community consultations, which highlighted local needs. The strategy was also informed by local, national and international designations, policies and best practice guidance.

The guiding principles of the GIS were to reinforce local identity; enhance biodiversity & manage the environment; establish multifunctional accessible green space; encourage a sustainable movement network; promote health and well-being; strengthen community and cohesion. These guiding principles were the bedrock of observation and analysis work. For example, the parish area is heavily dependent on car travel and necessitates more active travel. There is a lack of publicly accessible footpaths within the village and throughout the wider area, no dedicated cycle or foot network to the new Cranbrook Station to encourage more sustainable forms of transport. Poor north - south connectivity isolating the rich farmland landscape and its rural hamlets with Clyst Honiton Village. There was a lack of locally accessible green space.



Existing Site Appraisal - Clyst Honiton Parish

- Deciduous woodland
- Topographic High Point
- Traditional orchards
- Green infrastructure*
- Sub regional GI biodiversity corridor
- Blue infrastructure
- Local green infrastructure movement corridors
- Environmental Agency Floodzone
- Existing development area
- Allocated development area
- Allocated employment area
- Exeter Airport and restricted area
- Noise pollution
- Sunken lanes
- Railway line with Cranbrook Station
- Public right of way
- Other route with public access
- Clyst Valley Trail

*Including 'Green Wedge' from Local Plan, Clyst Honiton Regional Park', Floodzone 3, East Devon Local Plan 'West End'

Green Infrastructure Proposals - Clyst Honiton Village

- Proposed public open space
- Proposed wildflower meadow
- Proposed development areas
- Reinforce hedgerows and boundaries
- Primary network — Segregated pedestrian and cycle path with all year round access (min. 4.5m wide)
- Secondary network — Multi-use trail
- Local network: Informal path
- Local network: Formal path — Informal network of pedestrian paths
- Proposed improvement to junction
- Proposed public realm improvements — Street trees, pocket parks and green spaces
- The 'Green Ring' — Define the edge of the village with a 'green ring'
- Acoustic buffer with planting; no berry plants with height limit at maturity to accord with aviation authority guidance on birdstrike

1. Clyst Honiton Local Nature Reserve, no public access
2. Informal paths and access
3. Local Green Community Space
4. Wildflower buffer with native hedge and trees
5. Bee hives at Bypass site
6. Community small fruit and nut tree orchard
7. 3m wide shared foot/cycle path
8. New allotments
9. Village focal point — Create a pocket park and arrival space
10. Wildlife corridor — Including woodland planting to assist flood prevention, habitat creation

The proposals contained within the GIS were taken forward to create or justify policies within the Neighborhood Plan. These proposals included (but were not limited to) supporting the development of cycle routes and footpaths to improve mobility and connectivity within the Parish, allocation of local green spaces, providing a coherent 'green' edge to the village and surrounding areas, providing high quality design to include public realm improvements and enhancement of the historic core. The GIS strategy provided a framework for how future development across the Parish would be planned and delivered. In the plan community projects were focused on reconnecting people with nature and the creation of edible and foraging features, proposals aimed to enhance biodiversity and diversify landscape. In conclusion, the proposals provide improvements to the physical and environmental quality of the Parish, and will have long-term economic and social, health and well-being benefits to the community whilst creating a resilient landscape that responds to climate change.

On reflection, how can decision-makers move beyond good intentions in carbon reduction and protecting nature to fully integrate environmental considerations across the whole Industrial Strategy and implement this approach in practice? The only way to fully integrate good intentions into practice is to engage local communities in the process, from inception to actuality. Every GIS document produced for a NP has originality. Governed by the land in the NP Area, the community's bespoke aspirations and wishes for the protection and development of the green infrastructure of their area

The GIS policies and projects embedded in a NP provide both short and long-standing impacts by influencing decision making for the plan's lifespan. As the policies are statutory, these provide the template for any development coming forward. Planning of GI provides a twofold role of supporting the natural environment and benefiting the community in terms of health and well-being; which are well documented. A GIS provides an evidenced-based framework which enables community-based projects to develop and more essentially enables funding (match, set up or top up funding). Ideas coming forward through the GIS have activated community projects, and at Clyst Honiton they are looking at improvement of the public realm and the river banks, as well as a community "plant a tree project". The GIS process has inspired the community to be an integral and active part of their green infrastructure now and into the future.

The Neighbourhood Planning process, along with supporting policy evidence, such as Green Infrastructure Strategies, can provide local Parish's with the tools required to progress their own development projects (via NDOs), be empowered to shape their local identity and landscapes and reassert their connection with nature and the environment. Despite GIS's being increasingly used by local authorities in strategic planning they have not been widely used within a neighbourhood planning context: We are championing this process.

The Industrial Strategy and the Natural Environment

The government's Industrial Strategy rightly recognises that the "economy exists within the natural world, and cannot be separated from it", that "a healthy society depends on a healthy environment" and that it "is an essential basis for economic growth and productivity over the long term".

We know from the UK government's own statistics and from independent reports, such as State of Nature, that there is an ongoing decline in the UK's biodiversity and ecosystems. The commitment to not just restoring but enhancing our natural capital, as espoused in both the Industrial Strategy and the government's 25-Year Environment Plan, is admirable but needs to be delivered in practice. CIEEM has been working with partners on the Biodiversity Net Gain approach for development, with principles already published and further guidance due out later this year. The net gain approach is vital for reversing the current downward trend for our natural capital, not just in relation to development but across all areas of economic activity including in rural areas.

Green infrastructure is one way of integrating biodiversity and natural processes with our economic activities, for example, infrastructure development, that can have a net positive effect and help to deliver biodiversity net gain. The work of ecologists and environmental managers in restoring and enhancing nature for the benefit of people and the planet is critical to achieving the ambitions of both the Industrial Strategy and the 25-Year Environment Plan, and the project above shows the valuable input that environmental professionals have on improving our natural environment and having a tangible benefit on people's lives.

Jason Reeves, Policy and Communications Manager, Chartered Institute of Ecology and Environmental Management

Developing Reinforced Sustainable Polymers for 3D Printing

Dr. Daniel Thomas CEnv CEng CSci FBCS MIED

The current significant problem with conventional 3D printing polymers is that they traditionally are made from unsustainable, toxic and difficult to recycle materials. This includes; ABS, polycarbonate, HIPS and Epoxy-based polymers. These filaments are also not very strong and fail prematurely in a range of simple applications.

The benefits of 3D Printing technology is that it is an additive manufacturing process that has a 60% reduction in waste over traditional subtractive manufacturing processes, such as milling, cutting and turning. As a result, there is a significant need for developing a range of polymers that are both strong and sustainable.

Our research has recently developed an advanced 3D Printer filament for high-end applications that is based upon a sustainable Polylactic Acid (PLA) matrix polymer. These filaments have been designed so that they can be printed on any conventional FDM 3D Printing machine. These eco-friendly biodegradable materials are an alternative to traditional thermoplastics, which also usually contain a number of environmentally damaging synthetics.

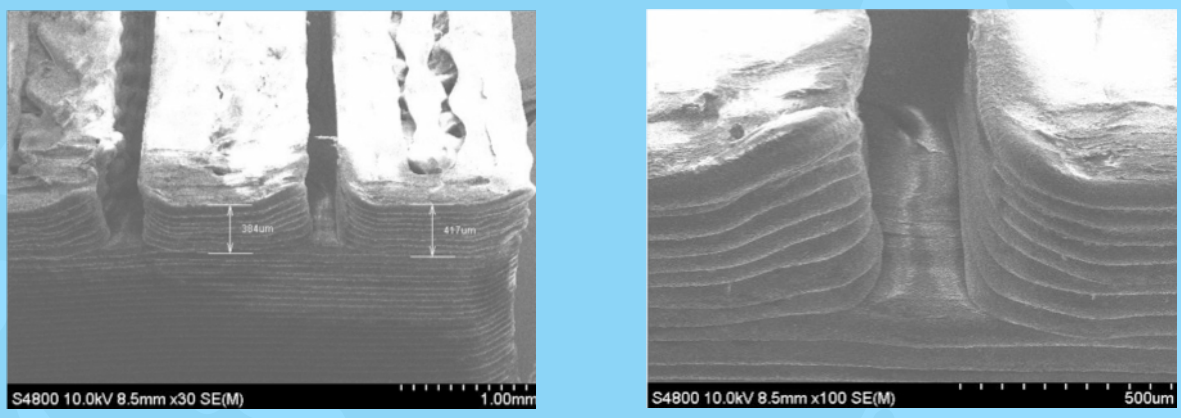


Figure: Showing micrographs of the different 3D Printed layers of sustainable plastic

We sourced recycled short carbon fibres from the automotive sector and added them to the polymer during its manufacturing phase. This produced structural reinforcement of 90MPa and a good layer adhesion with virtually no warping. Due to the 22% carbon microfibers in the filament, it has increased rigidity, therefore has increased structural support built right in. 3D Print temperature is standard: 200°C - 225°C and no heated bed is required, which reduced electricity consumption. The adhesion properties are excellent and under mechanical testing the polymer will fracture rather than delaminate.

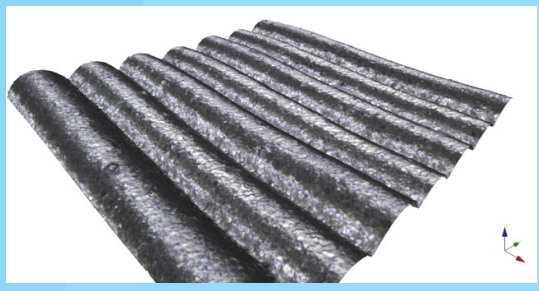


Figure. Showing the layer properties of the reinforced polymer after 3D printing

During the 2015 RHS Chelsea Flower Show, we worked with the British Ecological Society (BES) to design and fabricate a series of 3D printed models of the root systems of plants, which were displayed extensively during the event. I was employed to produce the 3D printed models of the root systems from plants images and concept designs. These were made from plant-based materials and were small enough for the show visitors to handle.

Figure: Design of a 3D Printed root system, made from sustainable reinforced 3D printing polymers

The base polymer itself is made from fermented corn starch, which forms a lactic acid compound, this is subsequently polymerised at high temperatures. The bulk formulation is made by adding short recycled carbon fibres into the polymer when in its liquid phase. This batch is cured and then pelletized. Following this, the pellets are extruded, cooled in water, dried, accumulated and finally wound up and sectioned to form a 3D printing filament

We are currently working with the Forestry commission to find future uses of this material as a biodegradable protector for young trees in forestry plantations. Further exciting uses also include the 3D printing full sized components for the aerospace sector including wing ribs and high strength and low weight applications.

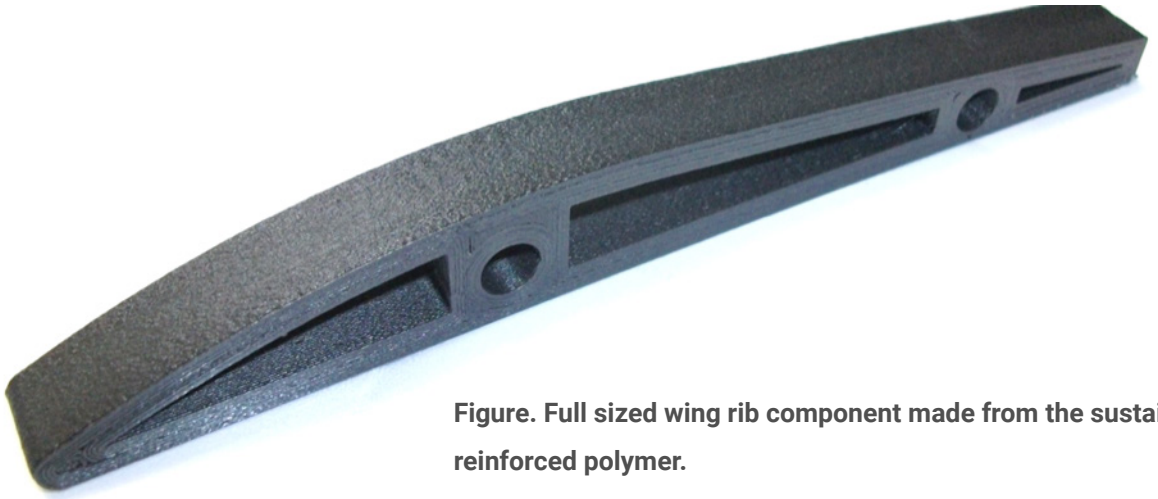


Figure. Full sized wing rib component made from the sustainable reinforced polymer.

The Industrial Strategy commits to setting up a 'regenerative circular economy', improving productivity by using resources more efficiently and regenerating natural capital.

The work completed by Dr Thomas in developing reinforced sustainable polymers for 3D printing covers all of these aims. The use of additive manufacturing in product design and development is, in itself, a minimal resource use, as the process enables designers to produce one-off prototypes and finished products without the need for mass production and tooling. However, many materials used in the process are fragile and can be toxic.

Dr Thomas' developments of biodegradable materials for use in 3D printing which incorporate recycled elements and are more robust and therefore have a longer in-use life means that additive manufacturing is moving towards being ever more sustainable.

Designers around the world make decisions every day which have huge impact on the environment – whether deciding on materials selection, manufacturing process or design for disassembly at the end of life, designers have responsibility for some of the biggest environmental decisions to be made within an organisation. It is in view of this that the Institution of Engineering Designers became a licensed body of the Society for the Environment and can award the tile of 'Chartered Environmentalist' to our suitably qualified and experienced members. Our CEnv members work in a wide range of industries, whether designing bridges, mobile communication devices or ships, their work is vital to the future of both the UK economy and the planet and their professional CEnv registration shows that the needs of the two can be balanced.

Libby Meyrick

CEO, Institution of Engineering Designers

Bio Mediated Infrastructures Using Local Waste as Resource: It's Local and Sustainable!

Dr Abhishek Tiwary CEnv MIEnvSc

Dr Tiwary, a Senior Lecturer in the Faculty of Engineering and Environment at Northumbria University has undertaken some pioneering work on integrating increased level of local waste residue in developing 'bio-mediated infrastructure'. This stems from his Marie Curie Fellowship project 'Bioenergy Technology Assessment – Environmental Burden Minimisation, BETA-EBM)' in 2014, which allowed him to collaborate closely with the scientists in the Energy and Environment Technology Development at the Energy and Resources Institute (TERI, India) and the Centre for Restoration Ecology in the Department of Science and Engineering for Sustainable Innovation at Soka University (Japan).

The initial research focused on developing environmentally savvy waste-to-resource technology operation on biomass (both solid and wet components), beyond its longstanding role in waste volume reductions and energy recovery to utilising the residual waste in developing 'fossil-free bio mediated built infrastructures'. Specifically, this has been long time overdue towards ensuring a sustainable pathway for fostering environmental best practice in utilising biowaste from Anaerobic Digestion (AD) technology, and is deemed to be useful to both AD operators commercially and to the community at large. AD is known for generating large volumes of process waste called 'digestate' (for example, typical digestate represents 70–95% of the feedstock volume). With greater emphasis on strategies for diverting biowastes from landfill and their sustainable re-utilisation through valorisation in AD, the volumes of digestate are expected to increase rapidly over the coming years.

Study outcomes from experimental and simulation work conducted so far have potential to offer a win-win for both bioenergy production and environmental burden minimisation for the process residue. The results arising from this work have paved scope for forward-looking and multidisciplinary applications, drawing interests from the following two broad categories of stakeholders – i.) Sustainability science (primarily researchers involved in urban waste management, renewable bio energy and environmental management); ii.) Socio-economic transition (including government bodies/planners and civil societies/community groups involved in developing local infrastructure and self-sufficient local communities through promotion of waste- and energy-grid independence).

The underpinning motivation for Dr Tiwary to pursue the science of bio-mediation has been to offer long-term solution to a range of intertwined environmental issues, including: Excessive depletion of abiotic material resources; Changing climate; Shifting energy practice; Engineering sustainability. Over the years, a number of policy measures have been launched, largely at the EU level, to boost the concept of bio-based products. Some of the recent entries include the EU agenda on: Circular Economy Action Plan, Green Action Plan for SMEs, Bio-based industries - more sustainable use of renewable resources, and Nature-based solutions. The circular economy package, adopted by the Commission on 2 December 2015, has created an important momentum to support the transition towards a more circular economy in the EU. This package included legislative proposals on waste, with long-term targets to reduce landfilling and increase recycling and reuse. However, within the shadows of these large strategic measures there is still a need for specific policy focus to translate some of the emerging science into practice, specifically towards supporting the value chain and facilitating the standardisation of the products to make them fit for purpose for a potential roll out in commercial infrastructure development.

Biomediation of infrastructure products

Research capacity developed so far:

- Mechanical performance - stability, sorption processability, thermal/mechanical properties
- Environmental performance.

Figure. Experimental and analytical set up.

Figure. Gas-bubbling system monitoring toxic emissions.

Example infrastructure products

- Suitable in turfing, drainage lining and general purpose landscaping

The institution of
environmental sciences

Clean growth has been identified by the Government as one of four 'Grand Challenges' which it believes, if addressed, will "put the UK at the forefront of the industries of the future", improve people's lives and enhance the UK's productivity. This mission sits at the heart of the Industrial Strategy, and has been further elaborated in its sister document, the Clean Growth Strategy.

Often it is assumed that clean growth simply means renewable energy: wind turbines and solar panels. In reality there are opportunities to promote clean growth across our economy. One of the biggest such opportunities lies making our economy more resource efficient, or circular (keeping resources in use for as long as possible, extracting maximum value, before recovering and regenerating products and materials at the end of each service life). A major factor in increasing resource efficiency is 'designing out' waste, through technological developments and system innovation. Dr Tiwary's work is at the cutting edge of research and development in this area.

His case study explains how, as we seek to divert biowastes from landfill, increasingly this is being utilised as feedstock in Anaerobic Digestion, an important waste-to-energy technology. However, this process generates large quantities of process waste (digestate). By developing practical uses for this residual waste, Dr Tiwary is helping to turn a challenge into an opportunity. Turning this digestate into bio-based infrastructure products not only reduces the waste burden of the Anaerobic Digestion process, but could also decrease the required resource inputs for development projects.

As such, this project links with multiple pillars of the Government's Industrial Strategy: it is rooted in science and innovation, with potential for commercialisation and job creation, it could directly inform future infrastructure developments, and directly relates to the clean growth mission. Dr Tiwary's technical expertise has been key, but also his inter-disciplinary approach. The ability to think critically and holistically about economic and environmental systems is a strength of sustainability scientists like Dr Tiwary, and their expertise will be vital in realising many of the goals of the Industrial Strategy.

Robert Ashcroft, Policy & Communities Officer, Institution of Environmental Sciences

Accelerating the Adoption of Sustainable Manufacturing Innovations

Robert Walker CEnv MCIWM

The Centre of Excellence for Sustainable Advanced Manufacturing (CESAM) will be a hub for world class manufacturing innovation and knowledge transfer, where businesses with productivity challenges collaborate with solution providers and researchers to develop new ways to improve their competitiveness and both economic and environmental sustainability.

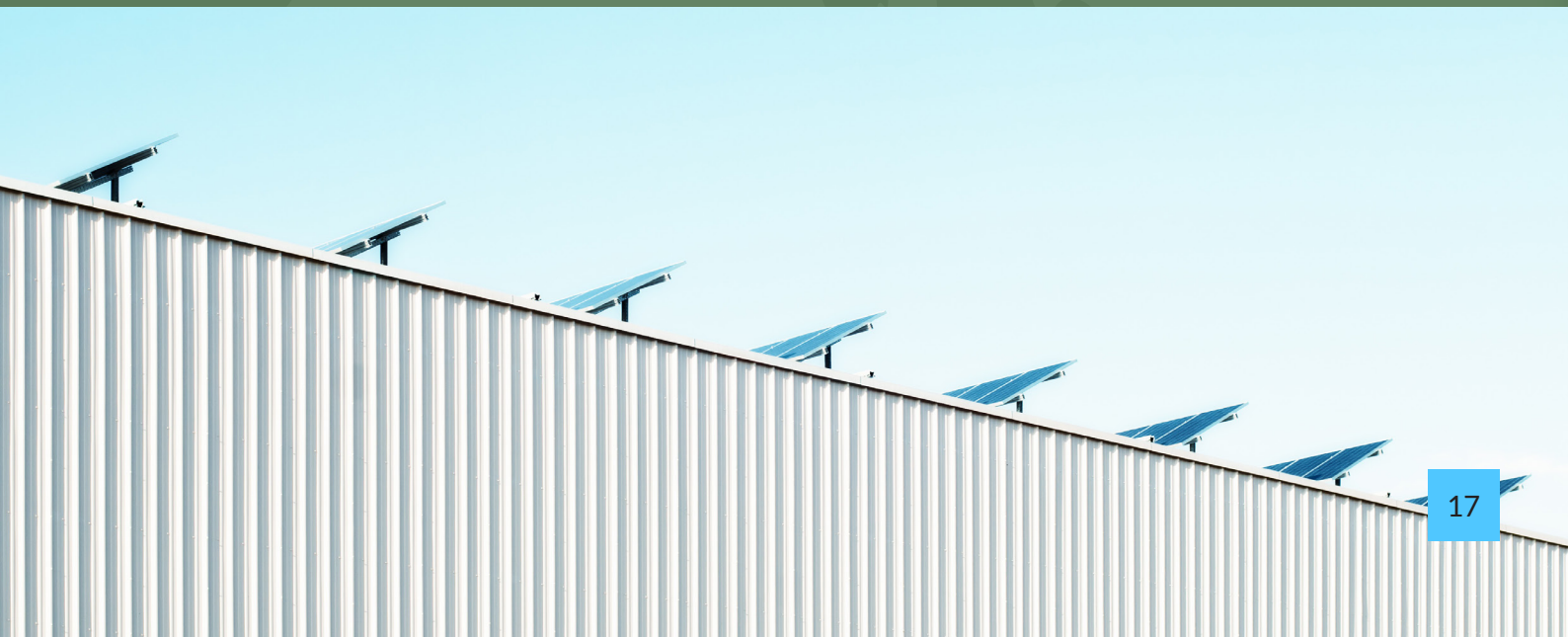
Uniquely, CESAM will accelerate the adoption of manufacturing innovations by demonstrating and proving them to industry standards on a realistic moving production line. There is no similar facility in the UK.

CESAM is being developed by the University of Sunderland, the North East Automotive Alliance and other partners on the 100 hectare International Advanced Manufacturing Park (IAMP) in Sunderland. CESAM has the support of key business and public sector organisations, including major OEMs like Nissan, Komatsu and their supply chains; North East LEP, Sunderland and South Tyneside Councils; and the High Value Manufacturing Catapult and Digital Catapult. CESAM is highlighted in the North East LEP's Strategic Economic Plan as a transformational initiative that will deliver a critical component of plans to create 'more and better jobs' through growth in smart and sustainable advanced manufacturing. It is also part of the Northern Powerhouse Routemap for Productivity and the Made Smarter Review of Industrial Digitalisation.

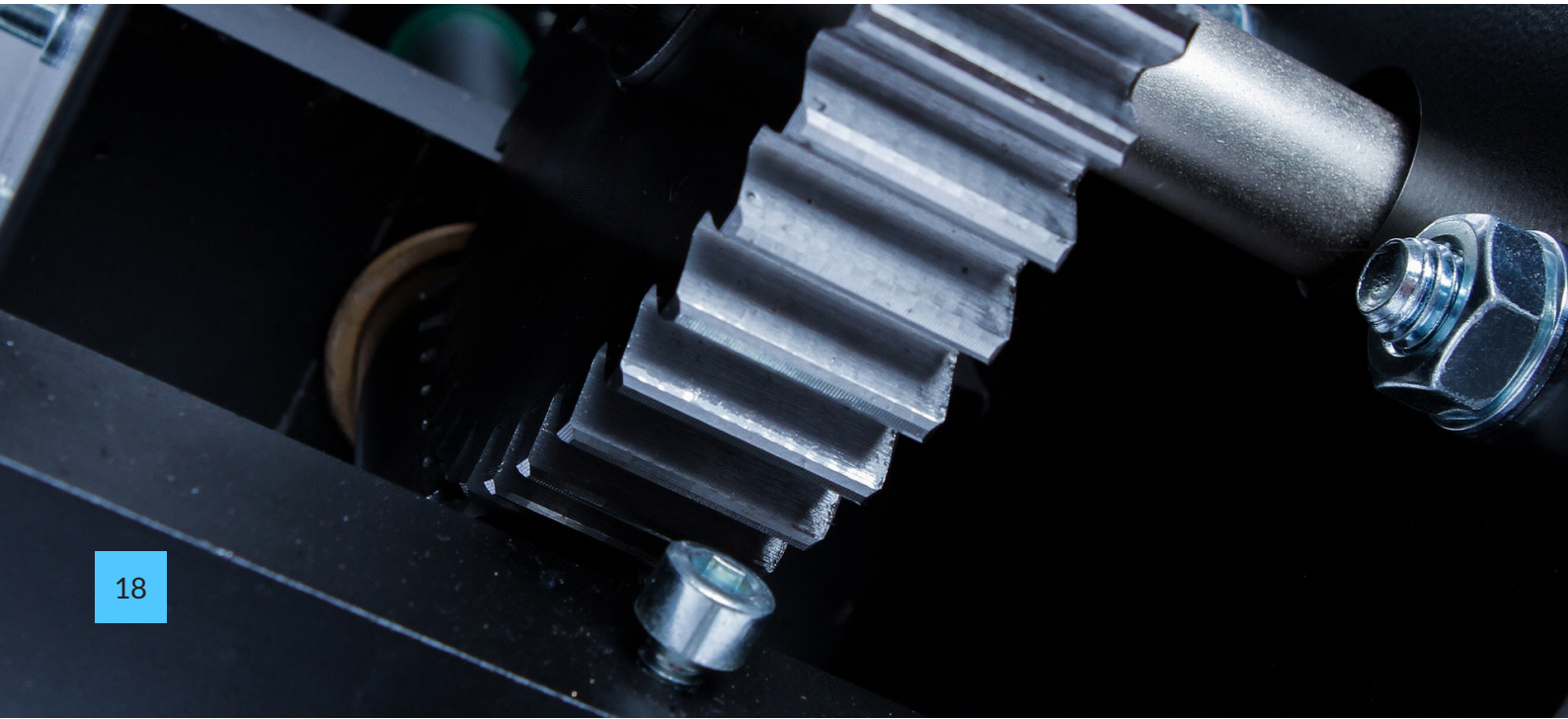
CESAM will initially work with manufacturers on projects aimed at doubling the UK content in the North East automotive sector. This represents an additional £3bn per annum to the economy by 2021. Without CESAM, the North East lacks the innovation support required to address challenges and opportunities arising from the cost, quality and performance targets set by manufacturers expanding production in the region; Brexit; and the rapid pace of technological change. Despite manufacturing 1/3rd of cars produced in the UK, the North East is responsible for less than 1% of research undertaken by the automotive industry. In the medium term, support will extend to other key advanced manufacturing sectors.

A pilot project has already begun with SME's in the region on Sustainable Advanced Manufacturing and is showing encouraging levels of engagement and scope for improvement.

Some of the themes identified by the Manufacturing Innovation Group of the NEAA and their links to both economic and environmental sustainability:



Innovation theme	Environmental benefit	Economic benefit
Automated inspection: spot defects at source/ early in assembly process so they are not duplicated and not built into full vehicles that have to be scrapped	Less defects = less wastage of resources	Improves 'right first time' production, less rework/ scrap = improved cost, quality, schedule reliability
Parts picking automation: isolates non-value added activity from production (picking parts adds no value/parts to the car)	Limited environmental impact, but more automation = enables staff redeployment to higher skilled roles	More automation = better productivity, global competitiveness & economic sustainability
Collaborative robots: inherently safe automation systems to work alongside human operators	Inherently safe = less space, and fewer resources for safety fences/ guarding	Less space & resources = less cost and better productivity, more flexibility to adapt to new tasks with less investment
Electric & automated parts delivery eg auto guided vehicles for parts delivery from one part of factory to another	Zero emission at point of use (and eliminate logistics emissions for fuel delivery/ handling), removes weight of driver (~84kg average)	Eliminate cost of fuels logistics and driver (redeploy to higher skilled role)
Simulation eg Witness/virtual reality to optimise process designs before installation	Avoid installing equipment with design faults = avoid wasting materials	Avoid faults = avoid wasting time, money and earlier, more reliable launch
Data analytics & visualisation eg condition based maintenance/ monitoring to enable replacement of equipment/ consumables only when failure is imminent or performance deteriorates (rather than on an cautious schedule)	Avoid replacing equipment before necessary = save resources	Avoid replacing equipment before necessary = less cost



Pat Jennings

Head of Policy & Communications, CIWM

Sustainable economic growth is not just about labour productivity; the availability and use of resources – raw materials, water, energy, land use – will also be critical to UK industrial competitiveness and resilience.

Back in 2012, the Government's Resource Security Action Plan noted that growing competition for resources was already having an impact on UK businesses, with 29% of profit warnings issued by FTSE350 companies in 2011 attributed to rising resource prices. Add in other risks, such as significantly increased price volatility in some commodity markets, the recent escalation of trade tensions around the globe, and the potential impact of Brexit on the availability or price of material resources needed by the UK economy, and it is not hard to see why CIWM and others have been striving to get the resource productivity message across to government.

The ambition expressed in the Industrial Strategy White Paper to double resource productivity by 2050, alongside other ambitions on zero avoidable waste expressed in the Clean Growth Strategy and Defra's 25-year Environment Plan are, therefore, welcome and will help to put this imperative at the heart of the UK economy in the future.

Ambition isn't enough, however; improving resource productivity means very different things in different industries. It requires innovation across the board, from new manufacturing technologies, logistics solutions and procurement frameworks through to the development of novel materials and the provision and uptake of high quality secondary materials to promote circular economic business models.

Developing a framework to support better resource productivity therefore requires action on a number fronts. The £4.7 billion Industrial Strategy Challenge Fund for research and development has the potential to be an important financial support framework but we must also recognise that there is significant existing expertise out there that can be captured and exploited. The work of the Centre of Excellence for Sustainable Advanced Manufacturing (CESAM), highlighted in this case study, is an excellent example of the potential for world leading collaborative problem solving and knowledge sharing. It is also highlights the points CIWM made in its original response to BEIS' Industrial Strategy Green Paper – that driving change is about people, local economic development opportunities, skills and practical knowledge sharing networks. And that is why the UK's Chartered Environmentalists and Chartered Waste Managers, with SocEnv and CIWM standing behind them, have so much to offer as we work collectively to shape a new resource productive future.

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CONTRIBUTING CONSTITUENT BODIES

CIWM

CIEEM Chartered Institute of Ecology and Environmental Management

Institute of Water

iED support inspire achieve

The institution of environmental sciences