
Anne Hurley
Why We Need To Switch To Sustainable Vegan Leather 4th Ed
For The Planet By 2030

The author is the founder and CEO of pioneering sustainable fashion brand James&Co. The brand in 2018 publicly ditched tailoring its premium vegan leather apparel & accessories in toxic traditional polyurethane (PU). It is the leading brand in partnering with new and innovative more sustainable vegan leather textile manufacturers.

The drive is to partner with retailers on the committed path to meeting the UN goal of keeping global warming to below 1.5 degrees Celsius by 2020. To collaborate with the retailers and the manufacturers to spread the message to consumers that the more sustainable choice to leather-look vegan materials is now available. To take the urgent transformative action for the fashion industry called out by the UN.

Retailers – please contact info@jamesandco.com.au to discuss becoming a stockist for our great products.

Investors – please contact invest@jamesandco.com.au to discuss funding for the brand.

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PART A: INTRODUCTION

Chapter 1: Introduction

1.1 Summary: Urgent Transformative Action Now

This 4th edition of *For The Planet By 2030: Why We Must Switch To Sustainable Leather* builds on the case made in the previous 3 editions. That is, faux or vegan leather – the synthetic alternative to real leather – has traditionally been and still primarily is the textile known as traditional polyurethane(PU). The case made in this book continues the theme that PU needs to be replaced with more sustainable artificial leather fabrics being developed and emerging in the market because of the harmful impact on the environment and workers in PU's materials and its manufacturing.

But as it should be, the case made in this book is in much stronger terms than made in the previous editions. This is because it is now beyond doubt that fashion textiles and the fashion industry need to undergo 'urgent transformative action' to get rid off textiles that impede the ability to limit global warming to less than 1.5% degrees Celsius by 2030. Getting rid of toxic PU is a climate change mitigation action.

The recent 3 IPCC reports, the fashion industry response, and the proposed regulatory reform to 'transform' the textile industry in the EU are unequivocal.

The manufacturers of synthetic leather in the supply chain have been innovating over recent years and receiving funding for their developments to get to commercialisation. Very positive and welcome advancements.

Fashion brands need to be also financially supported to tailor their fashion products in the more sustainable textiles for advancing climate change mitigation.

There needs to be collaboration at all levels of the supply chain to make the transformative change away from the toxic PU to the sustainable vegan leathers. Brands and retailers need to collaborate to get the message out to consumers about the sustainable leather alternative fashion products available and encourage the switch. Demand-side mitigation for climate change.

The fashion industry needs funding of up to $1 trillion if it is to be able to deliver the climate change goals.

1.2 Overview

The major harmful impacts of PU are that the making of PU requires the input of chemical solvents to create the chemical reaction needed to create the coating foam that is PU. The most used chemical solvent is DMF (Dimethylformamide). The making of PU also requires the input of fossil fuels such as petroleum derivatives for the glue factor needed to attach the PU coating to underlying textile. This results in the high emission of greenhouse gases from the factory in which it is made. Its manufacturing process is therefore harmful to the environment.

PU, because of its components, is a plastic fabric and is not biodegradable. Hence vegan leather fashion pieces made in PU are not biodegradable. The fashion industry is the 2nd largest contributor to landfill given that used fashion items are usually thrown away in rubbish and so they harm the environment and waterways in the same way that all other plastics in landfill and oceans do.

The 1st edition of this book called out the important developments to replace PU with more sustainable artificial leather textiles. The innovating range of lab-grown waterbased PU (WBPU) and plant-based synthetic leathers – Pinatex pineapple leaf leather, cactus leaf leather, apple leather, VEGEA,

mushroom leather. All of which are made without the DMF chemical and hence are undoubtedly more sustainable in the composition of the textiles.

All these plant-based more sustainable textiles include a component of WBPU to some degree as the coating material needed to attach the leather-look textile to underlying fabric. WBPU contains fossilfuels required for the glue factor, which is a plastic component, and so WBPU and plant-based more sustainable textiles with WBPU are not biodegradable.

Since the 1st edition of this book, there have been significant reports and actions from around the globe which put the end of using PU front and centre of needed actions for climate change. In short, unless the making and use of PU is ended, then meeting the target of limiting global warming to 1.5 degrees Celsius is very seriously imperilled.

This 4th edition delves more deeply into the circular economy and end-of-life disposal issues for artificial leather fabrics. The sustainability of the developing replacement PU materials and their environmental impact is without question important. The biodegradability of said materials is a critical part of their impact on the environment and climate change goals.

The edition includes recent innovations tackling the issues from the wide fashion industry perspective. Innovations to deal with re-purposing/recycling more sustainable textiles to keep them from landfill. Innovations developing fabrics that are BOTH sustainable and biodegradable because of their inputs.

All said innovations enable brands like James&Co that tailor only in the more sustainable artificial leather textiles to offer a way forward to our wholesale and retail customers. And to expand the message of ending the use of PU in all industries to meet critical climate change goals.

It is true that it could be said that James&Co is but a small niche area of fashion. But it is a defined activity which can become an implementable project with defined objectives.

James&Co is small but trying to make a difference in the use of the fabrics for our outerwear. There is a huge opportunity for larger brands who manufacture and sell apparel and accessories in vegan leather fabric to lead the charge.

This book is about the use of PU in the fashion industry and textiles for fashion. The fashion brand owned by the author of this book, James&Co, pioneers the tailoring of women's apparel & accessories in more sustainable vegan leather fabrics. However as PU is the synthetic leather textile used in other industries such as automotive, homewares etc the same arguments for ending its use in those industries apply.

This book looks at the facts and environment about the manufacture and use of synthetic leather textiles in and for the fashion industry. And calls out for collaborative action across the supply chain for urgent action to transform in accordance with IPCC calls:

- ending the making and use of PU fits in with the UN calls for urgent transformative actions by industry to address Climate Change and with the Sustainable Development Goals of the UN
- the imperatives for the fashion and textile industries to transform in line with the UN calls and switch to sustainable synthetic leathers – and the need for investors to partner with said industries to deliver for the sake of climate change mitigation
- the response of individual global governments and regulators to control and/or end use of PU – particularly the recent European Commission outlined regulatory reform for the textile market
- the increasing demand side calls by consumers for sustainability in the products they buy
- the growing availability of sustainable artificial leather for fashion items, more sustainable textiles, textiles both sustainable and biodegradable, end-of-life circular economy responses
- calling-out growing greenwashing claims by brands seeking to capitalise on demands for sustainable fashion and government/regulatory responses

1.3 For whom is this book relevant?

The book is relevant to just about anybody interested in the environment, sustainable fashion, vegan fashion, veganism, climate change and the like.

To consumers who demand to be able to buy sustainable alternatives for the products they want, established brands manufacturing fashion items - apparel,

footwear, accessories - in leather, brands planning to manufacture fashion items in leather, retailers with sustainability policies which include targets to source raw materials and finished products that are sustainable, retailers with in-house brands which include fashion items made in leather and retailers who sell leather fashion.

The book is relevant to Governments and regulators with policy objectives to remove environmentally and socially harmful chemicals and products, and implement climate change strategies.

It is relevant to brands and retailers who are members of Peta, Peta-approved Vegan and to all stakeholders involved in pursuing world action for addressing climate change, waste, environmental protection.

1.4 How can the information in this book contribute to the sustainable achievement of ending toxic PU making and use by 2030?

The information will assist all stakeholders and the planet in many ways:

- highlighting the imperative for the fashion industry to be a leader in addressing climate change and just one way in which it must transform itself in line with UN cries for 'transformative industry action' and drive action to lower greenhouse gas emission and stop global warming
- spread the word that the manufacturers of PU are or need to transform their sector in line, again in line with UN cries for 'transformative industry action' and transition to manufacturing sustainable artificial leather -with the expectation of some of the largest segment of manufacturers in China that make PU will be banned by Government regulation ultimately and likely by 2030
- puts the information in the context of the learnings for vegan fashion and sustainability from the coronavirus ie that sustainability is the must-have not the nice-to-have in their businesses and will help put the focus on responding to make it happen
- highlighting the industry and corporate responsibility imperatives for making the switch to sustainable alternatives and pointing to the significant commercial opportunities of the switch and response to consumer demand

- by raising knowledge of sustainable leather alternatives and the potential ultimate phasing out of PU the information will help brands and retailers in making sustainable decisions for their businesses
- through contributing to the ultimate removal of toxic PU from use as a clothing fabric for artificial leather, it will inform other fashion industry and textile industry stakeholders to make the switch to sustainable materials in their sphere
- highlighting the necessity of continuing the work of the circular economy movement to reduce toxic waste from the supply chain
- the information in the book will help to raise the comparatively low global awareness of the SDGs and Good Life Goals....
- *[to] help facilitate the large-scale global change which is required in order to shift the world onto a more sustainable and resilient path and tackle the vast challenges of eradicating poverty and improving the natural environment. Read more.*
- it will also raise awareness of the support of Peta for sustainable lether™ alternatives. Read More
- every consumer who makes an informed choice of the more sustainable purchase of a more sustainable leather alternative fashion product is a purchase choice which takes a PU vegan leather piece out of the equation and diverts it from subsequent addition to landfill
- the book is intended to help to contribute to reducing the fashion industry's status as one of the world's most polluting industries in terms of carbon emissions and even more so when it comes to the impact of contributing to waste and to plastic pollution in our waterways. It has also been estimated that 97% of textiles which are sent to landfill could actually be recycled. There is increasing focus by the fashion industry on 'reduce, reuse, recycle' to lessen the environmental impact.
- the book provides a platform of information to share with other stakeholders and raise awareness of the end-of-life disposal issue for synthetic leather textiles and initiatives to deal with it.
- the information will help in creating the mindset for consumers to reduce, reuse and recycle PU vegan leather fashion items and so make a difference to achieving the UN SDGs:

- REDUCE PU vegan leather fashion items by not buying another one in that fabric
- REUSE/RECYCLE PU vegan leather fashion items by engagement with government initiatives and on-line business initiatives working on doing that for all fashion pieces

1.5 About the word 'leather'

In October 2020 the Leather Decree became law in Italy.

The Leather Decree forbids the use of the word 'leather', even as a prefix or suffix, to identify materials not having animal origin. Hence the term 'vegan leather' and similar terms for synthetic leather materials are prohibited in Italy.

The Government announced that enforcement of the regulations would be actively carried out and types of behaviour that will be punished include the lack of a label or mark and the use of a label or mark that does not comply with the prescribed requirements.

In 2022 the Leather Decree in similar terms became law in Portugal. Thus 'vegan leather' usage is now forbidden in Portugal.

Leather Decrees of course are not the first time that countries have passed legislation about how particular products can and cannot be described. About the composition of the product and the information to the consumer about what it is, where it comes from etc so as not to mislead or deceive.

Legislation around the globe quite some time ago enacted that a sparkling wine cannot call itself 'champagne' unless it actually comes from the Champagne district of France.

Since 2013, as a result of pressure from the dairy sector, EU regulations have stated that designations like milk, butter, cheese, cream and yogurt can only be used to market products derived from animal milk. Thus, no descriptors of soy milk, almond milk and other non-dairy 'milks'. The response of a number of plant milk companies in the EU was to create a word including 'mylk', 'm*lk' and 'malk'.

Now with the increasing popularity of plant-based meats, those vegan products are under scrutiny in some jurisdictions for whether products which are manufactured from plants and not animals should be permitted to be described as 'meat'.

A prominent plant-based meat manufacturer Beyond Meat has the line 'HOW WE MAKE MEAT FROM PLANTS' and describes is products as 'beyond' burgers, sausages, beef, meatballs. Australian expanding plant-based manufacturer Fable offers 'braised beef' which is also cooked into 'stroganoff', 'rogan josh' and 'chilli con carne'.

As predicated by the 'champagne' excursion, the EU regulations on dairy descriptions and now the Italian Leather Decree on leather descriptions - will the use of meat industry terms in conjunction with new plant-based products attract regulatory responses around the globe because they are not true descriptors of the products and could mislead and deceive consumers?

I make no presumption to answer that question. But in the context of James&Co and the Leather Decree it does highlight for all stakeholders the necessity to consider how to re-name synthetic leathers as moves will undoubtedly continue to adopt similar prohibitions in other countries.

An early response in Italy has been to adopt a brand-based name for the textile with no reference to the word ‘leather’ with any prefix or suffice. The textile is VEGEA . Its manufacturer describes VEGEA as a 'vegan coated fabric' with its name coming from the combination of VEG (Vegan) and GEA (Mother Earth). And as a plant-based alternative material to synthetic oil-based non-renewable fossil-fuel based fabrics (traditional PU and PVC) and animal-derived ones (real leather). That's the sustainable vegan fabric from what James&Co manufactures.

The fabric is uniquely developed by a process for converting wine waste known as grape marc - that is grape skins, stalks and seeds discarded during wine production - into a textile.

As with cactus vegan leather, VEGEA has a coating of WBPU to hold the textile together and attach it to the underlying fabric base so it is not biodegradable.

You will see looking at the website that the word 'leather' or associated words like 'vegan leather' do not appear in the brand's title or any of its texts and comply with the law in Italy.

Another response would be to follow re-naming initiatives taken to comply with EU regulations forbidding the use of ‘milk’ and dairy terms unless derived from animal milk. That is, the creation of words such as ‘mylk’.‘

So it is that James&Co has is trade-marking the words ‘lether™’ and ‘goodlether™’ for non-animal leather fabrics. Removing the ‘a’ from the word is a simple indicator that it is not animal leather. No A = No Animal.

It would be great to see the word adopted across the relevant industries – vegan, fashion and all. Drop us a line to discuss usage.

1.6 About The Author

I am the founder and CEO of James&Co. The brand of eco outerwear for a better world.

You can learn more about me on LinkedIn and please invite me to connect with you.

1.7 About James&Co

The journey of the James&Co brand from 2012 to now in 2020 has involved several pivots to harness technology developments and social/environmental initiatives to be a business that is both for profit and for purpose.

We started as an online retail business in Australia for women’s jackets tailored vegan leather. The fabric was PU. Our outerwear was and is classic biker jackets, bomber jackets, casual jackets, and trench coats. The fashion

hero jackets that will never date or go out of style. Now made in more sustainable fabrics under the James&Co brand.

The brand's Vision from the beginning was achievement of eradicating outerwear fabrics that harmed the animal world. With the alternatives to PU our Vision now includes eradicating fabrics that harm the environment.

In 2018 we ended manufacturing in traditional PU. And we evolved from a retail business to B2B and are the 'go to' company for wholesale and private label of women's sustainable leather outerwear.

In 2012 we received certification as a Peta-approved Vegan business.

In 2019 we became a Certified B Corp.

In 2020 we achieved accreditation as a Bluesign® System Partner – the first such business to be accredited for synthetic lether™ by Bluesign® globally and the first Australian business to receive Bluesign® accreditation. Sadly we have been unable to pursue the opportunity because the registration fee required exceeds our ability to pay it at the moment. The accreditation still exists and hopefully before too long we can work with synthetic leather fabrics manufacturers in achieving verification as a Bluesign® product.

1.8 How James&Co's Brand Of Sustainable Leather Products Can Contribute

We are a small business with a firm focus on our niche area of outerwear and accessories in authentic eco sustainable leather. And with a firm focus on growing through our retailer partners equally committed to the sustainable change in the vegan leather market.

We have partnered with the leading producers of WBPU, cactus vegan leather, VEGEA and Pinatex pineapple leather for their fabrics. And with leading apparel manufacturers. With a commitment to supply chain transparency we share these details.

We are the only fashion brand currently that has totally and publicly ditched traditional PU and switched to the sustainable leather fabrics and so the only B2B brand that can work with retailers to offer these sustainable products to their customers.

We have partnered with Australian business AirRobe steps for actions to prevent our used products heading to landfill or oceans.

A partnership with James&Co for supply of our own labelled products by wholesale or private label of the retailers' products will be a demonstrable step taken by the retailer implementing and achieving their sustainability goals.

Chapter 2: The Good&The Bad Of PU Vegan Leather

2.1 How is vegan leather made?

Vegan leather/faux leather/pleather is a synthetic fabric that was developed with traditional polyurethane (PU).

PU was developed in 1937 by Otto Bayer. Not related to the Bayer family which founded the Bayer Group, he was employed by the business which consequently produced the chemical. In 1957 the American group Dupont introduced PU and also went on to develop commercial applications - such as the Spandex fibre renamed Lycra.

Starting first as a replacement for rubber, the PU industry grew in response to the developments of the scientific techniques which produced it. Biomedical, upholstery, automotive applications to the point where, as stated by the American Chemistry Council:

Today, PU can be found in virtually everything we touch—desks, chairs, cars, clothes, footwear, appliances, beds as well as the insulation in our walls and roof and mouldings on our homes.

PU is a plastic. It is not a standalone material. It is a resin; a coating material or 'foam' which is applied to an underlying fabric base. For example, polyester has regularly been used as the underlying fabric for apparel although this is now changing to more sustainable textiles.

This is how the American Chemistry Council describes PU:

> *Polyurethane chemistry is complex, but the basics are relatively easy to understand. Polyurethanes are formed by reacting a polyol [a particular chemical compound] with an isocyanate [another particular chemical compound] in the presence of suitable catalysts and additives [basically, chemical solvents].*

2.2 The good of vegan leather

The good of vegan leather is a simple proposition.

Vegan leather has a real leather look feel and appearance.

Hence it has been the perfect alternative to real leather for vegan and cruelty-free buyers and sellers for a long time. Using and wearing vegan leather is kind to the animal kingdom.

2.3 The bad of vegan leather

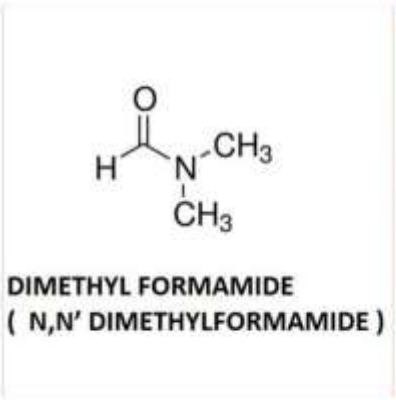
Whilst it is animal-friendly vegan leather is very detrimental to the environment and to humans because the making of PU also requires the input of chemical solvents to create the chemical reaction needed to create the foam. The most used chemical solvent is DMF (Dimethylformamide).

DMF is one of a group of chemicals known as volatile organic compounds (VOCs). DMF is particularly hazardous to workers exposed to it via inhaling it

or ingesting it in contaminated food or water or absorbing it through their skin. In addition to painful impacts such as abdominal pain, nausea, dizziness it can damage the liver, digestive tract and cardiovascular system.

The making of PU also requires the input of fossil fuels such as petroleum derivatives and this results in the high emission of greenhouse gases from the factory in which it is made. Its manufacturing process is therefore harmful to the environment.

PU is a plastic fabric and is not biodegradable. The fashion industry is the 2nd largest contributor to landfill given that used fashion items are usually thrown away in rubbish and so they harm the environment and waterways in the same way that all other plastics do.



There has been concern for many years about the health and environmental impacts of PU and much pressure on the manufacturers of the fabric to make changes to the manufacturing process and inputs.

There is more than one technology now being used by companies to manufacture the more sustainable alternative to PU vegan leather. There are also the growing number of more sustainable alternatives developed from plants.

PART B: Imperatives For Ending PU Vegan Leather

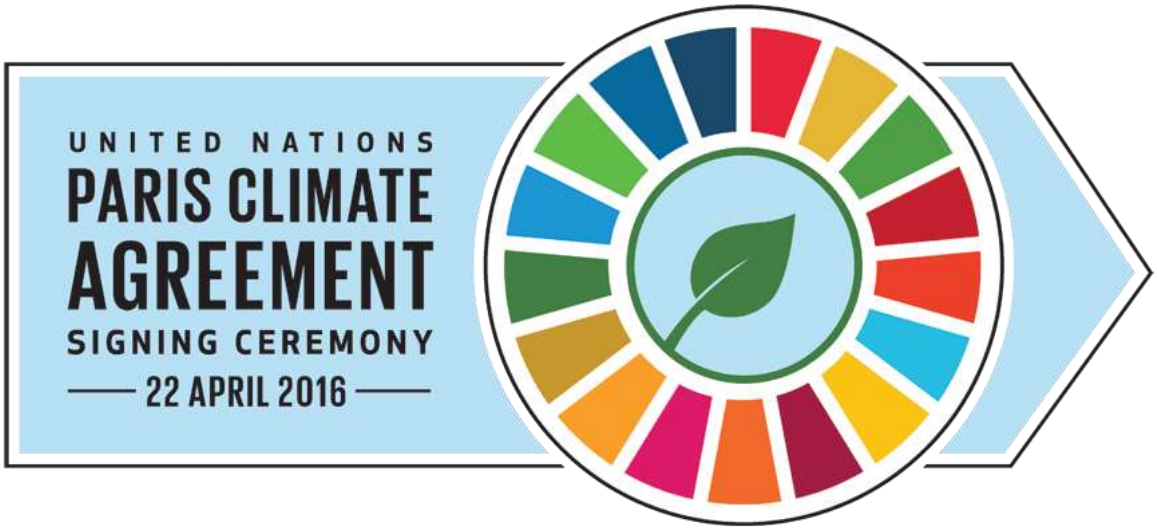
Chapter 3: Climate Change and The UN 2030 Agenda for Sustainable Development

3.1 The UN 2030 Agenda for Sustainable Development

In 2015 all UN Member States adopted the 2030 Agenda for Sustainable Development as the shared blueprint for peace and prosperity for people and the planet, now and into the future. That is a global partnership of 193 countries.

There are a number of component collaborative actions required to successful delivery of the agenda. We'll start with the over-arching global agreement setting the 2030 target and against which regular reports are issue.

3.2 The Paris Agreement 2016



The Paris Agreement is the legally binding international treaty on climate change. It was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016.

The goal it set is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels. (As noted below, recent IPCC reports are adamant it should be taken to be no more than 1.5 degrees Celsius.)

To achieve this long-term temperature goal, countries aim to reach global peaking of greenhouse gas emissions as soon as possible to achieve a climate neutral world by mid-century.

Implementation of the Paris Agreement works on a 5- year cycle of increasingly ambitious climate action carried out by countries. By 2020, countries are/were required to submit their plans for climate action known as nationally determined contributions (NDCs).

In November 2021 the UN Climate Change Conference was held in Glasgow, Scotland (COP26). This Conference is the world's largest meeting of climate policy decision makers. More than 190 world leaders, joined by thousands of

negotiators, government, NGO and industry representatives held talks to update their Paris Agreement commitments in 2015.

With the exception of a few nations – including Australia - following on from the IPCC Report there were ambitious targets set by nations to unite under a common vision not to cross the line of 1.5°C in the next 10 years, or ever.

3.3 IPCC Reports 2021-2022

The Intergovernmental Panel on Climate Change (IPCC) is a body of scientists convened by the UN for reporting on the science of climate change and impacts against achievement of the 2030 goal.

The IPCC has issued many reports since the Paris Agreement. Since the publication of the 1st edition of this book, the most recent 3 reports call out for urgent transformative action to prevent global warming in excess of 1.5 degrees Celsius.

- August 2021: 'Climate Change 2021: The Physical Science Basis'

The IPCC 6th Assessment Report 1st Instalment 'Climate Change 2021: The Physical Science Basis' was released on 9 August 2021.

This report is a summary of latest science describing what is happening to the climate. At its core is the description of 'human-induced climate change': that greenhouse emissions are driving by human activities. In summary, humans are the dominant cause of observed global warming over recent decades.

The IPCC report lays it out clearly that the world is warming up faster than previously thought. Its work confirms that the world has rapidly warmed 1.1 degrees Celsius higher than pre-industrial levels and is now fast approaching the critical target of 1.5 degrees that was set in the Paris Agreement in 2015.

The report confirms findings in previous reports that every tonne of CO_2 emissions adds to global warming. There is in fact an almost linear relationship between CO2 emissions and global warming.

Its unequivocal findings and stark warning for actions needed to be taken by businesses and policy makers is contained in this statement:

> *Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in carbon dioxide (CO2) and other greenhouse gas emissions occur in the coming decades.*

As noted earlier in this chapter, the Paris Agreement 2015 sets out the participating countries' agreement to keep the increase in global average temperature 'below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius'.

The IPCC report puts it beyond doubt that it is not possible to achieve the low level of warming aimed for in the Paris Agreement of 1.5-2 degrees Celsius unless the world's population stops emitting high levels of greenhouse gas emissions.

But the report also maintains that it is not too late to effect change 'with immediate, large-scale and sustained reductions in greenhouse gases…'.

'But it does require unprecedented transformational change, rapid and immediate reduction of greenhouse gas emissions to net-zero by 2010 and concerted action by global leaders and the private sector.'

(note: words bolded by the author)

At the UN Climate Change Conference in Glasgow, Scotland, in November 2021 the Report contributed to driving countries to set ambitious targets beyond those of the Paris Agreement. As noted earlier in this Chapter, with the exception of a few nations – including Australia - ambitious targets were set by nations to unite under a common vision not to cross the line of 1.5°C in the next 10 years, or ever. The target agreed was to reach net zero by 2050.

- February 2022: 'Climate Change 2022: Impacts, Adaptation and Vulnerability

The IPCC 6th Assessment Report 2nd Instalment 'Climate Change 2022: Impacts, Adaptation and Vulnerability was released on 28 February 2022.

This part of the 6th Assessment Report looks at the impacts of climate change, and what it means for us and Earth's ecosystems.

The report describes how drastic measures must be implemented if we are to reduce or reverse future damage of climate change. Global greenhouse gas emissions must be cut quickly, and the most vulnerable parts of nature and

society must be protected or strengthened to cope better with the changes ahead – and the situation is far more urgent than most people seem to realize.

One of the main conclusions of the report is that climate adaptation is proceeding too slowly and measures are being implemented on too small a scale to address the major climate challenges we face. Achieving a green transition is urgent – and the transition must be global.

The Report makes clear that it (note: words bolded by the author):

> *'…has a particular focus on transformation* and system transitions in energy; land, ocean, coastal and freshwater ecosystems; urban, rural and infrastructure; and industry and society. These transitions make possible the adaptation required for high levels of human health and wellbeing, economic and social resilience, ecosystem health, and planetary health. These system transitions are also important for achieving the low global warming levels that would avoid many limits to adaptation'*
>
> *(*defined as:'*Transformation refers to a change in the fundamental attributes of natural and human systems')

The fashion industry responded to this report with the overall observation that the industry's efforts fall far short of the challenge at hand, and that companies must move faster:

- Fashion industry's climate targets are not urgent enough. Brands need to dramatically reduce their emissions in the immediate future — in the next five to 10 years
- For more substantial impact, reducing total emissions needs to involve not only more sustainable materials, but a full transition to renewable energy across the supply chain and a different business model that relies less on churning out increasing volumes of new clothes
- Most of fashion's sustainability efforts are too niche or narrow to make a difference
    - Brands are making commitments to position themselves as sustainable. But they are not science-based, more 'popular opinion' based too often on specific materials and not on the full lifecycle of garments. How can any 'net zero' carbon

commitments be achieved without designing clothing that feeds the next generation of product at the end of use?

- There needs to be full-spectrum, and not piecemeal, changes. Manufacturers switching to renewable energy, accounting for a product's entire lifestyle, shortening the runway set for reaching targets and considering solutions for the full workforce and supply chain.
- Clearly more needs to be done across the corporate sector as a whole to halve emissions by 2030 and work towards reaching net-zero value chain emissions by no later than 2050
- Companies must make unequivocal commitments, including with the Race to Zero campaign, a UN-sponsored initiative rallying governments, companies and others worldwide to reach zero carbon emissions by 2050 at the latest
- The industry needs to transition to more sustainable business models and practices. There is a significant opportunity to reduce impact by moving away from today's linear model (take, make, waste). Maximize material efficiency, scale sustainable materials and practices, use cleaner energy practices, as well as collective action across the industry
- Beyond switching to sustainable materials, brands need to consider entire product lifecycles, including switching to clean energy and planning for end-of-life options that don't involve a landfill and can instead be part of regenerative ecosystems

- April 2022: 'Climate Change 2022: Mitigation of Climate Change'

The IPCC 6th Assessment Report 3rd Instalment 'Climate Change 2022: Impacts, Adaptation and Vulnerability was released on 8 April 2022.

Drawing on the findings and advice of the 1st and 2nd instalments of the 6th Assessment Report, the central message of this report was the hard-hitting 'It's Now Or Never' and the dire need to focus now on solutions to cut emissions.

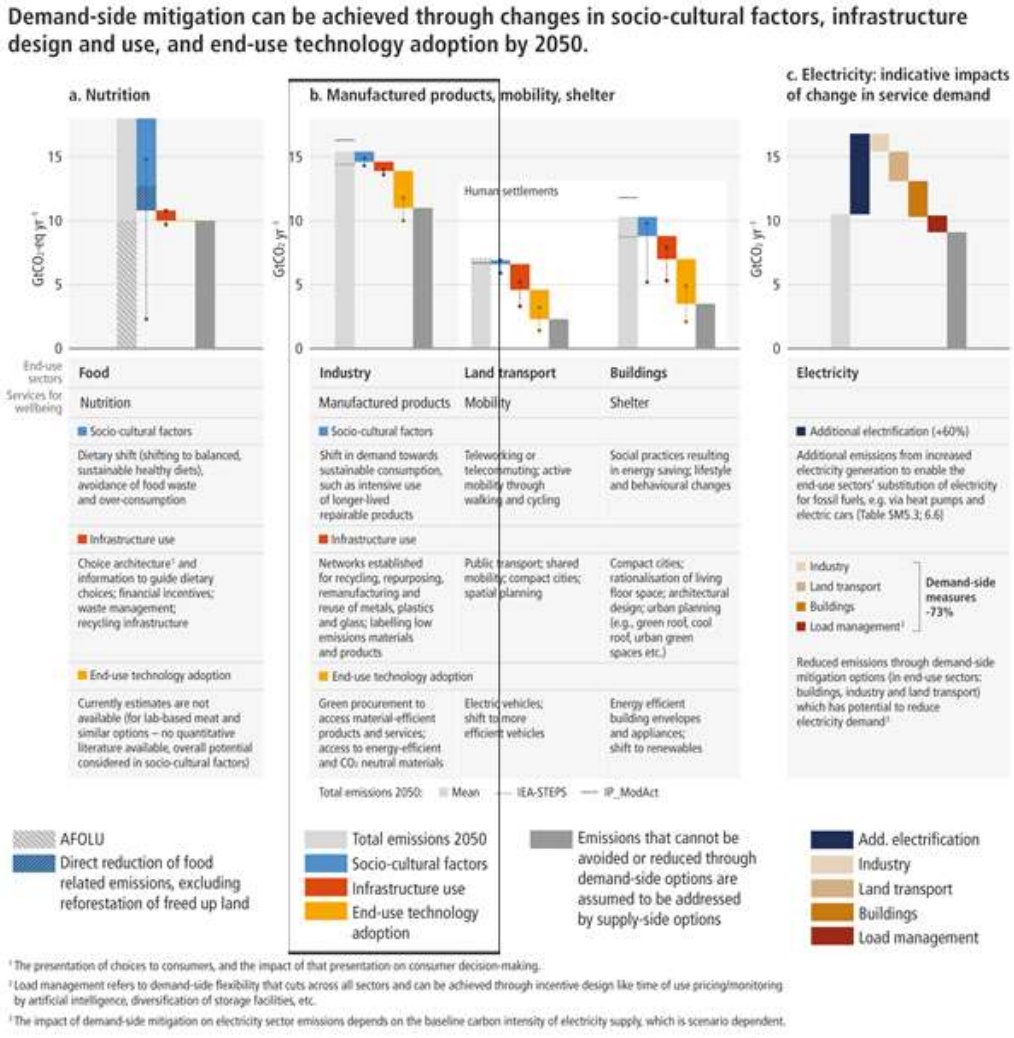
As elucidated in the 1st instalment Report, the earth has already warmed by 1.1°C above the pre-industrial levels. As this relentless warming continues, the planet will witness frequent and intense extreme weather events, devastating the lives of billions of people across the globe. Climate scientists have highlighted that emissions must halve in this decade ie by 2030 in order to limit global temperatures to under 1.5°C this century.

Further, if the target to reach net zero by 2050 which was agreed upon by the majority of nations at the COP26 summit held in Glasgow in November 2021, the report sets out that the global greenhouse gas emissions must peak before 2025 and then drop by at least 43% by 2030.

The report says that achieving these targets is possible by immediate and deep emissions reductions across all sectors. To avoid irrevocable changes, a major transition to clean energy resources is required and significantly cutting down fossil fuel use.

Of particular note for the fashion and textiles industries is this finding that would see the industries – with some transformation – be a significant early contributor to reducing greenhouses gases in manufacture and use of materials.

Using terminology of demand-side mitigation ie changes in end-user behaviour and choices, the report has quantified that behavioural change by consumers (combined with policy and other support) can reduce global GHG emissions of end-use sectors by at least 5% rapidly. The fashion and textile industry could contribute massively to lowering greenhouse gas emissions by transforming to industry models that sustainably use all sorts of materials via reusing and recycling products. In the context of PU, fashion items only made in more sustainable materials not toxic PU. The report notes that this is a strategy that has general public support, have no barriers to implementation, and can make a difference in a short time-frame.



The fashion industry needs no further reminder since its response to the 2nd instalment of the IPCC – other than it needs to take more urgent action on transforming its industry to a circular-economy as it identified then. With emphasis on materials that are both sustainable and regenerative.

The European Commission is well ahead on enabling this transformation as outlined in Chapter 8.

3.4 UN Climate Change Goals and the Fashion Industry

Under the auspices of UN Climate Change, fashion stakeholders worked during 2018 to identify ways in which the broader textile, clothing and fashion industry can move towards an holistic commitment to climate action.
They created the Fashion Industry Charter for Climate Action which contains the vision to achieve net-zero emissions by 2050. The Fashion Industry Charter was launched at COP24 in Katowice, Poland, in December 2018 and renewed and revised at COP26 in Glasgow, UK, in November 2021.

Chapter 4: Climate Change & the UN Sustainable Development Goals

4.1 Sustainable Development Goals

At the heart of the UN 2030 Agenda for Sustainable Development are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by the global partnership of 193 signatory countries.

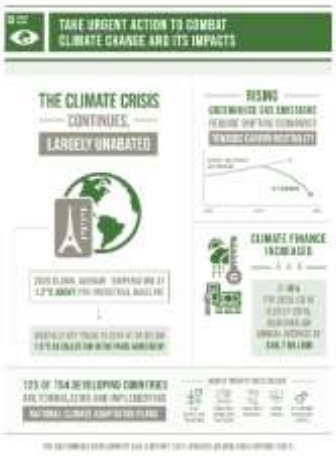
Each of the UN's SDGs is a broad global goal, broken down into several sub-goals – the Good Life Goals. They provide the high-level goals against which sectors can develop their relevant action plans for meeting 2030 targets.

It is submitted that the SDGs particularly relevant to PU and more sustainable synthetic leathers are:

SDG12: Responsible Consumption And Production

Read more.

SDG13: Climate Action



Read more.

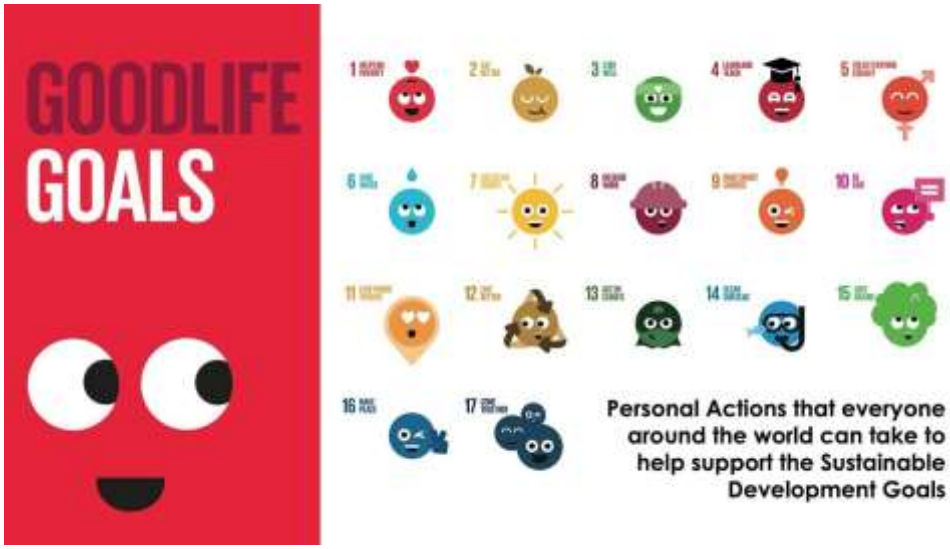
There are of course other SDGs which are relevant in general and likely to be specifically relevant to brands and retailers in the leather fashion market. So many areas for leadership.

One of the ways to help deliver the SDGs by 2030 is through the SDG Action Manager - a web-based impact management solution designed to enable businesses to take action on the SDGs through to 2030. To take advantage of it does require that a business be a Certified B Corp.

At Drapers Sustainable Fashion 2020, the UN and Conscious Fashion Campaign called on retailers to start a "Decade of Action" to achieve the SDGs by 2030.To do this though, brands and retailers now need to move from goal setting to implementing the changes that will achieve them.

4.2 UN Good Life Goals

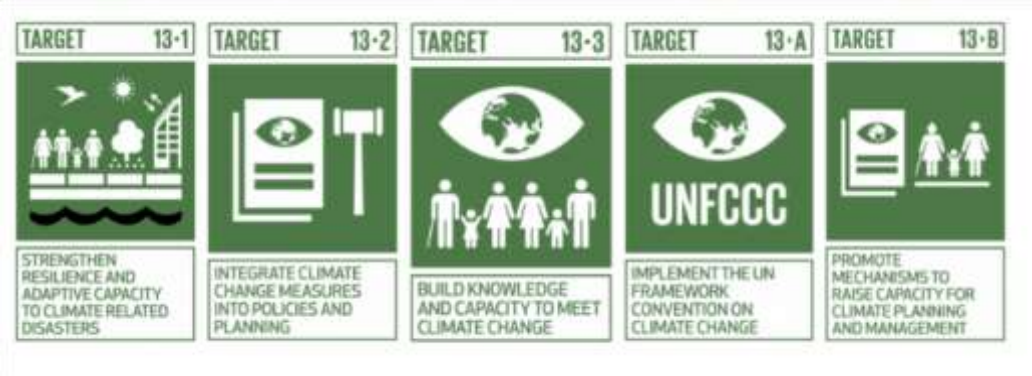
The Good Life Goals were developed as the blue-print for implementation of the SDGs. There are 5 Goals set out against each of the 17 SDGs - 85 ways any person and business can contribute towards the huge, planet-changing objectives that sit at the heart of the SDG agenda.



A component piece of developing the Good Life Goals was a research study which concluded that 96% of people feel their own personal actions, such as donating, recycling or buying ethically, can make a difference to helping make the world a better place and 88% of consumers expect brands to help them make a difference.

Good Life Goals for SDG 12

Good Life Goals for SDG 13



Chapter 5: Climate Change and Business

5.1 United Nations Global Compact

The private sector's contribution to sustainable development and achieving the SDGs is led by the UN Global Compact.

As the world's largest corporate sustainability initiative, it provides a framework to guide all businesses with its Ten Principles.

The Ten Principles relate to Human Rights, Labor, Environment and Anti-corruption. The Environment principles are:

Principle 7: businesses should support a precautionary approach to environmental challenges

Principle 8: undertake initiatives to promote greater environmental responsibility

Principle 9: encourage the development and diffusion of environmentally friendly technologies.

The UN Global Compact is the over-arching organisation leading the business initiative but the operations are conducted through the Global Compact Local Networks at the country level.

The UN Global Compact Local Networks are independent, self-governed, and self-managed entities. They enable companies to make local connections with other businesses and stakeholders from NGOs, government and academia and receive guidance to put their sustainability commitments into action. The Local Networks work closely with the UN Global Compact in New York and act as a point of contact for UN Global Compact signatories in a country.

To join the UN Global Compact in your country you need to be a large corporation or an SME with 10 or more employees. If those requirements do not apply to your 'micro enterprise' you can sign up to receive news bulletins and participate in events held by the network.

5.2 Australian Network of the UN Global Compact

The Australian Network of the UN Global Compact published its Pressures Report following the horror Australian 2019-2020 summer of bushfires.

The black summer of 2019-2020 saw the Australian landscape suffer unprecedented destruction. Climate change will continue to dramatically alter

the environment, threatening political stability, degrading entire ecosystems, displacing whole communities, and undermining business operations.

To respond, businesses will need to undergo drastic transformations, embrace emerging economic opportunities and deeply embed principles of sustainability. Businesses no longer have the luxury of time. They must step away from a business as usual approach and reposition themselves as more responsible and sustainably savvy.

The report outlines the key pressures facing businesses in 2020, and what companies can do to take advantage of the opportunities presented by the challenges in the Australian landscape to ensure their long-term viability.

Of particular relevance for businesses that make or sell fashion products made in PU is that consumers are more engaged in understanding a company's social and environmental values and whether the products are produced in an ethical manner when making a buying decision. Social and environment impact of a brand's supply chain is therefore critical. This is drawn out in the IPCC Report issued April 2022 when it identifies 'demand-side mitigation' as a relevant and achievable measure for meeting the 2030 target (see further Chapter 3).

5.3 Industry Collaboration on Sustainability & Chemical Control

Included in the collaborative bodies are entities set up as third-party verifiers for meeting specific sustainability criteria. As reported on later, some of these have come under scrutiny of achieving that objective.

- Bluesign®

A body which is gaining global collaborative fashion industry action is bluesign®. Founded in 2000, the organisation acts as an independent verifier of

companies to ensure trust and transparency. Supporting the fashion industry in its efforts to improve its sustainable processes, step by step, the focus is on consumer textile products along every stage of the supply chain. Getting toxic hazardous chemicals out of processing fabrics, minimising the harmful environmental impact of processes on water, energy and chemical consumption.

Bluesign® has compiled a list called FINDER which contains the details of 12,000+ positive chemicals from 190+ chemical suppliers which can be used in fabric processing. In October 2019 the FINDER list was added to the information on ZDHC as BLUESIGN became a contributor to ZDHC.

Bluesign® will verify a company's textile products to carry the bluesign® PRODUCT label. The business must have used the best technologies available, used resources responsibly and taken care to minimize the impacts on people and the environment.

Products that carry the bluesign® PRODUCT label can create confidence for consumers that they are supporting companies in their sustainable development and become a part of a unique movement for increasing sustainability in the fashion industry.

James&Co in August 2020 became the first brand globally to be approved as a bluesign® SYSTEM PARTNER for synthetic leather fabrics and the first brand in Australia to be so approved. This partnership recognises that James&Co will work with the suppliers of its leather fabrics to ensure the leather fabrics used for its outerwear contain no chemicals hazardous to the environment and people and the method of manufacture has minimal damaging impact on the environment, and the health and safety of workers.

We have been unable to pursue the work needed to achieve verification for brands producing lab-grown and plant-based leather synthetic alternatives. However the approval still exists for us to pursue the necessary steps.

- ZDHC (Zero Discharge of Hazardous Chemicals)

Roadmap to Zero is the collaborative blueprint of large brands and companies in the ZDHC global co-operative.

> *...to protect the planet by reducing industry's chemical footprint. That means working hand-in-hand with the entire value chain. We collaborate with global brands, chemical suppliers, manufacturers and other organisations that share our vision. Together we create a new way forward.'*
>
> *Its objective is to manage chemical inputs to ensure safer products, cleaner water and fresher air.*

The guidelines on chemicals used which are issued by leading global organisation ZDHC are complementary to Government regulation on chemicals in that they do not require mandatory compliance and whereas the EU regulations apply to chemical substances in finished consumer products, the guidelines of Roadmap to Zero apply to chemicals used in the manufacturing process.

Its Manufacturers Restricted Substance List contains the chemical DMF which is used to create the traditional PU. The guideline notes that textile and leather coating process have alternatives to the use of DMF - clearly including the process for traditional PU - and stipulates that where there is no alternative

...the deliberate use of [DMF] should be avoided and [its] presence in all formulations carefully monitored to ensured compliance with products RSLs and the EU regulation for chemicals.

The collaborative industry message to manufacturers is clear: do not make traditional PU as it contains DMF - make the alternative sustainable synthetic leather.

- Sustainable Apparel Coalition

Sustainable Apparel Coalition (SAC) is made up of over 250 leading apparel, footwear and textile brands, retailers, suppliers, service providers, trade associations, non-profits, NGOs, and academic institutions with the stated aim of 'working to reduce environmental impact and promote social justice throughout the global value chain.'

SAC developed the Higg Index suite of tools enables brands, retailers and facilities to measure and score a company or product's sustainability performance. It is said that the Index delivers a holistic overview that empowers businesses to make meaningful improvements that protect the well-being of factory workers, local communities, and the environment. And that with this data, the industry can identify hotspots, continuously improve sustainability performance, and achieve the environmental and social transparency consumers are demanding.

5.4 Assessment of Third-party Verification Organisations

Recent review entitled 'Licence To Greenwash' by the Changing Markets Foundation reported that 'the fashion sector is awash with certification schemes' Of the 100 schemes, the review examined 10 of the best well-known, including Bluesign®, ZDHC and SAC. All the schemes are voluntary and enjoy high degrees of cross-promotion.

Observations made in the review were:

- the fashion sector is one of the least regulated sectors in the world
- the schemes could be seen to partially exist as a genuine attempt to move towards sustainability in the absence of environmental legislation.
- there is no independent oversight of them
- fashion brand members exercise a large degree of influence over them
- they promote industry interests more so than consumer interests
- they are a key part of the greenwashing machinery of the modern fashion industry

The report rated the reviewed organisations, with the organisation coming in with the lowest rating being SAC and its Higg Index.

5.5 Other industry collaborations for sustainability

These organisations are by no means the only global organisations working with fashion brands, retailers and manufacturers for achieving greater sustainability.

- World Business Council for Sustainable Development.is a global company of 200 large international corporations who mission is
    - *...to accelerate the transition to a sustainable world by making more businesses sustainable and successful.'*

With realizing the UN Sustainable Development Goals as a key driver, their work program is divided into 6 streams including Circular Economy and Climate and Energy. Both highly relevant to brands and retailers of leather fashion products.

- Alliance to End Plastic Waste (AEPW) was formed in January 2019, the Alliance to End Plastic Waste was formed as a not-for-profit organization to develop, accelerate and deploy solutions, solutions that will unlock even more investment to help solve the magnitude of 8 million tons of plastic waste entering our oceans every year.
- A significant leader in the Alliance is Covestro which has led the development of the replacement for traditional polyurethane with sustainable non-toxic foam for WBPU and calls out regularly the commitment to the circular economy.
- Not to be under-estimated for sustainability collaborations are the certification body B Corp (and James&Co is happy to report that it is a certified B Corp). It is a certification that the business meets the highest standards of verified social and environmental performance, public transparency, and legal accountability to balance profit and purpose. B Corps are accelerating a global culture shift to redefine success in business and build a more inclusive and sustainable economy. Certification needs to be re-assessed every 3 years.
- There are also a growing number of industry collaborations focussing on sustainability from the perspective of the circular economy. One such is the Australasian Circular Textile Association (ACTA) which describes itself as Australia's first collaborative industry association to offer and facilitate complete circularity for the fashion and textile industry.
- Greenpeace and its 'Detox My Fashion' campaign aimed at getting fashion companies to eliminate hazardous chemicals from clothing production.

Chapter 6: Waste Management and Sustainability

6.1 Fashion disposed of in landfill

The most common method of disposing of PU waste is via landfill. It has been estimated that PU waste constitutes about 5% of the municipal waste, mainly derived from post consumer products – which of course includes clothing made in PU.

How to recycle PU rather than dispose of it via landfill has been the focus of study for some time (mechanical recycling, chemical recycling, energy generation) but without resolution. In fact, in our submission it is safer to take the view that PU cannot be recycled – and that includes traditional PU, WBPU and plant-based more sustainable vegan leather with WBPU component.

The design of textiles, products, systems and infrastructure with the aim of creating less waste is optimal — and by reusing, recycling and recovering valuable resources. This applies in the industry for PU fashion products. By changing the linear model of consumption to a more circular model, we can shift to a more sustainable course in which production continues to meet demand, supporting economic productivity while reducing our impact on the environment. This has been espoused in the recent IPCC reports (see Chapter 3) and is the focus of pending European Commission regulation (see Chapter 8).

6.2 Australian report and recommendations

A recent report on waste management in Australia makes very sound statements and recommendations applicable to the waste management in PU clothing (and likely all PU post consumer products). The recommendations are in conformity with those made by the IPCC and pending EU regulation.

The 'Towards a Waste Free Future' Report was released by ATSE on 18 November 2020. The focus of the status of waste management and recommendations for improvement was Australia. Whilst the differing approaches of other countries to dealing with identified issues of waste management was called out, it would be fair to say that at the generic level the identification of the issues which were the subject of recommendations would have global application.

In the context of this book and the need for the move for the fashion industry to ditch tailoring in traditional PU to the use of more sustainable lether™ fabrics, Recommendation 1 has particular application.

Recommendation 1 recommended steps to be implemented by all stakeholders – manufacturers and retailers, consumers, Government and researchers – to drive

> *'a paradigm shift to design for waste avoidance'.*

Across the recommendations was the focus on designing products with materials that would avoid waste.

Directed at manufacturers and retailers was the step to take advantage of circular economy principles to create more value from each unit of resource by, among other steps, designing products in materials that would avoid waste and creating and marketing products as sustainable, high quality and durable, thus promoting these features to consumers as desirable characteristics.

The fundamental role of consumers was also highlighted in recommending that they demand that businesses provide transparent data and information about the sustainability and environmental impact of their products or services (enforced by regulation if necessary). And use their market power to demand quality, accountability and sustainability from manufacturers and retailers.

And overall at a Government and research level that there be actions to promote waste avoidance and the circular economy (and hence sustainability) in consumer behaviour.

The recommendations are consistent with relevant issues reported on in the Australian Network of the UN Global Compact Pressures Report following the horror Australian 2019-2020 summer of bushfires (see Chapter 5.2).

The recommendations are also consistent with the focus on textiles in the pending regulation of the EU (see Chapter 8) and with the observations noted in relation to the fashion industry about the IPCC 2021 Report (see Chapter 3), especially:

> *beyond switching to sustainable materials, brands need to consider entire product lifecycles, including switching to clean energy and planning for end-of-life options that don't involve a landfill and can instead be part of regenerative ecosystems*

6.3 Initiatives for keeping fashion out of landfill

Since the 1st edition of this book, initiatives around the globe to address end-of-life issues and circular economy objects have been developed. James&Co entered into partnership with circular fashion movement initiative AirRobe.

AirRobe provides the way for buyers of a James&Co product to pro-actively choose to wear it now and re-purpose it later – to re-sell it, rent it, donate it, find upcycle and recycle opportunities. The life of the product is extended and it does not end up in landfill.

This initiative is critical for James&Co as we tailor at present in the more sustainable vegan leather textiles of WBPU and plant-based fabrics with WBPU component. As these textiles and our products are not biodegradable, the attention to end-of-life issues is needed.

We will be tailoring in the emerging textils which are sustainable and biodegradable, however that does not dispense with the need to extend the life of products offered by re-selling, renting etc.

AirRobe calculates that by selling or wearing just one pre-owned fashion piece, there are the following offsets: 19kg of C02 emissions, 95 litres of water, 2kg of textile waste.

The AirRobe focus on diverting fashion from landfill is in essence creating a new way to shop and extending the life of a purchase. As summarised in their Mission Statement:

To create a circular economy by building a network of designers, retailers and consumers who are transitioning e-commerce into re-commerce.

Chapter 7: Desperately Seeking Funding

7.1 Investment funding for fashion climate change transformation

It has been said very loudly from a number of sources that investor founding for the fashion and textile industries is an essential to 'transform' as required to meet climate change goals.

> *As sustainability rises to the top of the fashion industry's agenda, the question of how fashion companies will transform to achieve a sustainable operating model becomes pivotal. Progress to date falls short—and winning in the next decades will require disruptive innovation in the form of new materials, processes, technologies, and business models. Although an expanding innovation pipeline has emerged, only a fraction of all available capital reaches fashion and textile tech, leaving many innovators stuck in the financing gap, unable to advance their solutions to market.*
>
> Boston Consulting Group

The report from which the above quote is taken estimates that the fashion industry is at least $1 trillion short of the total investment needed to decarbonise the industry by 2050 – in line with commitments at COP26.

Another report released at the same time *Unlocking the Trillion-Dollar Fashion Decarbonization Opportunity* breaks down the $1 trillion funding needed by solution category and identifies the types of funders best placed to take advantage of the opportunity and benefit from the positive returns.

It says that the funding program will require a committed and coordinated effort by brands, manufacturers, philanthropy, government and industry organizations.

The recent IPCC reports highlight the barrier to achieving mitigation strategies posed by inadequate financial flows.

7.2 Coronavirus, sustainability and funding

Image taken at Drapers Sustainable Fashion 2020 where the UN and Conscious Fashion Campaign called on retailers to start a 'Decade of Action'.

The financial impacts of the coronavirus have highlighted the imperative for business to build sustainability into current business plans and their resilience plans for their future financial stability and survival.

> *If you don't have sustainability as part of your story, you'll get left behind.*
>
> John Miesner, debt advisory director at KPMG

There has been significant publicity for a recent fundraising by VF Corporation, owner of brands including Vans, Timberland and The North Face, for funds for projects to meet its sustainability targets. Projects including sourcing 80% of its materials from regenerative, responsibly sourced renewable and recyclable sources by 2030.

The fundraising launched a 'green bond' and raised 500m euros (SD560m) from a diverse group of investors from around the world.

Analysts have said about the fundraising that it is a sign that sustainability in the fashion industry is no longer a 'nice to have' but a mainstream and fundamental foundation from which forward thinking brands and retailers will be able to attract investment and be able to attract customers as they demand more ethical and environmentally friendly products.

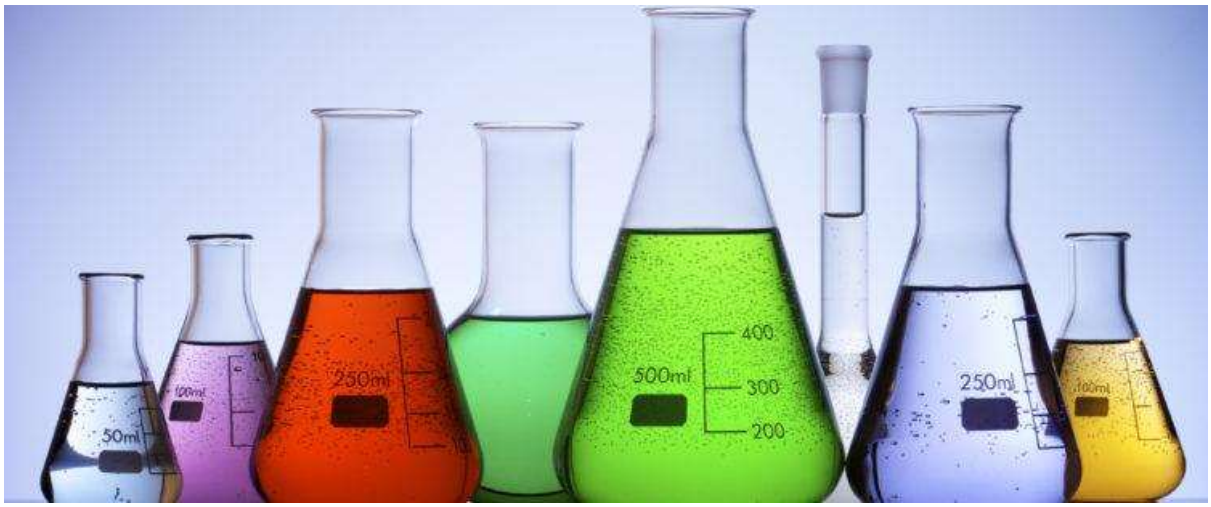
The fundraising success is also seen as a sign that the coronavirus crisis has focussed attention as never before on the need to eliminate waste from their business in line with the UN Sustainable Developments Goals. As reported on in Chapter 3 of this book, the SDGs were established by the UN in 2015 as a blueprint for working towards a better future for all, comprising 17 goals relating to issues including poverty, gender equality and environmental preservation.

And that if funding is sought from investors to weather crises like the coronavirus, potential investors will be looking at the business' investment in environment, social and governance (ESG) policies and whether the business' books are 'green enough' as a reason to invest.

They will also be look at the sustainability goals set by the business – and at the investment in the actions being taken to implement and achieve those goals.

In short – sustainability and finance need to be inextricably linked in their business plans. Sustainability is far from a fad and requires realistic targets and actions that will stand up to scrutiny from governments and investors in the long run.

Chapter 8: Government Regulation and Pending Regulation



Government regulations controlling businesses' activities in their sustainability operations are by no means global but the trend is upward.

The European Commission has been a leader in regulating and impacting the fashion industry engaged in products manufactured in vegan leather that is traditional PU. Never more so than the interlinked initiatives in the European Green Deal released in March 2022 of the proposed regulatory framework for 'making sustainable products the norm' (see further below).

8.1 Regulation of the harmful chemical solvent DMF

One of the initial catalysts for leather made in PU to end and to be replaced with more sustainable synthetic leather textiles has been regulation of the harmful chemical solvent DMF. As explained earlier, DMF is the solvent required to create the chemical reaction to create PU foam.

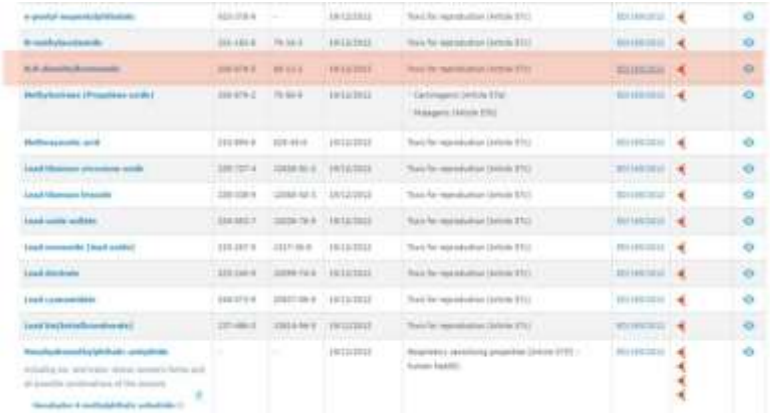
If you are a company established in the European Union and you import leather products made with PU into the European Union, you are likely to be subject to requirements set under the European Union's Regulation Concerning the Registration, Evaluation, Authorization and Restriction of Chemicals Application (REACH).

The application to the products will be because the leather product contains the chemical solvent DMF.

REACH is the European Commission Regulation on chemicals and their safe use. The Regulation specifies those chemicals whose use is either strictly limited or else banned because of their impact upon human health and/or the environment. Certain chemicals therefore must be specifically registered because of the risk they pose while others are banned and not allowed to be placed on the European market at all.

The Regulation does not apply just to the manufacturers of the restricted chemicals. It applies to importers who bring in any product which contains the restricted chemical so it therefore applies to most companies across the EU.

DMF is listed as a Substance Of Very High Concern (SVHC) in REACH. The impact of this listing is that it is not banned but potentially could be at some time and potentially be subject to the need for authorisation to use it. The possibility of this has risen with the April 2022 release of regulations for 'making sustainable products the norm'.



REACH places the burden of proof on companies. To comply with the regulation, if you import a PU leather product you must register the products you import and market in the EU and demonstrate to ECHA (European Chemical Agency) how the substance can be safely used, and you must communicate the risk management measures to the users.

If the risks cannot be managed, authorities can restrict the use of substances by banning it or making it subject to a prior authorisation.

A company established outside the EU, is not bound by the obligations of REACH. The responsibility for fulfilling the requirements of REACH lies with the importers established in the European Union, or with the only representative of a non-EU manufacturer established in the European Union.

Government concerns about the impact of DMF has also seen growing regulation around its use in consumer products in countries in addition to the EU. The American Chemistry Council notes that US Government regulation of chemicals including DMF is driving the use of WBPU in industrial and commercial applications.

8.2 Regulation for making 'sustainable products the norm'

In March 2022, the European Commission issued the European Green Deal, a series of interlinked initiatives with the aim of 'making sustainable products the norm'.

> *'The initiatives on sustainable products aim to ensure that by 2030 a significant part of products available to EU consumers will be designed to be durable and energy- and resource efficient, reparable, recyclable, and with preference for recycled materials…. The proposals in this package have the potential to bring the EU significantly closer to reaching the UN's 2030 Sustainable Development Goals, provided that their level of ambition is maintained and they are swiftly and effectively implemented.'*

8.3 Eco-design for Sustainable Products Regulation (ESPR)

The cornerstone of the proposed regulatory framework, the ESPR will regulate how products within its purview are made. It lays down a framework for setting ecodesign requirements based on the sustainability and circularity aspects listed in the Circular Economy Action Plan , including energy use, recycled content, presence of substances of concern, durability, reparability, including a reparability score, spare part availability and recyclability.

Within the targeted products to be regulated under the ESPR are textiles, described as 'products with most significant impacts on the environment and climate'. Textiles have been identified as a product with an urgent need and strong potential for the transition to sustainable and circular production, consumption and business models. The targeted regulation of textiles and textile products has 'the aim is to transform this sector and change not only textile design but also boost circular business models and reduce textile waste...

The EU Strategy for Sustainable and Circular Textiles when in place will cover PU and all synthetic artificial leathers. The textiles will be subject to the binding product-specific ecodesign requirements in the Ecodesign for Sustainable Products Regulation.

It is noted that requirements relating to the following will likely have consequences on the presence of PU and WBPU products in the EU:

- legislative action to restrict the presence of chemicals in products, which can complement existing law governing chemicals, such as REACH. The chemical DMF, which is in traditional polyurethane (PU), is a chemical of high concern in REACH. Legislation to restrict its presence may will have the impact of ending PU textile for leather-look products.
- legislated rules for restrictions on the presence of substances that inhibit the circularity of products and materials. These may also impact PU as above. Such a regulation will also impact more sustainable synthetic leathers made from WBPU and plant-based textiles which contain WBPU (Pinatex pineapple leaf leather, cactus leather et al) because it is

WBPU which prevents the biodegradability of the more sustainable (ie minus DMF) textiles.

8.4 Other regulatory developments around the globe

On a broader regulatory front, actions to note are:

In the US, DMF is regulated under California Proposition 65. The Proposition 65 List contains a wide range of naturally occurring and synthetic chemicals that are known to cause cancer or birth defects or other reproductive harm. These chemicals include additives or ingredients in pesticides, common household products, food, drugs, dyes, or solvents. DMF was listed in 2017 as a cause of cancer.

Again, in the EU, it has been announced that European Union regulations will require investment managers to disclose how they have integrated sustainability risks into their investment decisions by the end of 2020.

While there is no framework for what must be reported, investors must create a due diligence policy for how their investments have an adverse impact on sustainability. This will not be a requirement for UK investors, but brands seeking finance from sources in the EU will need to be aware of the regulation.

In the UK, the Financial Conduct Authority (FCA) has called for all listed companies to improve their climate-related disclosures by signing up to the standards of the Task Force on Climate-Related Disclosures by 2022. The global standard was set out in 2017 and includes making the disclosures in their main annual financial filing, and disclosing scope 2 and scope 3 greenhouse gas emissions, which come from indirect sources, as well as scope 1 emissions, which come from directly owned or controlled sources.

The framework is voluntary, but the FCA's intervention will now compel listed UK companies to comply or justify why they have not from 2022. The FCA has also said it is considering expanding the remit to more businesses.

Chapter 9: Growing Consumer Demands For Sustainability & Growing Markets: Imperative & Opportunity

9.1 Research reports regarding consumer demand for sustainability

Recent research reports reinforce that consumers want to buy sustainably. The conclusion to be drawn from all reports is that there is both an opportunity and a necessity for brands and retailers to work with consumers to raise their awareness about the availability of sustainable products and brands and their support for purchasing sustainable fashion.

In Drapers' report What will post-pandemic shopping patterns look like? analysts and retailers shared their expectations that consumers will be inspired by the positive impact the pandemic has had on nature and be keen to support retailers who took an ethical and philanthropic approach during the crisis.

There is no doubt that consumers are more engaged in understanding a company's social and environmental values and whether the products are produced in an ethical manner when making a buying decision. Social and environment impact of the brand and its supply chain is therefore critical.

The findings of a research report by Futerra released in October 2018 were instrumental in helping develop the Good Life Goals for implementation of the UN Sustainability Development Goals. Read more about SDGs and Good Life Goals.

That report found that 96% of people feel their own personal actions, such as donating, recycling or buying ethically, can make a difference to helping make the world a better place; and that 88% of consumers expect brands to help them make a difference.

The conclusion to be drawn is that there is both an opportunity and a necessity for brands and retailers to work with consumers to raise their awareness about the availability of sustainable products and brands and their support for purchasing sustainable fashion.

The Lenzing Group, a leader in sustainably produced wood-based specialty fibers, announced findings from its Global Consumer Perception Survey on Sustainable Raw Materials in Fashion and Home Textiles in September 2020. The survey, which was conducted in early 2020, assessed the perceptions and behaviors of Conscious Consumers towards sustainable clothing and home textile products, as well as their views towards sustainable raw materials and product features.

9,000 respondents across nine countries aged between 18 and 64 were surveyed using online questionnaires.

The three key findings of the survey:

- Conscious Consumers actively engage in pursuing a sustainable lifestyle and are constantly educating themselves about raw materials

86% of respondents believe purchasing clothes made from sustainable raw materials is a key component of living a more sustainable lifestyle.

80% said they frequently purchase products from brands that are committed to using sustainable raw materials and 77% purchase recycled materials in their products.

76% of respondents actively learn about sustainability through researching the production process of clothing products before purchasing.

88% read label hangtags on and most respondents are willing to pay an average of 40% more for clothing or home textile products with descriptions that reflect sustainability.

When shopping for clothing and home textile products, 44% of respondents consider the material type to be their most important, which is above price, design, brand reputation and function.

- Products described as 'Eco-friendly' or 'Natural' with a 'Biodegradable' or 'Recyclable' afterlife appeal to consumers

Over 80% of respondents said that they are "extremely interested" or "very interested" in sustainable fashion and purchasing clothing made from sustainable raw materials.

When asked about definition of sustainable clothing, respondents considered products being processed or manufactured using humane, eco-responsible production processes and products made from natural, organic or botanic materials as top considerations.

50% of respondents said they would be more likely to purchase a product described as "eco-friendly" or "natural", whereas over 60% of respondents are more likely to purchase products with a "recyclable" or "biodegradable" afterlife.

- Brands with greater transparency on raw materials and ingredients can gain consumer trust

83% of respondents considered brands that are transparent with their ingredients as trustworthy and 82% considered brands that are transparent about the origin of their raw materials as trustworthy.

82% of respondents also consider brands that are transparent about their production processes, 81% about their sustainable practices and 82% where their raw materials come from as trusted brands.

87% respondents believed that knowing what raw materials were used in their clothing and home textile products is important to build confidence in a brand as well as they also knowing the brand's environmental impact when deciding to purchase.

The key findings of the Lenzing survey provide insight into consumer habits towards pursuing a sustainable lifestyle, their knowledge of the raw materials used in clothing and home textile products, their perception towards brands and preferred product descriptions.

The findings also reflected the imminent need for closer collaboration within the clothing and home textile industries to provide consumers with more transparent information about the products they purchase, to enhance consumer trust and maximize business potential.

Given the popularity and resonance of terms 'eco-friendly', 'natural', 'recyclable' or 'biodegradable', there are opportunities for brands to provide more descriptions and greater clarity to the materials, production processes and product afterlife information to their products as consumer education.

A rallying cry for change has also come from protesters such as Extinction Rebellion and organisations such as the Conscious Fashion Campaign, a partner of the United Nations, in December, which engages global industry events to commit to the achievement of the United Nations' Sustainable Development Goals (SDGs).

A report released in 2021 by Baptist World Aid Australia The Australian Ethical Consumer Report is a research and survey report into the drivers of Australian fashion consumers and impediments to more ethical and sustainable fashion buying.

- **Key motivations for Australians when making purchasing decisions**

The top 3 influences for Australians when making fashion purchasing decisions are:

- quality
- low price
- suits my taste

Out of the top 10 influences, 'sustainable brands' as a key motivator rates no 7 and 'ethical brands' rates no 8.

- **Australians want to change their fashion consumption habits**

The research report found that, whilst the key drivers for purchasing decisions were those set ou above, many fashion consumers want to change those buying habits.

- almost 3 in 4 Australians (73%) strongly or somewhat agree that ethical fashion is important
- 87% want to change their fashion buying habits to consume more ethically in the future

- **Main barriers for Australians changing fashion consumption to consumer more ethically**

With 87% of consumers wanting to consumer more ethically, what is stopping them? The report found that the top 3 barriers for Australians to shop ethically for fashion are:

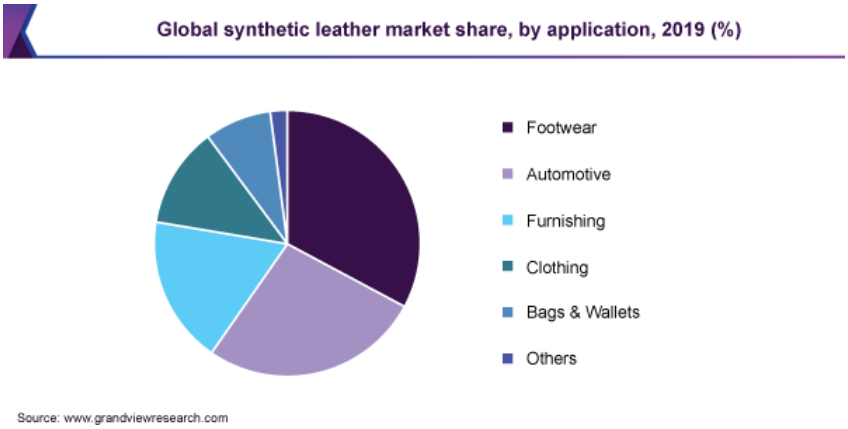
- I don't know what brands are ethical (37%)
- It's too expensive (33%)
- I believe it's harder to shop ethical in store (26%)

This report confirms again that there is both an imperative and an opportunity for brands and retailers to work on raising awareness of consumers about the sustainable brands to promote and grow their desire to purchase sustainably.

9.2 Growing vegan leather market

According to experts, the vegan leather market is expected to continue to grow rapidly in the future, reaching a market volume of USD 85 billion by 2025. The main driver for this growth is the paradigm shift away from animal leather to artificial vegan leather fabrics that are plant-based or lab-grown. The

demand for vegan leather is seen in applications across furnishing, automotive, clothing, bags, shoes and others – as reflected in this chart.



The experts say that the soaring demand for leather is driven by a range of factors including the evolving consumer trends for not-real-leather fashion and sustainable choices mounting concerns over the impact of PU vegan lether on the environment, rising awareness regarding the attributes of leather– including the sustainable attributes of plant-based leathers which are being released and the manufactured leathers without chemical solvents and which are bio-degradable.

Read more and Here and Here

There is no doubt there is a large opportunity for retailers and brands with the growth of vegan fashion. There is also the additional opportunity to offer the products which are both vegan and sustainable. An opportunity made possible with the development of WBPU to replace the toxic traditional PU.

The demand for vegan fashion is growing exponentially - in line with the growth of veganism globally.

Just one indicator of this are keyword online searches for 'vegan', 'vegan leather', 'vegan fashion'. In March 2019 Lyst reported that searches for “vegan leather” increased by 119% since October 2018 and the term “vegan fashion” was responsible for over 9.3 million social impressions.

9.3 Growing vegan women’s fashion market

The growth in women’s vegan fashion is a growing fashion sector on its own. On one view, the growth in vegan fashion is attributable to the growth in

individuals choosing the vegan lifestyle. On another view, the growth in vegan fashion reflects the growth in a new category of vegan fashion in the fashion industry. As the fashion industry responds to changing consumer attitudes demanding a more environmentally sustainable and animal-friendly type of fashion.

The market leader in vegan women's buying was beauty products with a staggering response to the demand for cruelty-free not-tested-on-animals products:

> *...of all the new vegan items launched in the UK last year, a staggering 82 percent belonged to the beauty category. The beauty sector was also responsible for 40 percent of vegan product launches in the US and 62 percent in Germany last year.* Fashion United

The next fashion sector to respond to growing demand for vegan products was the shoe industry:

...vegan shoes accounted for 32 percent of the footwear market in the US last year, up from 16 percent in 2017...vegan footwear accounted for 16 percent of the total UK market in 2018, up from 15 percent in 2017.'
Fashion Network

The growing demand by consumers for vegan products goes hand in hand with rising consumer expectations that the seller of the products can attest to the fact that the products are indeed vegan.

The recent release by the British Retail Consortium of Voluntary Guideline On Veganism In Fashion stated this as the reason for drafting and releasing the Guideline:

Consumers wishing to purchase vegan products are looking for assurances from retailers in the form of certification, labelling, or registration. However, retailers will need to consider all relevant impacts of any alternative materials used in vegan products. Note that in respect of labelling for sustainability, concerns are expressed about third-party verifications (see Chapter 5).

9.4 Growth In Biobased Leather Market

The global market for biobased leather ie non PU is forecast to grow at a CAGR of 47%.

The biobased leather market was estimated to be valued at $236.0 Million in 2020.

The growth rate is 47.0%, with an estimated value of $3500.0 Million by 2027.

PART C: Evolving More Sustainable Leather Fabrics

Chapter 10: Biobased more sustainable artificial leather

10.1 Introduction

In the previous chapter, we discussed the hugely growing biobased leather market. Biobased leather started as the alternatives to PU, being WBPU and plant-based plus WBPU textiles. Now with the evolving synthetic leather fabrics being developed without WBPU that category includes these new sustainable and biodegradable artificial leather textiles.

The development of textiles as leather-look materials needs to be seen as a continuum:

1. PU – the original vegan/faux leather that was discovered to contain harmful chemical DMF and be toxic to the environment and workers

2. WBPU – the synthetic leather which stopped the use of DMF and was kinder to the environment and animals, although it still required the use of fossilfuels to attach to the underlying fabric. More sustainable than PU but not recyclable or biodegradable.

Plant-based + WBPU – innovative leaders using waste from plants: Pinatex pineapple leaves, cactus leaves, apple skins, grape waste, and such. Made with WBPU as a component to some extent due to the need to attach to underlying fabric. More sustainable than PU but not recyclable or biodegradable.

3. Artificial leather that is 100% sustainable – innovative technologies evolving now, now all at commercial stage, which are both sustainable and biodegradable as no WBPU or fossilfuels included.

As explained earlier in this book, the imperatives for finding alternatives to PU are grounded in the harmful effects of that synthetic material in its composition and manufacture. Specifically, the ingredient of the toxic chemical DMF, the environmental effects on carbon and water due to its manufacture and the subsequent effects of its plastic composition on waste decomposition.

The country that leads in the manufacture of PU is China.

> *About 4 billion square meters of PU coated fabrics are produced globally each year. And PU-coated fabrics produced by China as the manufacturing center of the world account for 90% of the total.*
>
> Kaiyue Technology

Aware of the impacts of PU on the environment, technology companies and factories that make traditional PU in China has been expansive in the R&D required to make the sustainable changes to the fabric. Among the 8,000 high-tech enterprises in China's Silicon Valley - the Zhongguancun Science & Technology Zone - are many companies dedicated to producing the alternatives. Starting with 'waterbased PU' or WBPU.

The National People's Congress is working on more policies to implement legislation which will add more requirements to the expanding environmental regime. Indeed, there are views that China will completely prohibit producing traditional PU by 2030. In its observation on 2021 trends, Kaiyue Technology stated:

> *In the future, apparel fabrics will move towards sustainable development and environmental protection. Water-based clothing leather. The new ecological and environmental protection water-based PU clothing leather will be fully*

available, subverting the traditional PU, no carcinogen DMF, no formaldehyde, no benzene and other harmful chemicals.

In addition to the work being undertaken in R&D centers and factory laboratories for replacing PU with more sustainable leather, there has been much work being undertaken by innovators relying on plants to be the foundation of more sustainable leather fabrics (described as 'plant-based).

A common issue with all new alternatives is their suitability for tailoring apparel. That is, the fabrics need to be of a density that is thin enough for stretch and all other qualities for apparel. The thicker fabrics are easily adapted to making shoes and fashion accessories like bags as well as other industries like upholstery and automobiles. Fortunately, the technologists have been hard at work and the alternatives are increasingly suitable for apparel.

A point to make about WBPU and the plant-based leather alternatives that have been gaining market traction is that, while significantly more sustainable and environmentally-friendly than PU, none of them are as yet biodegradable.

WBPU does not contain the hazardous chemical DMF as PU does, but its manufacture still requires the application of some fossilfuels – mostly petroleum-based products – and hence is not bio-degradable. There is work ongoing to proceed without petroleum but is still in transition.

The plant-based alternatives are also not bio-degradable. They require the input of a coating of WBPU to some degree as the resin for the fabric. When WBPU can be made without fossil fuel requirements then biodegradability for these more sustainable leather fabrics will be achieved.

So it is that whilst there have been enormous strides forward, the pathway for these sustainable leather to be fully part of the circular economy is still a transitional one.

And it highlights that making the textiles for fashion more sustainable is a solid move, it is only half of the action required. Many commentators now call on the fashion brands to put focus on the end-of-life disposal of the products so that they do not end up in landfill or oceans.

10.2 WBPU

The earliest lab-grown alternative to PU faux/vegan leather was developed without the use of the hazardous chemical solvent DMF. The full name of the fabric is water-based polyurethane synthetic leather and is variously known as ecological synthetic leather, waterbased PU, waterbased PU leather, waterborne PU, waterbased synthetic leather, or DMF-free PU. WBPU is the usual abbreviation.

WBPU uses water instead of organic solvents and does not contain the harmful chemical DMF. There is no pollution during the production process and zero emissions of hazardous chemicals. These are its characteristics:

- high strength, thin and flexible, soft and smooth, good air permeability, no odor, and waterproof
- it still has good tensile strength and disturbance strength at low temperature and has good light aging resistance and hydrolysis resistance stability
- abrasion resistance, appearance and performance are close to natural leather, easy to wash and stain, easy to sew
- the surface is smooth and compact and can be used for various surface treatments and dyeing. The variety and price are relatively low
- water absorption is not easy to swell and deform
- zero emissions of hazardous chemicals.

Read more.

There is more than one technology implemented by the companies manufacturing the more sustainable WBPU, but the commonality is that WBPU does not use the toxic solvent DMF and so eliminates worker exposure to DMF, reduces energy consumption by 55% by avoiding heating water and multiple drying steps and although the new process is a water-based method, uses 95% less water than the DMF process.

WBPU was the first more sustainable fabric James&Co used to tailor its outerwear products as it led the way to ditch traditional PU fabric for more sustainable fabrics.

WBPU is welcome as an eco-friendly alternative to solvent-based traditional PU. However, as already noted, its manufacture still requires the application of fossil fuels – mostly petroleum-based products or plastic –and still emits high levels of CO2 in manufacture.

Hence WBPU is not biodegradable. Climate change, circular economy and end-of-life disposable issues still need attention. Read more.

10.3 Plant-based synthetic leather

Plant-based synthetic leather is in essence a further increment or variant development of a synthetic fabric to replace PU.

The fabrics are plant-based because they contain to varying degrees components of plants or plant waste – pineapple, grapes, apples, cactus leaves, mushroom.

One of the great things about plant-based synthetic leather fabrics is that they make use of what would otherwise be agricultural waste products. Additionally, they can – like Pinatex pineapple leaf leather - support farming communities by providing extra income for materials that they previously threw away and employment income as part of the supply chain for the fabric.

But the fabrics are not composed entirely of that particular plant. Most contain WBPU as an ingredient to some degree and is required as resin.

There continues to be the need for focus on end-of-life for these more sustainable plant-based leather fabrics to avoid disposition in landfill or

incineration and address the issues of waste management and circular economy.

- Pinatex pineapple leaf leather

An early leader in plant-based leather alternative was Ananas Anam with its Pinatex brand of pineapple leaf leather.

Piñatex is woven from the long fibres in pineapple leaves, the by-product of the pineapple industry, which are traditionally discarded or burned. The fibres in the leaves are fine, strong and flexible. They are harvested and stripped by pineapple farmers in the Philippines.

These fibres are then washed, purified and dried. The resulting fluff-like pineapple leaf fibre is mixed with a corn-based polylactic acid and transformed through mechanical processes into a non-woven mesh.

The fibres are turned into a mesh and finished into Pinatex in Spain. A resin top coating of WBPU gives it additional strength, durability and water resistance, and colour is added using GOTS certified organic pigments.

Pinatex is not biodegradable. FAQs on the website state that Pinatex is not 100% biodegradable. It contains 80% pineapple leaf fibre and 20% PLA and the resin used is a water-based PU resin (ieWBPU).

Another company making lether based on discarded pineapple leaves and other agricultural waste is Nova Milan. Based in Costa Rica which is the world's largest exporter of pineapples, leaving behind a lot of plant fibre waste – up to 5 million tonnes per year – that could be used to make vegan leather. Any plant material not used to make leather gets turned into fuel or natural fertilizers, which they donate to participating farmers.

The company's mission is to turn Costa Rica into the world leader of the emerging plant-based leather economy and to contribute towards achievement of global SDGs. In July 2021 the company opened its Innovation Center, located in Alajuela, Costa Rica. The center will highlight Nova Milan's plant leather, sustainable fabrics and bioplastics produced from organic plant waste such as banana, coconut, yuca and pineapple.

Nova Milan claims that, unlike other plant leathers, their plant leather is 100% biodegradable and that they are the 'first full supply chain ecosystem creating petroleum-free, plant based vegan leather at scale'.

- cactus leaf leather: Desserto

Synthetic leather made from prickly pear cactus leaves in Mexico is called Desserto.

The mature leaves of the cactus plant are cut and dried under the sun for three days until achieving the exact humidity levels required. There is no oven or additional energy like gas used in the drying process. The organic raw material is then used to make cactus leather.

There are no herbicides nor pesticides used in growing the cactus, there is no irrigation system for the cactus as it grows with rainwater and the earth minerals which are rich in Zacatecas.

On its website, Desserto sets out an early life cycle assessment comparing the sustainability impacts of its manufacturing process to those for real leather and traditional PU. In short, much less carbo-intensive, greenhouse gas emissions, less water usage, less waste generation.

Is it biodegradable? The answer is no. The fabric is not 100% plant and contains varying degrees of WBPU. The brand is working on decreasing the amount of WBPU in the fabric but it is not there yet.

- grape-waste VEGEA

VEGEA fabric is made in Italy. It is a plant-based leather material.

You will not see the word ‘leather’ in connection with the fabric. The word 'leather' does not appear in its title or any of its texts because legislation passed in Italy in 2020 forbids the use of the word 'leather' in any way to describe materials not derived from the remains of animals - including its use in conjunction with other terms such as eco leather, vegan leather, faux leather (see Chapter 1).

Its manufacturer describes VEGEA as a 'vegan coated fabric' with its name coming from the combination of VEG (Vegan) and GEA (Mother Earth). The term ‘biomaterials’ is also a description:

> *‘We develop plant-based alternatives to fully synthetic oil-derived materials for fashion, furniture, packaging, automotive & transportation. By leveraging the use of renewable resources as an alternative to non-renewable fossil ones, our production processes are based on the exploitation of biomass and vegetable raw materials.’*

The fabric is developed by a process for converting wine waste known as grape marc - that is grape skins, stalks and seeds discarded during wine production - into a textile.

Approximately 70% of VEGEA is the grape waste, with a significant coating of WBPU. Hence, it is not biodegradable.

- apple leather

Apple waste is being taken up by increasing number of companies to make apple leather.

One pioneering Italian company is Frumat which makes AppleSkin™ from apple waste in the Tyrol region of northern Italy. Harvested apples are pulverised in juice and made into jams. When making juice or jam, the seeds, stalks and skins of apples can't be used.

Before apple leather these left-overs were discarded. Now they are crushed and turned into a mushy pulp and made into a dried powder. The powder is then mixed with a resin – WBPU – and turned into apple leather.

The apple leather fabric is approximately 50% apple waste and 50% WBPU. Therefore whilst its manufacture is less harmful to the environment it is not biodegradable.

A company in Denmark has also embarked on the manufacture of apple leather. Made by Beyond Leather, the fabric is called Leap™. It is said that this fabric is more advanced than other plant leather because the product process is highly energy-efficient and uses 99% less water and 85% less C02 than traditional leather production (no comparison on the website with traditional PU). Also there are no harmful substances used in the manufacture and it is designed with a 3-layer structure, enabling the fabric to be broken down for appropriate end-of-life disposal. On the Beyond Leather website is a roadmap which sets out 2022 as commercial availability with 80% biobased ingredients leading to 2024 with the claim of 100% biobased ingredients (ie presumably no WBPU).

- mushroom leather

One type of mushroom leather is being produced by Italian research and development company Grado Zero Espace under the brand name Muskin.

Muskin is produced using a specific type of non-edible mushroom called Phellinus ellipsoideus. It is native to subtropical forests where it is considered a pest for feeding on certain tree trunks, causing them to rot. Which is another plus for mycelium leather – finding solutions for not one but two ecological problems.

Mushroom leather is grown from mycelial cells which are specially cultivated to result in a supple and robust leather alternative.

Muskin is said to be 100% vegetable and without toxic and chemical substances. Hence it is both sustainable and biodegradable.

Another brand of mushroom leather is Mylo™, the product of US biotechnology company Bolt Threads.

The fabric is made from mycelium, specially grown and harvested to result in mushroom biobased leather. Its website says that it is not biodegradable because, although not using fossilfuels or petroleum-based products, it is not plastic-free.

First products made in the textile were released in early 2022.

A good summary on work underway on leather fabrics made from bananas, bananas and coconut, apples, mushrooms, teak leaves is in in this Peta blog.

10.4 100% sustainable synthetic leathers

Starting to come onto the biobased leather market now are the textiles made without WBPU or petroleum derivatives.

In the previous sub-chapter we referred to companies Nova Milan and Beyond Leather, which say that their plant-based fabrics under development will be 100% biobased ingredients and no fossilfuels as resin.

Here are other biobased leathers in the top third of the continuum, at different stages of commercialisation.

- MIRUM®

- MIRUM® is a plant-based plastic free WBPU-free biobased leather developed by US company Natural Fiber Welding (NFW).

Said to be made only from natural inputs, it has low environmental impact and is recyclable.

James&Co has been in contact with NFW and will tailor a pioneer product in MIRUM® in partnership with them.

- Bananatex®

Bananatex® is the made purely from the naturally grown Abacá banana plants. Cultivated in the Philippine highlands within a natural ecosystem of sustainable mixed agriculture and forestry, the plant is self-sufficient, requires no pesticides, fertilizer or extra water.

Years of research and development resulted in a new material that meets environmental, economic and social sustainability. A truly circular fabric. alternative to the synthetic fabrics that dominate the market today.

Bananatex® is used to make a collection of bags for Qwstion.

In December 2021 the Bananatex® fabric was verified by Cradle to Cradle as Certified® Gold.

- Celium®

Celium® is leather-look textile made by Polybion® from agroindustrial food waste in Guanajuato,Mexico. It is a lab- grown bacterial cellulose membrane.

The environmental benefits are said to be that it uses 5% of the water used to produce conventional leather, uses only 10% of the energy used to produce conventional leather, No deforestation.

It is at the early stages of development and commercialisation. Says that it 'will drive positive consumer behaviours and sales in the long run' – which of course is the demand-side mitigation focus called out by the IPCC, European Union and other reports referred to in this book.

PART D: CONCLUSION

Chapter 11: Conclusion

It is now beyond doubt that fashion textiles and the fashion industry need to undergo 'urgent transformative action' to get rid off textiles that impede the ability to limit global warming to less than 1.5% degrees Celsius by 2030. Getting rid of toxic PU is a climate change mitigation action.

The recent 3 IPCC reports, the fashion industry response, and the proposed regulatory reform to 'transform' the textile industry in the EU are unequivocal.

The manufacturers of synthetic leather in the supply chain have been innovating over recent years and receiving funding for their developments to get to commercialisation. Very positive and welcome advancements.

Fashion brands need to be also financially supported to tailor their fashion products in the more sustainable textiles for advancing climate change mitigation.

There needs to be collaboration at all levels of the supply chain to make the transformative change away from the toxic PU to the sustainable vegan leathers. Brands and retailers need to collaborate to get the message out to consumers about the sustainable leather alternative fashion products available and encourage the switch. Demand-side mitigation for climate change.

The fashion industry needs funding of up to $1 trillion if it is to be able to deliver the climate change goals.