

I thank you for inviting me to talk today.

I am not a scientist but someone who has worked on environmental policies for 30 years. Perhaps you would judge my work to have been a gigantic waste of time given the situation we are in today. Looking around at the news, it is hard to be positive isn't it ?

Climate change is racing ahead faster than anyone believed and the IPCC report which was published in April is a stark warning of the future we face. Yet it was a watered down document, not telling the extent to which the climate is changing our habitats and threatening our existence. We're on course for an increase of 5c in global temperatures by 2100, not 1.5c.

We know, because we see it in even in our blood that we are literally consuming plastics but other forms of pollution, such as chemicals and air pollution in urban areas, are as big a killer as COVID. No coincidence that the highest death rates from COVID coincide almost completely with the worst air quality.

Population growth and migration place new burdens on our social fabric while the depletion of water and soil resources and loss of biodiversity jeopardise our future ability to live in many parts of the planet, including the western half of the USA.

And lastly, we are facing the challenge both as society as a whole and businesses to the supply chain breakdown and vulnerabilities, first evidenced during the pandemic and now by the Ukraine war.

We are in a perfect storm ladies and gentlemen, and we are all looking for places to shelter.

I don't have all the answers. We are all guessing our way forward. Despite 30 years of activism in this field, I am still learning.

Many of you here today are innovators in industrial biotechnologies which do and will increasingly provide solutions for these ecological challenges we are facing and in this short talk I want to give some of my thoughts about how we can accelerate transformation.

I believe that the reason we are struggling to find solutions to all these issues is that almost all of them require a business model in which we consume less. Less energy, less meat, less cars, less flights, less plastic, less water, less chemicals, less pesticides, less concrete, less metals, less clothes and so on. The recent report from the Club of Rome and Systemiq called Systems Change lays out exactly this need to reduce consumption as a priority. The Scottish First Minister wrote a supportive foreword.

Yet we have no successful history or example of a society that succeeds in feeding, clothing and providing for its people by continuous suppression of demand unless that is in wartime. And how do we do this, democratically ? Locking down millions of people to force them into consuming less? Giving people ration vouchers to ensure they consume no more than an established quantity good for the environment ? It is an improbable scenario isn't it ? Imagine telling your sales director that his target for 2025 is to decrease sales by 50%? Or your Chancellor, that his target is to reduce your economy by 25% ? This one may succeed by default by the way ! But this is the only certain solution we have to reducing global ecological breakdown. This is why we are failing, nobody accepts that choice.

And lest we forget, there are 1.3 billion desperately poor people whose daily needs are not met. They need to consume more not less and it is our duty to feed, house, clothe, educate and

provide healthcare for them too. Can we ask them to remain poor, in the name of climate change?

If our choices do not include suppressing demand, then what can we do ? Substitution of demand for less ecologically damaging products and systems is our best bet.

The really good news is that there are no longer any substantial technological barriers to reducing emissions and transforming our production models and materials to a low carbon and less polluting economy. Many of you are doing this already, and the issue is scale. Let's forget about technology being an issue for a moment, we have it all, or at least, all we need.

Part of this transformation is the move from fossil carbon to renewable plant-based carbon. Bio-based materials and polymers are already a reality. They need to scale up and for this we need policies, which I will come to shortly.

Another part is producing using renewable energies. Industry is still extremely energy intensive but also here, as we decarbonise and electrify our energy systems, the hope is that industries will produce more cleanly. It is a long road but the path is traced and we need you to ensure you are on this path.

I believe also that there are fewer financial barriers as long as we choose this to be so. The issue is to mobilise the political will to raise the funding needed, to drive it from destructive to regenerative economic activities. You know we spend globally some 6 trillion dollars subsidising fossil fuels and that this is completely crazy. Here we are fighting climate change and then spending our tax dollars to stimulate faster ecological destruction. It is madness. The UK gives ten times more money to the oil and gas industries as tax breaks than we give to the Climate Fund, the UN body which finances third world climate adaptation. Scotland also protects its offshore oil and gas industries as does every fossil fuel producing country worldwide. This has to change and we need you also to lobby for this to change, urgently.

I was glad to see the Glasgow COP26 adopt strong positions against the subsidies to the global fossil fuel industry. But again, the process is slow and the war in Ukraine is slowing it further. This is a mistake; we should use that golden opportunity of crisis to enact system change. Drilling for oil and gas or building more nuclear plants is not the way to go; it reminds me, as the Private Eye wrote last month, of the promises the Prime Minister made to build more bridges, or an airport on a swamp in the Thames. Fantasy world and also too late to solve our issues in the short term.

So we need industry to push for policies which will be fit for purpose in the new net zero world. Much of what companies in this room are doing, is moving in that direction and I applaud you.

Whilst change is very difficult on the scale we need it, there is no reason at least not to be ambitious. We can change. Humanity has proven over the last 75 years that it can cooperate and despite my introductory remarks, as an activist I personally have been involved in successful campaigns that have led to dramatic improvements in the quality of the environment around us and helped save the whales too. Just think of the ozone layer.

This current crisis gives us a unique opportunity because of the need to shorten our supply chains, move away from Russian fertilizers and energy, and the bioeconomy can help us do this. Using domestic natural resources we can decarbonise, reduce material and energy

dependence and create UK jobs and investments. We have to ensure this is done without endangering food supplies, our absolute priority. There will be a move away from trade globalisation back to localisation of production and a focus on national food, materials and energy security. The COVID pandemic and now Ukraine have exposed the fragility of long supply chains and the vulnerability of our dependence upon nations that are potentially hostile.

Today we are already making innovative materials from seaweed, fungi, cellulose of course, waste, starches, sugar, and so on. Scotland alone is estimated to produce some 20 million tons of biogenic raw materials, including wastes, annually. The World Biogas Association of which I was President for five years, calculates that globally some 105 billion tons of biogenic wastes are produced annually. Just harvesting half of these would create emissions savings in the region of 10%.

What a fantastic resource opportunity for a new industrial base. What an amazing opportunity to produce renewable energy, fertilisers, extract the starches and sugars as feedstocks for chemicals and return organic carbon to soil. The technologies are all available, the missing link is the political will, the correct use of our financial instruments to achieve the goals, not the technologies.

I know that for the UK the IBLF are modelling what it means in terms of investments, greenhouse gas reductions, to use our own bioresources and substitute oil and gas.

The bioeconomy has a key role to play in this technological change, not just for chemicals and energy, but also for materials and for the regeneration of our soils, landscapes and biodiversity. If anyone who has read the story of the Knepp Castle farm in Kent or the book *An English Pastoral* by James Rebanks, or the *Omnivores Dilemma* by Michael Pollan, will understand me when I say that the solution to many of our crises is under our feet. George Monbiot wrote on this subject last month in the *Guardian*. Healthy carbon and biodiversity rich soils are at the heart of a sound ecology. How to nurture nature and feed, clothe and give energy to everyone is the challenge of the century. It is your challenge and one that will provide enormous business opportunities to those who succeed.

We are developing, slowly and painfully, a green chemical industry that is tied into the agriculture of its environs, linked to the soil and land, serving it and feeding from it. This is one of the futures that chemistry has enabled and which we need to develop more rapidly, the biorefinery model. Adrian Higson has outlined this transition in his excellent paper you can find on the NNFCC website.

The challenge we all have is to make this transition a mainstream policy objective in the short term. So far, let's be honest, we are failing. We are still marginal. We need to be more vocal, present in more of the national fora deciding policies and lobby hard for the future bioeconomy. Finland, Italy are models where this transition is already a political and industrial reality. It can be done.

Since 1945 we have destabilised most natural equilibria with the promotion of synthetic products that have rendered our soils sterile, dramatically reduced pollinators, birds and many other species, made our farmers more vulnerable to the variations in climate they now face. It is nobody's fault, this is what we all wanted: boost production of food and materials. We live, we learn, we change, and industry now has to enable the technologies and use its experience to ensure that what you do is not just about selling more products, but about nurturing and enhancing the holistic management of the global commons; soil first, then water, air, food,

biodiversity. Green chemistry. You have the chemists, the biologists, the labs, the money, the knowledge, the field tests, the soil and water analyses. This is your expertise.

Industry must be at the centre of this change although I am not sure everyone always realises it. The statement last month from the CEO of Sygenta that we should stop organic farming was an example of exactly what we do not need. Another from the head of ESG at the HSBC bank was read by you all. I am glad I don't live in Miami.

Now more than ever we need to embrace a model that makes our collective lives safer, greener, cleaner and more prosperous, now. Dramatic change, to produce for a growing population without harming the environment is within our grasp, so let's grasp it! We have no more time to lose.

Technologically we can now envision a future in which we are not poisoning ourselves with the products, food or energy we need; we can create a world of sustainable economic development for both human beings and other life on this planet without which we are ourselves doomed. You are at the centre of this transformation and we need you to understand the scale of the challenges and seize the opportunity of resolving them.

Using natural, renewable resources to create a new chemical, material and energy future is the challenge many of you have taken on and which we all need to support for the future of humanity on this planet.

Thank you.

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