Deloitte.

**Is technology an enabler
for sustainability?**
How Blockchain can be used across
value chains to achieve sustainability

Table of contents

1. Introduction

The effects of climate disruption is increasing globally, with dramatic changes in temperature and regular weather patterns being observed on an almost daily basis.

Organisations should be concerned as early estimates suggest that trillions of dollars are at stake.[1] Transformation must be made at the value chain level, rather than simply examining individual supply chains in order to affect real impact on the fight to halt climate disruption. This transformation requires not only nascent technologies such as Blockchain and the Internet of Things but also a fundamental shift in organisational attitude towards truly sustainable future development.

This report focusses on emerging technologies, specifically Blockchain and the value it can generate for achieving sustainable goals when applied to value chains. Technology, and moreover Blockchain, will equip industries with the ability to provide market regulators and consumers with a new level of transparency and assurance across global value chains.

Blockchain has the potential to address challenges posed by consumers' growing need for transparency and information through improved data management, impact quantification, and verification and traceability of goods.

The use cases identified for the technology, presented in this report, that can create significant value for end-to-end value chains and more over sustainability and assurance are:

- Stock management, particularly within the fishing industry

- Enabling the circular economy through the greater recycling of plastics

- Reduction of counterfeit products

- Reduction in food waste

In order to demonstrate how Blockchain and Artificial Intelligence are already transforming industries to achieve sustainability goals, this report showcases a case study from Deloitte's proprietary tool "Fresh Analytics" which is currently in use by a leading retailer.

Finally the report concludes with next steps for progressing a Blockchain initiative focused on supply chain transformation.

---

1. [The New York Times, 2019](#)

1.1 The impact of climate change on business

Climate change is altering the world so drastically and at such an alarming pace that all businesses will need to undergo substantial transformation to avoid corporate extinction. This is due to unfeasible practices and the loss of sustainability conscious and information empowered consumers.

The central aim of the Paris Climate Agreement (PCA) was to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. However, we are falling incredibly short of the targets:

2.6 million km² lower than average

Arctic sea ice lowest on record, October 2019.[2]

1.5 – 3 ˚C

European heatwaves hotter by between 1.5 – 3˚C in 2019, in comparison to previous years.[3]

Most severe Australian bushfire crisis in decades

Scientists highlight that climate change is influencing the frequency and severity of dangerous bushfire conditions.[4]

420,000

People fled from South Sudan following severe flooding in November 2019.[5]

2. **Copernicus 2019**, Sea ice cover for October 2019

3. **The Guardian**

4. **The New York Times**, 2020

5. **BBC World News**, 2019

Organisations are increasingly disclosing the specific financial impacts they could face as climate disruption continues, such as mass flooding that could disrupt their value chains or more stringent climate regulations that impact the value of unsustainable investments.

Cross-value chain impacts will be felt by organisations who continue to disregard the potential and already realised impacts of climate disruption. Suppliers in regions under threat may become extinct.

Consumers are largely understood to be one of the driving forces towards more sustainable development for large organisations. This mass adoption of sustainability strategies and the growth in sustainably branded products is partly driven by a shift in customers' expectations, with generations Y and Z leading the way. Consumers increasingly wish to know the origin and impacts— negative and positive— of the products they buy on the people and the planet. As Gen Z arrive into the labour market and their purchasing power increases, organisations will increasingly be forced to clarify their sustainability agendas and qualify how they are operationalising the same, not only from a consumer perspective, but perhaps more importantly from a talent and hiring one.

In response to this crisis, businesses are beginning to take responsibility for the environmental impact of their operations and value chains, and are staking their claim as sustainable enterprises are aiming to transform their operations and convince consumers that they are minimising their effect on the environment. However, achieving this level of transformation is by no means simple. In many cases, an organisation's entire value chain needs to be reimagined and this cannot occur in isolation – cross industry participants need to come together to drive systemic industry change and the clock is ticking on the time left we have to impact any significant change.

The recently published Intergovernmental Panel on Climate Change's (IPCC) report on climate change and land use warned that the continued destruction of forests and huge emissions from cattle and other intensive farming practices will intensify the climate crisis, making the impacts on land still worse. Northern Brazil and the Amazon's deforestation for the development of dairy farms and cattle ranches is stark evidence of these developments.

6.   The Guardian

1.2 Corporate climate action and sustainability strategies are on the rise

While companies continue to publish climate action and sustainable development strategies, their customers and clients are increasingly holding them to account on these reports. The public is regularly demanding intensifying levels of transparency from organisations, pushing them to clarify their broader environmental impact on both the environment and the society that they operate in.

85%

> **Companies listed in S&P published sustainability reports in 2017.**

62%

> **World's top 300 companies demonstrated commitments to the UN SDGs.**

Sustainability Definition

While there are conflicting views on a broadly agreed definition of sustainability, some organisations have attempted to construct a definition which largely holds true. The European Commission understands sustainable development to mean "development that meets the needs of current generations without compromising the ability of future generations to meet theirs". Similarly, McGill University highlights sustainability as meaning "meeting our own needs without compromising the ability of future generations to meet their own needs", adding that not only does this focus encompass environmentalism, but also social equity and economic development.

2. Being sustainable

2.1 Sustainable Development Goals

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. They recognise that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.[7]

2.2 What is Sustainable?[8,9]

"All natural," "fair trade," "organic"— more and more products across our supermarkets and shops include claims of sustainability. But what do all these claims mean? Describing a product as "sustainable" could mean that it's sourced responsibly, for example, or that it utilises recyclable packaging—as well as a whole host of other potential attributes such as ethically sourcing, human rights compliancy, environmentally friendly etc. Understanding how and why sustainability claims are gaining momentum across product categories is critical to understanding how, when and why consumers prioritise sustainable options.

It is evident that there is a clear risk for companies that do not move the dial on their corporate sustainability in a real and tangible manner which their end-consumers can engage with and trust.

THE GLOBAL GOALS

Sustainable Development Goal 17

Strengthen the means of implementation and revitalise the global partnership for sustainable development.

Corporate climate action and broader sustainability strategies are on the rise. Climate action is by far the most prominent area of focus of sustainability strategies with SDG 17 the most cited in companies' reports, more than double any other.

16.6%

> Market share for products that had a sustainability claim on-pack.

5.6 times

> Products marketed as sustainable grew 5.6 times faster than those that were not.

Ref: Harvard Business Review June 2019

7.   Sustainable development

8.   European Commission, 2019

9.   McGill University, 2019

2.3 Why focus on sustainable value chains and not just the supply chain?

Basis for Comparison	Supply Chain	Value Chain
Meaning	The integration of all activities involved in the process of sourcing, procurement, conversion and logistics of the product.	The series of business operations in which utility is added to the goods and services offered by the firm so as to enhance customer value.
Concept	Conveyance	Value Addition
Sequence	Product Request > Supply Chain > Customer	Customer Request > Value Chain > Product
Objective	Customer Satisfaction	Gaining Competitive Advantage

By proactively engaging with an entire value chain, an organisation can create far more impact when evaluating sustainability. "Value chain" evaluation would consider both internal and external stakeholders in the value-creation process. It also encourages a full-lifecycle perspective and not just a focus on the (upstream) procurement of inputs. Value is generally used in a narrow economic sense, but it can be interpreted to encompass 'values', i.e. ethical and moral concerns as well as other non-monetary utility values such as closing material loops, the provision of ecosystem services and added customer value.

Organisations are engaging with sustainability agendas in a far more conscious way than ever before. However, the vehicle to incite fundamental change can be challenging to identify. Transformation of a value chain is no longer simply a process mapping exercise – it now involves evaluating an entire value chain to identify opportunities for creating added or shared value. By focussing on the creation of value, this can facilitate a greater organisation shift in mind-set from a logic of risk to a logic of opportunity, enabling value to be created—both business value (e.g. by generating new revenue streams) and sustainable value (e.g. by identifying sustainability issues faced by neighbouring communities).

3. Technology for sustainability

We are currently in the Fourth Industrial Revolution – we have moved from simple IT systems and automation to Big Tech and Data in a globally connected economy. Our current focus allows us to highlight the intersection between digital technology, including Blockchain, Artificial Intelligence, Robotic Process Automation, and sustainability.

As highlighted in this report, organisations are increasingly acknowledging the importance of clarifying the wider impact of their operations. Unsustainable practices can no longer be cloaked by ignorance, willful or otherwise. Linking digital proficiency and sustainable development should be at the forefront of strategic thinking for any business — as a means to differentiation and long-term sustainability among customers, regulators, and the communities where businesses operate.

By incorporating digital technologies, companies can start to harvest data about demand, usage, and the lifecycle of products for "circular economy" benefits. A circular economy is one in which products are manufactured and services provided with a focus on the reuse of materials and a reliance on renewable resources, for the benefit of the environment.

Blockchain is part of an ecosystem of digital technologies including remote sensors, internet of things, big data and artificial intelligence. The combined use of these new technologies can unlock new, more accurate ways to measure, report and verify sustainability outcomes at lower transaction costs. Digitisation of Measuring, Reporting, and Verification (MRV) also allows the coding of methodologies and processes in the form of smart contracts for the automated issuance, transfer and payment based on results related to sustainability performance. Digital MRV can also transform corporate value chains towards more transparency and accuracy on climate and sustainability impacts of goods produced and sourced, in accordance with the needs of the Paris Climate Agreement.

3.1 Macro technology forces at play

Digital technologies increasingly permeate human activity, not least those activities that promote sustainable development. In his speech to the 73rd UN General Assembly in September 2018, UN Secretary General Antonio Guterres described digital technology as having the ability to "turbocharge" progress towards the SDGs.[10]

Macro technology forces at play

Analytics
Extremely large data sets may be analysed computationally to reveal patterns, trends and associations, especially relating to human behaviour and interactions.

Cloud
Technology consumed in an 'as a service' model utilising shared technology resources with compelling economic value through better utilisation and automation.

Digital
Innovation, design and digital technology applied to business model - in strategic, creative, agile and adaptive ways to rapidly enable what is needed at scale for exponential impact.

Blockchain
Blockchain is an internet and database technology which creates a shared and replicated network of ledgers between participants in a public or private network.

Blocks of transactions are validated by way of consensus creating an immutable record of transactions whilst facilitating tokenisation of assets and the movement of their value.

Some Blockchains include "smart contract" capability which allows workflow to be distributed between participants.

RPA – Robotic Process Automation
Robotic process automation (RPA) is the application of software and technology with the use of artificial intelligence to carry out repetitive tasks quickly, tirelessly, and accurately improving operational efficiency

IOT – Internet of Things
IoT is a suite of technologies and applications that equip devices and locations to generate all kinds of information—and to connect those devices and locations for instant data analysis and, ideally, "smart" action. Conceptually, the IoT implies physical objects being able to utilise the Internet backbone to communicate data about their condition, position, or other attributes.

---

10. United Nations

4. Blockchain: Is it sustainable?

When deploying any Blockchain application, those involved in its development must consider the challenge particularly involved with its use of energy. As one of the more widely known applications of Blockchain technology, cryptocurrencies are regularly criticised for significant use of energy. For example, the upper estimate of bitcoin's energy consumption in July 2018 was 70 terawatt hours per year – the same amount of energy that Austria consumed in 2014 and around 0.35% of total global energy consumption that year.

As highlighted by this report however, there are far more applications for Blockchain than cryptocurrencies. There are many ways to construct and operate Blockchain networks, and "Proof of Work" is not the only way to achieve network consensus. For example, "Proof of Authority" (PoA) networks only allow authorised authorities to validate networks. When authorities don't have to "compete" for access, as in crypto-mining, there is less energy consumption throughout the network as a whole.

Nevertheless, it remains critical for organisations to consider the energy impact of any potential Blockchain solution.

For the purposes of this report, Blockchain will be the main focus of the use cases in question, building on the support from a variety of other technologies. Blockchain was selected due to a number of its key features:

- Transparency
- Traceability
- Connectivity
- Tokenisation
- Automation
- Security

Blockchain enables an eco-system play, meaning that it provides the unique opportunity for multiple industry participants to come together to solve problems, create new opportunities and pursue industry wide transformation. The features enabled by Blockchain will allow us to explore use cases within the areas of radical transparency and traceability, proving the veracity of the circular economy.

5. Use cases across the value chain

5.1 Food Waste

1/3
Food produced in the world for human consumption is lost or wasted.[11]

3rd
If food waste could be represented as its own country, it would be the third largest greenhouse gas emitter.[12]

£20bn
The Department for Environment Food and Rural Affairs (DEFRA) estimate for the worth of the 10 million tonnes of domestic food and drink wasted after the farm gate alone.[12]

A digitally enabled value chain operation could provide a possible solution. Through the use of Blockchain technology, companies can generate better business intelligence, leading to more optimal decision making and less waste. This is made possible by enabling greater transparency across the entire product lifecycle. This means that the guesswork and siloed working that characterises a largely paper-based food supply chain can be greatly reduced.

For example, data uploaded on growing conditions would allow farmers to flag events like an early crop or smaller than expected yield, and communicate this to purchasers well in advance. This visibility creates the opportunity to optimise supply-and-demand management so that produce can reach the shelves in the right quality and correct quantity to minimise waste and maximise sales. In the circumstance of sudden unexpected events, Blockchain technology can also reduce some of the associated risk and uncertainty that can impact the entire supply chain.

Take the case of recalling a product due to a food safety issue. Due to the length of time taken to identify the root of the problem in a paper-based supply chain, extra risk prevention measures have to be taken, which often results in huge batches of perfectly good produce being destroyed, costing millions. Access to end-to-end traceability data made available by using Blockchain would enable the scope and impact of a recall to be massively reduced by revealing the status, provenance, and real-time location of any product batch whose data has been uploaded to the chain.

While some amount of food waste is inevitable, the rest is generally due to current systems for planning, picking, shipment and purchase regularly being neither strategic nor data-driven enough. Using Blockchain infrastructure to more rigorously monitor buying patterns, the life cycle of a product, and provide more insightful real-time data will help those in the food service industry work towards mining food wastage.

Blockchain solutions can reduce market inefficiencies to create more value. Many inherent inefficiencies, such as food waste, are considered a "cost of doing business," but Blockchain solutions such as "smart contracts based on freshness" can reduce total industry costs and create new sources of value. New market entrants could offer "freshness management services," and "product-buyer matching." These new business models, enabled by Blockchain, IoT, and ERP solutions, can potentially connect the grocery value chain to a new, digitally defined industry-performance standard.

11.   UN Environment Programme, 2019

12.   Gov.uk, 2019

5.2 Fish Stocks

As worldwide fish stocks are depleting, a robust governance structure and tracking system is required to ensure that the marine environment can replenish itself in order to thrive once again.

While it remains incumbent on industry to drive better, more sustainable practices in terms of governance, digital prowess is required in order to enable greater transparency through a value chain.

So where could Blockchain fit?
An end-to-end tracking system could be implemented using a Blockchain solution for recording and verifying a trawler's activities in a given geographic location. This would provide transparency to a governance committee for fisheries. The aim of this solution would be to provide key information on fishing activities and areas which are at risk of overfishing

For example, the Port Authority would record the crew's plan (e.g. geographic location, type of catch, duration) before the vessel departs the harbour. The trawler's plan would be uploaded to a decentralised system which is accessible for the Port Authority and fishing crew, with the key identifier being the trawler's registration number. While at sea, the boat's transponder would record its position through GPS coordinates – similar to a plane and radar system. The trawler's position would be uploaded to the same decentralised system as the crew's plan. Therefore, the governance body and crew could monitor their position against their plan. Although this doesn't prevent a fishing crew from engaging in overfishing, it allows the fisheries governing body to record evidence of trawler's plans versus their actual fishing activities. Taking this a step further Blockchain can enable the reconciliation against landing documents for species and tonnage which could be cross referenced to any sales notes by the processor.

Furthermore if a vessel entered a Special Area of Conservation (SAC), the governing body could use this evidence to prosecute the crew for environmental damage. Moreover, if a vessel spends longer in an area

1/3

> Amount of world's assessed fisheries are currently pushed beyond their biological limits

Food and Agriculture Organisation of the United Nations.[13]
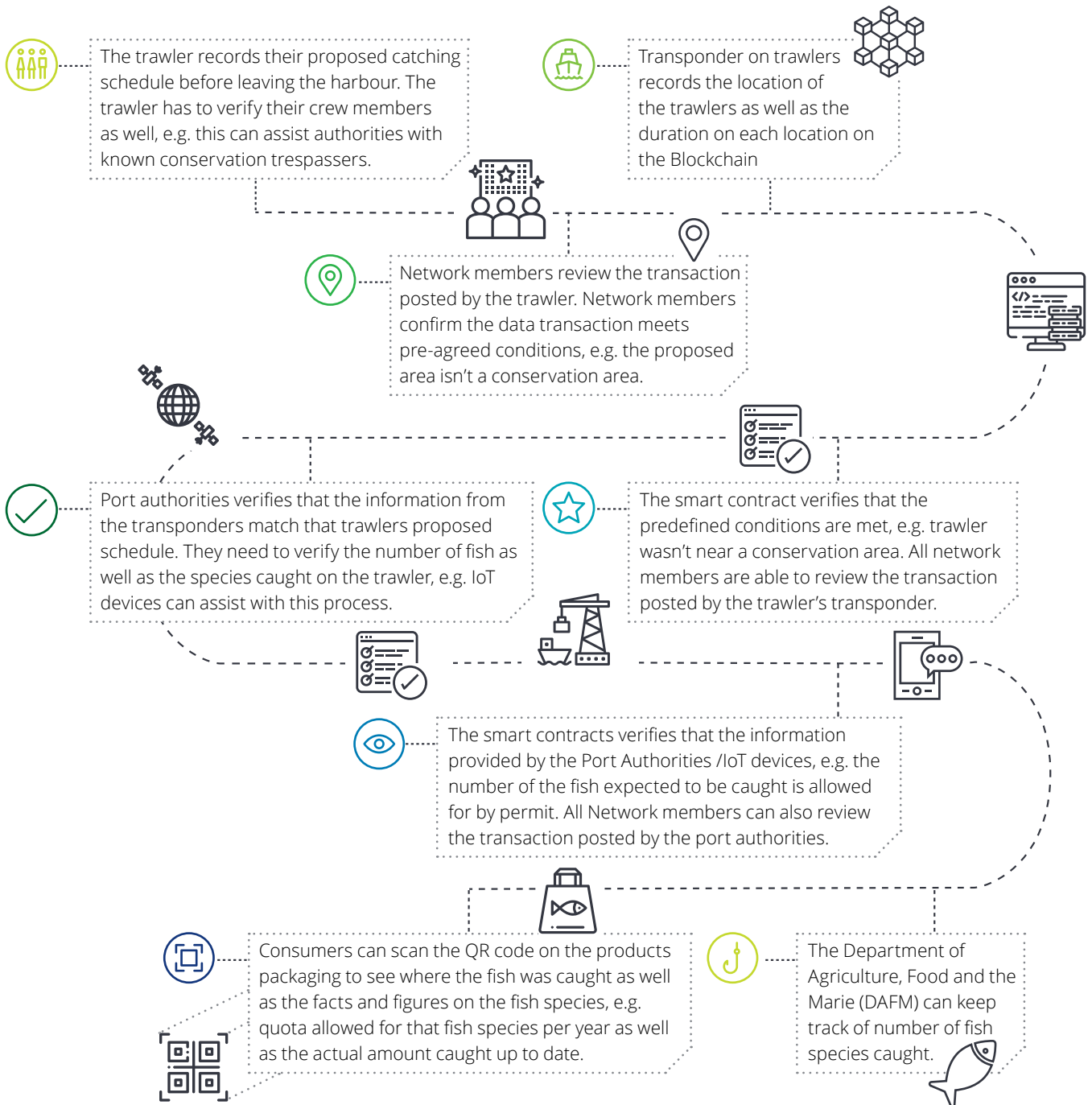
$362bn

> Demand for fish continues to increase around the world, and that means more businesses and jobs are dependent on dwindling stocks. Millions of people in largely developing, coastal communities depend on the fishing industry for their livelihood and half the world's population relies on fish as a major source of protein.[14]

than marked on their plan, the fisheries authority could use this as evidence of overfishing (of course, mitigating factors such as weather conditions would be taken into account).

Finally, governments could use the location data to identify areas which need to be 'rested' from fishing activities. This would be comparable to the farm system of the 'crop rotation' system that farmers employ to ensure that land stays fertile for the future. Although this isn't a physical barrier to prevent overfishing, it would discourage crews from taking part in illicit fishing activities because their vessels are being tracked on GPS and a temporal scale.

13. World Wildlife Fund, 2019

14. Food and Agriculture Organisation of the United Nations, 2019

The trawler records their proposed catching schedule before leaving the harbour. The trawler has to verify their crew members as well, e.g. this can assist authorities with known conservation trespassers.

Transponder on trawlers records the location of the trawlers as well as the duration on each location on the Blockchain

Network members review the transaction posted by the trawler. Network members confirm the data transaction meets pre-agreed conditions, e.g. the proposed area isn't a conservation area.

Port authorities verifies that the information from the transponders match that trawlers proposed schedule. They need to verify the number of fish as well as the species caught on the trawler, e.g. IoT devices can assist with this process.

The smart contract verifies that the predefined conditions are met, e.g. trawler wasn't near a conservation area. All network members are able to review the transaction posted by the trawler's transponder.

The smart contracts verifies that the information provided by the Port Authorities /IoT devices, e.g. the number of the fish expected to be caught is allowed for by permit. All Network members can also review the transaction posted by the port authorities.

Consumers can scan the QR code on the products packaging to see where the fish was caught as well as the facts and figures on the fish species, e.g. quota allowed for that fish species per year as well as the actual amount caught up to date.

The Department of Agriculture, Food and the Marie (DAFM) can keep track of number of fish species caught.
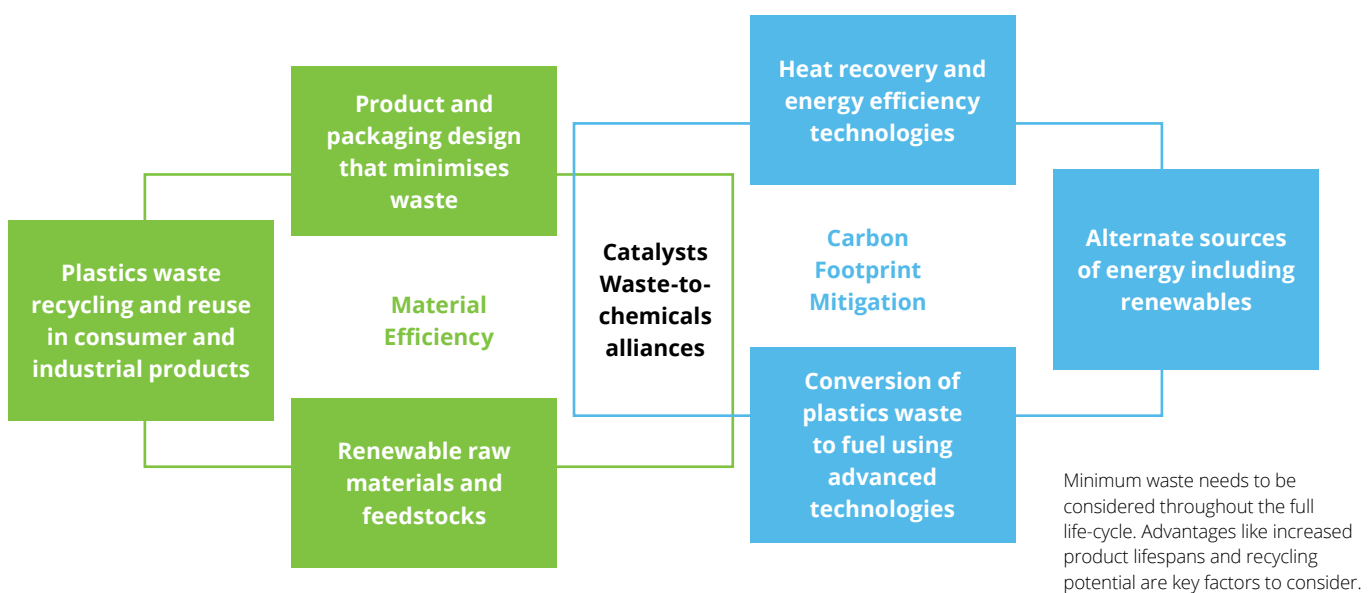
5.3 Circular Economy – Ensuring your plastic is actually recycled

Recent trends have seen plastic production, particularly food contact materials, come under scrutiny from environmental activists and consumers alike. As a direct result of this trend, there has been movement towards organic plastic alternatives and the recycling of plastics currently in circulation. Consumers are likely to see food and drink packaging claiming to be made of recycled materials. The problem here is validating the authenticity of this claim.

A study by 60 Minutes Australia[15] has shown that thousands of tonnes of Australia's plastic waste, that consumers believe is being recycled, is being sold to Malaysia illegally. This is having detrimental effects on the country, as they have to deal with plastic waste coming from all over the Western world. This acts as evidence that the plastic recycling system is not performing the way consumers expect.

The solution that Blockchain could provide in this instance would facilitate a more transparent system that allows consumers to track and trace exactly where their plastic is coming from, placing a responsibility on food and drink packaging manufacturers to make sustainable choices for their packaging. It also provides said manufacturers with a way to prove that their operations, from sourcing to production, are sustainable. As noted in Deloitte's Single Use Plastic Landscape Analysis[16], realising the vision of a truly circular economy can lead to substantial economic benefits, including significant net material savings. The full value of the circular opportunities globally in the packaging industry is estimated at about USD $270 billion per year in materials savings, all net of materials used in the reverse-cycle processes[17].

Aspiring towards a circular economy where everything is utilised, and nothing goes to waste.

Minimum waste needs to be considered throughout the full life-cycle. Advantages like increased product lifespans and recycling potential are key factors to consider.

15. 60 Minutes Australia, 2019

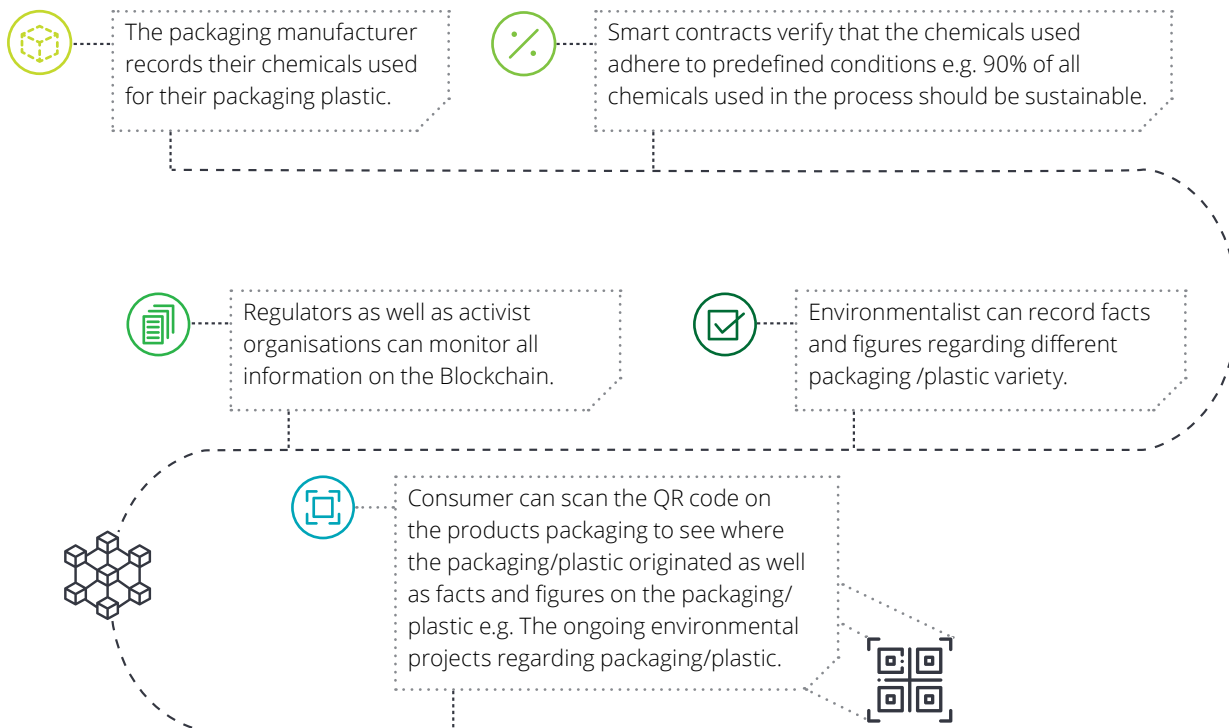16. Deloitte Analysis, 2019

17. World Economic Forum

So why use Blockchain?

Blockchain would act as the primary platform for this system, the goal of which is to allow manufacturers to prove that their plastic has been sourced from a regulated and sustainable recycling plant. A scan-able icon for the item of packaging would be placed on the label, allowing consumers access to information about the batch of plastic from which this packet was produced, so as to verify the authenticity of the claim and the origins of the recycled plastic in store before they buy. This icon is created by a smart production line machine in the plant where the labelling is produced. As the icon is created, the smart machine is also transferring information about the batch, say a set of plastic cases for punnets of strawberries, to the Blockchain. This data registered in the blocks would cover the geographic origins of the batch of plastic, the product or products it had previously been, and the date and location in which the plastic was repurposed – all linked to the icon on the label.

Information on the source of the plastic would be recorded and input onto the Blockchain as it was received from external sources. Having the suppliers of the plastic register this information on the Blockchain prior to delivery would allow for easy consolidation and transferral of data to the manufacturer. In this case, multiple members of the value chain, i.e. the supplier of the recycled plastic, the packaging manufacturer and the consumer, are all provided with access to the Blockchain to either supply, consolidate or view data about the origins of the plastic, providing a transparent and immutable account of the journey the recycled plastic took from source to shopping cart.

The packaging manufacturer records their chemicals used for their packaging plastic.

Smart contracts verify that the chemicals used adhere to predefined conditions e.g. 90% of all chemicals used in the process should be sustainable.

Regulators as well as activist organisations can monitor all information on the Blockchain.

Environmentalist can record facts and figures regarding different packaging /plastic variety.

Consumer can scan the QR code on the products packaging to see where the packaging/plastic originated as well as facts and figures on the packaging/plastic e.g. The ongoing environmental projects regarding packaging/plastic.

5.4 Alcohol
Reducing the risk of counterfeit alcohol

$1.8 Billion USD

Economic loss represented by illicit alcohol worldwide.

International Alliance for Responsible Drinking Report, 2018.[18]

Higher alcohol content

Unrecorded alcohol may contain higher ethanol content and potential contaminants, and the low cost can promote heavy drinking.[18]
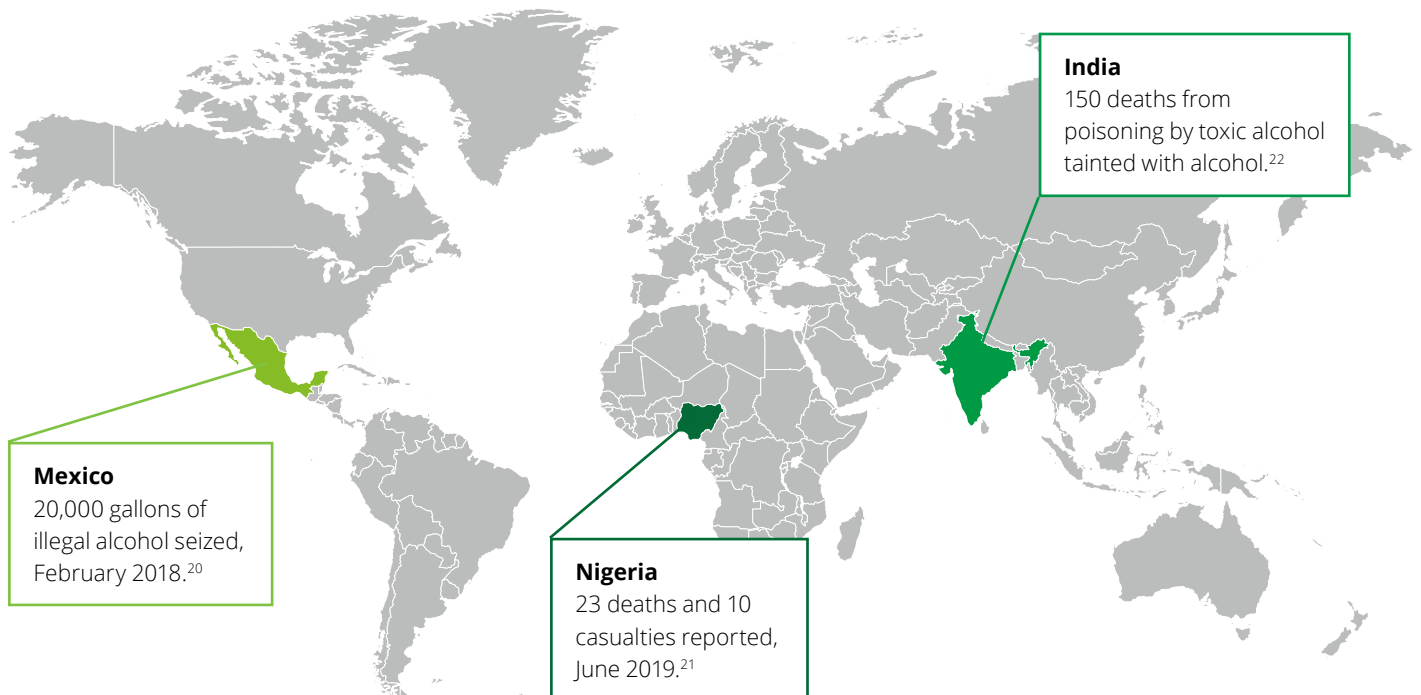
25%

Illegal and informally produced alcohol made up an average of about 25 percent of all alcohol consumed worldwide in 2014.

World Health Organisation[19]

The protection of the health of the population by preventing and reducing the harmful use of alcohol is a public health priority. Governments have made commitments to reduce the harmful use of alcohol through several WHO and UN resolutions. The harmful use of alcohol is mentioned in several other global strategies and action plans, and most recently – in the UN Sustainable Development Goals (SDGs), with a separate health target 3.5 on substance abuse, including harmful use of alcohol and the prevention and control of non-communicable diseases (NCDs).

India
150 deaths from poisoning by toxic alcohol tainted with alcohol.[22]

Mexico
20,000 gallons of illegal alcohol seized, February 2018.[20]

Nigeria
23 deaths and 10 casualties reported, June 2019.[21]

18. International Alliance for Responsible Drinking Report, 2018

19. World Health Organisation, Global status report on alcohol and health, 2018

20. The Drinks Business, 2018

21. Overseas Security Advisory Council, 2019

22. NPR, 2019

To combat these harms, the WHO strategy recommends bringing informally and illegally produced alcohol into the taxation system, implementing tax stamps, developing monitoring systems, and publishing warnings about the health risks of illicit and informal alcohol consumption. This could potentially be managed through a Blockchain based Track and Trace system. This system could provide a single view for an organisation's entire value chain, from the harvesting of the grains for alcohol to creating transparency around the safety mechanisms which are implemented to ensure that the product is safe to consume, e.g. test for no methanol.

By creating a transparent value chain, an organisation would enable their consumers to have detailed insight into the products that they are purchasing. The authenticity of an organisation's product could be guaranteed by information collected by sensors along the value chain. This data could then be written to a Blockchain platform, ensuring that it would remain incorruptible. Such technology-driven systems provide brand sustainability to the companies, creating a competitive advantage and guaranteeing a higher process quality and consumer safety.

So why use Blockchain over traditional technologies?
The value of Blockchain resides in the benefits enabled by Blockchain technology features which traditional technologies cannot match.

Feature	Blockchain	Traditional Database
Security/Permissioned access to data	Secure permissioned access to data	Multiple points security failure
Audibility	Data is auditiable	Data is auditable
Tamper-proof	Inherently tamper-proof	Can be accessed/tampered by database administrators
Integration with existing systems	Can integrate with existing systems	Can integrate with existing systems
Simplified access for ecosystem partners	Easy access to a public network for data sharing with other ecosystem partners	Difficulty in adding ecosystem partners (Other OGDs)
Adding additional ecosystem partners	On-boarding additional partners is relatively simple; no large system integration is required	On-boarding additional partners is costly
Data ownership	No data/database "ownership" as Blockchain is a distributed ledger	Complexities with data ownership across multiple systems

6. Next steps

Accelerating the transition to a low-carbon and sustainable-growth economy is one of the most pressing challenges facing businesses and governments today—and handled in the right way, it can also create significant opportunities for growth and innovation.

In order for digital platforms to be implemented in any value chain, engagement across the full value chain would be required, meaning each farmer, distributor, packager, and other agricultural supply chain actors must be willing to adopt and use technology.

Blockchain technology is by no means the silver bullet that can put the world on track to meet a 1.5° or 2° target. There is little technology can do to solve issues such as lack of political ambition or regulatory and institutional challenges of the Paris Agreement. Work on the priority areas of innovation identified in this report remains largely early stage as governments, the UNFCCC secretariat, multilateral organisations, NGOs, private businesses and start-ups are gaining experience through use case implementation. Much

research and development stands before us, including real-world testing in a wide range of use cases. This is why, in close collaboration with its network of partners, Deloitte will continue to develop best-in-class solutions in collaboration with our clients and accelerate adoption of Blockchain and other digital technologies for climate action.

Getting started with an implementation roadmap
Deloitte partners with clients to explore every aspect of Blockchain technology and develop tailored solutions designed to deliver value. Through strategy, architecture, design, and development, we serve our clients in their quest for innovative Blockchain solutions that are market-ready and address real business issues.

To progress a Blockchain initiative we suggest a three phase implementation roadmap to enable solutions advance from design, to development and ultimately implementation and ecosystem adoption and scaling.

6.1 Three phases for an implementation roadmap

1 > **2** > **3**

Phase 1: Develop and select use cases based on key criteria

Phase 2: Pilot a proof of concept to demonstrate value

Phase 3: Develop Blockchain solution with full stakeholder engagement
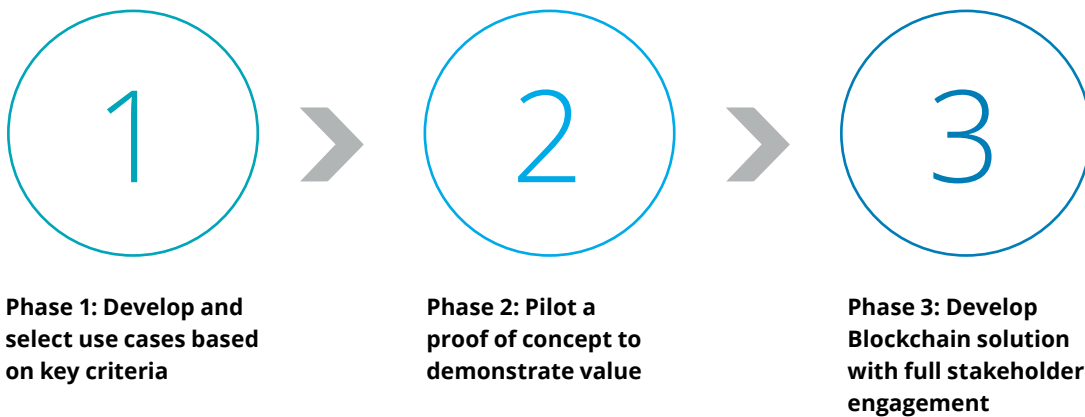
1

Phase 1: Develop and select use cases based on key criteria

After reviewing the features and benefits of Blockchain technology and ultimately understanding where and when Blockchain makes sense, it is critical to build an inventory of prioritised use cases that answer specific business challenges.

Firstly understand the major value chain network problems that your business / industry is facing and if and how Blockchain is an effective solution to these problems. Following that, use cases should then be prioritised based on how well they are aligned to Blockchain features and benefits.

Value Identification - phase 1 considerations

- Do you often share information, credentials or value with others?
- Do you currently need to prove to others you are transacting reporting accurately?
- Is there presence of intermediaries to enable trust today?

Prioritise use cases and select 1-3 to pilot based on the use case evaluation framework:

- Viability: Expected return
- Feasibility: Ability to deliver
- Desirability: Alignment with business

Assess how well use cases leverage Blockchain strengths

Inventory use cases addressing business challenges

Learn where and when Blockchain makes sense

2

Phase 2: Pilot a proof of concept to demonstrate value

Throughout the second phase, a use case is shaped, validated and aligned to the technical elements required for the solution to be delivered. Key players in the target ecosystem are identified who must be included as part of the, Minimum Viable Ecosystem (MVE), for the product development lifecycle.

A prototype is developed which can be piloted to prove that the concept works and demonstrates value. Those outcomes are expressed not only as technical success but more importantly as value delivered.

Participant Eco-system - phase 2 considerations

- Do you have a network of stakeholders (i.e. more than 2)?
- Are you dependent on other stakeholders for information?
- Is there scope to open the eco-system to ancillary parties in the future?

Retrospect to confirm value and identify new challenges

Build and test the proof of concept iteratively (agile workflow: discover, design, build, review)

Select the Blockchain technology stack

Develop functional and technical architecture

Define the minimum viable ecosystem (MVE) and onboard team

3

Phase 3: Develop Blockchain solution with full stakeholder engagement
To develop a winning strategy, all aspects of implementation must be considered such as the governance and operational model and processes that will underpin the successful rollout of an industry wide digital platform.
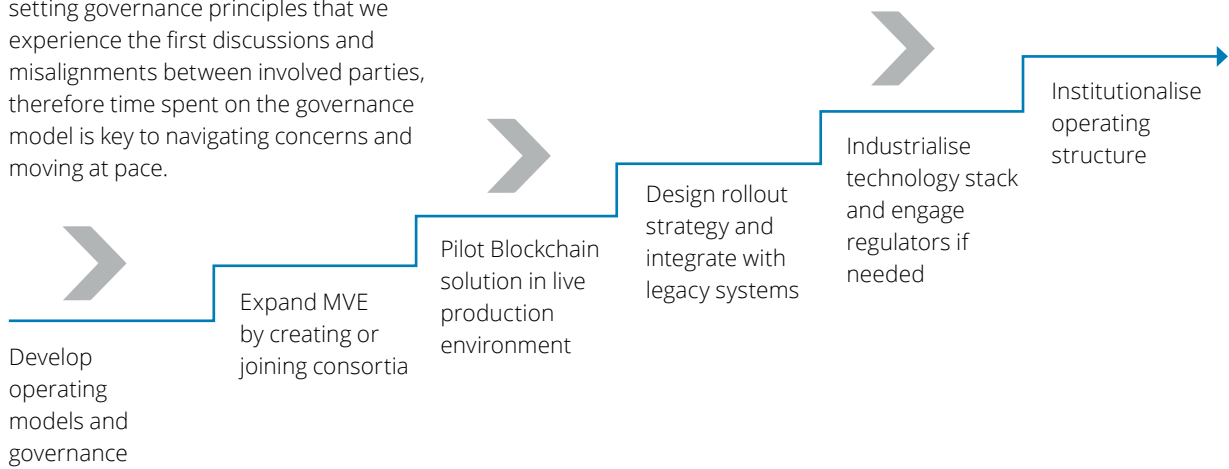
Organisations need to consider the impact of Blockchain implementation on existing operations, data management, compliance protocols and talent in addition to ecosystem formation and integration.

As Blockchain is a multi-stakeholder solution early engagement and alignment is crucial for the success and adoption of the platform. It is often in relation to setting governance principles that we experience the first discussions and misalignments between involved parties, therefore time spent on the governance model is key to navigating concerns and moving at pace.

As the solution demonstrates value and the ecosystem starts to scale, participants recognise the benefits of collaboration across the value chain and can be incentivised to share specific information to solve common relevant problems and even create new business models.

Eco-system Expansion - phase 3 considerations

- What governance model would need to be put into place in order to support the eco-system?

- How would membership of the eco-system be managed in the future?

- How much support from wider industry would be required in order to gain critical mass?

Develop operating models and governance

Expand MVE by creating or joining consortia

Pilot Blockchain solution in live production environment

Design rollout strategy and integrate with legacy systems

Industrialise technology stack and engage regulators if needed

Institutionalise operating structure

Blockchain at Deloitte

Deloitte Global Blockchain Community

| 3 Hub labs | 5 Spoke labs | 50+ Ecosystem partners | 50+ Clients using Blockchain | 1500+ Community of practice |

| Blockchain Labs | Consulting | Tax | Legal | Risk Advisory | Corporate Finance | Cyber | Audit |

Our people collaborate globally with clients, regulators, and policy makers on how Blockchain and digital assets are changing the face of business and government today. New ecosystems are developing Blockchain-based infrastructure and solutions to create innovative business models and disrupt traditional ones. This is occurring in every industry and in most jurisdictions globally. Our deep business acumen and global, industry-leading audit and assurance, consulting, tax, and risk and advisory services help organizations across industries achieve their varying Blockchain aspirations. Reach out to our leaders to discuss the evolving momentum of Blockchain and digital assets, begin prioritizing initiatives, and understand how to manage the opportunities and pain points associated with Blockchain adoption efforts.

Bibliography

Arnold, S. (2019). Opinion: The inconvenient truth behind McDonald's 'eco friendly' straws. [online] The Independent. Available at: https://www.independent.co.uk/voices/mcdonalds-plastic-straws-recycling-carbon-footprint-green-washing-waste-starbucks-a9041871.html [Accessed 5 Mar. 2020].

BBC News. (2019). Toxic alcohol kills 130 Indian tea workers. [online] Available at: https://www.bbc.com/news/world-asia-india-47341941 [Accessed 5 Mar. 2020].

Berg, A., Schlag, N. and Stuchtey, M. (2015). Getting the most out of your sustainability program. [online] McKinsey & Company. Available at: https://www.mckinsey.com/industries/retail/our-insights/getting-the-most-out-of-your-sustainability-program [Accessed 5 Mar. 2020].

Bové, A. and Schwartz, S. (2016). Starting at the source: Sustainability in supply chains. [online] McKinsey & Company. Available at: https://www.mckinsey.com/business-functions/sustainability/our-insights/starting-at-the-source-sustainability-in-supply-chains [Accessed 5 Mar. 2020].

Cambridge Institute for Sustainability Leadership. (2019). 'Value chain' definitions and characteristics. [online] Available at: https://www.cisl.cam.ac.uk/education/graduate-study/pgcerts/value-chain-defs [Accessed 5 Mar. 2020].

Engel, H., Enkvist, P. and Henderson, K. (2015). How companies can adapt to climate change. [online] McKinsey & Company. Available at: https://www.mckinsey.com/business-functions/sustainability/our-insights/how-companies-can-adapt-to-climate-change [Accessed 5 Mar. 2020].

Food wastage footprint & Climate Change. (n.d.). [online] Food and Agriculture Organisation of the United Nations. Available at: http://www.fao.org/3/a-bb144e.pdfb [Accessed 5 Mar. 2020].

Frederick, S. (2016). Concept & Tools | Global Value Chains. [online] Global Value Chain Initiative. Available at: https://globalvaluechains.org/concept-tools [Accessed 5 Mar. 2020].

Fuessler, J. (2018). NAVIGATING Blockchain AND CLIMATE ACTION An Overview. [online] Climateledger.org. Available at: https://www.climateledger.org/resources/CLI_Report-January19.pdf [Accessed 5 Mar. 2020].

Furfari, A. (2020). European Certification of Plastics Recyclers - Eco-Innovation - European Commission. [online] Eco-Innovation. Available at: https://ec.europa.eu/environment/eco-innovation/projects/en/projects/eucertplast [Accessed 5 Mar. 2020].

Galen, D. (2019). 2019 Blockchain for Social Impact. [online] Stanford GSB Center for Social Innovation. Available at: https://www.gsb.stanford.edu/faculty-research/publications/2019-Blockchain-social-impact [Accessed 5 Mar. 2020].

Goedde, L., Horii, M. and Sanghavi, S. (2020). Pursuing the global opportunity in food and agribusiness. [online] McKinsey & Company. Available at: https://www.mckinsey.com/industries/chemicals/our-insights/pursuing-the-global-opportunity-in-food-and-agribusiness [Accessed 5 Mar. 2020].

GOV.UK. (2019). UK supermarkets sign government pledge to help halve food waste. [online] Available at: https://www.gov.uk/government/news/uk-supermarkets-sign-government-pledge-to-help-halve-food-waste [Accessed 5 Mar. 2020].

Graham, B. (2019). 'I think most people in Australia feel lied to, I think they feel disappointed'. [online] NewsComAu. Available at: https://www.news.com.au/technology/environment/60-minutes-exposes-the-shocking-practices-behind-recycling-in-australia/news-story/8396c05b28cf97348515ea57ffc64444 [Accessed 5 Mar. 2020].

Harper, R. (2019). Study shows that UK consumers throw away £9.7bn of food per year. [online] New Food Magazine. Available at: https://www.newfoodmagazine.com/news/91103/study-consumers-throw-out-9-7-bn-food-per-year/ [Accessed 5 Mar. 2020].

Herweijer, C. (2018). Building block(chain)s for a better planet. [online] Pwc.com. Available at: https://www.pwc.com/gx/en/sustainability/assets/Blockchain-for-a-better-planet.pdf [Accessed 5 Mar. 2020].

McGowan, M. (2019). Glencore mine could be forced to sell coal only to Paris agreement signatories. [online] The Guardian. Available at: https://www.theguardian.com/environment/2019/aug/06/glencore-mine-could-be-forced-to-only-sell-coal-to-paris-agreement-signatories [Accessed 5 Mar. 2020].

Nielsen.com. (2018). Sustainability Sells: Linking Sustainability Claims to Sales. [online] Available at: https://www.nielsen.com/us/en/insights/article/2018/sustainability-sells-linking-sustainability-claims-to-sales/ [Accessed 5 Mar. 2020].

Olmsted, L. (2018). Fake Whiskey Might Be A Much Bigger Problem Than You Think. [online] Forbes. Available at: https://www.forbes.com/sites/larryolmsted/2018/12/20/fake-whiskey-might-be-a-much-bigger-problem-than-you-think/#59094b4d22d5 [Accessed 5 Mar. 2020].

Bibliography

O'Sullivan, K. (2018). Ireland among worst offenders for overfishing, says new report. [online] The Irish Times. Available at: https://www.irishtimes.com/news/environment/ireland-among-worst-offenders-for-overfishing-says-new-report-1.3449450 [Accessed 5 Mar. 2020].

O'Sullivan, K. (2019). Move to plant-based diet 'effective way to reduce carbon emissions' – IPCC. [online] The Irish Times. Available at: https://www.irishtimes.com/news/environment/move-to-plant-based-diet-effective-way-to-reduce-carbon-emissions-ipcc-1.3980932 [Accessed 5 Mar. 2020].

Prokesch, S. (2010). The Sustainable Supply Chain. [online] Harvard Business Review. Available at: https://hbr.org/2010/10/the-sustainable-supply-chain [Accessed 5 Mar. 2020].

Schiano, S. (2018). Climate Change Is Transforming Business. [online] Forbes. Available at: https://www.forbes.com/sites/forrester/2018/10/11/climate-change-is-transforming-business/#32a2b9a12f47 [Accessed 5 Mar. 2020].

Smith, R. (2018). What is the Environmental Impact of Bitcoin Mining?. [online] CoinCentral. Available at: https://coincentral.com/what-is-the-environmental-impact-of-bitcoin-mining/ [Accessed 5 Mar. 2020].

Theworldcounts.com. (2020). Food Waste Facts. [online] Available at: https://www.theworldcounts.com/challenges/consumption/foods-and-beverages/food-waste-facts [Accessed 5 Mar. 2020].

Whelan, T. and Kronthal-Sacco, R. (2019). Research: Actually, Consumers Do Buy Sustainable Products. [online] Harvard Business Review. Available at: https://hbr.org/2019/06/research-actually-consumers-do-buy-sustainable-products [Accessed 5 Mar. 2020].

World Health Organization. (2018). Global status report on alcohol and health 2018. World Health Organization. https://apps.who.int/iris/handle/10665/274603. License: CC BY-NC-SA 3.0 IGO

World Wildlife Fund. (2019). Overfishing. [online] Available at: https://www.worldwildlife.org/threats/overfishing [Accessed 5 Mar. 2020].

Authors

David Dalton
Partner
EMEA Blockchain Lab Lead
ddalton@deloitte.ie

Aoife Connaughton
Director
Sustainability Specialist
aconnaughton@deloitte.ie

Amy Pugh
Senior Manager
EMEA Blockchain Lab
apugh@deloitte.ie

Rachel Maher
Consultant
EMEA Blockchain Lab
ramaher@deloitte.ie

————————————————

With special thanks to the following
individuals for their contributions to
the development of the paper:

Stephen Byrne
Consultant
EMEA Blockchain Lab
stepbyrne@deloitte.ie

Jonathan Kelly
Consultant
Business Operations
jonkelly@deloitte.ie

Marinus Prinsloo
Senior Consultant
EMEA Blockchain Lab
mprinsloo@deloitte.ie

Smriti Verma
Solutions Developer
EMEA Blockchain Lab
smrverma@deloitte.ie

Contacts

Deloitte.

At Deloitte, we make an impact that matters for our clients, our people, our profession, and in the wider society by delivering the solutions and insights they need to address their most complex business challenges. As the largest global professional services and consulting network, with over 312,000 professionals in more than 150 countries, we bring world-class capabilities and high-quality services to our clients. In Ireland, Deloitte has over 3,000 people providing audit, tax, consulting, and corporate finance services to public and private clients spanning multiple industries. Our people have the leadership capabilities, experience and insight to collaborate with clients so they can move forward with confidence.

**MAKING AN
IMPACT THAT
MATTERS**
since 1845