

VISIONS OF A
Sustainable
FUTURE

Introduction

Prof. Frances Bowen, Pro-Vice-Chancellor for Social Sciences



Prof. Fiona Lettice, Pro-Vice-Chancellor for Research & Innovation



Visions of a Sustainable Future highlights UEA research and partners' viewpoints on the future of sustainability. These leading sustainability thinkers suggest that organisations need a clear purpose and strong environmental and social values. Another key theme is to have sustainable buildings, which embody a careful choice of materials and innovative building methods. A better use of resources is a thread that runs through the viewpoints here - giving consumers timely and well-presented information to help them make better informed decisions and to act more responsibly. To achieve a more sustainable future, we need political will, we need emission reduction targets and savings at city as well as individual level, we need energy efficiency and the use of alternative energy sources, we need new strategies around our use of water and our attitudes to air and sea pollution and we need to make environmentally-ethical investments in businesses. All of these points are discussed more fully here.

As well as organisations within the East of England region taking a lead on these issues, UEA and the Norwich Research Park have a long history of world-leading research on sustainability. This publication showcases some of our leading researchers' contributions on how we need to rethink and reimagine the future of sustainability, alongside the ethos, vision and ambition of organisations across a range of sectors. It is time for collective, globally inclusive action and disruptive innovation if humans are to thrive and achieve long term environmental and social sustainability. We plan to play a key role in driving sustainable growth, bringing together key players in the research, education, business and policy fields to take a multidisciplinary perspective to the transformational changes needed to address the key challenges ahead to ensure a vital and sustainable future for all.

www.uea.ac.uk/research

Designed by TMS Media.

Photography by David Kirkham and Kieron Tovell.

Printed by Healeys Printers on Revive 100 Uncoated paper, which is manufactured from FSC® Recycled 100% post-consumer waste, using Saphira BIO inks formulated from sustainable raw materials.



Contents

01	Becoming a sustainable company has been a win-win Dr. Andy Wood, Adnams	p. 4
02	Sustainable Development Goals: the road ahead for business Prof. Konstantinos Chalvatzis & Dr. Gaia Melloni, Norwich Business School, UEA	p. 6
03	Political will is needed to meet the UN's goals Dominic Allen, Norfolk County Council	p. 8
04	Fifty shades of green: the world of sustainable investment Radostina Dencheva, Chadwicks	p. 10
05	Expressing a preference for sustainability in a marketised world Dr. Mike Brock & Prof. Theodore L Turocy, School of Economics, UEA	p. 12
06	Better information will help cut carbon emissions Hannah Wooller, Hudson Architects	p. 14
07	Making energy-efficiency in our homes a 'no-brainer' Paul Bourgeois, Cambridgeshire & Peterborough Combined Authority	p. 16
08	Disrupting consumerism by design Dr. Nigel Hargreaves, Synfo Ltd	p. 18
09	Environmental sustainability is about wellbeing and responsibility Dr. Teresa Belton, School of Education and Lifelong Learning, UEA	p. 20
10	Cities hold the key to meeting our carbon reduction targets Jono Adams, Anthesis	p. 22
11	Norwich can lead the world with centre for sustainable change Asher Minns, Tyndall Centre for Climate Change Research, UEA	p. 24
12	War on plastic has shown the power of a tipping point Dr. Vittoria Danino, The Anglian Centre for Water Studies	p. 26
13	A geographical perspective on sustainability Prof. Andrew Lovett, School of Environmental Sciences, UEA	p. 28
14	Sustainable development needs to be globally inclusive Prof. Arjan Verschoor, School of International Development, UEA	p. 30
15	Making sustainability social Science, Society and Sustainability (3S) Research Group, School of Environmental Sciences, UEA	p. 32
	United Nations Sustainable Development Goals	p. 34

Becoming a sustainable company has been a win-win

“When you behave in a sustainable way, the multiplier effect of that can be quite profound”

Adnams is all about doing business in the right way and attempting to gain a competitive advantage from that. This goes back more than a decade to the organisation defining its purpose, but also a set of social and environmental values which it wanted to abide by. In doing that, the company showed it took sustainability seriously and wanted to bring these things to life, firstly for our staff, secondly for our shareholders and thirdly for our customers. And that approach has helped put Adnams on the map.

It coincided with a phase of investment which included a brand new and incredibly innovative distribution centre. We acquired a disused gravel pit at Reydon, on the outskirts of Southwold, and set about making it sustainable in every possible way. It was the first commercial building in the UK to use lime hemp construction. The construction was sunk into the ground with a roof carpeted in grass. Instead of steel roof beams, glulam (glued and laminated wood) beams were used to support the roof. They are strong yet lighter than steel and come from renewable, sustainable forests, and look pretty good too. The building, which opened in 2006, captures rainwater, filters it through reed beds and then back again to water our own roof and flush the loos. It is a ground-breaking building and it still works really efficiently today. It remains a massive statement to the outside world and to our staff.

The next phase was to renew the brewery itself. We had this big piece of land and we could have uplifted the brewery and put it out of town and had a very efficient business. However, we felt it was important to keep the heart of Southwold intact by maintaining a working business here. So, when the visitors have gone, the cake shops and cafés remain open and you still have those salaries going into the local economy.

From an environmental perspective, it captures steam and we have managed to more than halve the amount of water which goes into a pint of beer. On average the water-use ratio for a pint of beer is about 9:1. We have got that down to 3:1. Although it is fair to say the rest of the industry is working on this too.

In doing these things it was about being clear on what we wanted to achieve. Some of them cost more money, but the payback has been fantastic. Not only has it been more efficient but when we started talking about what we were doing, we had supermarket chains and pub retailers beating a path to our door. We were suddenly having different conversations with these powerful retailers as we moved into that environmental best practice space. It's been a win-win-win – a win for the industry, a commercial win for us and a win for the environment.

Being able to measure the environmental impact of what you do is critical, and we have tested the carbon footprint of each of our bottled beers. We have been able to do that analysis because we know the output from our plant and buildings very accurately. CO₂ is a proxy for waste, it is energy being wasted so there are cost savings to be gained.

That is part of the role Adnams can play. It can be innovative and help take the industry in a certain direction. We light-weighted our bottle many years back, so we could reduce the amount of glass used, which is a very environmentally intensive process. Other brewers have followed our example, including AB InBev, which is responsible for three in every ten pints of beer consumed worldwide. So, it shows that when you behave in a sustainable way, the multiplier effect of that can be quite profound.

01





Sustainable Development Goals: the road ahead for business

It is already more than three years since the Sustainable Development Goals (SDGs) were adopted by the United Nations and a new, somewhat surprising, role is emerging for them. But what are the SDGs?

In a departure from the previously celebrated Millennium Development Goals (MDGs) the UN adopted the 17 SDGs before the end of 2015 to continue and deepen the development agenda. However, to consider the SDGs as a mere continuation of MDGs would not do them justice. We have entered a new era where development goals are for developing and developed countries alike and – for the first time – businesses are key stakeholders. Indeed, several companies have been quick to incorporate the SDGs into their sustainability reports. With business and management research on the SDGs only beginning to emerge, we developed reporting indicators that capture reporting awareness, reporting quality and even industry-specific goal suitability. Using advanced textual analysis and big-data analytics, we built the most comprehensive dataset to date with detailed manifestations of SDGs in corporate reporting for the period 2015-2017, including 4,200 firm-year observations of 2,524 firms from 59 countries. But why are the SDGs relevant for businesses?

By design, SDGs are business-ready. The increase of 17 SDGs from 8 MDGs means that they are explicit enough to cover in detail issues of the environmental, social and economic development agendas. A range of business stakeholders were consulted before their launch which led to numerous refined indices that help monitor, evaluate and reflect on progress for each goal. The power of the SDGs for corporate engagement lies in their diversity, spanning resources management, poverty alleviation, health and life quality, environmental protection, improved governance and societal justice. No matter the industrial focus on materials, manufacturing or services there are goals and specific indices for companies to report, showcase their performance and even compete on.

“The power of the Sustainable Development Goals for corporate engagement lies in their diversity”

Not all goals and indices are of relevance to all companies, but all companies can find indices that matter to them and their stakeholders. Speaking directly to businesses, SDG 12.6 calls for integration of sustainability performance information in standard reporting cycles. Adjacent to that is the flexibility of the SDGs in relation to a global sustainability agenda, no longer splitting the world into developing and developed countries. Without a doubt, there are country-level specificities and our research looks into those in relation to parameters reflecting resource endowments, climate sensitivity, financial exposure and even cultural traits such as long-term orientation, individualism and masculinity. Even for multi-national corporations with complex, international operations and supply chains, SDGs provide a reporting platform that delivers variety and balance.

It might still be too early to tell whether SDGs will complement or completely replace corporate sustainability reporting with schemes as popular as the Global Reporting Initiative, Carbon Disclosure Project, Sustainability Accounting Standards Board and Integrated Reporting. Nevertheless, they do provide a new framework to report on sustainability challenges and our research provides insights in how cutting-edge companies have been quickly catching up. Now is the time for all companies to think how they contribute to the advancement of the Sustainable Development Goals.

This research was also supported by Dr. Effie Symitsi, formerly a UEA PhD student and now a Lecturer at Leeds University Business School.

Political will is needed to meet the UN's goals

“The million-dollar question is – have we really moved forward with this agenda?”

Sustainable development. It is a term we all know well and one that was defined in a 1987 United Nations report as development that ‘meets the needs of the present without compromising the ability of future generations to meet to their own needs’. The document came in at a hefty 300 pages and did a good job of slicing up the world and recasting it through a sustainability lens. Much of it is still relevant and could be lifted into a report today. The million-dollar question is – have we really moved forward with this agenda?

You can trace this debate right back to the green revolution of the 1960s and much has happened to create a more sustainable world. There was the Rio Earth Summit in 1992 which came up with a set of principles intended to guide countries in future sustainable development and was signed by 170 countries. Out of it came the creation of roles like my own at Norfolk County Council.

In 2000, the UN launched eight pithy Millennium Development Goals which put a commendable focus on the eradication of poverty, education, gender inequality and child mortality. Critics, however, saw them as too narrow and said they weren't developed with some of the countries they were designed to help. It was argued by some, that achievements were more to do with the waiving of debt, aid programmes and the responses to natural disasters, than any fundamental changes on the ground.

So, with that and other accusations ringing in the ears of the UN, they were replaced by 17 Sustainable Development Goals. A staggering 83 national surveys were carried out over three years, making it the largest consultation in UN history. Of course, some say these are too broad and numerous to achieve anything and it goes without saying that there can be no perfect solutions to such complex global issues. And while it is better to have a set of goals to concentrate the minds of governments than none at all, will they fundamentally influence the root causes?

Take the headline goal of ending poverty in all its forms, everywhere. Extreme poverty is defined as having to subsist on less than \$1.90 a day, but the latest figures suggest this is a reality for 783 million people (11 percent). You can fiddle until Rome burns, but there is clearly still a significant chunk of the world's population barely getting by. Yes, we have put a dent in extreme poverty since 2000, but progress is patchy, and many countries remain blighted by it. Levels of hunger are on the rise, and while many of us complain about our Wi-Fi, many people around the world aspire to clean water and enough food.

The fact we are having the discussions around these and other issues every decade or so, with limited success, shows there is still much to be done. The UN continues to play a key role, championing this discussion and pricking the consciences of governments, businesses and others. Ultimately, however, whatever sustainable development goals are set will only be achieved where there is the desire to bring about change, with governments leading the way. That message is underlined in the UN's report back in 1987 entitled ‘Our Common Future’. The closing section of the sustainable development section concluded: “Thus, in the final analysis, sustainable development must rest on political will.” I couldn't agree more.





Fifty shades of green: the world of sustainable investment

“Socially responsible investing
has been a real success story”

If investing in a sustainable way was once the philanthropic preserve of the super wealthy, it sure isn't now. Ordinary people weighing up where to put their personal life savings can choose to do so in a way that will have a positive impact on the world they live in and will eventually bequeath to future generations. Where once they might have been put off by the higher cost and risk associated with environmentally-ethical investments, they can now be free of such considerations when going 'green', making it a much easier decision.

Socially responsible investing has been a real success story in recent years, with ethical funds assets skyrocketing from around \$50 billion in 2005 to more than \$220 billion in 2016, according to Bloomberg figures. Millennial investors are the most concerned about the social and environmental impact of their investments and the increasing influence of these demographics is driving more corporate focus on sustainability.

There can, however, be significant barriers which prevent many investors from arriving at this point: inertia, the hectic pace of modern life, even cynicism about the good that investing money in a sustainable company will actually do, or whether its sustainable credentials bear scrutiny. Green investing can be a decidedly grey area, with certain countries keen to clean up their reputations as sustainability soars up the agenda. In 2017, China was the largest emitter of greenhouse gas and the largest investor in renewable energy – nearly half of the world's new renewable energy investment. Saudi Arabia is reportedly starting up \$7 billion of renewable energy projects this year, with solar plants leading the way.

My proposal would be for a sustainable investment project based here at UEA. The University has a very strong behavioural economics department which has access to a wealth of data. And, as students are going to be the generation which will have the most impact on the sustainability over the next 10 or 20 years, such an initiative would present the perfect opportunity to find out what drives and would change their behaviour.

Younger investors are more conscious of sustainability than previous generations. They are used to having to research things online and make comparisons before they spend their money. This is also a generation that has grown up with climate change. But for most of our clients, how they decide whether or not to invest in sustainable investments is similar to how people decide whether to buy sustainable products from the supermarket or just adopt more sustainable behaviour in general, i.e. by considering convenience and cost.

One of the reasons many of us don't move towards more sustainable investing is we think it will involve hours of research into the available options. What we need to do is make sure that when people come to make investment decisions, the information they need is available up front. This means we have to promote where that information can be obtained and then present it in a way that takes all the hard work away from the investor and makes it easy to understand the benefits, using social media, apps, websites and events, whatever it takes.

As financial advisors, we also need to inject this attitude shift into our client relationships. If they are investing for their children and the future, it is about asking them, 'What do you want the future to look like?' and reassuring them there is a tangible benefit and that they can play their part.

Expressing a preference for sustainability in a marketised world

Are markets an enemy or an ally in realising a sustainable society? When the two of us, as economists, introduce the analysis of markets to our students, we often emphasise the potential power of markets to organise enormous amounts of information. Markets can, in principle, distil data on the tastes and attitudes of large numbers of people, alongside constraints in resources and technology, into prices. These prices give individuals the information they need, alongside their own tastes and attitudes, to make informed decisions.

The outcomes arising from markets, then, are expressions of people's tastes and attitudes. In practice, we often see markets select outcomes which are not attractive from a standpoint of sustainability. Many of us find this discomfiting. After all, most people, when asked, express at least some concern for the welfare of future generations. The discrepancy between such statements and market outcomes is a cause for reflection.

We make the provocative suggestion to use the market as a mirror. When we look into this mirror, we find that our decisions don't line up with our stated preferences for sustainability in the longer term. Although market approaches are not the right solution for every problem, the market-as-mirror metaphor is a powerful diagnostic, which argues that success in realising a sustainable society ultimately will require two ingredients. First, people must value sustainable characteristics in their tastes and attitudes; sustainability is itself only sustainable if people freely and genuinely value the long term. Second, people must have a way to act on those tastes and attitudes in all the decisions they make.

A sign that these ingredients are essential is the rapid growth in recent years of product labelling advertising the pro-sustainability features of products. The sustainable sourcing or environmentally-friendly lifecycle of a product usually does not affect one's personal experience of the product. The reason for promoting these characteristics of the production process is presumably because these characteristics will be valued per se by the people who will choose them. Giving this contextual information to people about a good's production can help create the pathway to allow people to express their tastes and attitudes in their choices.

Having more information when making a choice, and more options to choose from, seems like a clear win. However, as behavioural economists, we must point out that a body of research findings raise a caveat to the idea that information will be a cure-all. Although in many cases more options are better, researchers have identified situations in which choice overload sets in. This relates to situations where having more options decreases our satisfaction with the outcomes of a choice we make. Understanding when choice overload sets in is an active area of research, especially at the Centre for Behavioural and Experimental Social Science and the Network for Integrated Behavioural Science at UEA. There is evidence that the type of thinking required to make decisions plays a role: the more a person needs to reason consciously about a decision, the more likely choice overload will emerge. For example, many of us delight in checking out the latest features on a variety of smartphones (an intuitive decision), but balk at thinking about selecting from an array of possible provider contracts (a consciously calculated one).

Likewise, although humans are fabulous at processing information – think of all the data coming into your senses as you read this piece – our ability to take in and react to some kinds of information is limited. Labelling of product characteristics inherently requires our conscious thought. We are limited in the rate at which we can take in this kind of information, and we therefore naturally prioritise information which is easily digested, novel or unexpected. Overly complex labels are mostly ignored, and familiar ones can lose their salience over time.

This frames the challenge that we and our behavioural social science colleagues at UEA are interested in. A sustainable society ultimately must be the expression of the values of society's members. Well-designed markets are a powerful ally in enabling this, when members are well-informed and empowered to influence sustainability through their own choices. The design challenge is to provide information and options structured in a way that play to our natural strengths in information gathering and processing. We and our colleagues at UEA hope to be part of meeting this challenge by combining our research with practitioner expertise.

“A sustainable society ultimately must be the expression of the values of society’s members”





Better information will help cut carbon emissions

“You need to be informed to make responsible decisions about your consumption”

I try and make responsible choices, both as an individual and particularly in my professional role as an architect. The materials we use, construction methods and the ongoing energy consumption of buildings have lasting environmental consequences, as well as human ones. Consider the deadly Grenfell Tower fire or the collapse of the Morandi Bridge in the Italian city of Genoa.

As a responsible consumer, you need to be informed to make responsible decisions about your consumption. However, it is hard to know the wider impact or hidden implications of those decisions. Sourcing materials in a global economy has sociological and ecological implications and yet there is little accessible information about the way the raw materials we use are accessed, processed and manufactured. And, outside of work, if you are time-poor and working hard, as so many people are, it's especially hard to do things like buy items with less packaging or shop locally. So, for many of us, time and a lack of information is against us.

In the world of construction, the environmental impact of the materials we use can be shocking. Global process emissions for cement in 2016 were found to have been equivalent to about four percent of all emissions from fossil fuels and sixty-six percent of these have occurred since 1990. This means cement alone accounts for the same levels of carbon as air travel.

We work to an understanding that the bulk of a building's environmental impact isn't in the embodied carbon, but its ongoing energy usage. Buildings in the UK account for nearly half of our carbon emissions. With around twenty six percent attributed to our homes and seventeen percent to non-domestic buildings, our focus is on encouraging the whole sector to manage their energy more efficiently. To meet legally binding targets, we need to cut greenhouse gas emissions by at least eighty percent from 1990 levels by 2050.

To achieve the required improvements in the way the building fabric works, we rely on performance information supplied by the manufacturer when specifying modern composite construction materials. We know these materials have been tested over relatively short timescales and have limited guaranteed life spans. So, if you have something that performs less well but lasts infinitely longer, like traditional construction materials, at what point does one function outweigh the other? We are designing a low-carbon future, but are we unwittingly building in future embedded carbon requirements through redundancy and replacement?

The Building Regulations and voluntary accreditation schemes which we work to are designed to help the client and their team make responsible choices. Both CIRIA (Construction Industry Research and Information Association) and BRE (Building Research Establishment) have information available on the environmental impact of materials applied through assessment methods, such as BREEAM, AECB and Passivhaus. These schemes are now being widely applied by local authorities and have started to impact the quality of information and accountability. However, I would like to see more independent sources of information on the full environmental and human impact of materials to allow architects to make informed decisions in projects outside these schemes.

As a professional, it would be good to have better signposting between the academic research that underpins the implications of the materials and the products we specify, so we can make responsible choices. And personally, I'd love some reliable rules of thumb which allow us to quickly evaluate the harm done by our consumption.

Making energy-efficiency in our homes a 'no-brainer'

It's odd to think that people will think nothing of spending £1,000 on a TV or paying £80 a month for a satellite TV package. Yet, despite our energy bills now outstripping what we fork out in council tax, we barely give a passing thought to the comparative cost of our energy supplies. So, the question we need to be asking is how can we convince people to prioritise and explore alternative ways of running everything from their shower to their car?

When I had solar panels installed on the roof of my house, two people in the same street did the same shortly after. They said they had been thinking about it and then after I talked to them about the benefits and costs, they followed suit because people buy on recommendation. The problem is we lead increasingly busy lives and not everyone has the time available or the motivation to, say, upgrade their aging gas boiler to a more sustainable source of heat energy such as a condensing model or even an air source heat pump. Certainly not until it packs up and we end up in a crisis are we forced to take action.

People over the age of 60 probably have more time and disposable income to take these kinds of decisions, but to achieve a more sustainable society we need to engage with the public as a whole. And as consumers, we need to be giving some thought to our energy supplies, especially as we are set for steady increases in our energy costs for the foreseeable future due to rising demand, transportation costs, wholesale prices and government legislation. The domestic sector is moving away from mains gas and towards electric forms of heating. But although sustainable energy has the potential to slow and even reverse the rise in gas prices, little will stop electricity prices going up for some time to come. On top of that, if your gas boiler is close to the end of its life, switching to electricity will require a whole new infrastructure system in your home and therefore may entail higher costs.

“As consumers, we need to be giving some thought to our energy supplies”

In terms of how we buy energy, we are moving from a commodity to a service-based system. People will want warmth in their homes and a fixed bill instead of an estimated or fluctuating one. Smart meters have proved quite popular. At the end of June 2018, about 12.5 million gas and electric smart meters had been installed and by 2020 everyone in England, Scotland and Wales will have been offered them. But I can't always see the point in something that uses electricity to tell me when I can save electricity. Why pay for a Nest thermostat which connects my heating system and then to my router and then to an app on my phone? Just because you can do something, doesn't always mean you should. The US Environmental Protection Agency found consumers could reduce energy usage by 10-30 percent using the schedules and temperature settings of programmable thermostats. Ultimately, however, the thermostat's energy-efficiency potential is more dependent on the owner than the technology.

So, what's the answer? Maybe we need to shock people into change by telling them that by 2022 there will be no gas for household use and the price of electricity will double. And they need to start thinking about it now if they want to keep their bills down. The best way of ensuring we deliver that message is probably a mainstream national campaign involving a range of organisations that people trust, and which is compelling and easy to grasp. In short, we need to make energy-efficiency a no-brainer for us all.





Disrupting consumerism by design

“Waste is both our nemesis and potentially our saviour”

I really dislike the label ‘consumer’. It’s a marketing triumph by the GDP growth mindset, which is behind the current economic race to the bottom in natural resource exploitation. Consumerism encourages us to ignore or abuse natural law by the way it promotes a ‘take, make, use and lose’ process. Consumers are valued by economists, but more stuff ends up in the sea or landfill. This use-once, throwaway culture regards built-in obsolescence, like takeaway coffee cups, as healthy for the economy. Advocates for the consumer label, have captured the imagination of Western, Educated, Industrialised, Rich and Democratic (WEIRD) countries to which emerging economies aspire today, and taken us beyond ecological tipping points.

But the truth of the matter is, we don’t consume stuff. We digest, transform, convert and downgrade it into other products, usually described as waste, heat and entropy. Waste is both our nemesis and potentially our saviour. It’s our nemesis if we continue to ignore it, as the environment becomes more polluted. Take the conversion of land-based resources that leads eventually to air and sea pollution as the most obvious impacts of such unsustainable consumption. If allowed to continue, economic growth based on consumerism becomes self-limiting by literally consuming the essential support we need from the ecosystem, making our environment unbearable to live in. We are already well on the way to such a place. This is not sustainable society.

But what if we disrupted the ‘take, make, use, lose’ chain? There are ways to do this, but they all require a design change in how we make and use things. Let’s start at the front end – the ‘taking’ and ‘making’ of things and processes. There’s much to be gained by observing how nature operates in the selection of resource and its conversion. The biosphere and what lives inside it have been carefully improving these practices for billions of years and they are laid out before us to imitate or adapt to our needs. *Biomimicry* 3.8 has been assembling a ‘Design Lens’ to help us understand a

bio-inspired approach to sustainability [1]. Emulation of principles, patterns and strategies found in nature are linked to the need to (re)connect what we do to the environment and be conscious of the ethos of our approach to taking and making.

We can design with the end in mind, so our products and packaging – when at the end of their design life or broken – can be utilised for other purposes and therefore displace the mining of new resources or disposing as waste. Processes such as work and mobility should also be considered this way. Implementing this concept more widely could help us get away from being consumers and realign ourselves as borrowers (with the biosphere as a resource library) or inventors for new uses of things. Nanotechnology, distributive systems and collaborative networks are all applicable here.

The concepts of re-use, recycle, repurpose, are all familiar to us, but would be easier to implement if we designed with them in mind. To disconnect the ‘use’ from the ‘lose’ links in the chain, we could join the end of one ‘use’ (using the three-Rs above as intermediaries) to the start of another ‘take’, such as by up-cycling, before we ‘take’ again. The promotion of such a circular economy is a hallmark of the Ellen MacArthur Foundation that hosts an annual Disruptive Innovation Festival [2]. We should also consider practices like mobility, food and health in the same way, say by running vehicles on renewable fuels. Ultimately, the way we design and consume must change if we are to move to a sustainable society.

This thought piece was inspired by Doughnut Economics [3] as a basis for a sustainable society utilising biomimical, circular, collaborative and distributive organisational design models.

[1] <https://biomimicry.net/the-buzz/resources/designlens-essential-elements>

[2] www.ellenmacarthurfoundation.org

[3] www.kateraworth.com/doughnut

Environmental sustainability is about wellbeing and responsibility; we urgently need new narratives

The language around sustainability is overwhelmingly technical and abstract: CO2 emissions, resource management, eco-system services, biodiversity loss, fossil fuels, renewables, carbon trading, Passivhaus standards, etc. Such terminology means little to most people, and clearly does not motivate the kind of actions necessary to safeguard the natural world on which we all depend. Instead, matters directly or indirectly involving material consumption in its innumerable forms continue to dominate popular discourse.

If we are to succeed in forging environmental sustainability, behaviour change is a crucial complement to technological innovation, as the Intergovernmental Panel on Climate Change has stated. So if today's aspirational lifestyles are to be remodelled, the world's over-consumers must come to feel inspired to play their part.

While the high street is in decline, merchandise still flies out of online warehouses round the clock; and energy is liberally consumed as though this posed no threat to tomorrow. An injunction to buy less will not have mass appeal in a culture that's saturated with words and images that encourage consumption, and in which the quick, though fleeting, hit of acquisition is an everyday expectation. Yet every purchase we make exacts some environmental toll - unless it's second-hand or locally handmade from organic, bio-degradable or reclaimed materials, unpackaged and transported on foot or by bike. Raising awareness of this is crucial.

But, beyond this, for sustainable living to become a systemically embedded norm, we need a fresh and positive perspective, one that connects directly with people's deep needs and feelings. Affluence has increased hugely in the UK in the last 60 years, but happiness has not. Indeed, poor mental health is now widespread. So a culture which emphasises non-material sources of wellbeing that enable people to flourish would not only benefit personal and social wellbeing but would also increase our chances of preserving a liveable planet.

Good relationships – with family, friends, colleagues, neighbours, and a sense of belonging – are our foremost source of wellbeing. To be able to build and maintain these does not require material consumption, but it does need certain human qualities and capacities such as empathy and the ability to listen and to share, and these may well require support. In order to thrive, human beings also need to be actively engaged in some way, whether social, physical, intellectual and/or creative. We benefit measurably, too, from close contact with nature, and the ability to appreciate small things. If the cultural emphasis changed from production and consumption to the valuing of non-material assets such as these, we would get much further towards achieving environmental sustainability.

The most fundamental requirements are food, clean water, decent shelter and security, but all these will be jeopardised worldwide in coming decades if global greenhouse gas emissions are not sharply and rapidly curbed. We need to develop a new popular narrative about a better way of living which both increases happiness and protects the life of the planet. And another about the urgent need to pull together to rescue our precious environment from the common enemy of global warming.

“We need a fresh and positive perspective that connects directly with people's deep needs and feelings”





Cities hold the key to meeting our carbon reduction targets

One thing is for sure. Cities need to up their game in terms of carbon reduction. Although they only cover a fraction of the world's land mass, cities are responsible for two thirds of the world's energy and 70 percent of global CO₂ emissions. So, they have an enormous carbon footprint and when it comes to delivering the targets set out in the Paris Agreement, the clock is running down.

The UK's localisation agenda means major cities are being given accountability and responsibility to do things themselves. This makes a lot of sense because a lot of solutions require government to be more nimble than central government and better engage with other institutions. But our cities are struggling to understand the scale of ambition they need to meet, the areas they need to focus on in order to achieve carbon reduction and how they can measure and report that in a way which is consistent.

Anthesis has developed SCATTER (Setting City Area Targets and Trajectories for Emission Reduction), a ground-breaking tool which provides city regions with the opportunity to standardise their greenhouse gas reporting and align them with international standards. There are lots of good things happening, but we can't be investing in things that are not going to significantly reduce carbon. We need to define an ambition which is meaningful and not just driven by politics and public relations. Local authorities and cities don't have the budgets and resources to do complex modelling. So, this tool is that balance of being sufficiently robust and having the latest data, which is relevant and user-friendly.

SCATTER's pilot programme in Greater Manchester was launched in March 2018 by the Mayor of Greater Manchester, Andy Burnham at his inaugural Green Summit and we are now helping other Core Cities, regions and even some international local authorities. Rather than simply setting a target for carbon reduction, we need to look at the number of actions that can be realistically taken and choose a scale of ambition for those actions that is suitable for the city in question. This gives you your carbon reduction trajectory.

The Tyndall Centre at the University of Manchester has looked at what carbon ambition can be realised and still keep with the Paris Agreement on climate change, the long-term goal of which is to keep the increase in global average temperature to well below 2°C above pre-industrial levels and limit the increase to 1.5°C. That means that Greater Manchester can continue with its current carbon emissions for six more years, but after that not emit another tonne of carbon. So, this has led to Manchester setting a target and we are now working with other cities to see if they can meet their existing targets or set new ones.

We appreciate cities don't just have greenhouse gas as their focus, but they are aligned very much with energy resources which are critical to their futures. Almost all cities have made some really strong leaps in certain areas. Bristol has made progress in terms of a modal shift in transport, with more people cycling, and Birmingham is now leading the way in district heating, which delivers cost-effective, low-carbon heat in the form of hot water or steam, through a network of insulated pipes. But are these the right things to be doing? SCATTER will help support cities to set emission reduction targets and provide a high level of information on the areas and interventions that have potential to generate the most significant emissions savings.

“Cities need to up
their game in terms
of carbon reduction”

Norwich can lead the world with centre for sustainable change

My vision for a sustainable society could be summed up in two words. Disruptive innovation. And a centre for exploring and delivering this meaningful change would be located here in Norwich, where it could address the glaring, but glossed over, inequalities on our doorstep.

By disruptive innovation, I mean new services delivered in a new way. An electric car is not disruptive, it still provides transport. It does not pollute the air like a petrol or diesel vehicle, but it still contributes to congestion and parking problems. Cars are parked for more than 85 percent of the time and towns and cities are ruled by the car, and roads and car parks take up huge amounts of space, with little consideration to the welfare of people. What might be genuinely disruptive is not owning a car and calling up an electric car on your smartphone when you need it. Not only does this cut pollution, it keeps roads and pavements clear, streets free for children to play in, and reduces the din of traffic noise.

Sustainability is change for better lives for everyone; it includes health, welfare, quality of life, equality, as well as the environment. In 2015, the United Nations launched 17 Sustainable Development Goals (SDGs) for all countries to act on. They are principles to live and design by. To refocus sustainability requires transformation. This must have real disruptive impact, not more of the same, or a tweak here and there, or the same indicators of growth and success.

What we need now is the century of the unself which looks at how we engage, change locked-in choices and habits and transform. We work with values, ambition and aspiration, not what not to do. Target markets for a sustainable society are clear. Firstly, the least sustainable people: the wealthy, high-emitters, the middle-class, those who fly frequently for work and pleasure. Then there are those in poverty who are not unsustainable in the same way, but are vulnerable, disenfranchised and unrepresented. The aim of the UN's SDGs is to improve lives as part of sustainability.

Disruptive innovation is 'do different'. It is a customer offer that is low-carbon and sustainable, the transformation of a service to something better. I would like to see a research centre and an incubator of social and technical ideas located in Norwich because, after all, consumption and the innovation of ideas is local. For this hub to have any chance of positively impacting on happiness and quality of life, as well as creating a sustainable environment, it would need business, academia, the public sector and other organisations to collaborate.

Norfolk hides its poverty well. There are significant levels of deprivation across the city and county that would shock many people. One primary school has more than 50 percent of pupils receiving free meals. To qualify, their household must earn less than £12,000 a year. This means they are in the bottom two percent of the country's most deprived people. Norfolk is second bottom in the UK table for social mobility and home ownership is very low at 40 percent: the national average is above 60 percent.

Norfolk offers a clean slate in terms of developing and testing pioneering ideas for a sustainable society. It never had an industrial revolution like the rest of Britain, but it can lead the world with its sustainable development revolution. All the ingredients are here – businesses, the University, local organisations – to come together and research and write the cook book.

“Disruptive innovation
is ‘do different’ ”





War on plastic has shown the power of a tipping point

We can learn a lot from plastic bottles or rather the campaign to reduce our use of them. Not least that if things can come together to create a tipping point, real progress can be made.

It was back in 2015 that the Refill campaign began in Bristol and there are now more than 1,600 Refill stations across the UK, with the scheme operating in 13 towns and cities in England. Refill Norwich was launched in 2017 thanks to Anglian Water and City to Sea, allowing people to use a smartphone app to locate the pubs, cafés and other businesses with free water stations. At the time of writing, this has saved 26,708 plastic bottles from being used in the city. This is not just fantastic for the environment. The average household water bill is £1.15 a day on everything – the cost of a bottle of shop-bought water. So, sustainable water is also good for our pockets.

The BBC series Blue Planet 2 highlighted in devastating technicolour how plastic waste is slowly killing our sea creatures, birds and fish, prompting extensive media coverage of the issue. Plastic pollution had been highlighted by scientists and environmental groups over a number of years, but it took David Attenborough describing how eight million tons of plastic is dumped in the world's seas every year to enhance public awareness. As a result, more consumers began demanding sustainable plastics and more companies started doing their bit. But to really change people's behaviour and drive real change, a number of factors have to come together.

“Sustainable water is also good for our pockets”

My idea is for an interdisciplinary research centre to bring together people from the arts, social sciences and media, with regulators, climate scientists and psychologists. Where we were originally working up a bid for a building at UEA where this could happen, now we are assessing how we can do this virtually and, as a group, what we can realistically achieve. One of the things the research centre could explore is what elements need to come together to create a tipping point in terms of other sustainability issues.

Take drought, for example. The water industry faces a significant and growing risk of severe drought arising from population growth and climate change. Drought will have impacts on households, businesses, farmers and the environment. Anglian Water Services operates in the eastern region, which has a large – and growing – agricultural sector that needs water for irrigation but is also one of the driest parts of the country. This will pose real challenges in ensuring a sustainable water supply into the future. The region is home to globally important wetlands and chalk streams that must be protected. If we are to strengthen the case for investing in long-term resilience to maintain services to customers and protect the environment, we need to enhance our understanding about the environmental impacts of drought, so we can work with our customers to mitigate them.

The response to drought and other sustainability challenges facing the world lies not only in the development of new technologies, but in how we understand and mitigate the impacts of climate change on the water available to us and how as a society we value and use water. The war on plastic has shown us that confronting consumers and businesses with the shocking environmental damage caused by waste can lead to a very real shift in behaviour and help achieve a more sustainable society.

The question is, how can we work together to ensure that continues?

A geographical perspective on sustainability

As a geographer I think it is important to recognise that the nature of a sustainable society will vary from place to place. The idea of maintaining and enhancing natural capital is now a common theme in sustainability debates and the form of such assets (e.g. minerals, soils, water resources and ecological communities) and the pressures upon them vary markedly both between and within countries and regions. For instance, I recently led a study which conducted a natural capital asset check and risk register for the area served by Anglian Water and highlighted the particular significance of the region for national stock of high quality agricultural land and habitats such as saltmarsh or reedbeds. It was also evident that there were particular pressures on water resources arising from drivers such as climate change and expansion of urban areas. Mapping such assets and pressures can then help to identify the key sustainability challenges in particular localities as a precursor to developing appropriate mitigation strategies.

Within a region such as East Anglia many of the most important sustainability challenges ultimately revolve around the use of land. As we seek to meet increasing demands for energy, food and water it is essential to appreciate that these supply chains are inter-linked (e.g. increased food supply may require additional water for irrigation and more energy for fertiliser production).

Greater demand for low-carbon sources of energy also has implications for land use because most renewables supply between two to five times less power per unit area of land than fossil fuels or uranium. Results from my current research funded by the Natural Environment Research Council suggest that this will lead to a more geographically-distributed pattern of supply and demand in the UK, with multiple smaller generators instead of a reliance on a few large power stations. For East Anglia it is likely to mean that energy supply will become a more prominent feature of the rural economy. In turn, this has potential consequences for agricultural activities, landscape character and local biodiversity, as well as possible benefits for employment and new sources of job creation.

“Managing land use to integrate economic, social and environmental considerations in the long-term is at the heart of attaining sustainability objectives”

These pressures on land use are reflected in discussion as to whether ‘land sharing’ or ‘land sparing’ is a better approach. In the former different uses (e.g. food production, energy generation, provision of wildlife habitats or recreation facilities) are interspersed and integrated, while in the latter large and separate areas are devoted to particular activities. For any individual place one important consideration is the compatibility of different activities and the extent to which individual uses can support multiple functions (e.g. the management of woodland for carbon sequestration, wildlife habitat and recreation provision). In an era of a globalised economy, but where individual countries are re-thinking their trading relationships, another factor is the spatial scale at which specialisation is feasible. For instance, the UK currently imports around 60 percent (by value) of the food consumed in the country. If the terms of trade were to alter towards protectionism and self-sufficiency then this would increase the national priority placed on agricultural production in regions most suitable for such a purpose. On the other hand, a shift towards intercontinental trade agreements and more food imports would accentuate specialisation on a global level and, on a UK scale, reduce the value of agricultural production relative to other land uses.

Managing land use to integrate economic, social and environmental considerations in the long-term is at the heart of attaining sustainability objectives. Evaluating options to achieve such integration needs to examine spatial variations and relationships at scales from the local to global. The nature of a sustainable society in a particular place is therefore heavily influenced by its geography.





Sustainable development needs to be globally inclusive

How will we feed the world in 50, 20, even 10 years' time when agricultural intensification is already one of the biggest contributors to climate change and environmental pollution? It has been estimated that in 10 years from now the global calorie deficit could be as high as 214 trillion calories per year, the equivalent (by my calculations) of 480 billion adult size portions of cauliflower and macaroni cheese. With no evidence that alternatives such as ecological intensification will increase agricultural productivity anywhere near sufficiently, are we going to avoid global hunger and starvation by throwing more chemical pesticides and chemical fertilisers at the problem, with all the environmental damage that we know these do?

The United Nation's Sustainable Development Goals – humanity's representatives' most recently articulated aspirations of our common future on this planet, a “better and more sustainable future for all” – seem irreconcilable. Goals number 1 and 2 – no poverty and no hunger – seem impossible to achieve while also, for instance, keeping the water clean from chemicals (Goal 6) and reducing global warming (Goal 13).

Paradoxically, the goals may be reconciled by adding yet another aspiration, the one that explicitly motivates all the others: to leave no one behind.

How can that be? When we have a bunch of seemingly irreconcilable goals that seem wishful thinking, how can we achieve them by adding a requirement that would appear to make the achievement of the goals even harder?

An example may help make the point. There are 33 million smallholder farmers in Africa, which make up about 80 percent of all farmers in the region. These smallholders grow most of the food that Africa's population relies on: in some countries as much as 90 percent. Many of these farmers are devoid of good agronomic advice, are far away from output markets, do

“Sustainable development may be within reach when it includes marginalised and forgotten people”

not have access to reliable agricultural inputs (often the seed they buy turns out to be fake), have limited access to credit and typically no access to insurance, have livelihoods threatened by pests and crop diseases, livestock diseases, human diseases, droughts, erratic rainfall (made worse by climate change), and predatory governments. Even when improved agricultural inputs are available, such as high-yielding varieties of seed, they often don't have the cash to buy them or cannot take the risk that a drought will ruin their investment – in short, they are stuck in a low investment/low productivity trap.

If these African smallholder farmers were assisted by good agronomic advice, access to markets, access to finance and insurance, reliable and sustainable ways of managing soil fertility and fighting pests and diseases, drought-resistant crops, pest-resistant crops, and good meteorological satellite-based advice on when to plant (easily available to Western farmers), then these farmers would be released from their poverty trap, invest in their farms, and help feed their countries and the world.

This is one example among many of how sustainable development may be within reach when it includes marginalised and forgotten people, people whose wellbeing turns out to be crucial for the wellbeing of all of us. At UEA, and indeed across the Norwich Research Park, we are working on helping bring about globally inclusive sustainable development. Some examples are our work on drought insurance, water security, equality and justice in access to natural resources, gender equality, adaptation to climate change, and on crops that are both more nutritious and better suited to the growing conditions in developing countries.

Making sustainability social

When it comes to sustainability everyone is part of the problem. So, in 3S we think that everyone also has to be part of the solution. Society is too often shut out of the debate. As a result, society gets excluded from the challenge of making more sustainable ways of living. This urgently needs to change if we are to build truly sustainable societies.

Too much hope has been placed in science and technology to provide silver bullet solutions to sustainability. In terms of concerted action, we often look to central government and big business to lead the way. This means that society is often given only one option – to accept new policies and technologies that are imposed on them. This way of working reflects the vested interests of the powerful and serves to uphold the unsustainable status quo. It does this because it leaves out public concerns about whose vision counts, who's in control, who wins and who loses, and ultimately whose interests are served by sustainability?

In 3S we believe sustainable innovation should be for the public good. So, it stands to reason that unless society is engaged and involved, innovation is unlikely to be sustainable. To do this, we have conducted pioneering research to understand how society engages with sustainability and to develop better approaches to social engagement on issues such as energy, climate change, emerging technology, and natural hazards.

For example, our work has generated new understandings of how individuals experience and cope with fuel poverty, how households engage with 'smart' technologies in everyday life, and how community groups are working to generate their own localised solutions to energy, waste and flooding.

As part of the UK Energy Research Centre and working in collaboration with public, private and civil society partners, we have formed the world's first national Observatory on Societal Engagement to map, monitor and enhance how these multiple forms of engagement join up as part of wider national and international responses to the low-carbon transition. Across this work we have strived to transform the dynamic of dominant approaches to sustainability - turning the engagement problem around from one of communicating to the public to one of powerful institutions listening to public concerns and enabling citizen-led solutions.

By working together to improve relationships between science, innovation and society we can transform the way we do things to create more sustainable ways of living. There's no such thing as sustainability without society.

“Unless society is
engaged and involved,
innovation is unlikely
to be sustainable”



The Sustainable Development Goals

These goals are the blueprint to achieve a better and more sustainable future for all. They address the global challenges we face, including those related to poverty, inequality, climate, environmental degradation, prosperity, and peace and justice. The goals interconnect and in order to leave no one behind, it is important that we achieve each goal and target by 2030.



NO POVERTY

Economic growth must be inclusive to provide sustainable jobs and promote equality.



GENDER EQUALITY

Gender equality is not only a fundamental human right, but a necessary foundation for a peaceful, prosperous and sustainable world.



ZERO HUNGER

The food and agriculture sector offers key solutions for development, and is central for hunger and poverty eradication.



CLEAN WATER AND SANITATION

Clean, accessible water for all is an essential part of the world we want to live in.



GOOD HEALTH AND WELL-BEING

Ensuring healthy lives and promoting the well-being for all at all ages is essential to sustainable development.



AFFORDABLE AND CLEAN ENERGY

Energy is central to nearly every major challenge and opportunity.



QUALITY EDUCATION

Obtaining a quality education is the foundation to improving people's lives and sustainable development.



DECENT WORK AND ECONOMIC GROWTH

Sustainable economic growth will require societies to create the conditions that allow people to have quality jobs.



INDUSTRY, INNOVATION AND INFRASTRUCTURE

Investments in infrastructure are crucial to achieving sustainable development.



LIFE ON LAND

Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss.



REDUCED INEQUALITIES

To reduce inequalities, policies should be universal in principle, paying attention to the needs of disadvantaged and marginalized populations.



PEACE, JUSTICE AND STRONG INSTITUTIONS

Access to justice for all, and building effective, accountable institutions at all levels.



SUSTAINABLE CITIES AND COMMUNITIES

There needs to be a future in which cities provide opportunities for all, with access to basic services, energy, housing, transportation and more.



PARTNERSHIPS FOR THE GOALS

Revitalize the global partnership for sustainable development.



RESPONSIBLE CONSUMPTION AND PRODUCTION

Responsible consumption and production.



CLIMATE ACTION

Climate change is a global challenge that affects everyone, everywhere.



LIFE BELOW WATER

Careful management of this essential global resource is a key feature of a sustainable future.



Thank you

We would like to thank everyone who contributed to this publication, and all those who took part in the Sustainable Society workshops. For more information about the next steps of this project, or to be put in touch with any of the authors, please email business@uea.ac.uk. To find out more about research at UEA visit www.uea.ac.uk/research