

TO (RE-) THINK MATERIALITY

IN THOUGHT WITH

Dr. LUKE HAVERHALS, Founder and CEO of NFW
Extracted from a 49m conversation with LUKE in Illinois and with BEN and SIÂN in London

MAKING
A PLANT
POWERED
FUTURE
A MATERIAL
REALITY



“NATURE SOLVED ALL THE
SCALE QUESTIONS LONG, LONG AGO.”

Dr. LUKE HAVERHALS

“EVERYTHING WE MAKE
EITHER RETURNS TO THE EARTH
AS FOOD OR AS POISON.”

TO (RE-) THINK MATERIALITY

Humankind has run up a debt it simply cannot service. Nature gave us everything we needed, and we squandered every penny of it.

We ploughed everything into toxic assets. We thought nature had gifted us a blank cheque. So we spent like there was no tomorrow. We built petrochemical facilities and spent trillions on creating consumer demand for products encased in thick layers of indestructible plastic.

And as our debt to nature ticked higher and higher we tried to inflate our way out of the crisis in the form of recycling more and more petrochemical-based detritus.

Dr. LUKE HAVERHALS, the founder and CEO of *NFW*, holds a simple truth that cannot be repeated often enough. Humanity will never recycle its way out of the plastic crisis. Plastics will *never* be circular enough. Instead, Dr. Luke argues, we have to go back to nature.

NFW is a purpose-driven organisation whose mission is to invent and manufacture shockingly sustainable materials from plants. It unlocks nature's potential, giving industries and innovators fundamentally new material platforms to create responsibly.

Luke argues that any viable solution today must be able to scale and meet the needs of our rapidly growing population. *NFW*'s categorically new technologies employs 'natural chemistry', inspired from nature, and regenerative agriculture as the new 'nutrient' supply chain. He believes that this approach is not just an idea, it is a new paradigm of material reality that will literally shape human history. And critically, he envisions that this future does not ask consumers and brands to make trade-offs between costs, aesthetics, and sustainability.

And at its heart is a belief in a simple truth. In one day, nature creates more nutrient plant matter than all synthetics derived from fossil fuel production by mankind in one year.

AND IT IS BECAUSE OF THIS SCALE THAT
NATURE CAN BE OUR COLLECTIVE SOLACE.

SEAS OF GREEN

I grew up on a farm surrounded by beautiful hills in Iowa. It is a rolling, expansive state where life makes sense. It is a state of cornfields and jaw-dropping scenery.

As a kid, I used to walk to the summit of these hills with my father. He used to love going up there and taking in the moment. In a world full of pressure and strife, he would stand and stare out into the horizon.

In the summer the wind would blow across the plains and the fields would resemble a green ocean—moving up and down gently wave after wave.

I was amazed by the sheer scale of the green space. It was clear to me as a child that nature had given us something humans could not match even in our most fanciful dreams.



Haverhals Farm homestead, Hawarden, Iowa

More than 85 percent of Iowa's land is used for agriculture, producing more corn than any other state, with farmers harvesting 12.8 million acres of corn in 2018. Photograph by Seth Haverhals.

PHENOTYPES

I am very lucky. I benefit from a phenotype which has meant I have always been pretty curious.

I am good at synthesising information and finding patterns in data that others might not be able to spot. I am good at spotting consistent patterns in things that might otherwise seem totally disparate.

It is a trait my wife, Noelle, and I have passed on to our three daughters—and one that I find pulses through my brain each and every day. And I think that is why I think how I think.

IN THE NAVY

After college I decided pretty quickly that I wanted to get a PhD in chemistry. And I eventually went off to the *United States Naval Academy* to be a Chemistry Professor. It was an amazing, wonderful time of discovery.

I also thought very deeply about what was going to give me fulfilment in life—in terms of relationships and how I interacted with the people around me. And I knew very early on that I would not be happy if I dedicated myself to a job in which the sole purpose was earning money.

I wanted a vocation and something that was truly meaningful—something that would tie my beliefs and values to what I did on a day-to day basis.

I started thinking back in the early noughties about materials and what kind of material resources could be developed that could enhance human dignity and quality of life. Of course at the same time, I wanted to think more about solutions that worked in harmony with nature, not against it.

THE ROOT OF EVERYTHING

Initially I worked on fuel cells and battery technology. Then I started to realise that all these materials that convert energy into different forms ultimately are derived from the same thing—nature.

Everything—be it the wardrobe I put my clothes in, the computer I work on or even the power plant that keeps me warm at night—is rooted in the power of nature.

I realised, in essence, that you cannot have a meaningful conversation about materials without talking about the true power of nature. And when you realise that you start to get angry about how broken our relationship with materials has become since the mass proliferation of petrochemical-based products.

AN UNQUALIFIED DISASTER

It frightened me to think that humankind was ignoring this profound truth so blatantly by shifting to plastic proliferation and consumption.

When you are a chemist to even think about the petrochemical origin of plastics is enough to make your head spin.

Fundamentally no-one likes where plastics come from and no-one likes where they end up. But somehow, we have been told stories about this material that do not actually match the reality. There is a huge disconnect.

In using plastic, we have a material that fundamentally nature does not want.

You buy a pair of shoes, wear them for a year and there is nothing you can do with them other than throw them away. They are so full of toxic plastic Mother Nature has no interest in taking them back.

Plastic is a disastrous material too when you consider the carbon footprint. Plastic has been one of the main galvanising forces for the petrochemical industry in the history of the world.

THE NATURAL REPLACEMENT

Natural materials are the most complicated, highest performing, amazing wondrous things you could possibly wish for. And they are materials we did not have to spend a dollar to invent.

These materials can just do amazing things that are really quite stunning. And I started to think “how would I try to replicate that as part of a replacement for plastic?”

But more fundamentally the question was: Why don't we use plants in the way that we use plastics? Why don't we use plant-based textiles to make those everyday products that humankind will always need?

TECHNICAL LIMITATIONS

Very quickly I started thinking about the technical limitations of those abundant natural materials we so often take for granted.

I began reading a lot about people trying to synthesise bioplastics and build fermentation reactors. But I was not convinced that more plastic was the answer—and the bioplastics solution is not one that is scalable.

So, what happens when you let everyone on planet Earth live like your average American? Well, that equation does not scale well.

So it has to start with scalability. And if plastics are our scalable answer, if we are going to keep making materials like that, with a basic understanding of what it takes to let your average American and everyone else live their chosen lifestyle, then there is a big cliff humanity are heading right towards.

There has to be a fundamentally different approach—one that has not been considered before.

CYCLE OF NUTRIENTS

We are most at one with nature when the way we behave is at one with the cycle of nutrients.

The cycle of nutrients is a process rooted in ecological harmony. It is a sustainable process of give and take. And it is one of mutual benefit. After all, nature solved all the scale questions long, long ago.

Us humans along with other animals and plants consume nutrients found in the soil. And then these nutrients are recycled back into the soil via death and subsequent decomposition.

It is a perpetual process and one that has worked for millions of years. And it is the very antithesis of any process as flawed enough as to contain petrochemicals.

FOOD FOR THE SOUL

The best chefs understand the cycle of nutrients. They produce food at one with nature's perfect circle.

You eat best when you eat what nature delivers. Most of the really good dishes are beautiful because the chef doesn't actually have to do much other than assemble the food on the plate.

The flavours sing because they are fresh and natural. The chef lets the nutrients do the work and they embrace the notion of 'less is more'. A chef does not try to do too much or corrupt the process with anything artificial.

This kind of 'cooking' or 'baking' is the scalable philosophy we now need to create the materials of the future.

A PROFOUND MISSION

And so, in 2015 I founded *NFW* with this philosophy at its heart.

We envision a world that does not rely on plastic, where abundant natural materials enable people and the planet to thrive together.

Above all, we're obsessed with leaving the world better than we found it.

OF THE SAME EARTH

The best materials for the future are the ones that grow from the ground. At *NFW* we take the byproducts of producing food and we mix, shape, and mould them into beautiful materials.

These nutrients are ones that everyone would recognise—including starch, gum, cork, rice husk and coconut fibre. These are often waste products left over from the food production process.

We are working with some of the most iconic brands in the world. We are collaborating with companies who have realised that you can make beautiful, durable products from what nature has simply given us.

We have worked with the watchmaker *IWC* on a watchstrap made exclusively from plants and minerals. We have collaborated too with *Ralph Lauren* on the world's first all-cotton performance apparel. And this is just the start.

People are waking up to the fact that our footwear, bags, car interiors, and furniture can be made out of a material that nature has created. But crucially, they are made out of a material that nature is happy to accept once the product has come to the end of its life.

What we are rethinking here is the entire energy need, the energy dilemma. Because really, plants are just a form of a solar cell, but it is a solar cell tied to a 'molecular factory' that builds materials from the atom up.

MUSK AND MARS

If we are to tackle our most profound planetary challenges, we are going to have to do it together—and with creativity.

All around the world there are people who believe humanity should be a multi-planetary species. Elon Musk believes we should go to Mars, for example. For Musk this trillion-dollar endeavour is worth every penny.

But before we set our sights on Mars—we need to work out how to get along better on our current spaceship Earth. We have got to get better at sharing wealth, collaborating together and making the most of our respective capabilities.

And if we are to embark on something as ambitious as getting to Mars, we are going to have draw on all our wells of creativity—embracing the talents of people from every field.

Our different skills and creative lenses on it will be what the world needs. Of that I am very certain.

And I suppose our quest to Mars is a good metaphor about humankind itself. We will only achieve something truly gargantuan when we rally together and celebrate the innovation and penetrating intelligence that makes truly great things possible.

CONFLICT

The curious career of the human experience has been one of conflict.

We all know that our brothers, our sisters, and our friends, challenge us on certain things. This creates a certain amount of conflict. This creative tension can be a good thing because it can force us to challenge ourselves to be better. And as a result, the human race moves forward.

But conflict over resources has never propelled us forward in a constructive or fair way. These conflicts expose a profound injustice that affects those who are deprived access to resources. It starts to impinge on their human rights, and ultimately on their basic sense of dignity.

This is why we must work together to ensure resources are shared far more equally across the world. How we use materials will have a huge impact on this.

CUSP OF SOMETHING AMAZING

We are on the cusp of a materials revolution. We are seeing the first shoots of growth, but I am convinced we will soon see a wholesale shift to natural materials.

Soon everyone will see what we are doing on materials make total sense.

When you take nature's nutrients—naturally abundant and created through photosynthesis, and work to make them into something ingenious—you are in turn reinventing the world for the better. And in turn we take a step forward on the road to human dignity and planetary health.

ENDS.

(A SPACE TO THINK.)