

ROADMAP 2023

THE
EARTHSHOT
PRIZE

SELECTION PRIORITIES

2023

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01 INTRODUCTION



Dear friends, partners, advocates and changemakers,

The Earthshot Prize is a platform dedicated to finding and growing solutions that will repair our planet this decade. We wake up every day to support innovators and leaders working to create a better world. They may be a university, a charity, a tech startup or even a city. Our role is to shine a spotlight on their solutions, to support and help scale them, and in doing so, unleash the urgent optimism in each of us.

The world is at an inflection point: we have seven years to reduce global greenhouse gas emissions by over 40% and protect 30% of land, freshwater, and oceans. This is daunting when we consider the solutions yet to be uncovered, the scale of change needed to repair and regenerate the planet, the speed at which we must scale solutions, and make inclusive green growth the dominant engine of our economies.

Our founder, Prince William, The Prince of Wales, was inspired by a similarly daunting task: President Kennedy's challenge to the American people to land a person on

the moon and bring them home safely within the decade. This "Moonshot" was achieved in seven years, delivered by a collaborative effort of over 400,000 scientists, engineers, academics and business people. A common endeavour, it unlocked innovation, which fueled economic and social progress, and inspired a new generation to aspire to become astronauts.

The Earthshot Prize was established in the same spirit. Together with our community of Official Nominators, we search the world for solutions with proven working prototypes, signs of success, and the



UNLEASH
THE URGENT
OPTIMISM

INTRODUCTION

RETHINK
AND
REUSE

potential to transform the environment. We seek a plurality of nominations from a diverse and representative group of people and from all sectors. From our fast growing pool of nominations, we begin a process to identify a Top 150 and then a Top 15. Annually, these Top 15 become a cohort of Earthshot Finalists of which five will receive catalytic Earthshot Awards, and all 15 will enter the Earthshot Fellowship for a year of dedicated support.

Two and a half years since we were founded we can attest with certainty, based on thousands of nominations, that innovation is happening everywhere. The world's talent is increasingly dedicating a sense of innovation, ingenuity and entrepreneurialism to creating and scaling solutions. It is this ingenuity that has already enabled previous Earthshot Prize Winners and Finalists to make leather from temple flower waste, new textiles from captured carbon emissions, and redesign whole city strategies away from 'use-and-dispose' towards 'rethink-and-reuse'. This new wave of innovators hold our future in

their hands and we are here to support, spotlight, scale and champion them – and to encourage others to aspire to become a part of this community.

However, they face a battle to scale their ideas. They may face a lack of capital or access to networks of talent and power. And, because we are particularly focused on women-led, indigenous-led, global south and east solutions, our finalists may face additional barriers accessing support.

At The Earthshot Prize everything we do is aimed at helping these innovators and their solutions reach their full potential. To do so, we work with our Global Alliance of Partners from philanthropy, Not-for-profit, government, investment and business.

The solutions we find are stories of possibility and potential, and it begins with our Roadmap. We have listened to experts from around the world who have guided us on the areas that need more support, or that could reach positive tipping points in the next 3-5 years. The Roadmap also guides our Official

WE POSSESS THE POWER TO TRANSFORM

An aerial photograph of a city, likely London, showing a mix of modern glass skyscrapers and older brick buildings. The image is overlaid with large, bold, green text that reads 'WE POSSESS THE POWER TO TRANSFORM'. The text is semi-transparent, allowing the city details to be seen through it.

Nominators as they select innovations from around the world. It is a sketch of the world in front of us, and illustrates areas of opportunity and possibility that solutions can unlock. It is a guide too, to how we select winning nominations - in an effort to help Nominators and Nominees when they enter The Earthshot Prize.

Finally, we hope it is a roadmap for each of us to consider where and how we can contribute. We encourage everyone to consider the role you can play in our collective effort, helping us focus on the 15 priority areas outlined in this document. Each one of us, regardless of background, expertise, or sphere of influence, can make a difference.

Together, then, we can transform our cities into sustainable places to live. We can restore degraded landscapes, revive dwindling biodiversity, and build regenerative agricultural systems that provide the food we need. And we can forge a new paradigm of inclusive growth and social justice, where no one is left behind.

We can take inspiration from past Earthshot Prize Finalists and Winners each of whom channelled urgency into a force for change. That's why Earthshots matter. They are the story of possibility, potential, inspiration and optimism.

As you go through the pages of this report, let optimism be your guide. The road ahead may be arduous, but every step taken, no matter how small, carries us closer to a world transformed if we do it together, with focus, collaboration, and determination.

On behalf of The Earthshot Prize team and our community of partners,

A handwritten signature in black ink, which appears to read 'Hannah Jones'.

Hannah Jones

02 EXECUTIVE SUMMARY



EXECUTIVE SUMMARY

FIFTEEN AREAS OF INTEREST.

PROTECT AND RESTORE NATURE	CLEAN OUR AIR	REVIVE OUR OCEANS	BUILD A WASTE-FREE WORLD	FIX OUR CLIMATE
<p>01 Protecting areas of high biodiversity such as forests, wetland, peatlands and wildlife corridors</p> <p>02 Restoring damaged ecosystems</p> <p>03 Feeding people while protecting nature</p>	<p>01 Engaging citizens in data collection and clean air policies</p> <p>02 Preventing the burning of fields, forests and waste</p> <p>03 Transitioning to clean transportation for all</p>	<p>01 Protecting and restoring coastal ecosystems</p> <p>02 Replenishing fish populations</p> <p>03 Reducing demand for fishmeal</p>	<p>01 Reducing food loss from farm to fork</p> <p>02 Phasing out single-use and non-recycled plastics</p> <p>03 High-value circularity in fashion and electronics</p>	<p>01 Creating an equitable clean energy future</p> <p>02 Addressing non-CO2 greenhouse gas emissions</p> <p>03 Decarbonising hard to abate sectors</p>

FOUR FILTERS TO ASSESS AGAINST

- 01 - POTENTIAL FOR GLOBAL IMPACT
- 02 - DIVERSITY OF SOLUTION TYPES
- 03 - STAGE OF INNOVATION
- 04 - ORGANISATIONAL FOUNDATIONS

FIVE CROSS CUTTING ENABLERS

- 01 - SOLUTIONS THAT USE TECHNOLOGY, AI OR DATA TO ENABLE TRANSFORMATIVE CHANGE
- 02 - SOLUTIONS THAT CREATE OR LEVERAGE NATURE AND CARBON MARKETS, NOVEL FINANCIAL MECHANISMS AND ESSENTIAL LEGAL SOLUTIONS
- 03 - SOLUTIONS LED AND INFORMED BY INDIGENOUS AND LOCAL COMMUNITIES
- 04 - SOLUTIONS THAT PROMOTE SHARED ECONOMIC OPPORTUNITY
- 05 - SOLUTIONS THAT ENABLE POLICY CHANGE

03 OUR SELECTION THESIS



AT THE EARTHSHOT PRIZE, WE SEARCH THE WORLD FOR ENVIRONMENTAL SOLUTIONS WITH THE POTENTIAL TO REPAIR OUR PLANET THIS DECADE.

Whether they are from the public or private sectors, a university, a city, a non-profit or a company, we are open to nominations of every type and from every sector.

In particular, we aim to identify the solutions needed to achieve our five Earthshots. In order to be successful, this search requires guiding principles: a thesis. This Roadmap, then serves as our Selection Thesis, similar in style to an investment thesis.

It aims to direct our search towards specific sectors within the five Earthshots that can make the fastest progress. It also explains the characteristics of innovations that makes them more likely to create transformational change. This informs our choice of Finalists. Through this strategy, we believe we can find a group of solutions that could achieve the five Earthshots if they are equipped with the necessary talent, investment and resources.

The Earthshot Prize can only appoint 15 Finalists per year. However, we intend to highlight many more solutions this decade. A vast portfolio of varied innovations that fit this selection thesis will give us the greatest chance to achieve the Earthshots.



PRINCE WILLIAM - LONDON 2021 AWARDS CEREMONY

OUR SELECTION THESIS

THE SUCCESS OF THIS THESIS DEPENDS UPON THREE GROUPS OF PEOPLE.

FIRST, THE INNOVATORS.

As the creators of the solutions we support, nothing could be achieved without them. We firmly believe, and have already proven that there are thousands of people globally developing solutions to repair the planet. We believe nominating a diverse group of solutions, then, will give us the greatest chance to achieve the Earthshots.

SECOND, OUR NOMINATORS AND SELECTION PARTNERS.

This group seeks out the most exciting solutions. They have access to global networks and encourage innovators to share data about their solutions. Their intelligence and perceptiveness helps discover solutions that deserve more attention and support.

AND THIRD, THE SUPPORTERS AND ADOPTERS OF SOLUTIONS, INCLUDING THE GENERAL PUBLIC.

If we are to support a sufficient number of solutions this decade, identifying them is only the beginning. Innovators in all sectors tell us that to scale up their solution they require access to capital, supportive policies and regulation, visionary customers and partners, and talented recruiters and advisors. This is why The Earthshot Prize seeks to instill urgent optimism around the world, ensuring active and involved citizens support these solutions.



HUTAN - 2022 FINALIST



OUR NETWORK'S SEARCH HAS ENABLED US TO UNCOVER THOUSANDS OF DIVERSE GAME CHANGING INNOVATIONS ACROSS THE GLOBE IN THE FIRST THREE YEARS OF THE PRIZE.

Official Earthshot Prize Nominators are hyper-connected experts in their field who find solutions that offer great potential. A list of the [300+ nominators](#) who wish to be publicly recognised is available on our website.

Nominated solutions are assessed by our selection partners, who marry knowledge in the environmental field with expertise in scaling up, whether the solution is for-profit, public sector, or not-for-profit.

TO ASSESS THE POOL OF NOMINATIONS WE RECEIVE EACH YEAR WE ARE GRATEFUL FOR THE SUPPORT OF THREE GROUPS:

01. Expert Advisory Panel: Over [60+ experts](#) donate their time to review the potential impact and novelty of a selection of our nominations, and whether the solution is best-in-class. In 2023, over 170 solutions were reviewed by this expert panel. Some of these experts also volunteered time to be interviewed as part of this revised Roadmap.
02. The Chartered Institute of Patent Attorneys: Dozens of UK patent attorneys donate their time to review the intellectual property position of nominees and to identify actions to take.
03. Deloitte: The consultancy firm provides its expertise to help assess nominees' readiness to scale and their fit to our selection criteria.





THE EARTHSHOT PRIZE AIMS TO SPEED HUNDREDS OF SOLUTIONS TO SCALE.

The Prize spotlight and the Fellowship Programme accelerator supports each cohort of 15 Finalists, with the five annual winners receiving the added bonus of £1m of prize money. But it is our aim to support far more than 150 Finalists over this decade.

Over the coming years we will build partnerships and initiatives that support a wider selection of nominees to achieve their scale ambitions. Alongside this, thought leadership interventions will seek to give whole sectors of innovation a greater chance of success by addressing the way finance and policy can choose to hinder or support innovation.

The Fellowship programme aims to help all 15 Finalists supercharge their growth by unlocking new financial, networking and partnership opportunities. This programme includes a week-long in-person retreat that provides the perfect opportunity to collaborate and share their ideas for growth. Throughout the Fellowship, specialist coaching and support is provided by organisations from our Global Alliance of expert businesses, NGOs and philanthropists to aid our Finalists on their journey towards making a transformational impact.

More details on our efforts to speed solutions to scale can be found in our impact reports and regular news stories on [The Earthshot Prize website](#).

IN 2022, WE INTRODUCED THE FIRST ROADMAP



With the intention to update it as we learn about the state of environmental innovation across the globe, and the types of innovations that the Prize is suited to supporting to scale.

After just 18 months we have chosen to update this document because the Prize itself is an innovation, in its early stages and developing rapidly. We have now run three searches and three selection processes, held two awards ceremonies, supported thirty Finalists and ran one cycle of our Fellowship programme. Armed with many new insights from this work, and aware of our knowledge limitations, this update shares our learnings and newly acquired knowledge to guide our search.

In writing this report we have sought the knowledge of 40 global environmental experts and reviewed over 70 scientific publications, and combined this with the insights gained from our last year of activity.

THIS HAS RESULTED IN THE FOLLOWING CHANGES:

01. An update to the priority interest areas within each Earthshot, based on the need for innovation, and the potential to reach a tipping point in the next five years
02. A revision of the selection filters used to choose the Earthshot Prize Finalists
03. A clarification on which environmental and social metrics we will use to measure the success of the Prize in supporting solutions to scale their impact
04. A refining of our definition of the “stage of solutions” we are keen to identify
05. An addition of detail on the differences between the solutions we seek from the public sector, the private sector and third sector
06. An addition of a new filter that focuses on a solution’s foundations including the leadership team and organisational maturity
07. An addition of a new cross-cutting enabler related to policy changes, to help solutions scale faster

FIVE EARTHSHOTS FOUR FILTERS

FIFTEEN AREAS OF INTEREST



04 FIVE EARTHSHOTS



FIVE EARTHSHOTS



01



PROTECT AND RESTORE NATURE

We choose to ensure that, for the first time in human history, the natural world is growing – not shrinking – on our planet

02



CLEAN OUR AIR

We choose to ensure that everyone in the world breathes clean, healthy air - at World Health Organisation standard or better

03



REVIVE OUR OCEANS

We choose to repair and preserve our oceans for future generations

04



BUILD A WASTE-FREE WORLD

We choose to build a world where nothing goes to waste, where the leftovers of one process become the raw materials of the next - just like they do in nature

05



FIX OUR CLIMATE

We choose to fix the world's climate by cutting out carbon: building a carbon-neutral economy that lets every culture, community and country thrive

05 FOUR

FILTERS





**WE AIM
TO SPEED
HUNDREDS
OF SOLUTIONS
TO SCALE**

We aim to speed hundreds of solutions to scale that can achieve the five Earthshots

Therefore, our search process is not solely about finding 15 Finalists each year, but identifying and understanding a large and varied portfolio of innovations across the globe.

This is an important new message for our nominators and search partners. To date, approximately 1 in 100 nominations have become Finalists and had their growth supported by the Prize. We aim to improve that ratio to 1 in 10 and beyond in the coming years, meaning that there is a much higher chance that nominating an innovation will lead to tangible support for its growth.

Also, the more nominations that are received, the greater insight we can provide on the state of environmental innovation, which through thought leadership interventions will aim to unlock the path to scale for whole sectors of innovation.

During the first three years' search for innovations, we experienced gaps in the innovations nominated in several geographies, demographics and sectors. Therefore we ask that nominators lean towards submitting more innovations rather than fewer. Nominations of a large and varied range of innovations are vital for the Prize and increase the chances that our interventions can enable many hundreds of solutions to scale outside of the 15 Finalists.

When it comes to selecting the 15 Finalists we have amended the filters we will use to make that choice in 2024.

FILTER 01

POTENTIAL FOR GLOBAL IMPACT

Finalists will have the potential to be relevant on a global level by 2030 based on a shortlist of environmental metrics. We are interested in solutions that also make a positive social impact, such as improving lives or creating green jobs, alongside the essential environmental impact.

We also seek nominations that are transformative and best-in-class as an indicator of global impact potential.

Transformative solutions have the potential not only to have an impact, but revolutionise their fields. Transformation could be achieved by growing their solution to a global scale, or changing the incentives or rules of a sector, or local radical disruption of the norm that inspires others to replicate that radical improvement.

Best-in-class means a solution is among the most advanced of its type. It may have the most field tests, or have market-leading traction in customer partnerships, or have received the greatest

independent validation of its effectiveness. To win the Earthshot Prize, nominations will need to present a strong case that this solution has a special and unique position among its peers, with quantification to back this up.

SOLUTIONS MUST CLEARLY ARTICULATE THEIR IMPACT TO DATE, AND THEIR POTENTIAL TO MAKE A DIFFERENCE IN THE FUTURE BASED ON ONE OR MORE OF THE FOLLOWING ENVIRONMENTAL METRICS:

01. Hectares of land, ocean or freshwater systems protected or restored
02. Biodiversity increases on land, freshwater systems or in oceans
03. Reduction in concentrations of particulate matter (PM2.5/ PM10)
04. Tonnes of waste saved, reduced, recycled or avoided
05. Tonnes of greenhouse gas emissions saved, captured or avoided

FILTER 02

DIVERSITY OF SOLUTION TYPES

We accept solutions from any country or sector in the world. It is through a diversity of solutions that we identify new opportunities or connections, and demonstrate the need for collective action globally.

Past finalists included grassroots not-for-profits, tech start-ups, global data monitoring systems, cities and countries. Diversity makes a Finalist cohort stronger and will be a consideration throughout our selection process. We place a particular emphasis on geographic representation, gender and indigenous representation and actively source innovations from these communities.

NOMINEES, THEREFORE, COULD BE:

01. An organisation (not-for-profit or for-profit)
02. Government institution, local or national (including a country or city)
03. A partnership of more than one organisation
04. A team or small group of individuals

FOUR FILTERS

FILTER 03

STAGE OF SOLUTION

Finalists will have solutions that can be scaled or replicated quickly with financial, communications or organisational support.

FINALISTS' STAGE OF DEVELOPMENT WILL LIKELY FIT THE FOLLOWING CRITERIA:

01. They are well-developed beyond the idea stage. They may still have development requirements to address before they can scale but will, for instance, have working prototypes, programmes and initiatives, or completed pilots that demonstrate their effectiveness. They will have tested their solution with their target users or recipients and seen early positive impact. They will already be active in the field or their market with customers, partners or audiences.
02. They are not limited solely by access to financials and funds but require additional support to be scaled or replicated at scale. Solutions that have already achieved a level of maturity where they only need access to funding will benefit less from the Earthshot Prize support and are, therefore, less of a focus for the Finalist podium.

03. They have made significant progress in the past year with clear organisational or solution-based breakthroughs, examples of which include completion of a major field impact evaluation, the launch of an in-market pilot programme, acquisition of a first customer or contract, successful fundraising, launch in a new geography or sector, or important hires made.

FILTER 04

ORGANISATIONAL FOUNDATIONS

Finalists will encounter many opportunities to scale their solution and inspire replication through the Earthshot Prize so we will seek solutions that are mature enough to maximise the support they receive. We will judge this based on the foundations they already have in place.

IN PARTICULAR, WE'RE LOOKING FOR SOLUTIONS THAT HAVE THE FOLLOWING:

01. **QUALITY OF LEADERSHIP:** A dedicated team and a founder committed to scaling or replicating the solution. This does not require a complete team; it may, in fact, be one dedicated person ready to execute the tasks required to scale a solution. Such people will bring knowledge of the solution and the problem it addresses. Solutions that can be replicated will have leaders keen to share it.
02. **INCLUSIVE LEADERSHIP:** A team that demonstrates inclusivity and representation because of the well-documented effect this has on performance. We will be looking for teams that represent their community, including female, indigenous and local community-led solutions.
03. **ORGANISATIONAL MATURITY:** the nominee ought to have solid governance and financial arrangements. A Board of Directors or Trustees, or an advisory board of some kind

is a good indicator of an institution with sufficient maturity to benefit from the Prize. Established partnerships and investor or funder relationships, meanwhile, demonstrate that others believe in the solution.

04. **SCALE MODEL:** A nominee with a credible model by which their solution could be replicated or scaled to have transformative impact. We are model agnostic, because we know that achieving the Earthshots will take a range of for-profit, not-for-profit and public sector solutions. What is essential for Finalists is a clear route to transformative impact. The model will include what partnerships would accelerate it, and what resources or skills they may need. Localised solutions, such as those created by cities or NGOs, who aim to inspire change far and wide, will preferably identify partners and activities that can support replication elsewhere, alongside pushing the boundaries and overcoming challenging barriers in their location.

FOUR FILTERS

HOW WE SELECT WINNERS FOR EACH EARTHSHOT



FIFTEEN AREAS OF INTEREST.
THREE PER EARTHSHOT,
PLUS WILDCARDS.



FOUR FILTERS
TO ASSESS AGAINST

01 - POTENTIAL FOR GLOBAL IMPACT

03 - STAGE OF INNOVATION

02 - DIVERSITY OF SOLUTION TYPES

04 - ORGANISATIONAL FOUNDATIONS

TOP NOMINEES
GO THROUGH

SELECTION

06 THE FIFTEEN AREAS OF INTEREST



FOR EACH
EARTHSHOT, WE
EXPLAIN THE
WORLD AS IT
IS AND HOW IT
MUST CHANGE.



For each Earthshot, we explain the world as it is and how it must change. We then expand on three areas of interest for each Earthshot. In many instances, our areas of interest converge.

For example, a solution that helps clean our air may also help us fix our climate. Similarly, a solution that helps build a waste free world may also help revive our oceans. This is to be expected due to the interdependencies across the Earthshots. Each area of interest, each Earthshot, contributes towards our mission. Solutions that span multiple categories will, for the purpose of the Prize, be assessed against the single category that best represents the solution and its impact.

We appreciate that these 15 areas of interest exclude whole sectors of human activity and fields of innovation, in order that we focus on these areas of high opportunity. We also observe that these areas of interest will flex over time as new opportunities arise to help other sectors of innovation reach a tipping point.

Therefore, the message to our nominators is to continue to put forward solutions within these 15 areas of interest AND in alternative fields. We will be delighted to understand solutions that offer the possibility of rapid positive impact no matter which sector they operate in, and will consider such solutions for The Earthshot Prize in 2024 and beyond.

THE FIFTEEN AREAS OF INTEREST

THE FIFTEEN AREAS OF INTEREST



**PROTECT
AND RESTORE
NATURE**

- 01 Protecting areas of high biodiversity such as forests, wetland, peatlands and wildlife corridors
- 02 Restoring damaged ecosystems
- 03 Feeding people while protecting nature



**CLEAN OUR
AIR**

- 01 Engaging citizens in data collection and clean air policies
- 02 Preventing the burning of fields, forests and waste
- 03 Transitioning to clean transportation for all



**REVIVE OUR
OCEANS**

- 01 Protecting and restoring coastal ecosystems
- 02 Replenishing fish populations
- 03 Reducing demand for fishmeal



**BUILD A
WASTE-FREE
WORLD**

- 01 Reducing food loss from farm to fork
- 02 Phasing out single-use and non-recycled plastics
- 03 High-value circularity in fashion and electronics




**FIX OUR
CLIMATE**

- 01 Creating an equitable clean energy future
- 02 Addressing non-CO² greenhouse gas emissions
- 03 Decarbonising hard to abate sectors



PROTECT AND RESTORE NATURE





IMAGINE A
WORLD IN WHICH
WE BECOME
STEWARDS, NOT
DESPOILERS, OF
THE NATURAL
WORLD.

A world in which farms and forests co-exist without competition, in which cities are transformed into green oases, with access to nature available to all. In which a nation's wealth is measured not only by its natural resources, but also its riches of diverse wildlife, and where generational and indigenous wisdom is brought to the fore. To make it reality, we must act now.

Biodiversity encompasses all life on earth: animals, plants, fungi and microorganisms. In ecosystems, species work together to support life. They support human life and planetary resilience too, providing breathable air, food, clean water, medicine, fuel and shelter. However, biodiversity is declining tens to hundreds of times faster now than at any other time in human history, and perhaps as fast as any mass extinction event in Earth's history.⁽¹⁾ Since the Industrial Revolution, pollution, logging, intensive agriculture, and the development of urban

settlements has degraded flora and fauna. Climate change will become an additional major cause of biodiversity loss unless we limit warming to 1.5 degrees.⁽²⁾ The consequences are clear: a quarter of animal and plant species are currently threatened with extinction and one million more species face extinction within the coming decades unless we change course.⁽¹⁾

With the right solutions this future is possible. That means combining conservation efforts with sustainable production of food and timber, and restoring and replenishing forests and waterways that have been destroyed and polluted. Doing so will not only halt and reverse the collapse of biodiversity, it will also help us address climate change. It is estimated that protecting, restoring and managing natural carbon stores such as forests, wetlands and grasslands has the potential to capture about one third of the carbon emissions needed to keep us on the path to 1.5 degrees.⁽²⁾

PROTECT AND RESTORE NATURE



TO PROTECT AND RESTORE NATURE, WE SEEK SOLUTIONS ACROSS THREE AREAS OF INTEREST:

01 Protecting areas of high biodiversity such as forests, wetland, peatlands and wildlife corridors

02 Restoring damaged ecosystems

03 Feeding people while protecting nature

01 PROTECTING AREAS OF HIGH BIODIVERSITY SUCH AS FORESTS, WETLAND, PEATLANDS, AND WILDLIFE CORRIDORS



POLE POLE FOUNDATION - 2021 FINALIST

We need to work together to stop biodiversity loss. Man-made habitat destruction and, in particular, land-use change, is its biggest cause, which is a combination of deforestation, land conversion for agriculture and urbanisation, among others.⁽³⁾

There is much work to do and designating protected areas can deliver rapid positive impact. In December 2022, more than 190 countries made a groundbreaking agreement to prioritise the natural world by protecting 30% of land and oceans by 2030. This is inspiring work. Protection of this kind is critical to ensuring nature grows by the end of the decade.⁽⁴⁾ Protecting the remaining parts of the Earth which are most important for biodiversity, such as intact forests, wetlands, peatlands, grasslands and other habitats, can rapidly arrest the increasing extinction rate.

Designating an area for protection is only the beginning of the turnaround that is needed. Effective protection work requires protected areas to be in the right places, with the right management, and they need to last. We also need to measure baselines of areas in pristine condition to assess the impacts of human activities, understand the workings of the ecosystem, and to evaluate how well management techniques are working.

SPECIAL ATTENTION SHOULD BE GIVEN TO:

- 01 Biodiversity hotspots and ecologically diverse areas:** Where large concentrations of endemic plant and animal species can be found, as well as the most diverse ecosystems and their species.
- 02 Large intact ecosystems:** those that have not been significantly altered by human activities. It is believed only 3% of the world remains ecologically intact and much of this lies in lands stewarded by indigenous people.⁽⁵⁾
- 03 Ecologically diverse areas:** as we expand coverage of protected areas, we must ensure representation for the most diverse ecosystems and their species.
- 04 Wildlife corridors:** These connections, across land and water, are vital because habitat fragmentation means only 10% of protected areas are connected.⁽⁶⁾ The ability of species to move around is the function of a healthy ecosystem and increases the chance of species surviving in a given geography.⁽⁷⁾

01 PROTECTING AREAS OF HIGH BIODIVERSITY SUCH AS FORESTS, WETLAND, PEATLANDS, AND WILDLIFE CORRIDORS

WE SEEK NOVEL AND UNIQUE SOLUTIONS TO PROTECT BIODIVERSITY,

As well as the recovery of plant, animal and insect populations, this protection work has multiple secondary environmental benefits. It also contributes to improved air quality, and the fight against global warming. Many of these areas of vital importance for biodiversity are also large carbon sinks and therefore help us towards our global climate goals. Tropical forests, for instance, store up to 25% of the world's carbon, and protecting them ensures that carbon remains locked up indefinitely.⁽⁸⁾

Protecting the planet's remaining biodiversity also benefits all of us. Well functioning, biodiverse ecosystems support human and societal needs, including food and nutrition security, energy, development of medicines and pharmaceuticals and freshwater, which together underpin good health. Many of these biodiversity hotspots are

far from fully explored with tens of thousands of species of plants, animals and fungi unidentified. The short-sighted destruction of biodiverse areas for quick financial returns threatens to destabilise planetary systems. It also destroys our chances of discovering new medicines or compounds that could revolutionise industries.⁽⁶⁸⁾

We seek novel and unique solutions to protect biodiversity, including new ways to incentivise protection, put a value on nature, and benefit the people who manage and preserve these important ecosystems. Indigenous people and the local communities who live in these areas should lead and guide us because protection works best when done by those with generational knowledge. Meanwhile, we need ways to measure biodiversity at a granular level and seek technological solutions with the potential to quickly improve our understanding.

THIS SOLUTION ALSO HELPS US:



HUTAN - 2022 FINALIST

02 RESTORING DAMAGED ECOSYSTEMS

As well as protecting the existing areas of high biodiversity, we must also restore the much larger area of the planet's ecosystems that have been degraded or damaged.



RESTOR - 2021 FINALIST

If we are to stop the decline in wildlife, it is essential we do. We must not only protect the best, but also improve the rest.

Monitored global wildlife populations have seen a devastating 69% drop on average since 1970, rising to 94% in Latin America & The Caribbean.⁽⁶⁾ If we are to restore these populations to previous levels and beyond, we need to restore the ecosystems they depend on. There is no silver bullet. Turning this around requires a combination of solutions including reforestation, habitat management, rewilding, and allowing natural regeneration.

Globally, forests contain the majority of terrestrial biodiversity. However, forest habitat continues to decrease and the loss of biodiversity threatens the forest ecosystem in a vicious cycle. Logging, firewood cutting, pollution, invasive pests and wildfires are damaging the world's last remaining forests. Restoring these ecosystems means replanting and reducing the pressure on forests so that trees are given space and time to re-grow naturally. Benefits of reforestation are highest when expanding or reconnecting remaining forests, when focusing on regions with high numbers of endemic species, and those that have had high proportions of loss.⁽⁹⁾

But it's not just about forests and replanting. Shrublands, wetlands, grasslands and savannahs are being overgrazed, converted to agriculture and overtaken by invasive species. Freshwater environments host a rich biodiversity, including one-third of vertebrate species but have been degraded by pollution, overfishing, infrastructure & the extraction of water.⁽⁶⁾ Reintroducing native animal and plant species and allowing nature to take over helps ecosystems recover and improves their resilience. Rewetting peatlands and wetlands can have benefits for biodiversity as well as storing the carbon that is emitted when those habitats dry out. Ecosystem restoration & improved forest management has the potential to reduce global carbon emissions by around 4 billion tonnes between now and 2030.⁽¹⁰⁾ Thriving ecosystems, meanwhile, create jobs and wealth for local people.⁽¹¹⁾

This is a promising vision of the future. We therefore seek solutions that accelerate vital restoration work. Tree planting is important, but restoration of vast swathes of land and water requires more. In this effort, indigenous and local people with generational knowledge should lead and guide. Technology, meanwhile, must be part of the solution. Putting

power into the hands of local land stewards could speed change. And we will seek long-term solutions, with ways to monitor progress during and after the restoration work, vital to making a difference.

The 2022 Earthshot Prize Finalist, [Hutan](#), provides an inspiring example of restoration at work. For twenty five years they have studied and monitored Borneo's abundant biodiversity, such as orangutans, elephants, and hornbills. Their research revealed wildlife could co-exist with local people if allowed to travel freely between the region's fragmented forests. These efforts guided Hutan's efforts to work with palm oil plantations to create wildlife corridors and reforest degraded areas with native trees, providing passage, food and shelter for wildlife.

THIS SOLUTION ALSO HELPS US:



03 FEEDING PEOPLE WHILE PROTECTING NATURE



KHEYTI - 2022 WINNER

While increasing conservation and restoration is key, we also need to address the drivers of biodiversity loss. Since the 17th century, land used for agriculture has increased 5.5 times. Half the world's habitable land is turned over for agriculture. And our land use is increasing as the world's population grows along with our appetite for food production. This is the number one cause of habitat loss, accounting for 80% of all land-use change globally as natural habitats are destroyed and fragmented to make room for more crops and grazing animals.^(12, 13)

Our diet is an important factor. Much of the expansion we have seen in land use for agriculture is driven by animal farming. Almost 80% of agricultural land is used for meat and dairy production, increasingly at the expense of land rich in biodiversity. Around 40% of the cereals grown across the world are used for animal feed.⁽¹²⁾ Eating more plants and less meat, particularly in the Global North where food poverty is low, would reduce the total land use needed for agriculture, and significantly help nature recover.⁽¹³⁾ This also reduces our global carbon footprint. Greenhouse gas emissions generated by animal products

are between 10 and 50 times higher than those generated by plant-based food.⁽¹³⁾

Another important issue is unsustainable agriculture. Intensive farming techniques, such as heavy tillage and chemical fertilisers destroy fungi, soil diversity, and insect populations, with knock-on effects for animals further up the food chain.⁽¹³⁾ Already, a third of agricultural soils are degraded. Half of all topsoil has been lost in the last 150 years. Fertilisers and pesticides have led to a decline in populations of pollinating insects, and the excess seeps into lakes and rivers, harming aquatic life and, when allowed to flow out to the sea, causes deadly algae blooms. At the same time soil is a vitally important carbon sink containing 80% of terrestrial carbon, with soils high in biodiversity holding the most carbon.⁽¹¹⁾

Farming solutions are necessary but can't come at the cost of yield otherwise agricultural land will need to expand and encroach even further into animal and plant habitats. If we develop sustainable farming techniques while increasing the yield of sustainably farmed land, and eat foods that require less land in their production, we reduce pressure on biodiversity. Improvement in sustainable agricultural techniques have vastly improved in recent decades. Some solutions are here already, and they need to be scaled. This will not only be positive for nature, it also has the potential to reduce carbon emissions by 3-4 billion tonnes by 2030.⁽¹⁰⁾

We seek scalable solutions that create healthy soil, full of microbiomes and capable of producing high quality, higher yield, nutrient dense food. We seek solutions that work with nature and improve the biodiversity on farmed land using techniques like crop rotation, minimum tillage and agroforestry while reducing the use of pesticides. We also seek solutions that provide alternative protein sources, or otherwise reduce our agricultural footprint on nature.

Kheyti, an Indian start-up and 2022 Earthshot winner, has developed a solution transforming the fortunes of small-hold farmers. Its Greenhouse-in-a-Box offers shelter for crops from unpredictable elements and destructive pests. The start-up also trains and supports farmers to ensure their greenhouse works as effectively as possible. The results are startling: plants in the greenhouse require 98% less water than those outdoors, while yields are seven times higher. 90% cheaper than a standard greenhouse, they are doubling farmers' incomes, allowing them to invest in their farms and in their children's education.

THIS SOLUTION ALSO HELPS US:



FIX OUR CLIMATE



REVIVE OUR OCEANS



CLEAN OUR AIR



BUILD A WASTE-FREE WORLD



CLEAN OUR AIR



IMAGINE A
WORLD IN WHICH
EVERYONE,
NO MATTER
WHERE THEY
LIVE, BREATHES
IN CLEAN,
HEALTHY AIR.



A world in which no child ever dies from a pollution-related illness, and in which renewable energy is affordable and plentiful everywhere: powering transport, heating homes, and cooking food.

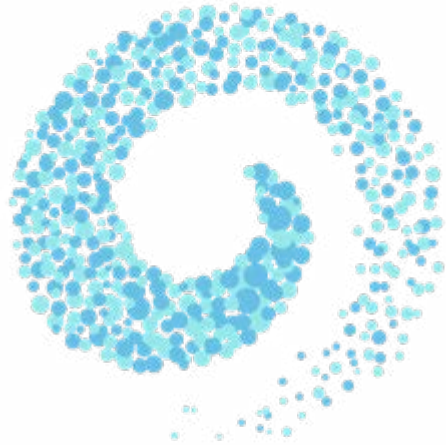
This vision is possible with the right global effort. Today, almost everyone breathes air exceeding World Health Organisation air quality limits. Due to improvements in monitoring we understand the issue better than ever. Over 6,000 cities in 117 countries now monitor air quality, but their citizens still inhale unhealthy fine particulate matter and nitrogen dioxide. This is borne out in the statistics: air pollution is estimated to contribute to seven million deaths per year globally.⁽¹⁴⁾

Those in low and middle-income countries suffer most, accounting for more than 9 in 10 air pollution-related deaths.⁽¹⁵⁾ Children under five in low-income countries are 60 times more likely to die from exposure than their high-income counterparts.⁽¹⁶⁾ That makes poor air the leading environmental risk factor for early death, exceeded only by high

blood pressure, smoking and dietary risks. Yet deaths don't tell the full story. The real impact is no doubt greater, with long-term exposure increasing the risk of respiratory and cardiovascular disease, lung cancer and stroke. A recent review also found an association between air pollution and impaired cognitive ability.⁽¹⁴⁾

Drivers differ by country, but slash and burn agriculture, transportation, industry, and household heating and cooking are among the biggest causes. Over the past 30 years, we have made promising progress: deaths from indoor air pollution have fallen globally, much of that down to a shift to cleaner energy.⁽¹⁷⁾ But it is a task unfinished and we haven't had the same level of progress on outdoor pollution. While many countries now have policies in place, implementation and funding often lags behind ambition.⁽¹⁸⁾

With the right solutions, we can transform the air we breathe. That means bringing together policymakers, both local and national, to solve the problem. And it means making use of innovation to monitor and curb the high levels of pollution around us.



CLEAN OUR AIR

TO CLEAN OUR AIR, WE SEEK SOLUTIONS
ACROSS THREE AREAS OF INTEREST:

01 Engaging citizens
in data collection
and clean air policies

02 Preventing the burning
of fields, forests and waste

03 Transitioning to clean
transportation for all

01 ENGAGING CITIZENS IN DATA COLLECTION AND CLEAN AIR POLICIES



THE BLUE MAP APP - 2021 FINALIST

Air quality data tells us so much: the nature of pollution in the air, where it comes from, how it's changing, and how it affects our health.

However, while more governments than ever are monitoring air quality and sharing data publicly, there are still gaps. Recent analysis found only 61% of countries have government-led air quality monitoring. Only 53% of countries publicly share the data they collect, and less than half of those do so in a way that could be considered useful.⁽¹⁹⁾

Low and middle-income countries - the most heavily polluted - tend to be where the largest monitoring gaps exist.⁽¹⁹⁾ While there is good coverage in many capital cities globally, there are gaps in smaller cities and in rural Asia, Latin America and Africa.⁽²⁰⁾ Low-cost sensors exist, but the quality of data collected by them is often poor. Where there is data, it is rarely in real-time or available to aid decision-makers. Globally we need a more concerted effort of national and local stakeholders, to make unrestricted and transparent data the standard.

The city of Beijing shows how data can change lives. In the early 2000s, concern about the city's air quality grew. Data from local air quality monitors showed higher levels of pollution than those being reported centrally. This evidence along with public pressure helped the government take note. They released a National Air Quality Action Plan and, between 2013 and 2020, pollution exposure nationwide declined by an average of almost 40%.⁽²¹⁾

We seek solutions that improve our understanding and measurement of air pollution, and turn this evidence into restrictions of sources of air pollution, especially where it is most prevalent. For developing countries where emissions have not yet peaked, we urgently need a better understanding of their scale and source. Satellite-based technology could help us track the long-distance movement of air pollution. Ground-based monitors could give us even more granular local data. Crucially, this is not about gathering data for data's sake. We seek solutions that effectively share and use the data to increase the accountability of polluters and enable citizens

and governments to join forces behind progressive policies. We believe, too, in the importance of empowering people to monitor the air in their own towns and cities, so that they can determine their own solutions. We need solutions which accelerate data collection, help build and maintain air quality networks around the world, and use the data collected to drive meaningful change.

Using air quality monitoring to drive change has been done with great success by our 2021 Earthshot finalist, [Blue Map App](#). China's first public environmental database. It gives citizens the opportunity to use real time air pollution data to advocate change. Users can check local air and water quality and receive pollution data from more than 4,000 factories. Already, tens of thousands of "micro-reports" have been filed by [Blue Map App](#) users about polluting factories, and thousands of the biggest emitters in China have been persuaded to address their violation records.

THIS SOLUTION ALSO HELPS US:



FIX OUR
CLIMATE



PROTECT
AND RESTORE
NATURE

02 PREVENTING THE BURNING OF FIELDS, FORESTS AND WASTE



TAKACHAR - 2021 WINNER

Stamping out burning is good for the earth and for farmers, too. The world over, farmers often set fire to cultivated fields to clear stubble, weeds and waste before sowing crops.

It is fast and efficient, but perilous to planetary and human health: the source of deadly black carbon emissions. It costs farmers too. Fires destroy the organic matter that makes the soil fertile, decreasing yields over time. But despite the consequences, the burning of fields remains common practice.⁽¹⁶⁾

In north-west India, the burning usually occurs after the April wheat harvest and the October rice harvest. Though the capital Delhi suffers from poor air quality year-round, it deteriorates through these periods, with pollutants blown down on the southern wind. A 2019 study showed that, in the Indian districts where burning is most intense, residents were three times more likely to visit hospitals with respiratory infections.⁽²²⁾

This is a difficult problem to solve. In theory, it could be fixed overnight but farmers are under extreme pressure to make a living, caught in a debt trap, buying seeds, fertilisers and pesticides on credit at high-interest rates because banks do not deem them creditworthy. The only solution is one that benefits both farmers and nature.

We can achieve it. We seek solutions that tackle the problems of agricultural burning, forest burning and open waste burning. This might be a tech solution

that converts crop residues to other products, better ways to track and manage burning, or even an outreach programme that helps farmers share best practices. It might even be a social solution or incentive scheme that rewards farmers each time they don't engage in slash and burn techniques.

A great example of a technological solution comes from our 2021 Earthshot winner [Takachar](#) who have developed a novel way to turn crop residues into sellable products like fuel and fertiliser. Designed with Indian farmers in mind, the solution is a cheap, small-scale technology that attaches to tractors in remote farms. The technology cuts smoke emissions by up to 98% and, at scale, could cut one billion tonnes of CO² per year, while helping Indian farmers earn a living.

THIS SOLUTION ALSO HELPS US:



FIX OUR
CLIMATE



PROTECT
AND RESTORE
NATURE

03 TRANSITIONING TO CLEAN TRANSPORTATION FOR ALL

Between now and 2050, the global population is expected to grow by 1.5 billion with the population of Africa expected to double.

Much of that increase will occur in cities and as cities grow, so too will traffic volumes and demand for vehicles.⁽²³⁾ This is an opportunity to scale zero-emission transportation for all.

Shifting to electric vehicles is part of the answer and great progress is being made here. In 2020, less than 5% of all new cars sold were electric. In 2023 it will be 18%. China accounts for 60% of all sales, while sales in Europe increased 15% in 2022, and in the US, 55%. Take-up remains low outside the major markets, but in 2022 sales tripled in India, Thailand and Indonesia collectively.⁽²⁴⁾ Evidence shows zero-emission vehicle legislation, such as those enacted in the EU and US respectively, can spark change quickly.^(25,26) It sends a message to the market and drives investment and innovation throughout the supply chain. As production ramps up, demand increases too, while the price of a vehicle falls, setting off a virtuous cycle.

However this is not just about electric vehicles. We can't simply swap all the internal combustion engines for battery powered alternatives and have the same number of vehicles on the road. We must also look for ways to redesign the world's transport systems and reduce traffic. Guadalajara in Mexico provides a shining example. Over the last few years they have transformed 2.5 km of previously heavily trafficked roads to give priority to pedestrians and cyclists. They have established an exclusive lane for public transport and cyclists through the city centre, while also transitioning their transport fleet to electric vehicles.⁽⁶⁹⁾

The benefits of this transition are immense, not only helping the billions afflicted by poor air quality, but helping us reach climate targets. Transport relies more heavily on fossil fuels than any other sector and is responsible for a fifth of global emission. Road travel accounts for most of this, mainly driven by passenger vehicles, as well as freight trucks and lorries.^(27,28) We must accelerate progress on personal transport in Asia, Latin America and Africa, while also addressing pollution from public transport and road goods vehicles, such as buses, trucks and off-road transport globally. We need better batteries, tyres,

brakes, and vehicle components. We also need improvements in the transport systems, especially in cities and urban areas. This means more cycling and walking options, efficient and clean public transport and more car sharing. If scaled, the green transport industry also has the potential to avoid more than 4 billion tonnes of global carbon emissions by 2023 making it a win for air and a win for climate.⁽¹⁰⁾

We seek solutions, therefore, that reduce air pollution from transport across the world, including buses, trucks, lorries and off-road vehicles. We need widespread access to green public transport available in cities, which would reduce reliance on cars. New policies could reduce urban traffic, while new financial models could increase investment in electric vehicle charging infrastructure. Innovation in battery technology is also needed to reduce charging time and increase electric vehicle range.

One of our 2022 finalists, [Roam Electric](#), is an example of an organisation who is supporting this

ROAM - 2022 FINALIST



transition. The company builds motorcycles and buses tailored to the African market with affordability and reliability at the forefront. The aim to make electric transport accessible to a far broader market, setting the standard for electric mobility in Africa.

Note: transport-based solutions whose primary purpose is reducing carbon emissions, rather than air pollution, may be nominated in the "Fix our Climate" category instead.


THIS SOLUTION ALSO HELPS US:





REVIVE OUR OCEANS





**IMAGINE A
WORLD IN
WHICH THE
WORLD'S
OCEANS ARE
PRESERVED
FOR FUTURE
GENERATIONS.**

In which vast pods of whales traverse them without hindrance, where mangrove swamps and coral reefs lie unblemished, and where oceans teem with an astonishing diversity of marine life, while providing livelihoods and sustenance for those who rely upon them.

We must set our minds to it because we all depend on oceans. They cover 70% of the world's surface, hold 97% of water, and contain 99% of liveable space for millions of species.⁽²⁹⁾ They also play an important role in global warming, absorbing over 90% of excess heat trapped by man-made greenhouse gas emissions.^(30, 31) In total, they hold 42 times more carbon than the atmosphere, with mangroves, tidal marshes and seagrass meadows acting as natural carbon reservoirs.⁽³⁰⁾

Pollution, overfishing and climate change are disrupting oceans and marine-life beyond their sustainable limits. As pollution pours out of rivers into the ocean, deadly algae blooms are spreading and coastal ecosystems lie exposed to rising seas. With the ocean nearing its carbon storage limit, acidification is beginning to increase, further harming corals and other marine life. 55% of the ocean is subject to industrial fishing and 33% of fish stocks are classified as overexploited.⁽¹⁾

With the right solutions, however, we can restore and preserve the world's oceans. That means replenishing damaged coastal ecosystems. And it means changing fishing practices so populations of wild fish can be restored.



REVIVE OUR OCEANS

TO REVIVE OUR OCEANS, WE SEEK SOLUTIONS
ACROSS THREE AREAS OF INTEREST:

01

Protecting and restoring
coastal ecosystems

02

Replenishing fish populations

03

Reducing demand for fishmeal

01 PROTECTING AND RESTORING COASTAL ECOSYSTEMS



LIVING SEAWALLS - 2021 FINALIST

Protecting and restoring coastal ecosystems benefits everyone. Coral reefs, mangroves, salt marshes, and kelp forests lie where land meets sea.

They are a rich source of biodiversity, providing nurseries for fish and cover from predators. They directly influence both the diversity and abundance of ocean life. They reduce coastal erosion, offer protection from storms and attract tourism in the form of divers and wildlife lovers. They provide a source of food, jobs and economic security for local people, and for the fishing industry, upon which we all depend. They also remove carbon from the atmosphere, 10 times faster, in fact, than terrestrial ecosystems such as rainforests. Most of this 'blue carbon' is stored under the ocean floor where decomposition is slow leading to a build up of extensive carbon stocks.⁽³¹⁾

However, these systems are threatened. They are the part of the ocean most heavily used and impacted by human activity. At the same time, rising

ocean temperatures, rising sea levels, and rising carbon emissions have all negatively affected them. Seagrass, for instance, has decreased 29% since the late 19th century and between 20-35% of mangroves have been lost in the past 50 years alone.⁽³⁰⁾

Now, the amount of CO² the ocean can store is reaching its limit. This is causing acidification, which bleaches coral reefs and harms coastal-dwelling organisms.

And damage to coastal ecosystems only makes climate change worse. Like trees, kelp forests act as lungs for the world, breathing in carbon and out, oxygen. But while coastal ecosystems cover an area equivalent to only 1.5% of land-based forests, their degradation causes carbon emissions in the atmosphere equivalent to over 8% of terrestrial deforestation.⁽³²⁾ Imagine what could be achieved if we set our minds to restoring them. Mangroves, salt marshes and seagrass beds can sequester carbon at up to 10 times the rate of equivalent terrestrial ecosystem areas, and, alongside seaweed and marine fauna, have the potential to reduce carbon emissions by 0.3 - 0.9 billion tonnes of CO² per year by 2030.⁽³¹⁾ Oceans have enormous powers of recovery when we remove the most damaging practices and keep the rest under control.

We seek solutions that protect and restore not only what's on the coastal floors, but also what swims and migrates through these coastal ecosystems. Local and indigenous coastal communities must be allowed to play a role in this work. We need innovative funding and finance models that assign a value to these ecosystems. This could incentivise

governments, cities, towns and villages to protect and restore their coastlines rather than destroying them. Investment from the private sector would turn enthusiasm into meaningful action. It's crucial that, in the next 3-5 years, financing for coastal biodiversity & blue carbon initiatives such as these are developed to match, or exceed, similar investments in terrestrial carbon markets. As on land, we also need to reintroduce key animal and plant species back into the coastal ecosystems that have been most damaged to allow for their full recovery.

The 2021 Earthshot finalist, [Living Seawalls](#), and 2022 Earthshot winner, [Indigenous Women of the Great Barrier Reef](#), both show examples of coastal protection in action. Living Seawalls' habitat panels are designed to mimic rock pools and mangrove roots, and are fitted to new or existing sea defences. The solution has been proven to increase marine life 36% in two years, and is now expanding globally. In Queensland, the Indigenous Womens' group brings together generational knowledge with modern tools like drones to monitor coral changes, forest fires and land degradation along the coastline.

THIS SOLUTION ALSO HELPS US:



02 REPLENISHING FISH POPULATIONS

We want to see oceans thrive, but as things stand, fish populations are in decline. The cause: overfishing, pollution, and poor management of commercial fisheries.

The number of sustainable fishery stocks have decreased from 90% in 1974 to less than 65% in 2019.⁽³³⁾ This depletion changes how fish reproduce and the speed at which they mature. It also negatively impacts the ecosystems, creating an imbalance that erodes the food web and leads to a loss of vitally important marine life.

It harms people too. 58.5 million people were employed in the fishing sector in 2022. 600 million people depend on fisheries and aquaculture.

⁽³³⁾ Decline in fish populations puts these people and their livelihoods at risk. Mismanagement of fisheries, for instance, is estimated to lead to an annual economic loss of \$80 billion globally.⁽³⁴⁾

We know what works. Allowing an overfished area to replenish for even two years can fully restore

marine life, and there is evidence to show it can create abundant marine life in surrounding areas, too. It brings broad ocean ecosystem benefits, protects biodiversity, and boosts fisheries yields, which can empower local communities, create jobs and support livelihoods. Local solutions, in particular, can make a big difference. While legislation tends to focus on industrial-scale fishing, like deep sea trawlers, local artisanal fisheries need support if we are to revive fish populations. This benefits people, as well as marine life, allowing us to increase fisheries productivity by 16.5 million tonnes, which would improve food security among coastal populations.⁽³³⁾

We seek a range of solutions which address the challenge of dwindling fish populations. This could be tech based solutions which help us understand how and when overfishing occurs, or stop it happening in the first place. It could be ways to protect and monitor large sections of the ocean to allow for marine life recovery, it could be educating those who work in smaller, artisanal fisheries

around sustainable practices, or incentivising them and rewarding them for using light touch sustainable fishing methods.

Our 2021 Earthshot finalist [Pristine Seas](#) shows us how an innovative approach can be used to protect vast areas of the ocean. They bring together scientists, filmmakers and policy experts to explore and document the wildest places in the ocean and encourage leaders to protect these ecosystems and allow them to recover. They have worked with local and indigenous people, governments and partners to establish 26 marine reserves globally: an area over twice the size of India.

THIS SOLUTION ALSO HELPS US:



PRISTINE SEAS - 2021 FINALIST

03 REDUCING DEMAND FOR FISHMEAL



SEAFORESTER - 2022 FINALIST

Fishmeal is an ingredient used primarily in diets for farmed fish & domestic animals, and millions of tonnes are produced every year, often from small, wild-caught fish, like herring.

It is a vital practice, but has become unsustainable and inefficient. It is estimated four to five tonnes of whole fish is required to make a single tonne of dried fish meal.⁽³⁵⁾ Roughly 20% of all wild-caught fish are used to feed farmed fish. This problem is only likely to intensify, with farmed fish estimated to represent 60% of all global fish consumption by 2030.⁽³⁶⁾

This is having a negative effect on marine ecosystems. Small fish and crustaceans, such as sardines, anchovies, and krill, play a vital role in the food chain. Tuna, sharks and whales rely upon them as a source of food. It also has a knock-on effect for other forms of marine life, such as mammals and birds. The exploitation of these small fry, then, could lead to the collapse of populations further up the food chain. We are reaching a tipping point. It

is estimated that demand for fishmeal and fish oil could surpass the global supply of small fish by as early as 2037.⁽³⁷⁾

Swift action would prevent this. It would also improve food security. It is believed 90% of fishmeal and fish oil could be used instead for human consumption.⁽³⁶⁾ Already, fish and seafood provide 3.3 billion with almost 20% of the animal protein in their diets.⁽³³⁾ If fish used in fishmeal production were used to feed people we could provide some of the world's poorest countries with a rich source of nutrition.

We seek solutions that reduce the impact of fishmeal production and reduce the need for fishmeal altogether. This could be breakthroughs that improve the feed efficiency and mean less input is needed, or technology that allows for greater transparency throughout the system. It may also be alternative proteins and fishmeal replacements such as insect protein and feeds produced from fungi. We also seek ways to reduce excess catch of wild fish in the fishmeal production such as more sustainable fishing or aquaculture practices.

THIS SOLUTION ALSO HELPS US:






BUILD A WASTE-FREE WORLD



BUILD A WASTE-FREE WORLD

IMAGINE A
WORLD WHERE,
AS IN A NATURAL
ECOSYSTEM,
NOTHING IS
EVER WASTED,
AND EVERYTHING
IS REPURPOSED.



A world in which every item of clothing made is reworn or recycled, where resources are equally distributed, and where food poverty is eradicated and the food we once threw away, used to fill empty stomachs.

To work towards this vision we need to rethink the way we make, use and dispose of things. If we are to build a waste-free world, then, we will need to look at the way we extract resources, how we produce and consume materials, and how we discard them once we have no further use of them. This not only means limiting the generation of waste, but using resources more efficiently throughout the life cycle of material products.⁽³⁸⁾ In our current economy, we take materials from the Earth, make products from them, and eventually throw most of them away as waste in a linear process. In a circular economy we stop waste being produced in the first place. This means redesigning products to be more durable, reusable, repairable, and recyclable, and kept in circulation for as long as possible. Currently the global economy is only 7% circular which means that we recycle and reuse only a limited part of materials that would otherwise become waste and that we continue to

heavily rely on raw, non-recycled materials. Whilst we may not be able to get to 100% circularity, it's essential that we minimise the use of resource, and the creation of waste.⁽³⁹⁾

Waste is a climate problem too. It is estimated that over 3% of global greenhouse gas emissions come directly from waste. Waste is also the third biggest source of methane emissions: a greenhouse gas that traps 82.5 times as much heat as carbon dioxide over a 20-year timespan. Looking more broadly, 70% of global greenhouse emissions come from the material economy, starting from extraction through production and ending in disposal. Creating a waste-free world, then, will only help reduce pollution, but help us solve the climate crisis.⁽³⁸⁾

With the right solutions, we can drastically reduce the amount of waste in the world. Through a circular economy we can tackle the systemic inefficiencies that lead to the excessive generation of waste, meeting human and social needs in a resource-smart way. That could mean cutting material consumption, regenerating, distributing, or using fewer, more durable products for longer, while making use of old ones. Eventually we can minimise the exploitation of resources and cut waste for good.⁽³⁹⁾



**BUILD A
WASTE-FREE
WORLD**

TO BUILD A WASTE-FREE WORLD, WE SEEK SOLUTIONS ACROSS THREE AREAS OF INTEREST:

01

Reducing food loss
from farm to fork

02

Phasing out single-use
and non-recycled plastics

03

High-value circularity
in fashion and electronics

01 REDUCING FOOD LOSS FROM FARM TO FORK



THE CITY OF MILAN - 2021 WINNER

Redesigning the way we think about food and the lifecycle of food products is a priority if we want to build a world free of unnecessary waste.

This applies throughout the whole system - from the food that is extracted, used, and discarded through the value chain as well as the end-products we consume. We need food production to be smart and efficient.

As things stand, roughly 40% of the food produced globally is lost or wasted: equal to 2.5 billion tonnes a year.⁽⁴⁰⁾ In low- and middle-income countries, the problem is largely one of loss, as food fails to make it through the production and transportation stages. Animal death, challenges due to climate change, as well as poor agricultural and transportation practices are some of the root causes. Waste among retailers and end consumers is a larger factor in higher-income countries, with problems caused by unnecessarily stringent regulations, promotional deals, and in some cases poor temperature control.⁽⁶⁶⁾

This problem of waste also has wider ecological impacts. The greenhouse gas emissions produced from food loss and food waste account for between 8 and 10% of all greenhouse gas emissions.⁽³⁹⁾ To produce the food we need, vast swathes of land are turned over to agriculture, but almost a quarter of cropland is used to produce food that is lost or wasted.⁽³⁹⁾

A circular economy approach can help tackle the inefficiencies of production, including the way ingredients are sourced and food products are made. Redesigning food production and shifting towards a more sustainable diet has the potential to reduce waste, while also freeing up previously forested land for restoring nature, and avoid around 2 billion tonnes of carbon emissions by 2030.⁽¹⁰⁾

We seek solutions that help reduce waste throughout the entire system. This could be ways to train farmers and workers on how to protect their crops and reduce loss during and after harvesting.

It could be technology solutions that help move products through the system before they expire, or improve our ability to trace food and waste throughout the supply chain. It could be ways to discourage overproduction, penalise waste or make it easier for organisations to donate food that would otherwise go to waste. It could even be ways of extending shelf life or upcycling and transforming waste into high value materials for other sectors.

The City of Milan, a 2021 Earthshot winner provides an example of how waste can be reduced through the food lifecycle. Their hubs recover food from supermarkets and company canteens, and deliver it to NGOs, who then distribute it to the poorest. Milan is the first major city to enforce a city-wide food water policy which includes food banks, charities, universities and businesses. Today, the hubs recover roughly 130 tonnes of food a year, equivalent to 260,000 meals. This is a blueprint that can be scaled elsewhere, and their aim is to halve food waste in the city by 2030.

THIS SOLUTION ALSO HELPS US:



FIX OUR
CLIMATE



PROTECT
AND RESTORE
NATURE

02 PHASING OUT SINGLE-USE AND NON-RECYCLED PLASTIC

Plastic has become essential to everyday life, whether it is the products we buy or the packaging in which they are contained.

Annually we produce about 460 million tonnes per year, more than double the amount we did in the year 2000.⁽⁴⁵⁾ But almost half of plastic ends up in landfill. 17% is incinerated and less than 9% is recycled.⁽⁴³⁾ This has a devastating impact on the natural world and on human health. More than 14 million tonnes of plastic enter marine ecosystems every year and breakdown into microplastics, damaging the organisms they come into contact with.⁽⁴⁴⁾

As a fossil fuel product, plastics also have an enormous carbon footprint. Throughout their lifecycle, plastics emit 3.4% of global greenhouse gas emissions, equal to around 2 billion tonnes per year. 90% of these emissions come from their production and conversion from fossil fuels with the remaining coming from their end of life. By 2060, if we continue as we are, emissions from the plastics lifecycle are set to more than double to 4.3 billion tonnes.⁽⁴⁶⁾ Phasing out plastics means reducing our

reliance on finite resources, such as fossil fuels. This is achieved through the elimination of non-recycled plastics and their replacement with recycled or renewable materials. This is within reach. Delegates from 180 nations recently took the first concrete step toward a legally binding global treaty to regulate plastic, a first of its kind.

We seek solutions that embrace a circular approach by addressing source materials and aiming to eliminate and replace plastics. These include innovative, non-toxic, plastic alternative materials with a positive impact on our oceans and climate, or business models and social innovations that reduce our reliance on plastics altogether.

2022 Earthshot winner [Notpla](#) shows us one way we can work towards a plastic-free world. They have created an alternative to plastic made from seaweed and plants. The solution is natural and biodegradable, and is used to create packaged products, including a bubble to hold liquids, a coating for food containers, and paper for the fashion industry.



NOTPLA - 2022 WINNER

THIS SOLUTION ALSO HELPS US:



**FIX OUR
CLIMATE**



**PROTECT
AND RESTORE
NATURE**

03 HIGH-VALUE CIRCULARITY IN FASHION AND ELECTRONICS

In today's consumer culture, we are taught we need to buy and use more. Brands, influencers and advertisers convince us we need to have the latest season's fashion and upgrade our phone to the newest model to stay relevant.

This barrage of messaging masks the mountains of waste that overconsumption causes. Each year, less than 1% of material used to produce clothes is recycled into new clothing.⁽⁴⁷⁾ The average EU citizen, meanwhile, uses up 18 kilograms worth of electronic goods a year, representing 70% of hazardous waste that ends up in landfill.^(39, 48) If we are to turn the tide against environmental damage we need to buy and use less, while also repairing and reusing more.

Between 2000 and 2015, clothing production doubled while the average number of times a garment was worn decreased by 36%. When clothing is thrown away, most of it will be burned or buried in landfill. The global fashion industry produces around 2.1 billion tonnes of greenhouse gas emissions per year and if as little as 23% of clothing produced was reused or repaired, we

would reduce emissions by up to 16% - a third of the abatement needed to keep warming below 1.5 degrees.⁽⁴⁹⁾

Most materials used in the fashion industry are extracted, enter the economy and leave again in a straight line. Recycling should be a last resort, as recycling loses the effort invested in the finished product. High-value circularity keeps all the effort, energy, materials and carbon emissions invested in a product in use for the longest time with the lowest impact.

To address this we need to not only use less, but also extend the lifespan of goods and materials through a culture of re-selling, renting, repairing and remaking. This requires a shift in the fashion sector so that a product or its components can re-enter a loop, with infrastructure to support their journey back to the start of the chain. New materials that avoid the extractive damage of the key ingredients of our goods are also needed. Designing for re-use and zero waste requires technology, products, business models and new materials. The complete opposite of fast fashion.

We seek solutions, therefore, that help reduce overconsumption, reduce the environmental

impact of consumer goods and foster a culture of repair and reuse within the fashion and electronics industries. We need social or technological innovations that design and produce lower impact goods. We need to promote multi-use over single-use products. We need new, replacement materials that are lower impact and recyclable. We need solutions that incentivise society to keep goods for longer, repair or remake them, and then return them into circulation to be used again. We need models that optimise human and planetary health instead of maximising consumption.

The city of Amsterdam, a 2022 Earthshot finalist, recently became the first city in the world to commit to a circular economy, showing others what is possible at scale. By 2030, it aims to halve its use of raw materials. By 2050, its economy will be fully



CITY OF AMSTERDAM - 2022 FINALIST

circular, in which all products and materials are reused or regenerated. To do so it will cut waste in three areas: the food people eat, the products they use, and in materials used in the built environment. At the same time, it is changing the mindset of residents and companies: from "use and dispose:" to "rethink and reuse". If it succeeds, it could be an example to the world.

THIS SOLUTION ALSO HELPS US:



FIX OUR
CLIMATE



PROTECT
AND RESTORE
NATURE



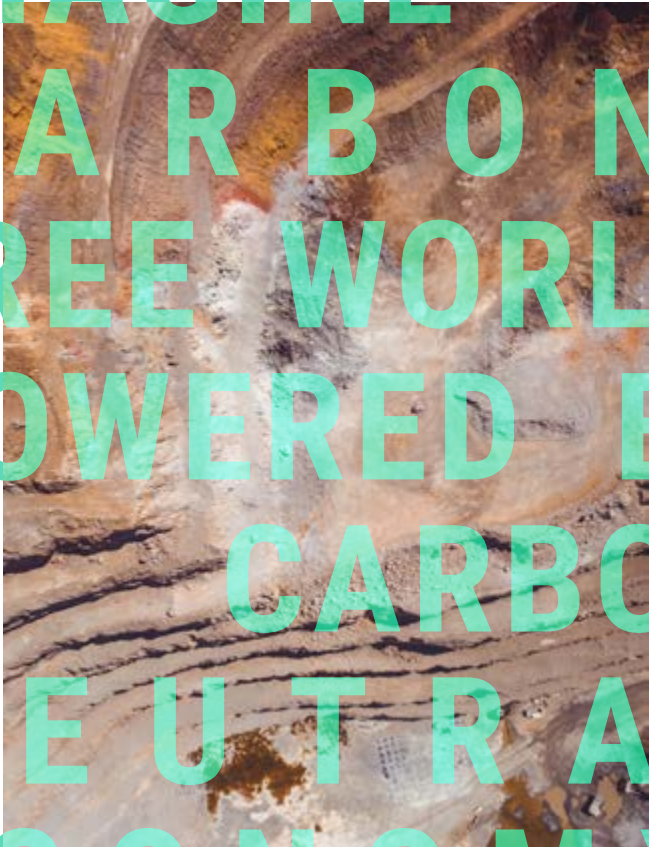
CLEAN OUR
AIR



FIX OUR CLIMATE



IMAGINE A CARBON- FREE WORLD, POWERED BY A CARBON NEUTRAL ECONOMY.



Where the buildings we live in, and the transport we use does not cost the earth. Where city-dwellers walk or cycle into work, in the shade of trees and amid the sound of birdsong. Where seasonable, low-carbon footprint food is plentiful and affordable, and the air is clean and breathable.

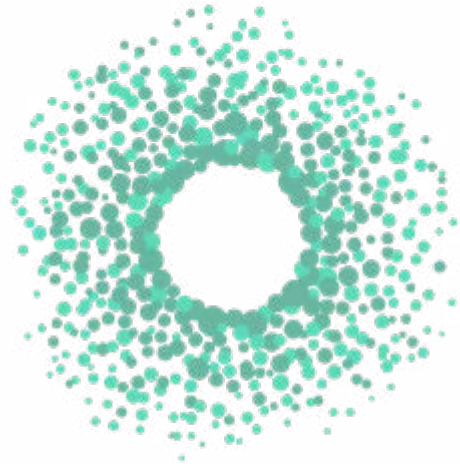
This world is still possible, but we must act urgently and swiftly. Since pre-industrial times, concentrations of greenhouse gases in the atmosphere have doubled and the Earth has warmed by an average of 1.2 degrees. In the past decade, we have experienced record-breaking temperatures and extreme weather events. (50) Wildfires have blazed over Australia and California. Floods have swept Bangladesh and India. And Europe has experienced intense summer heatwaves. These events are deadly, and are causing loss of livelihoods and the destruction of natural habitats.

Global warming was once thought to be a gradual, steady process. Now, we understand it to be a cumulative one, which has the potential to cause dramatic and irreversible changes. If we surpass the 1.5 degrees of warming, we are likely to trigger a number of tipping points, whose cascading effects will lead to even more severe effects. Worse still, triggering these tipping points could lead

to runaway processes, beyond our control, that further intensify global warming. They include the disintegration of the arctic ice sheet, the dieback of the Amazon rainforest, and permanent shifts in the monsoon season.⁽⁵¹⁾

These effects are connected: in the worst case scenarios the melting of the ice sheet could raise sea levels by seven metres.⁽⁵¹⁾ The freshwater released could then slow the major circulation of the Atlantic ocean which controls temperatures in Europe.⁽⁵²⁾ It could also contribute to the collapse of parts of the West and East Antarctic ice sheets, which could raise sea levels another 10 metres. ⁽⁵¹⁾ This affects rainfall in the Amazon, sucking life out of the rainforest and removing its ability to store carbon, accelerating a vicious cycle.⁽⁵³⁾ Every time the thermometer edges up, these threats are intensified. We know rapid action is needed to reduce greenhouse gas emissions, with the aim of limiting warming to 1.5 degrees, if we are to avoid the worst effects of climate change.⁽⁵⁴⁾

In recent years we have seen progress. We have seen falling prices of solar energy and widespread growth in electric vehicles. With the right solutions we can fix our climate for good. We must work quickly and remain optimistic about the future we can create. That means ending our reliance on fossil fuels, transitioning towards clean forms of energy, and adapting the way we live to stop climate damage.



**FIX OUR
CLIMATE**

TO FIX OUR CLIMATE, WE SEEK SOLUTIONS ACROSS THREE AREAS OF INTEREST:

01 Creating an equitable clean energy future

02 Addressing non-CO² greenhouse gas emissions

03 Decarbonising hard to abate sectors

Please note that while carbon removal solutions haven't been explicitly highlighted as a priority area within Fix our Climate they are of interest and feature in multiple priority areas across the Earthshots. Land based carbon sink solutions such as forests, wetlands, peatlands and soils are essential for biodiversity improvements on land and therefore appear within our Protect and Restore Nature priority areas. Similarly coastal and ocean sink solutions such as mangroves, salt marshes and seagrass meadows are essential for ocean health and appear within our Revive our Oceans priority areas. We are also open to engineered sink solutions which fall within the last priority area in Fix our Climate.

FIX OUR CLIMATE

01 CREATING AN EQUITABLE CLEAN ENERGY FUTURE



SOLSHARE - 2021 FINALIST

The last decade has seen vast improvements in energy storage, the adoption of electric vehicles, and in solar power efficiency.

In 2022, renewables accounted for more than 90% of growth in electricity demand.⁽⁵⁵⁾ One study estimates that carbon emissions from the global power energy sector may have peaked in 2022, plateauing for the next five years.⁽⁵⁶⁾ Renewable energy will meet much of the growing global demand.

That said, the use of fossil fuels remains high, with the likes of coal, oil and gas continuing to fuel much of the world's current energy demand, with the share of energy from fossil fuels has remained largely unchanged at 82%.⁽⁵⁷⁾ Fossil fuels are by far the biggest contributor to climate change, accounting for 75% of all emissions.⁽⁵⁸⁾ The clean energy transition, although gaining momentum, is still in its infancy. Solar installations, for instance, will need to more than triple, and wind installations will need to increase six fold to meet targets.

We need to move swiftly. According to the International Energy Agency, half the emissions reduction needed to reach net-zero requires tech that is not yet commercialised.⁽⁵⁹⁾ Capacity additions of renewables must triple by 2030.⁽⁶⁵⁾ We also need to scale up alternatives to wind and solar, like geothermal and hydroelectric plants. The benefits and costs of this transition must be fair and equitable, we need large-scale energy alternatives to fossil fuels that are cheap, safe, and sustainable, whilst not relying on continued extraction of rare

mineral resources - such as lithium and cobalt - from the Global South, in order to power a the power the clean energy transition.⁽⁶⁰⁾

We seek more innovative solutions as well as business models and policies that will accelerate the green energy technologies and solutions we have today, while providing economic opportunities and clean energy access for all in society. This might be new technologies that improve energy storage solutions, new policies that drive quicker widespread adoption or financial mechanisms that help fund new renewable energy projects.

2021 Earthshot finalist [SOLShare](#) are a prime example of how we can transition away from fossil fuels in a way that is equitable for all. They have created the world's first peer-to-peer energy exchange network. This allows homes across Bangladesh with rooftop solar panels to sell excess energy into microgrid networks for others to buy. This not only helps the environment but gives local people a new and plentiful source of income. SOLshare's solar grids have helped more than 10,000 people in remote communities, reducing emissions by 30% and boosting household incomes by as much as 25%.

THIS SOLUTION ALSO HELPS US:



CLEAN OUR
AIR



PROTECT
AND RESTORE
NATURE



REVIVE OUR
OCEANS

02 ADDRESSING NON-CO² GREENHOUSE GAS EMISSIONS

To turn the tide against climate change, we need to go further than decarbonisation alone. We must also curb so-called “super pollutants” which have an outsized impact on global temperatures.

Many stay in the atmosphere for a shorter length of time than carbon emissions, but they have a bigger warming effect. They include short-lived pollutants, such as methane, black carbon soot, tropospheric ozone, and hydrofluorocarbons, as well as the longer-lived nitrous oxide.⁽⁶¹⁾

The short life of many of these super-pollutants works to our advantage. If we stop their escape into the atmosphere, we will reduce warming faster. A tonne of methane, for instance, causes 86 times more warming than a tonne of CO².⁽⁶¹⁾ But while CO² can stay in the atmosphere for centuries, methane only lasts around a decade.⁽⁶¹⁾ Hydrofluorocarbons (HFCs) are a group of entirely man made industrial chemicals primarily used for air-conditioning,

refrigeration, insulating foams and aerosol propellants. The most abundant HFC is 3,790 times more damaging to the climate than carbon dioxide. HFC emissions are increasing at a rate of 10 to 15% per year, largely as a result of increased demand for air conditioners in buildings.⁽⁶²⁾

Cutting super-pollutants like this, then, could prevent 90% of their predicted warming within a decade.⁽⁶²⁾ It could avert four times more warming by 2050 than CO² cuts can, reduce projected warming in the Arctic by two thirds, and the rate of global warming by half, keeping the 1.5 degrees commitment alive.⁽⁶¹⁾

We seek solutions that address the multiple causes of this short-lived but high impact global warming. This could range from new ways to find and reduce methane leakages, or reducing the HFC’s emitted from refrigerators and air-conditioners.



LANZATECH - 2022 FINALIST

THIS SOLUTION ALSO HELPS US:



CLEAN OUR
AIR



PROTECT
AND RESTORE
NATURE

03 DECARBONISING HARD TO ABATE SECTORS



4.4.01 - 2022 WINNER

Until recently, government and business focused on the easiest sources of emissions to address, including electricity generation and passenger vehicles. Such areas account for more than two-thirds of global emissions.^(64, 65) Less attention, however, has been on the so-called “hard to abate” sectors, such as agriculture, heavy duty transportation like shipping and aviation, and heavy industry like cement and steel. These account for 20% of emissions, a proportion likely to grow as reductions are made elsewhere.⁽⁶⁴⁾

These sectors are carbon-intensive. The steel industry, for instance, uses high amounts of energy to power high temperature processes, achieved by burning fossil fuels. Abating steel, therefore, is a slow and costly process, especially in countries where there are few other renewable energy sources. The processes involved are also complex, which makes finding new carbon-free alternatives equally so. The cement industry claims no ready to scale alternatives to fossil fuels have been found. Shipping and aviation, meanwhile, have not yet been electrified at scale as they require high-density local energy sources, still best provided by fossil fuels.⁽⁶⁵⁾

The construction sector and the built environment are critical to this progression. The choices of planners, architects and builders can increase or decrease the use of carbon intensive industries. Refurbished buildings can minimise embodied carbon while often offering greater commercial and social returns than demolition and rebuilding. The UN has identified a breakthrough goal that all new and refurbished buildings must achieve at least a 40% reduction in embodied carbon by 2030. Addressing the hard to abate sectors supplying the built environment is a crucial factor.⁽⁷⁰⁾

Many technologies required to bring about the energy transition have only recently been developed. But innovation needs to be faster, especially where carbon-intensive processes can be replaced with alternatives. Only by making these options economically viable can the transition be done at scale. Government has a role to play in this by encouraging investment that can help industries bring their costs down.⁽⁶⁵⁾ Recent research shows it is possible to get hard-to-abate sectors to net-zero by 2050. The economic cost would be less than 0.5% of global GDP.⁽⁶⁵⁾ Meanwhile, in most cases the price rise for the consumer would be limited to 1%, with aviation as the main exception, where economy class ticket prices would only increase by 10% to 20%.⁽⁶⁴⁾

03 DECARBONISING HARD TO ABATE SECTORS

There are three main routes to decarbonising hard-to-abate sectors. First, reducing demand for carbon intensive products by switching to a circular economy in heavy industry and one built around logistic efficiency in heavy duty transportation. Second, by improving energy efficiency. And third, by deploying decarbonising technologies across all sectors. Examples of this include electrification, biomass, hydrogen, and carbon capture. As clean technologies scale, costs will come down, as they already have for renewable technologies like solar and wind.⁽⁶⁵⁾ We also know that engineered carbon sinks will be a part of the long-term solution, whether they be carbon capture and storage, direct air capture or carbon mineralisation. As an example, the International Energy Agency models have shown the need for direct air capture to be scaled up to capture almost 60 Mt CO² per year by 2030 in order to offset the carbon emissions we are unable to abate in these sectors.⁽⁶⁶⁾

We are seeking solutions, therefore that reduce emissions from carbon intensive processes in the construction industry, heavy duty transportation and other hard to abate sectors. This could be solutions that reduce or otherwise avoid those emissions in the first place, provide low or those that effectively capture CO² already emitted.

Named after the molecular weight of carbon dioxide, 2022 Climate winner [44.01](#) removes CO² permanently by mineralising it in peridotite, a rock found in abundance in Oman as well as in America, Europe, Asia and Australasia. Peridotite mineralisation is a natural process, but in nature it can take many years to mineralise even a small amount of CO². 44.01 accelerates the process by pumping carbonated water into seams of peridotite deep underground. 44.01's first project will mineralise 1,000 tonnes of locally-captured CO² every year until 2024 and their long-term goal is to have mineralised 1bn tonnes of CO² by 2040. Another 2022 finalist, [Low Carbon Materials](#), wants to clean up the construction industry. It makes OSTO[®], a carbon-negative alternative to traditional aggregate, one of concrete's main ingredients. LCM is working with the industry to create a new zero carbon concrete block with OSTO[®] making up 10 percent of its overall weight.

THIS SOLUTION ALSO HELPS US:



CLEAN OUR
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PROTECT
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NATURE



REVIVE OUR
OCEANS



LOW CARBON MATERIALS - 2022 FINALIST

12 CROSS CUTTING ENABLERS



OUR REVIEW OF THE SCIENTIFIC LITERATURE AND CONVERSATIONS WITH EXPERTS

Identified approaches and tools that can accelerate the environmental improvements we seek without being specific to any single Earthshot. We call them the cross-cutting enablers and when adopted by innovators and their supporters, they could rapidly accelerate their growth and impact.

We have identified five such enablers. The deployment of these enablers is considered as part of the selection of Finalists, but not as a tick-box exercise. We are interested in how innovators embrace these enablers to achieve change and build a credible scale model, not necessarily how many of these enablers they use in some incidental way. We therefore share these enablers more as inspiration for innovators and those supporting them, because it may be that considering how to use these approaches or tools could unlock a new rapid path to scale.



01

SOLUTIONS THAT USE TECHNOLOGY, AI OR DATA TO ENABLE TRANSFORMATIVE CHANGE



03

SOLUTIONS LED AND INFORMED BY INDIGENOUS AND LOCAL COMMUNITIES



02

SOLUTIONS THAT CREATE OR LEVERAGE NATURE AND CARBON MARKETS, NOVEL FINANCIAL MECHANISMS AND ESSENTIAL LEGAL SOLUTIONS



04

SOLUTIONS THAT PROMOTE SHARED ECONOMIC OPPORTUNITY



05

SOLUTIONS THAT ENABLE POLICY CHANGE

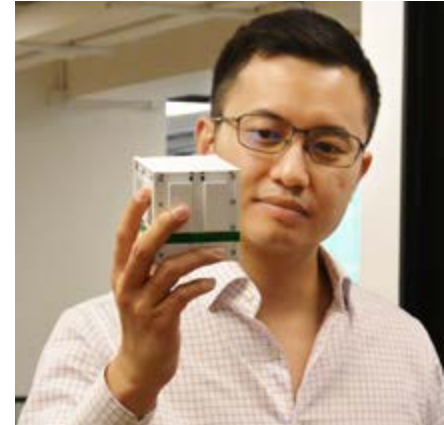


RESTOR - 2021 FINALIST

01 SOLUTIONS THAT USE TECHNOLOGY, AI OR DATA TO ENABLE TRANSFORMATIVE CHANGE

The mission to repair the planet this decade requires innovative technology that helps us make giant leaps forward, whether it be in cutting greenhouse gas emissions or in improving the quality of the air we breathe.

The latter might help us improve accountability, or empower us to make faster decisions. Or, alternatively, we might better employ technologies like blockchain, to improve carbon accounting and track products through their life cycle. Innovation technology could also be a satellite system which maps the protection or restoration of forests, seas and rivers in real-time. Our 2021 finalists, [Restor](#) and [Blue Map App](#) are good examples of solutions using technology like this.



AMPD - 2022 FINALIST

02 SOLUTIONS THAT CREATE OR LEVERAGE NATURE AND CARBON MARKETS, NOVEL FINANCIAL MECHANISMS AND ESSENTIAL LEGAL SOLUTIONS

If we are to achieve our mission, we will need to deploy new approaches to financial and legal systems.

We know the current systems are heavily weighted to incentivise the very behaviours, markets and systems that we seek to disrupt and obsolete.

Let's imagine solutions that allow citizens and investors who act as stewards of the environment to be fairly rewarded for their work. Let's imagine innovative ways to make subsidies work for people and planet, and attract more investment to vital environmental innovations. Let's reimagine carbon markets and think clearly about nature markets. The entire global economy is dependent on nature, but nature is often treated as a free resource. Markets that value and seek to enhance nature will be essential to its protection.

Let's also recognise the vital contribution that legal solutions can deliver, including the preservation of land rights for indigenous and local land stewards, and the emerging field of rights for nature and biodiversity. Finance and legal solutions deployed at scale could quickly empower local people around the world to protect and restore nature and our climate. 2021 Nature winner, [the Costa Rican government](#), and Climate finalist [SOLshare](#) are examples of citizens receiving financial benefits for engaging in this essential work.



POLE POLE FOUNDATION - 2021 FINALIST



REPUBLIC OF COSTA RICA - 2021 WINNER



INDIGENOUS WOMEN OF THE GREAT BARRIER REEF - 2022 WINNER

03 SOLUTIONS LED AND INFORMED BY INDIGENOUS AND LOCAL COMMUNITIES

We seek solutions led and informed by indigenous peoples. These communities and societies tend to produce less waste and fewer climate impacts.

They also tend to have access to better knowledge of the local environment. We want to demonstrate the efficacy of this knowledge and show it can be applied elsewhere. This means engaging and partnering with indigenous peoples and with local communities such as our Nature winner in 2021, [Costa Rica](#) and our Oceans winner in 2022, [Indigenous Women of the Great Barrier Reef](#).



REPUBLIC OF COSTA RICA - 2021 WINNER

04 SOLUTIONS THAT PROMOTE SHARED ECONOMIC OPPORTUNITY

Imagine a solution which, in repairing the planet, shares wealth and opportunity too. We need solutions, then, that benefit those whose lives they aspire to change, as it is often the poorest hit hardest by the planet's disrepair.

So, we imagine solutions that bring under-represented groups into the decision-making process. Solutions that are accessible to all, affordable by all and ensure a world where everyone has equal access to a better life. Solutions which provide access to the financial tools people need and help them use those services effectively, particularly those below the poverty line.

A microgrid could ensure everyone has access to clean, affordable power. People who make their living cutting down forests, meanwhile, could instead be rewarded for managing them. 2022 Air winner [Mukuru Stoves](#), and Nature winner [Kheyti](#) are good examples of solutions that are accessible to all.



KHEYTI - 2022 WINNER



MUKURU CLEAN STOVES - 2022 WINNER



CITY OF AMSTERDAM - 2022 WINNER

05 SOLUTIONS THAT ENABLE POLICY CHANGE

We know we cannot complete our mission without the public and private sectors.

And we know the free market works best when public policy sets an overall direction which aligns everyone towards societal improvements. Let's imagine, then, a policy change that catalyses markets as big as we've seen with electric vehicles. Or it could be a change that more stringently regulates greenhouse gas emissions. Or one that regulates waste management and incentivises recycling and reusing. Where such policies are introduced at the local and national level, they can often be replicated elsewhere. Of our previous finalists, the [city of Amsterdam](#) and the [city of Milan](#) are good examples of policy change in action, whether it's the creation of a circular economy or setting up a city-wide food waste policy.

THE CITY OF MILAN FOOD WASTE HUBS - 2021 WINNER



13 THE WORLD WE CHOOSE





THE FUTURE WE LIVE IN WILL BE THE FUTURE WE CHOOSE

We are, after all, the only species on Earth capable of imagining and creating a better future for ourselves. Throughout history, there have been few problems so great we have not imagined a solution, whether it was the 1969 Moon Shot mission or our efforts to create a Covid-19 vaccine. The environmental crisis is perhaps the greatest of our lifetimes, but with imagination, innovation and commitment, we can solve it too.

We are already making progress. Over the past three years, the Earthshot Prize has discovered, spotlighted and scaled solutions from all over the world, demonstrating the power of what it means to put our collective weight and support behind those on the front lines of innovation.

That's why we need urgent optimism. Urgent because the time we have to restore the world is finite; optimism because we have the collective ingenuity to realise this ambition.

Let us use this Roadmap as a blueprint to imagine and then drive collectively towards a planet where the natural world, on land and in the oceans, is flourishing; where everyone breathes in clean healthy air; where nothing we use or make ever goes to waste; and where we cut carbon from the atmosphere and avert the climate crisis.

We do this by working together - innovators, NGO's, commercial organisations, philanthropists, academics and the public all have a role to play. Together, we create a more prosperous world for all, not only for ourselves, but for our children and for all generations to come.

14 CONTRIBUTORS

This report was authored by Stephen Lavery, Vanessa Di Virgilio, Louisa Tholstrup, Michael Lacquiere and Chris Large with valuable feedback provided by colleagues from The Earthshot Prize Team. Copywriting support was provided by The Draft, the final report was designed by James Booth, and Rhea Patel supported with all references included throughout the report.

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The following list of individuals were interviewed or consulted through the process for their personal expertise and views, not as representatives of their organisations. Without their valuable insights and contribution to this work, this report would not have been possible.

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The report represents the views of The Earthshot Prize rather than the individuals listed, and any mistakes are our own. Should you have any queries about the report, please email: press@earthshotprize.org.

15 REFERENCES



REFERENCES

Numerical order, as they appear in the document.

01. Díaz, S., Settele, J., Brondízio, E. S., Ngo, H. T., Guèze, M., Agard, J., Arneth, A., Balvanera, P., Brauman, K. A., Butchart, S. H. M., Chan, K. M. A., Garibaldi, L. A., Ichii, K., Liu, J., Subramanian, S. M., Midgley, G. F., Miloslavich, P., Molnár, Z., Obura, D., Pfaff, A., Polasky, S., Purvis, A., Razzaque, J., Reyers, B., Roy Chowdhury, R., Shin, Y. J., Visseren-Hamakers, J., Willis, K. J., and Zayas, C. N. (eds.) (2019). Summary for policymakers of the global assessment report on biodiversity and ecosystem services. Bonn: Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) secretariat. Retrieved from: IPBES Website
02. The Nature Conservancy. (2021). Natural Climate Solutions Handbook: A Technical Guide for Assessing Nature Based Mitigation Opportunities in Countries. Arlington, VA: The Nature Conservancy. Retrieved from: Nature Conservancy Website
03. Jaureguiberry, P., Titeux, N., Wiemers, M., Bowler, D. E., Coscieme, L., Golden, A. S., Guerra, C. A., Jacob, U., Takahashi, Y., Settle, J., Díaz, S., Molnár, Z., & Purvis, A. (2022). The direct drivers of recent global anthropogenic biodiversity loss. *Sci. Adv.*, 8(45). doi:10.1126/sciadv.abm9982
04. Protected Planet. (2023). Discover the world's protected and conserved areas. Retrieved from: Protected Planet Website
05. Plumptre, A. J., Baisero, D., Belote, R. T., Vázquez-Domínguez, E., Faurby, S., Jedrzejewske, W., Kiara, H., Kühl, H., Benítez-López, A., Luna-Arangurú, C., Voigt, M., Wich, S., Wint, W., Gallego-Zamorano, J., and Boyd, C. (2021). Where Might We Find Ecologically Intact Communities?. *Frontiers in Forests and Global Change*, 4. doi:10.3389/ffgc.2021.626635
06. Almond, R. E. A., Grooten, M., Juffe Bignoli, D., and Petersen, T. (Eds). (2022). Living Planet Report 2022 - Building a Nature-Positive Society - Full report. Gland: WWF. Retrieved from: WWF Website
07. UNEP-WCMC and IUCN. (2021). Protected Planet Report 2020. Cambridge: UNEP-WCMC and Gland: IUCN. Retrieved from: Protected Planet Website
08. Rainforest Trust. (2017, September 1). Climate Change Series Part 1 - Rainforests Absorb, Store Large Quantities of Carbon Dioxide. Retrieved from: Rainforest Trust Website
09. World Economic Forum (WEF) & McKinsey. (2021). Nature and Net Zero. Cologny/Geneva: WEF. Retrieved from: WEF Website
10. Shukla, P. R., Skea, J., Slade, R., Khourdajie, A. Al., Van Diemen, R., McCollum, D., Pathak, M., Some, S., Vyas, P., Fradera, R., Belkacemi, M., Hasija, A., Lisboa, G., Luz, S., and Malley, J. (Eds). (2022). Climate Change 2022: Mitigation of Climate - Summary for Policymakers. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press, New York, NY/ Interlaken: Intergovernmental Panel on Climate Change (IPCC). Retrieved from: IPCC Website
11. Dasgupta, P. (2021). The Economics of Biodiversity: The Dasgupta Review - Abridged Version. London: HM Treasury. Retrieved from: GOV.UK Website
12. Ritchie, H. and Roser, M. (2019, September). Land Use. Our World In Data. Retrieved from: Our World in Data Website
13. Benton, Prof. T., Bieg, C., Harwatt, Dr. H., Pudasaini, R., and Wellesley, L. (2021). Food Systems Impact on Biodiversity Loss. Chatham House. Retrieved from: Chatham House Website
14. Health Effects Institute. (2020). State of Global Air 2020. Special Report. Boston, MA: Health Effects Institute. Retrieved from: State of Global Air Website
15. World Health Organisation (WHO). (2022, December 19). FACT SHEET: Ambient (outdoor) air pollution. WHO Newsroom. Retrieved from: WHO Website
16. Clean Air Fund. (2022). Clean Air is Everyone's Business. London: Clean Air Fund. Retrieved from: Clean Air Fund Website
17. Ritchie, H. and Roser, M. (2021, January). Air Pollution. Our World In data. Retrieved from: Our World in Data Website
18. United Nations Environment Program (UNEP). (2021, September 2). One in three countries in the world lack any legally mandated standards for outdoor air quality [Press Release]. UNEP News, Stories and Speeches. Retrieved from: UNEP Website
19. Sawant, V., Hagerbaumer, C., Rosales, C. M. F., Isied, M., Biggs, R. (2022). 2022 Open Air Quality Data: The Global Landscape. Washington, DC: OpenAQ. Openaq Website
20. UNICEF. (2019). Silent Suffocation in Africa. New York, NY: UNICEF. Retrieved from: UNICEF Website
21. Air Quality Life Index (AQLI). (n.d.). China: National Air Quality Action Plan (2013). Retrieved from: AQLI Website
22. Chakrabarti, S., Khan, M. T., Kishore, A., Roy, D., and Scott, S. P. (2019). Risk of acute respiratory infection from crop burning in India: estimating disease burden and economic welfare from satellite and national health survey data for 250 000 persons. *International Journal of Epidemiology*. 48(4). 1113-1124. doi: 10.1093/ije/dyz022

REFERENCES

23. Institut national d'études démographiques (INED). (2022). Projections by continent. Retrieved from: INED Website
24. International Energy Agency (IEA). (2023). Global EV Outlook 2023. Paris: IEA. Retrieved from: IEA Website
25. European Parliament. (2023, February 14). Fit for 55: Zero CO² emission for new cars and vans in 2035 [Press Release]. European Parliament Press Room. Retrieved from: European Parliament Website
26. The White House (WH). (2023, April 12). FACT SHEET: Biden-Harris Administration Proposes New Standards to Protect Public Health that Will Save Consumers Money, and Increase Energy Security. WH Briefing Room: Statements and Releases. Retrieved from: WH.GOV Website
27. International Energy Agency (IEA). (n.d.). Transport Improving the sustainability of passenger and freight transport. Retrieved from: IEA Website
28. Ritchie, H. (2020, October 6). Cars, planes, trains: where do CO² emissions from transport come from?. Our World in Data. Retrieved from: Our World in Data Website
29. Barder, M., Mitchell, W., Hirsch, T. V., and Vyas, T. (2021). A drop in the ocean: Closing the gap in ocean climate. London: Deloitte. Retrieved from: Deloitte Website
30. Lebling, K., Northrop, E., McCormick, C., and Bridgwater, E. (2022). Towards Responsible and Informed Ocean-Based Carbon Dioxide Removal: Research and Governance Priorities. Washington, DC: World Resources Institute. Retrieved from: WRI Website
31. Hoegh-Guldberg, O., et al. (2019). "The Ocean as a Solution to Climate Change: Five Opportunities for Action." Report. Washington, DC: World Resources Institute. Retrieved from: Ocean Panel Website
32. Conservation International. (2021). Blue Carbon Integrating Ocean Ecosystems in Global Climate Action. Arlington County, Virginia: Conservation International. Retrieved from: Conservation International Website
33. Food and Agriculture Organisation of the United Nation (FAO). (2022). The State of World Fisheries and Aquaculture 2022. Towards Blue Transformation. Rome: FAO. Retrieved from: FAO Website
34. The Nature Conservancy. (2021, January 25). A Healthy Ocean Depends on Sustainably Managed Fisheries. Retrieved from: Nature Conservancy Website
35. Miles, R. D. and Chapman, F. A. (2021). The Benefits of Fish Meal in Aquaculture Diets. Environmental Science. Retrieved from: IFAS Website
36. Changing Markets Foundation (CMF) and Compassion in World Farming (CIWF). (2019). Until the Seas Dry. Compassion in World Farming. CMF and CIWF. Retrieved from: CIWF Website
37. Eit Food. (2021, October 7). Why alternative and sustainable fish feeds are needed. Retrieved from: Eit Food Website
38. Global Alliance for Incinerator Alternatives (GAIA). (2022). Zero Waste to Zero Emissions - full-report. Berkeley, CA: GAIA. Retrieved from: GAIA Website
39. Circle Economy. (2023). The circularity gap report 2023. Amsterdam: Circle Economy. Retrieved from: CGRI Website
40. WWF-UK. (2021). Drive to waste: The Global Impact of Food Loss and Waste on Farms. Woking: WWF-UK. Retrieved from: WWF Website
41. Our World in Data. (n.d.). Global meat consumption, World, 1961 to 2050. Retrieved from: Our World in Data Website
42. Ellen Macarthur Foundation (EMF). (2021). The big food redesign study. Isle of Wight: EMF. Retrieved from: EMF Website
43. United Nations Environmental Programme (UNEP). (2023, January 27). Plastic Treaty progress puts spotlight on circular economy. Retrieved from: UNEP Website
44. United Nations Environment Programme. (2021). From Pollution to Solution: A global assessment of marine litter and plastic pollution - Full Report. Nairobi: UNEP. Retrieved from: UNEP Website
45. The Organization for Economic Cooperation and Development (OECD). (2022). Global Plastic Outlook: Economic Divers, Environmental Impacts and Policy Options. Paris: OECD Publishing. Retrieved from: OECD Website
46. Organisation for Economic Co-operation and Development (OECD). (n.d.). Plastic leakage and greenhouse gas emissions are increasing. Retrieved from: OECD Website
47. Ellen Macarthur Foundation (EMF). (2017). A New Textiles Economy: Redesigning Fashion's Future. Isle of Wight: EMF. Retrieved from: EMF Website
48. World Economics Forum (WEF). (2019). A New Circular Vision for Electronics: Time for a Global Reboot. Cologne/Geneva: WEF. Retrieved from: WEF Website
49. Ellen Macarthur Foundation (EMF). (2021). Circular business models: redefining growth for a thriving fashion industry. EMF. Retrieved from: EMF Website
50. Carbon Brief. (2020, February 10). Explainer: nine 'tipping points' that could be triggered by climate change. Retrieved from: Carbon Brief Website

REFERENCES

51. Lenton, T. M., Rockström, J., Gaffney, O., Rahmstorf, S., Richardson, K., Steffen, W., and Schellnhuber, H. J. (2019). Climate tipping points - too risky to bet against. *Nature*. 575. 592-595. doi: 10.1038/d41586-019-03595-0
52. Caesar, L., Rahmstorf, S., Robinson, A., Feulner, G., and Saba, V. (2018). Observed fingerprint of a weakening Atlantic Ocean overturning circulation. *Nature*. 556. 191-196. doi: 10.1038/s41586-018-0006-5
53. Boulton, C. A., Lenton, T. M., and Boers, N. (2022). Pronounced loss of Amazon rainforest resilience since the early 200s. *Nature Climate Change*. 12. 271-278. doi: 10.1038/s41558-022-01287-8
54. Climate Crisis Advisory Group (CCAG). (n.d.). The Global Climate Crisis and the Action Needed. CCAG. Retrieved from: CCAG Website
55. International Energy Agency (IEA). (2023). Credible pathways to 1.5°C. Paris: IEA. Retrieved from: IEA Website
56. Hostert, D., Kimmel, M., Berryman, Dr. I., Vasdev, A., Bullard, N., Bromley, H., Ampofo, Dr. K., Cheung, A., Sanghera, S., Lubis, C., and Annex, M. (2022). New Energy Outlook 2022 - Executive Summary. BloombergNEF. Retrieved from: BNEF Website
57. Bolano, A., Lodesani, F., Pratt, M. P., Pachthod, D., Samandari, H., Tai, H., and Polymeneas, E. (2022). The energy transition: A region-by-region agenda for near-term action. McKinsey & Company. Retrieved from: McKinsey Website
58. SEI, IISD, ODI, Climate Analytics, CICERO, and UNEP. (2019). The Production Gap: The discrepancy between countries' planned fossil fuel production and global production levels consistent with limiting warming to 1.5°C or 2°C. SEI, IISD, ODI, Climate Analytics, CICERO, and UNEP. Retrieved from: The Production Gap Website
59. Kahsar, R. (n.d.). Climate Tech's Perfect Storm. Basalt, CO: Rocky Mountain Institute (RMI). Retrieved from: RMI Website
60. Muñoz Cabré, M. and Vega Araújo, J. (2022). Considerations for a just and equitable energy transition. Stockholm+50 background paper series. Stockholm Environment Institute (SEI). Retrieved from: SEI Website
61. Zaelke, D., Picolotti, R., Campbell, K., and Dreyfus, G. (2022). The Need for Fast Near-Term Climate Mitigation to Slow Feedbacks and Avoid Tipping Points. Institute for Governance & Sustainable Development (IGSD) and Center for Human Rights and Environment (CHRE/CEDHA). Retrieved from: IGSD Website
62. Climate & Clean Air Coalition. (n.d.). Hydrofluorocarbons (HFCs). Retrieved from: ccacoalition Website
63. Sun, X., Wang, P., Ferris, T., Lin, H., Dreyfus, G., Gu, B., Zaelke, D., and Wang, Y. (2022). Fast action on short-lived climate pollutants and nature-based solutions to help countries meet carbon neutrality goals. *Advances in Climate Change Research*. 13(4). doi: 10.1016/j.accre.2022.06.003
64. Fanworth, E. (2019). Heavy industries have a vital role to play in fighting climate change. World Economic Forum (WEF). Retrieved from: WEF Website
65. Energy Transitions Commissions. (2018). Mission Possible: Reaching Net-Zero Carbon Emissions from Harder-to-Abate Sectors By Mid-Century - Full report. Energy Transitions Commissions. Retrieved from: Energy Transitions Commission Website
66. International Energy Agency (IEA). (2022). Direct Air Capture. Paris: IEA. Retrieved from: IEA Website
67. Boston Consulting Group (BCG). Closing the food waste gap, Retrieved from: BCG website
68. World Health Organisation (WHO). (2015). Connecting global priorities: biodiversity and human health: a state of knowledge review. Retrieved from: WHO Website
69. C40 Cities Climate Leadership Group Inc (2023). Clean air accelerator: How cities are cleaning the air we breathe. Retrieved from: C40 website
70. United Nations Framework Convention on Climate Change (UNFCCC). (2023). Race to Resilience. Retrieved from UNFCCC Climate Champions website

An aerial photograph of a river delta, showing intricate patterns of water and land in shades of blue, green, and brown. A semi-transparent globe icon is centered in the upper half of the image, with the text 'THE EARTHSHOT PRIZE' overlaid on it.

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