



CLIMATE CRITICAL

ITS NOT JUST ABOUT THE ENVIRONMENT, IT'S ABOUT SURVIVAL

Find out:

- What the construction industry's emissions contribution has been
- Why the linear economy model of operation is flawed
- What the linear economy is costing construction and the environment
- How construction firms can do things differently
- What opportunities exist in the circular economy
- What are the steps to initiating positive change



WHY SHOULD CONSTRUCTION CARE ABOUT THE CLIMATE CRISIS AND CREATING CIRCULAR ECONOMIES?

INTRODUCTION:

Climate activism is nothing new, people have been carrying placards and demonstrating against big organisations for decades on environmental issues.

They have been viewed as tree huggers standing in the way of progress, naïve to the ways of the world. Costing construction companies time and money. And while this may be true, has anyone ever asked the question;

What has development and construction cost the planet?

Construction as a sector is a major contributor of CO₂ emissions and a mass producer of waste – two areas that have had a very large impact on climate change and contributed to the current climate crisis the world finds itself in. But that's not where it stops either.

It may be time to admit that the way humans have gone about development hasn't made much progress at all. Rather, it's set earth back as a habitable planet,



and we are now starting to feel the catastrophic effects.

Whether you believe in it or not, our climate is changing and scientists have warned that the token effort humans have made by reducing and recycling is not enough. We need to do more. Much more.

But what does that more look like?

In this white paper we look at some of the statistics and why they are cause for concern, explore how we got to this point, and then discuss what solutions may work for the construction industry.

ABOUT ELLIS FOX:

Recruiting for senior roles in construction, it is critical that we stay up to date on industry happenings and the impact they have on various sectors of the industry.

If we thought Brexit would impact the construction industry, it's nothing compared to the effects of climate change.

Adapting is going to require having the right people in place with the right vision, knowledge and skills to drive effective change.



PART 1 – IS CONSTRUCTION TO BLAME FOR CLIMATE CHANGE?

Traditional business suggests that everything has a cost, and in every project there will be some loss. Raw materials are extracted and processed, new products are created and by products are discarded as waste.

It's been accepted that that's just the way economies work and for centuries few people questioned if this linear model of operating is in fact the best way.

Certainly businesses know about pollution and waste, but it was accepted as the norm, part of the process and an unavoidable part of business. Or so most people thought.

Greta Thurnberg was right when she said to world leaders: "How

dare you!" It's her generation that will have to live with the consequences of a linear economy – take, make, brake and waste.

The belief that the earth has an unending supply of resources and would naturally filter out the effects of pollution and ecosystem destruction is

seriously flawed and extreme weather events are proving it.

Up until now most business sectors have failed to listen to the warnings. Now amid growing global public concern, governments are setting more stringent emissions and climate change targets, even writing them into law. As a result change is no longer going to be optional.

It is true that the construction industry is just one economic sector, surely it's not responsible for climate change? What about manufacturing, retail and other major industries, surely they are more to blame for skyrocketing CO₂ emissions and pollution?

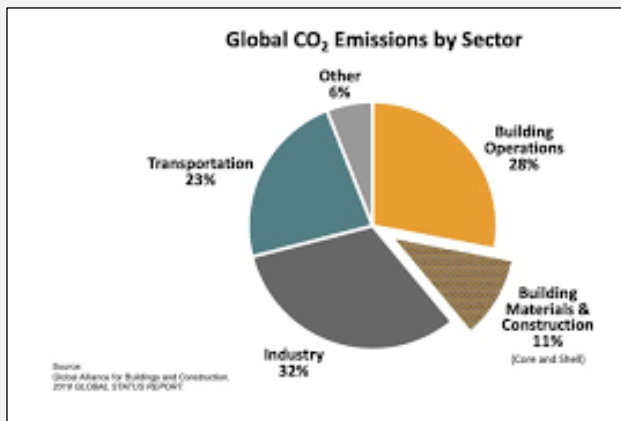
Certainly all industries have contributed to the problem but



the statistics on the construction industry are higher than most other industries. Construction could well be blamed for their large contribution to CO₂ emissions.

HOW MUCH HAS CONSTRUCTION SPECIFICALLY CONTRIBUTED TO CLIMATE CHANGE?

Statistics show that construction contributes 11% of global carbon emissions. Combined with building operations it amounts to 39% of global carbon emissions. That is a large percentage for a single sector.



THE WASTE FACTOR:



In the UK alone the construction industry contributes 32% of waste generated, more than any other sector.

The industry uses on average 400 million tonnes of material each year. Of that a quarter ends up as waste, some is reused, but still 25 million tonnes of construction waste ends up in landfill. These are not small figures and should not be an acceptable norm.

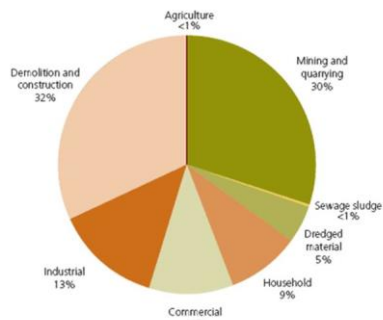
Given how tight profit margins are in the construction industry, shouldn't contractors be looking at more effective ways to utilise materials and reduce waste as a priority when considering cost cutting measures?

Keep in mind that this waste is adding multiple costs to the business. It's not just the purchase and initial transport costs of material that is being wasted.

Consider the time on site, consider moving the waste, collecting the waste material, transporting it for processing or disposal, not to mention the cost of sending it to landfill. When these costs are factored in it is far more than a quarter of the material costs being wasted.

Even if environmental concerns regarding waste are not a priority, companies cannot ignore the financial case for reducing waste. What difference would it make to the business bottom line if wastage could be reduced by just half?

Waste produced by sector in the UK



BENEFITS OF REDUCING CONSTRUCTION WASTE

- **Optimise material purchasing costs**
- **Reduce volume of material required for projects**
- **Reduce materials transport requirements and costs**
- **Reduce storage space required for materials**
- **Benefit from having a site that neat and tidy, reducing accidents as a result**
- **Comply with legislation**
- **Conserve natural resources**
- **Reduce CO₂ emissions**

RESPONDING TO DEMAND

News reports say how much more infrastructure is needed in the UK, how much more housing is needed. And economists will say that construction is simply responding to the demand of urban expansion.

There's no doubt about it, the engineering and architectural feats of modern construction are impressive. Mile-wide bridges spanning rivers and seas, tunnels stretching for miles under both land and water, skyscrapers that seem to defy gravity.

Engineers and civil contractors have managed to claim back land from the sea, channel rivers build urban developments in environments that many thought impossible.

Cities have expanded, connecting towns, absorbing

villages into suburbs and creating sprawling urban metropolises across the globe. It's happened as a seemingly natural progression, meeting the demands of an ever growing human population.

Even a few decades back the mindset prevailed that the earth held abundant resources, more than enough to meet our needs, so we just took what we needed. We took natural ecosystems and dissected them with roads and railways. We took forests and replaced them with housing estates and golf courses. We channeled rivers and dammed them up all to create an infrastructure to support modern life.

We've called it progress and patted ourselves on the back for our great achievements. But we've conveniently ignored the environmental costs and how disrupting the closed loop of ecosystems will impact the earth's climate and the future impacts of urban development.

Certainly the world has many impressive cities. But somehow in our quest for efficiency, economy and connectedness,



we've overlooked key components of the puzzle. We've exploited natural resources, disrupted the natural balance of ecosystems and now we're paying the price.

While infrastructure and construction development opportunities have been met with great enthusiasm, by contrast the response to environmental concerns has been apathetic at best.

But now the very environment we've been ignoring is having the last word. Extreme weather is placing infrastructure under strain, in some parts, obliterating it with flash floods and storm surges. Extreme temperatures are causing infrastructure failures affecting almost everything from

transportation to utilities and communications.

It is interesting that now news reports are changing their wording –it's no longer climate change, now it's referred to as the climate crisis. And governments are starting to take

a hard line in an attempt to address the fact that countries are nowhere near meeting emissions targets.

Take London's ultra-low emission zones, for example. A concept welcomed by most, but having a large and direct impact on the construction industry.

Most heavy duty construction vehicles are diesel powered, a fuel with high emissions. The new law is therefore limiting transportation and machinery works in key areas because they do not comply with the new emissions laws.

While there are low emission electric construction vehicles available, replacing a fleet is a major expense. Especially if



existing vehicles have to be written off because they hold little resale value.

The construction industry still has a heavy reliance on fossil fuels and virgin materials, from the production of raw materials through to work on site, transportation etc. While some rubble is reclaimed these processes are largely inefficient and costly, which is why contractors may think twice about going that route.

While there's a lot of talk of transitioning to a circular economy where resources are optimised and waste materials are repurposed as building resources, there hasn't been a great deal of progress industry wide.



Considering the built environment contributes almost 40% to CO₂ emissions, surely there's a responsibility to actively work to bring those figures down? And if not for the environment, there's certainly an economic case to transition to

a circular economy. But will construction step up to the opportunity?



PART 2 – CLIMATE CHANGE TARGETS AND LEGISLATION

In June 2019, the UK became one of the first economies to pass legislation regarding net-zero emission targets. This is set to have a significant impact on commercial and industrial sectors. In the past many sectors have set targets, and when they have failed to meet them simply stated that they were overly ambitious to start with but at least they have made progress in the right direction. In a way they should be commended for making some effort, but if the scientists are to be believed, some effort is no longer enough.

The Paris Agreement, on which the UK's revised Climate Act is based is aimed at globally

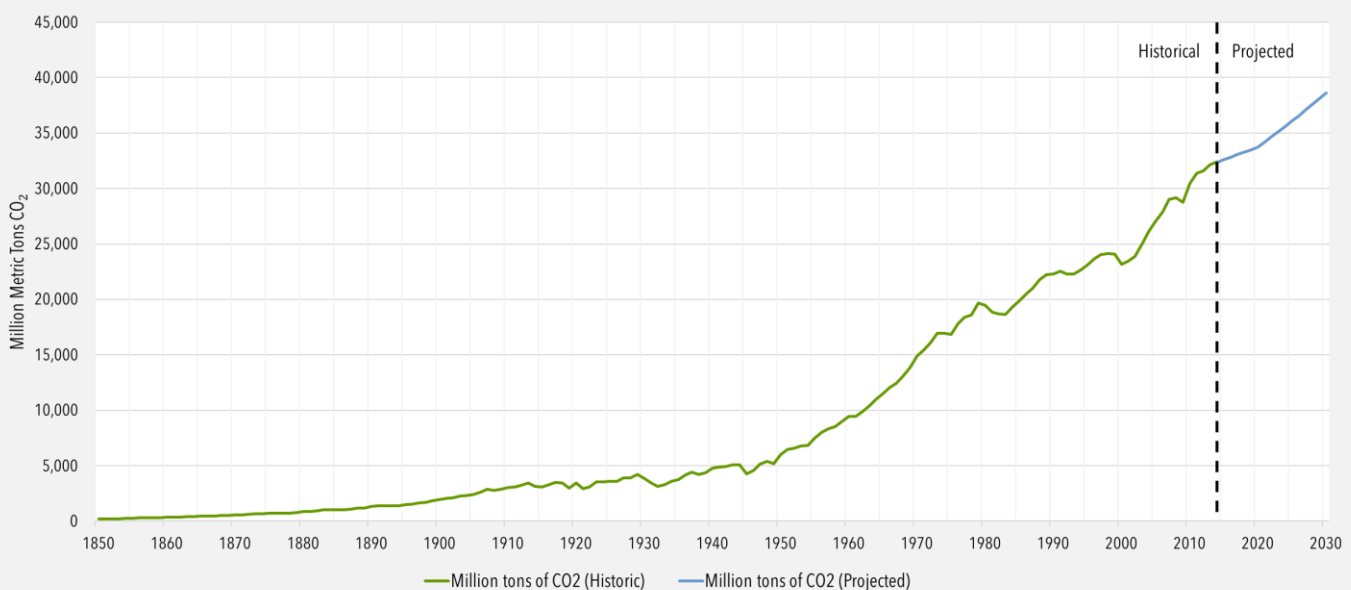
keeping the temperature rise below 2 degrees centigrade – which is seen as a tipping point for the planet. More specifically it aims to achieve a temperature rise of no more than 1,5 degrees centigrade globally to ensure that temperature remain well below the tipping point. Reducing carbon emissions is seen as a key component to achieving this.

While the UK may not be one of the largest CO₂ producers worldwide (that honour belongs to the USA and China), when explaining why net-zero emissions were legislated, the government highlighted that the UK played a large part in starting

the industrial revolution which instigated the exponential rise of CO₂ emissions and therefore have a responsibility to take the lead in reducing the levels once again.

When the Climate Change Act was passed initially in November 2008 the targets were set at reducing CO₂ emissions to 80% of 1990 levels.

The new targets aim to achieve 100% of 1990 levels by 2050. The Climate Change Act also details carbon budgets set to run until 2032. These emissions targets and carbon budgets will be assessed by the Committee on Climate Change (CCC) who will report to parliament on progress





and compliance. Industry sectors are going to now be accountable for their contributions to CO₂ emissions and waste.

It must be remembered that because the construction sector uses vast quantities of raw materials, is a major contributor to CO₂ emissions, and generates massive volumes of waste, any initiative to reduce these can have a significant impact, both environmentally and economically.

WHAT PROGRESS HAS BEEN MADE TO DATE?

In the 10 years since *The Climate Act* was initiated the UK has achieved a total 43% reduction in CO₂ emissions. However, most of this has come from the energy

generation sector. Buildings and construction which account for 39% of CO₂ emissions has achieved only a minor reduction in the past 10 years.

There has been much to-ing and fro-ing on building policies and incentives from government which has frustrated progress. In

2006 a zero-carbon homes policy was initiated by Gordon-Brown, with the objective to reduce heating and cooling demands and improve energy efficiency and renewable energy generation. This policy was subsequently scrapped in 2015. As a result energy retrofits reduced by 95%, as there was no longer any incentive to do so.

The government has announced major investments in the renewable energy sector and rolling out infrastructure to support this. There is an ambitious plan to create an extensive EV charging infrastructure, and tie that into a renewable energy grid. These and other initiatives are aimed at reducing carbon emissions further.



In terms of waste reduction and repurposing of materials in UK construction the figures are more encouraging. DEFRA reports that in 2014 the UK generated 202 tonnes of waste in total, of which construction, demolition and excavation accounted for almost 60%. It is further reported that 89% of non-hazardous waste was recovered – well above the EU target of 70% recovery rate.

There isn't currently any more data available to measure if there has been any improvement in the past 5 years. The only plus is that there certainly seems to be a greater level of awareness in terms of processing and

dumping waste. Additionally many waste management companies are offering consulting services to companies to help them reduce their volumes of waste and improve materials efficiency.

OPPORTUNITY OR THREAT?

There is a great opportunity in the construction industry to improve materials efficiency. Technology can support this by providing more accurate estimations and project planning, and more efficient materials purchasing and processing. When linked to project management systems

this can provide a wealth of valuable data.

On the flip side, should contractors continue with business as usual, they are likely to see margins squeezed even more. Reducing wastage can have a direct impact on the business bottom line. Additionally non-compliance in terms of emissions and waste processing could result in hefty fines or other penalties.

Being a major contributor to CO₂ emissions places an obligation on the construction industry to start implementing policies that will result in real change.



PART 3 – INNOVATION AND A NEW WAY OF THINKING

While closing the loop may

In terms of the climate crisis the rhetoric is clear. Industry needs to act now, they need to do more with greater efficiency and greater urgency.

The construction industry and main contractors in particular are ideally positioned to influence change.

If new infrastructure and commercial developments can be built within a low carbon framework it'll go a long way towards achieving emissions targets - simply because the industry as a whole is such a large contributor of CO₂ emissions and waste.

Secondly, incorporating low carbon elements into the design and planning of projects can help ensure that buildings operate more efficiently and with a much lower carbon footprint. Buildings alone account for 33% of global CO₂ emissions so if we are to reach emissions targets, creating more efficient buildings is essential.

Not to mention that that it is significantly cheaper to implement these changes from the design stage than having to



retrofit after construction has been completed.

Construction planning and management will need to be revolutionized, because it cannot continue to operate in a linear economy. It's simply not sustainable.

The concept of a circular economy is simple: improve resource efficiency in all aspects of operations, eliminate pollution, reduce waste and repurpose resources so that the supply chain becomes circular and self-sustaining. Admittedly though, implementation is much more complex.

sound simple, there are many elements to factor in.

An entire mindset change needs to take place, where every step of each process is analysed to see if it can be used to close the loop and create a circular economy.

THE CIRCULAR ECONOMY IN CONSTRUCTION

For many entrenched in the linear way of thinking, it may seem impossible to build without generating some form of waste. But perhaps that is because waste is not seen to have any significant value so it doesn't matter if it is discarded.

The circular economy way of thinking looks to redefine waste as a resource with value instead of being a cost. It encourages innovation, finding ways to create more value and increase the lifespan and usefulness of resources.

Circular thinking designs with efficiency in mind, seeking to optimise resources and processes so that waste and pollution is eliminated.

MATERIALS:

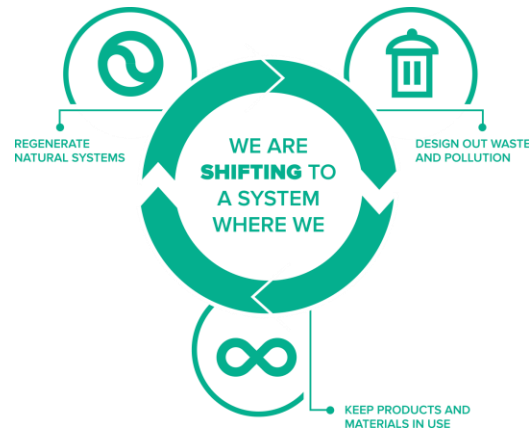
Careful consideration goes into the sourcing of materials. Taking into consideration where and how the materials are obtained. Instead of using only virgin raw materials, they look for resource alternatives that already exist in the economy, but haven't been fully optimised. An example of this would be utilising reclaimed steel or brick from demolitions.

It's not just the waste element that is important. The manufacture of steel accounts for 25% of global CO₂ emissions. Not far behind is concrete, whose manufacture accounts for 19% of CO₂ emissions.

Combined these two raw materials account for almost half of industrial carbon emissions. If the construction

CORE PRINCIPLES OF THE CIRCULAR ECONOMY:

- Design to eliminate byproducts of waste and pollution.
- Keep products and materials in use - increase resource lifespan and usefulness.
- Regenerate natural systems



industry is to make a significant contribution towards reaching emissions targets, it has to reconsider how it resources projects.

TRANSPORTATION:

Transportation singularly accounts for 23% of global CO₂ emissions. This is why people talk about sourcing local raw materials. Every time materials have to be transported long distances, it dramatically increases the carbon footprint of the product.

MATERIALS STORAGE:

Sourcing materials locally also reduces the requirement for storage space on site. This results in a safer working environment because there are fewer materials on site. Buildings account for 33% of global CO₂ emissions. Therefore when warehousing requirements are reduced so are CO₂ emissions.

CONSTRUCTION WASTE

The majority of rubble discarded as waste is a combination of mixed elements; concrete, steel, wood, plastic packaging, and even soil and organic matter. It is difficult to separate as it's often

bonded together in the construction process. Being able to repurpose this material is not as simple as being able to crush it and mix it up to create a new construction compound.

Some elements may weaken the compound if waste is not properly sorted. Typically sorting will involve three or more processes.

This is one of the reasons that sorting and processing construction waste is so expensive and why many contractors simply opt to send it to landfill. However, landfill capacity is diminishing, so in the future construction companies will be forced to look at alternatives.



5 WAYS TO REDUCE CONSTRUCTION WASTE:

- **Reduce volume of materials packaging**
- **Sort and segregate waste materials on site**
- **Reuse, reclaim and repurpose materials in good condition**
- **Design construction processes to eliminate waste**
- **Implement a zero landfill policy**

MATERIALS EFFICIENCY

The simplest way to reduce waste is to optimise the efficiency of materials. Considering 25% of materials procured end up as waste, more accurate forecasting and procurement could significantly reduce this.

RECLAIMING & RECYCLING

Currently it is estimated that only 1% of building materials are reclaimed, which hints at a huge opportunity to improve material efficiency and reduce waste.

In addition to reclaimed materials, innovators are finding ways to recycle building materials to increase the

lifespan of resources and eliminate them from landfill.

ENERGY CAPTURE

Energy capture is vastly underutilised in commerce and industry and is one element that can contribute significantly to reducing emissions, waste and pollution.

EXAMPLES OF RECYCLING IN CONSTRUCTION:

Some innovative designers have found ways to create construction materials from recycled materials that have the same strength and sometimes

better durability. This has a dual benefit of reducing waste and at the same time helping reduce the volume of virgin raw materials used. The knock on effect is that it is saving natural resources and in some cases, depending on the processes, also reducing carbon emissions.

Asphalt aggregate:

There are two recycling applications, both of which are improving the durability of roads while using recycled materials. One application uses unsorted plastic instead of sand and stone. It has been found that the plastic bonds better, reducing cracks and wear. Another application uses recycled rubber tires, this has the added bonus of reducing traffic noise on highways.

Recycled pavers:

Concrete from demolition sites is crushed and sorted, then mixed and molded to form paving slabs and bricks. Some designs incorporate recycled plastic which further enhances the durability of the pavers and prevents cracking due to heavy loads.

Plastic piping:

Certain plastic compounds can be effectively remolded and some companies are reclaiming plastic waste from construction sites and reforming plastic piping and conduiting to meet standard specifications so that it can be used on site for construction applications.

Composites:

Recycling technology combining recycled wood and plastic polymers creates a composite that can be used to create door and window frames as well as scaffolding planks and roofing beams. Composites have both strength and durability and this can be adjusted according to the application.

Boards

Panel boards and plasterboards can be made from recycled materials and used in a wide variety of construction applications.

These are just a few examples of some of the innovations in recycling and construction.



INNOVATIONS AND OPPORTUNITIES

There is an opportunity to collaborate with partners outside of the industry and make use of their expertise to improve efficiencies and take advantage of their innovations.

Digital technology in particular has a huge role to play in helping optimise project planning and management. Bringing together expertise from various sectors can help speed up the transition to a circular economy and help businesses meet emissions targets.

There are several independent organisations focused on supporting innovation aimed at

the circular economy and who provide guidance and resources to businesses who are interested in making the transition.

The Ellen MacArthur Foundation and the Circular Economy Club both have a global presence, supporting sustainable business initiatives and making a wealth of resources available in the form of case studies and reports.

The circular economy concept is not new and there are many organisations around the globe that have already gone through the transition. There is no need to reinvent the wheel. Businesses can learn from other sectors and organisations and in that way preempt some of the challenges they may face in the process.

Innovation is certainly at the heart of circular economy thinking – finding ways to do things more efficiently and to ascribe value to resources that may have been previously thought of as worthless.

Recently in Italy a company created disposable cups made from orange peels. In the Canada a factory is producing hemp bricks as a sustainable alternative to concrete.

People within the construction and infrastructure industries know best the challenges being faced and are ideally positioned to come up with innovative solutions that can save resources, time and money.

It's up to organisations to provide the platform for innovation and encourage a culture of learning and creative problem solving. That is how the industry can become more productive and profitable.



PART 4 – DRIVING CHANGE FOR CLIMATE CHANGE

Change is not something that happens easily in the construction industry. Systems and mindsets are entrenched, the supply chain is characterised by long term contracts and projects that span several years. Deciding when and where to start implement change is not an easy decision.

perspective, it could have huge benefits to the business and industry.

In order to drive this change, construction leadership will need to make a firm commitment as part of the company vision to reduce carbon emissions and create specific measurable targets and strategies to curb

will be required, because getting board members buy-in will not be easy. Especially if their business experience is entrenched in the linear way of thinking.

OVERCOMING STUMBLING BLOCKS TO TRANSITION TO A CIRCULAR ECONOMY

One should not dwell too long on the barriers to change because none of them present impossible situations. People can change, they can learn new skills, they can apply new thought processes, they can adapt.

Systems can also change, so can policies and procedures. As long as there is a decision to change, and a vision to drive the process forward, it is possible.

Businesses need to take a holistic approach to curbing emissions and reducing waste. It starts with an awareness and changing mindsets and assigning a value to resources and materials.

Setting a zero waste target can be the catalyst for change. If there cannot be any waste, what



In order to implement effective change and comply with the requirements of the new emissions laws, main contractors are going to have to conduct a careful review of almost all of their projects, systems and processes. While this may seem like a mammoth task, seen from a different

emissions, pollution and waste.

More importantly they will need to have a detailed understanding of circular economy concepts so that they can initiate change from a linear economy mindset.

In terms of soft skills, high levels of diplomacy and negotiation

is to be done with it? How can it be used? Is there an option to repurpose it or use it instead of raw materials?

Simply having a policy of: 'It's not OK to throw away.' Can have a powerful impact on business operations. Forcing innovation and creating new ways of doing things.

8 Reasons change needs to happen:

- Increasing resource scarcity
- Increasing costs of resources
- Critical and urgent need to reduce carbon emissions
- Pollution reaching critical levels
- Climate impacts affecting infrastructure
- Economic need to improve business efficiency.
- Waste and landfill capacity limited
- Compliance is legislated

If there is to be a recycling program, having designated skips for different materials on site will make segmenting waste materials much easier.

But it is the design that can have the most impact. The design decides the materials and their usage. The design decides the



building efficiency. Even the design of the project implementation can determine the level of efficiency achieved.

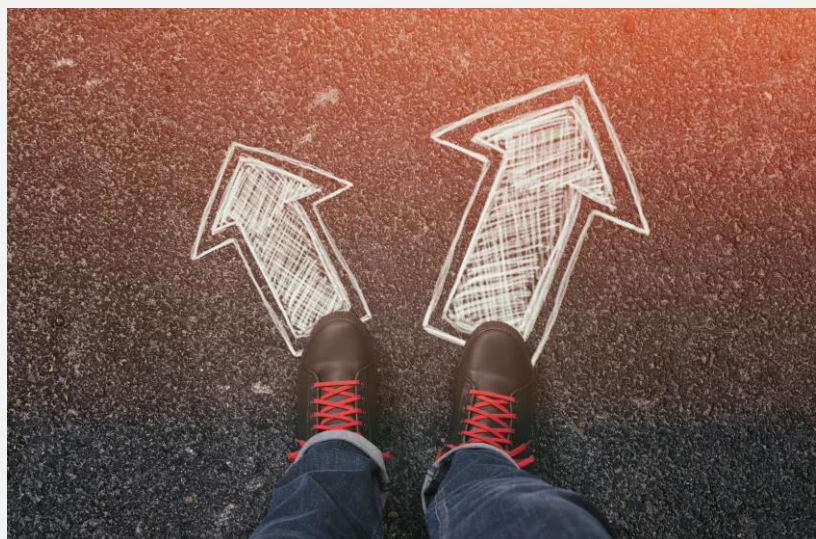
There are some groundbreaking projects where up to 70% of materials used were recycled or repurposed, and this was achieved without compromising on strength or durability of structures.

Incorporating energy efficiency principles in the design can

dramatically reduce the requirements for heating and cooling which can have a huge impact on carbon emissions.

It starts with setting a clear goal and then aligning all decisions and thought processes to that vision. Strong leadership that is willing to drive the process is a key element of success.

Which way will construction go? The decisions made today will be critical.



CONCLUSION:

The earth is at a critical point where we have one last opportunity to try fix the mess that we have created by curbing carbon emissions, and cleaning up waste and pollution. If we do nothing, if we reach the tipping point and go beyond it, then recovery may no longer be possible.

But it's not just about being backed into a corner. If climate change isn't incentive enough, the economic case for a circular economy should be.

If businesses want to futureproof themselves and ensure a level of sustainability, realistically, it is the only way forward. And those leading the charge will gain the competitive edge in the industry.

Construction and buildings combined are responsible for almost 40% of CO₂ emissions. This cannot continue unchecked. The industry has an obligation to make an effort to reduce waste, pollution and emissions. And even if industry leaders don't feel obligated, there is now a legal requirement to start implementing change.

The change may not be easy, and it certainly won't be quick, but the benefits of building and infrastructure and economy that



is more sustainable is well worth the effort.

There is more to it though. The process of change is an opportunity for innovation and improving efficiency, finding ways to do more using less raw materials, and reusing and reinventing resources that were previously considered waste.

In the end it is going to create a more sustainable business. And considering the turbulent times that the construction industry has endured in recent years, sustainability is a big draw card.

In short, embracing the circular economy will be good for business, good for people, good for the economy, and good for the planet. It is the future of business.

HOW ELLIS FOX CAN HELP

Implementing change is going to require specific expertise and strong leadership. If your organisation needs senior expertise to step into the gap and drive change, talk to us.

We can help you find the right people with the right business knowledge, construction and infrastructure experience and leadership qualities you need.

Contact us via email at team@ellisfox.co.uk or call us on Tel: 020 7183 0255.

