SEPTEMBER 2022

iCLIMA WHITE PAPER

CLIMATE CHANGE MITIGATION

REPRESENTING THE IMPACTFUL SOLUTIONS.

THE BEST WAY TO REDUCE CARBON IN THE ATMOSPHERE IS BY NOT EMITTING IN THE FIRST PLACE.

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INTRODUCTION

Climate change is the greatest challenge we face this century. Increasing emissions since pre-industrial times have led to a sharp rise in global temperatures. Left unchecked, this warming will lead to dangerous disruption to our global ecosystems. In 2015, world leaders signed the Paris Agreement, agreeing to reach Net Zero by 2050 in order to hold global temperature rise to the safe level of 1.5°C above pre-industrial levels. At COP26 in Glasgow this pledge was re-affirmed, with 138 countries now committed to their own Net Zero target.

However, the most recent report from the Intergovernmental Panel on Climate Change (IPCC) showed that we remain well off track, heading for potentially disastrous levels of warming. The report stated that we have the tools available, but need increased financial, governmental and consumer action to take advantage of them. This is beginning to happen, and the UNPRI forecasts that we could see a step change in the next couple of years. Consumer behavior is already shifting and increasing volumes of 'sustainable' financial products are being released. It is clear that large volumes of investment are to flow into companies and technologies that will reduce and avoid carbon emissions.

Companies offering solutions to reduce global emissions will benefit in the near, medium and long term. A broad range of these companies are represented in the **iClima Global Decarbonization Enablers Index (ticker: CLMA).**

Unlike other 'green' indices, which rely on opaque ESG scores with questionable climate impact and are therefore vulnerable to greenwashing, CLMA focuses on companies with products and services that directly enable 'CO_2e Avoidance'. This refers to emissions reductions from products or services that provide the same or similar function as existing products but with significantly less emissions, or enables emission reductions of a third party.

CLMA quantifies the avoided emissions enabled by the companies in its index, and across the index as a whole. This is an objective, forward looking and impact focused alternative to ESG scores.
iClima Earth Ltd, the company behind the CLMA index, performs a rigorous screening and vetting process to select its 'Climate Champion' companies included in the index. It then uses a bespoke methodology to calculate the carbon avoidance of each company, and of the index as a whole.

CLMA benefits from:

- **Net Zero aligned regulatory changes** in key markets, such as the EU, the US and China (committed to Net Zero by 2060, leading in clean-tech). Regulation is ramping up post Russia's invasion of Ukraine and the global energy crisis.

- **Consumer demand shifts**, including plant-based diets, telepresence, and ride sharing.

- **Balanced exposure to a comprehensive list of climate change solutions**. CLMA is the only index that provides comprehensive exposure to the full spectrum of solutions, looking beyond renewable energy. The five sectors include enabling solutions, sustainable products, and water & waste improvements.

- **Exposure to high growth solutions**. Exciting high growth spaces like fuel cells and the new hydrogen economy, as well as Vehicle to Grid (V2G) and distributed generation are well represented in CLMA.

- **A data-based approach** to company selection, to fight 'greenwashing'.

The CLMA index is a diverse portfolio of solutions across five broad sectors:

SITUATIONAL ANALYSIS
THE SIZE OF THE PROBLEM

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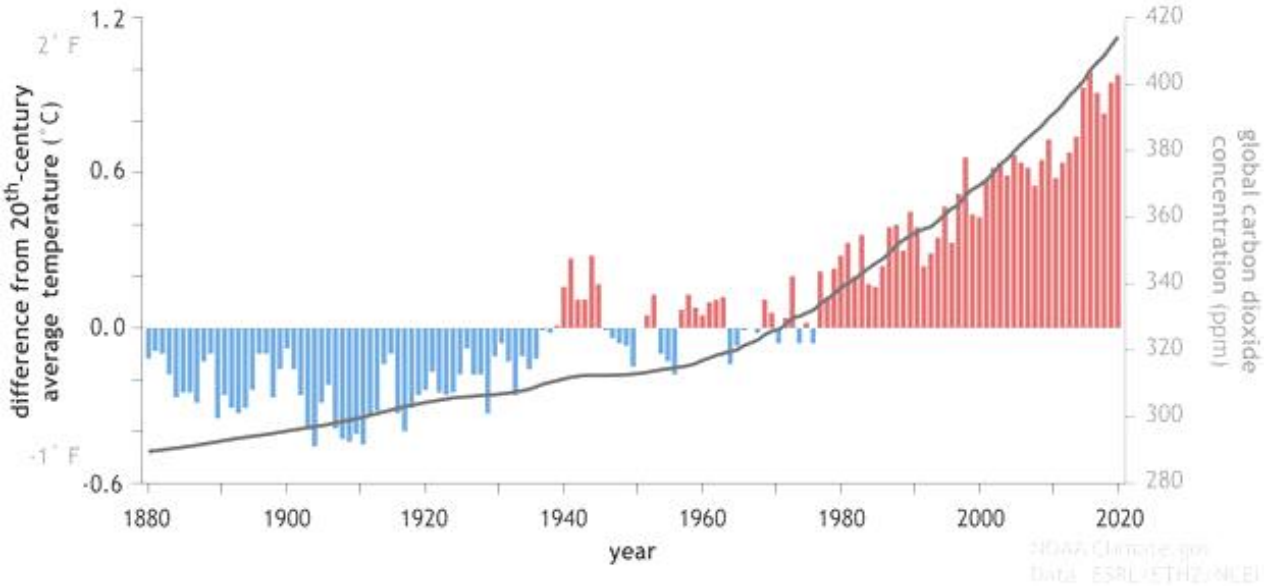
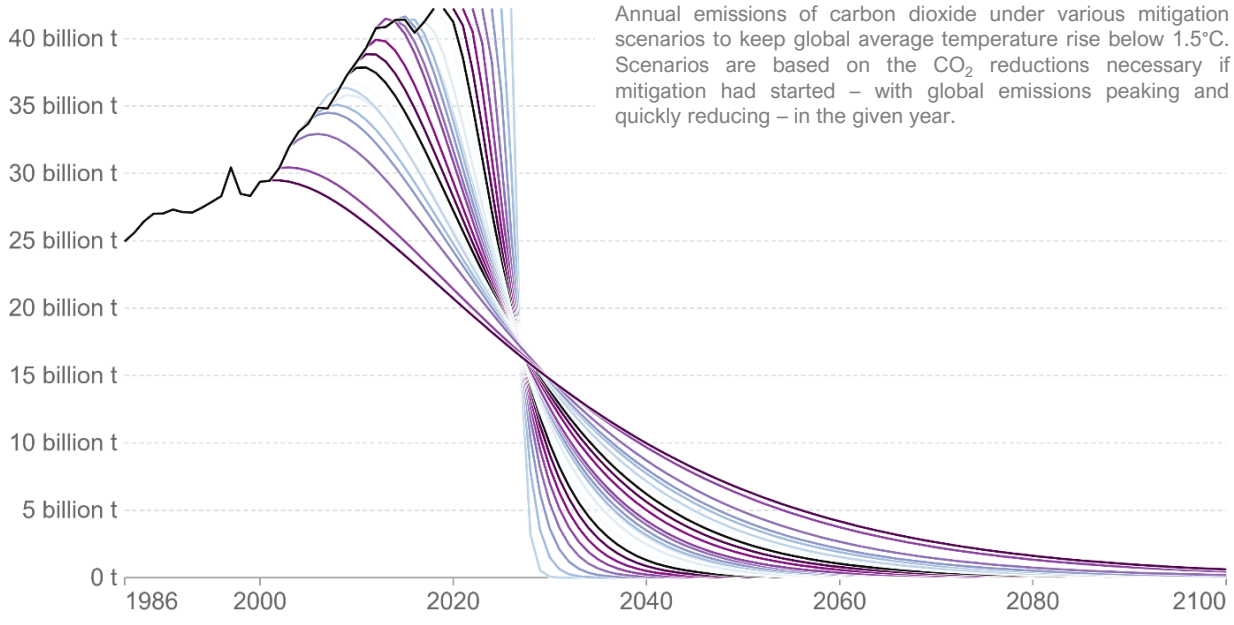
Since the Industrial Revolution, increasing volumes of CO_2e have been entering the earth's atmosphere. The increase in emissions picked up pace at the end of the last century, which has led to a steepening rise in global temperatures as illustrated in the graph below, reprinted from the NOAA.

Global atmospheric carbon dioxide and surface temperature (1880-2020):



At COP21 in Paris, world leaders pledged to hold global warming to 1.5°C. The seven years since the Paris Agreement was signed have seen temperatures continue to rise, and the impacts have been intensifying. With fraught negotiations at COP26 reaffirming the goal but failing to secure sufficient concrete commitments, each year of delay requires more drastic action to stay at safe levels of warming, as shown in the graph below, reproduced by Our World in Data using analysis undertaken by Robbie Andrews (2019).

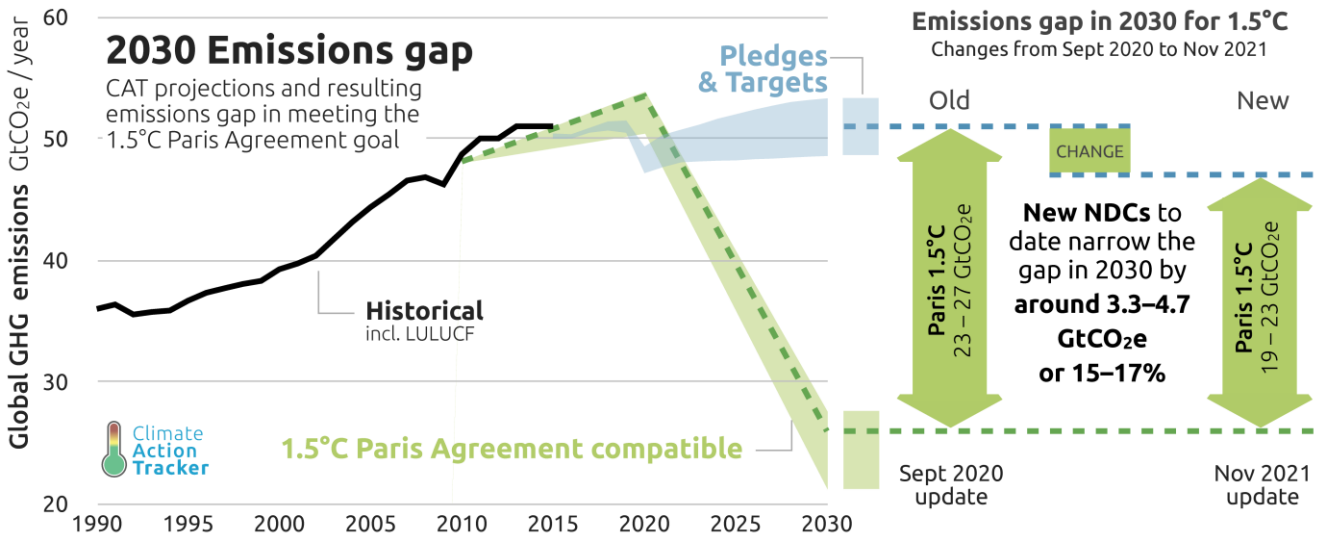
CO_2 reductions needed to keep global temperature rise below 1.5°C



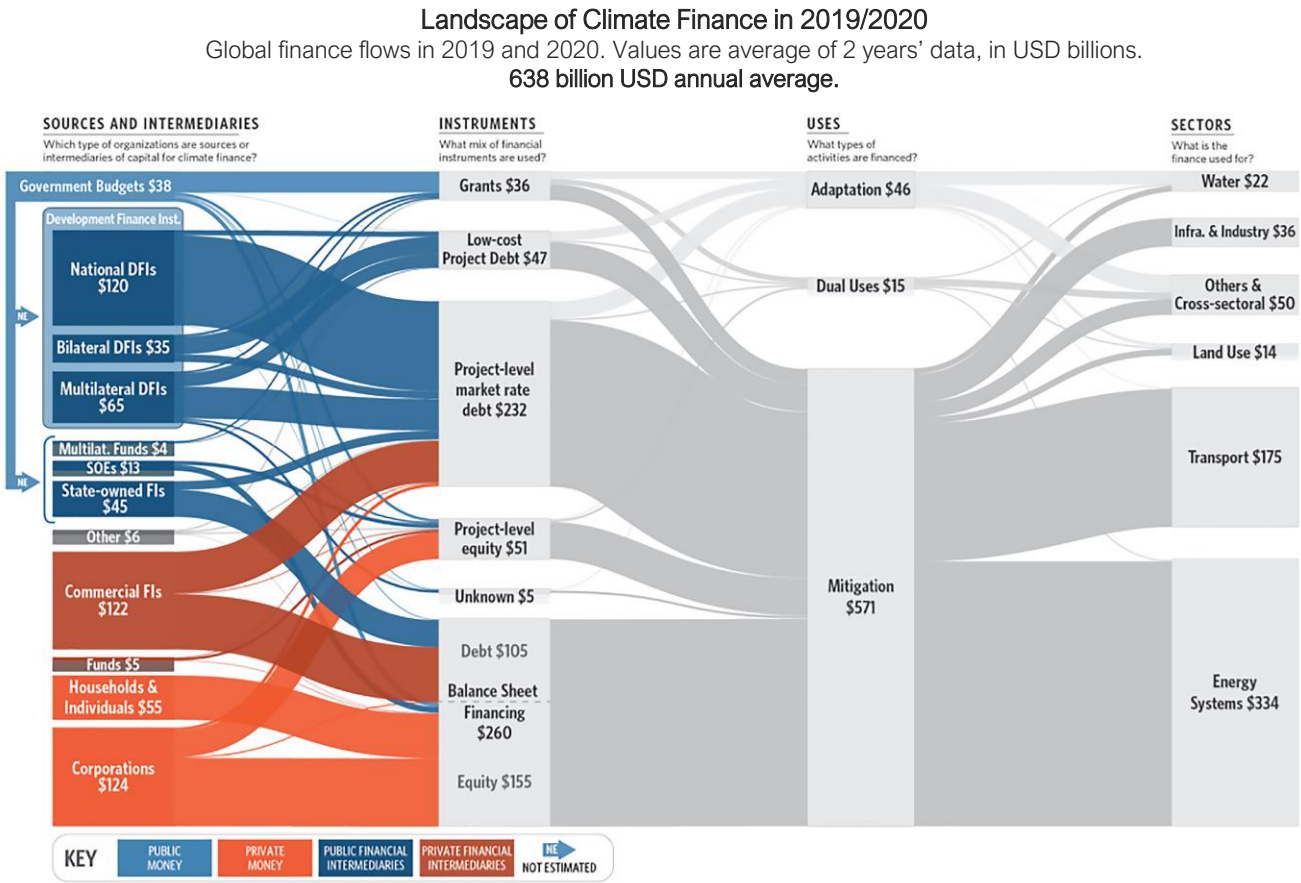
Annual emissions of carbon dioxide under various mitigation scenarios to keep global average temperature rise below 1.5°C. Scenarios are based on the CO_2 reductions necessary if mitigation had started – with global emissions peaking and quickly reducing – in the given year.

Source: Robbie Andrews (2019); based on Global Carbon Project & IPPC SR15
Note: Carbon budgets are based on a >66% chance of staying below 1.5°C from the IPCC's SR15 Report.

In 2021, 36.4 $GtCO_2e$ was released into the atmosphere. For reference, 1 $GtCO_2e$ is enough to cover the UK in a blanket of CO_2e 4.1 meters thick. To achieve the target of limiting temperature rise to 1.5°C, we must halve the current level of CO_2e emissions by 2030. That's a yearly reduction target of about 4 Gt of CO_2e, or 7%. Perhaps worryingly, this is roughly the same drop that was seen when the global economy ground to a halt in 2020, so incremental changes are clearly not sufficient. The graph below is taken from the latest CAT Emissions Gap report., and shows the discrepancy between current and necessary action. As temperatures rise above 1.5°C it is now clear that ecosystems will start to break down and livelihoods will be destroyed.



For the world to reach the above targets and achieve Net Zero emissions by 2050, large amounts of investment are necessary. In fact, mobilizing finance was the third pillar of the Paris Agreement, alongside mitigation and adaptation. Despite reaching around $630 billion in 2020, the CPI estimates that climate related financial flows need to grow by 590% in order to meet our 2030 goals. The following schematic from the Climate Policy Initiative shows financial flows across the years 2019-20.



ROADMAPS FOR SUCCESS

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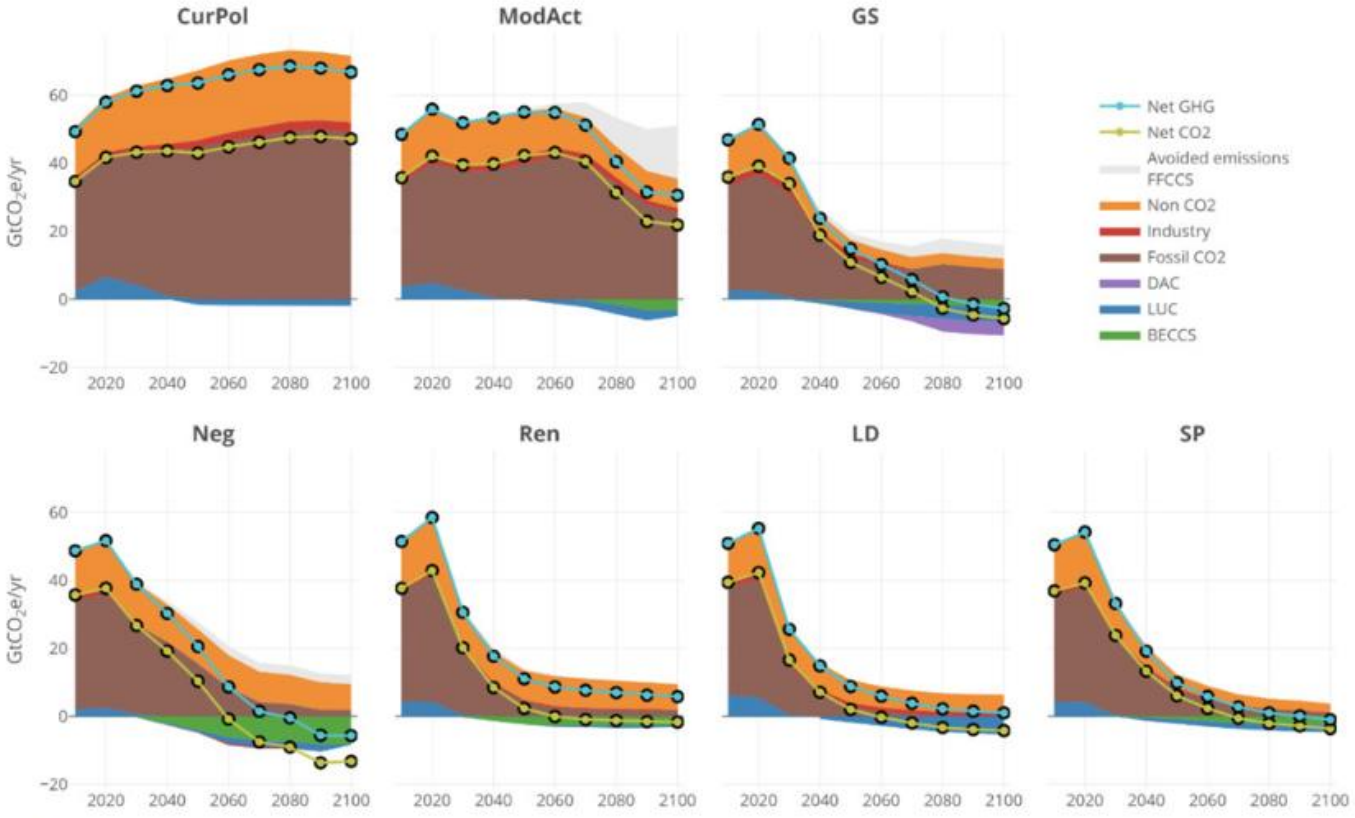
1. IPCC AR6

Despite the magnitude of the task we face, we have a number of roadmaps to help us tackle it. Particularly important are those presented by the IPCC, most recently in their Sixth Assessment report (AR6). IPCC reports, released every six or seven years, have been imperative in guiding our understanding of the crisis. Influential analysis from actors as diverse as the IEA, Greenpeace and McKinsey uses IPCC scenarios as a foundation, and the body's broader conclusions slide into climate-related discourse in all corners of society. To produce AR6 alone, 234 scientists trawled through over 14,000 academic papers in order to set out across three volumes the causes, consequences and solutions to climate change. In the third and final piece termed 'The Mitigation of Climate Change', the authors outline seven 'Illustrative Pathways' (IPs) that represent potential emissions trajectories. Each maps on to a 'Climate Category' which is the corresponding warming outcome. Here, we briefly outline the different IPs and the pathways that they represent. The graphs below are taken from Carbon Brief's fantastic summary.

Climate Category	Warning Outcome	Illustrative Pathway
C1	Below 1.5°C with no or limited overshoot	SD, LD Ren
C2	Below 1.5°C with high overshoot	Neg
C3	Likely below 2°C	GS
C4	Below 2°C	
C5	Below 2.5°C	
C6	Below 3°C	Mod-Act
C7	Below 4°C	Cur-pol
C8	Above 4°C	



Greenhouse gas emissions by source (non-CO2 emissions, industry, and fossil CO2) and CDR (direct air capture, land use change, and bioenergy with carbon capture and storage) over time under each illustrative pathway. Source: IPCC (2022) Figure 3.7.

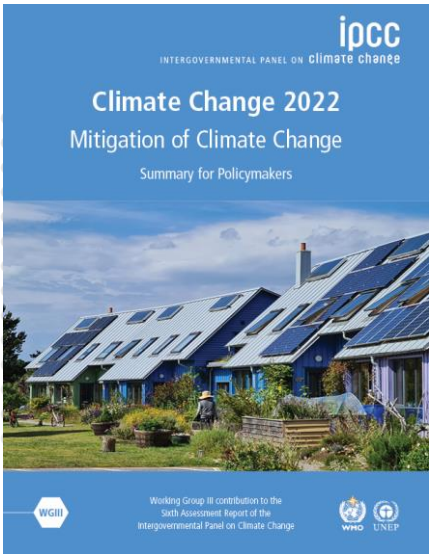
Clearly, we have a number of potential futures. The Moderate Action (Mod-Act) pathway involves us meeting our current 2030 commitments (primarily NDCs), but with little further ambition. It relies heavily on retrofitting fossil fuel infrastructure with CCS technology, and leads us to a potentially disastrous level of global warming. The Current Policies (CurPol) pathway is based on current Nationally Determined Contribution commitments. Tricky to categorise, based as it is on myriad studies from different time periods and different policy landscapes, it ends up with a best warming estimate of 3°C, but a range of 2.2°C to 3.5°C. This is equivalent to an emissions gap of 19- 26GTCO$_2$e per year by 2030 between current policies (NDCs) and a 1.5°C aligned scenario. Five pathways are focused on mitigation and keep warming to below 2°C. In order of warming outcome, their features are as follows:

- Gradual Strengthening (GS) sees a relatively slow phaseout of fossil fuels, which is countered later in the century by high levels of carbon dioxide removal (CDR). It is based on a scenario of high demand, which is met, alongside these relic fossil fuels, by high levels of renewable energy.

- Net Negative Emissions (Neg) relies heavily on CDR, particularly bioenergy with carbon capture and storage (BECCS) and biomass to offset a slow fossil fuel phaseout and meet high future energy demand. The pathway sees significant 'overshoot' before a period of negative emissions return temperatures to 1.5°C. Note that this overshoot means climate system tipping points may be triggered with irreversible consequences before temperatures can be brought down. Coupled with this, the CCS technology needed has yet to be proven economically feasible at scale, making Neg a high-risk scenario.

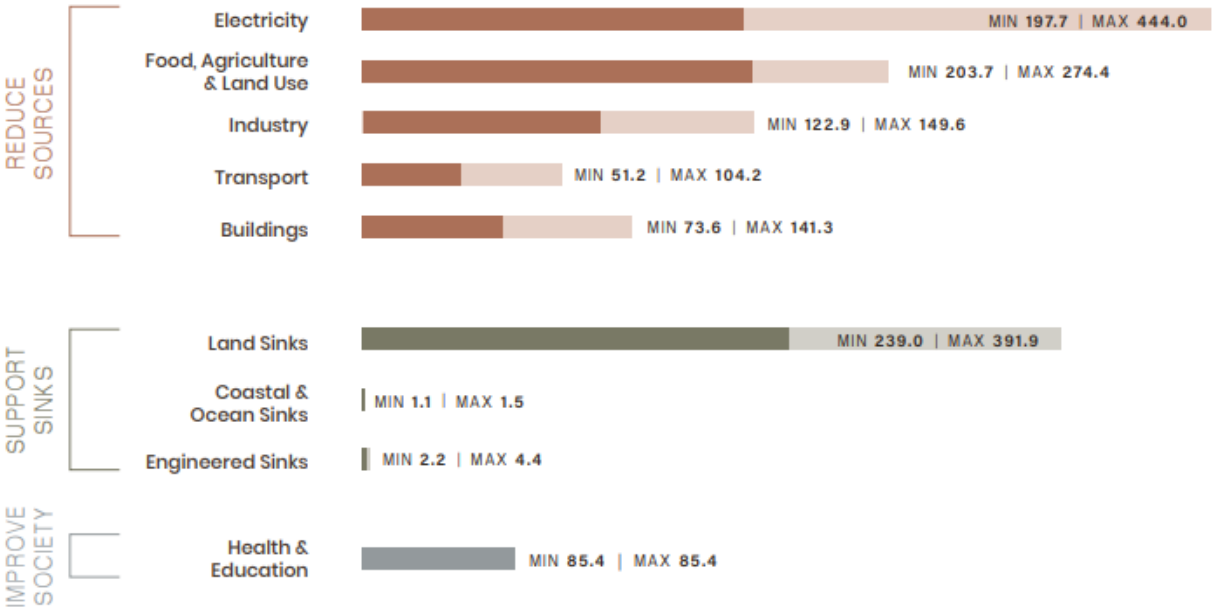
- Renewables (Ren) is characterised by a rapid fossil fuel phaseout and concordantly limited use of CDR. Moderate future energy demand is met, unsurprisingly, by renewables, alongside high levels of electrification.

- Alongside Ren, Low Demand (LD) and Shifting Pathways (SP) are high ambition, the result of a "successful international climate policy regime". They see a significant reduction in future demand and a rapid phaseout of fossil fuels. Note the importance of land use change (LUC) as a mitigation strategy in LD (afforestation, reforestation, restoring wetlands etc) versus SP's higher reliance on unproven BECCS. SP has a strong focus on SDG policies targeting "poverty reduction" and "broader environmental protection".



2. PROJECT DRAWDOWN

Amongst governments, academia, the private sector and civil society, one body using the IPCC's work caught our eye. That body was Project Drawdown, a not for profit focused on outlining specific solutions to climate change, focused on the theoretical future point they call 'Drawdown', when greenhouse gases in the atmosphere stop climbing and start to steadily decline. The original 'Drawdown Review' was a major inspiration and guide for CLMA, helping us to identify and weight different sectors within the universe of solutions. The graph below shows the potential for emissions reductions across different economic sectors, the figures in the bars representing the volume of CO_2e that could be reduced/sequestered between 2020-50.



As an example of the granularity in the report, the reductions under 'Electricity' are constituted as follows. The figures in the table show the minimum/maximum level of CO_2e that could be reduced/sequestered between 2020-50.

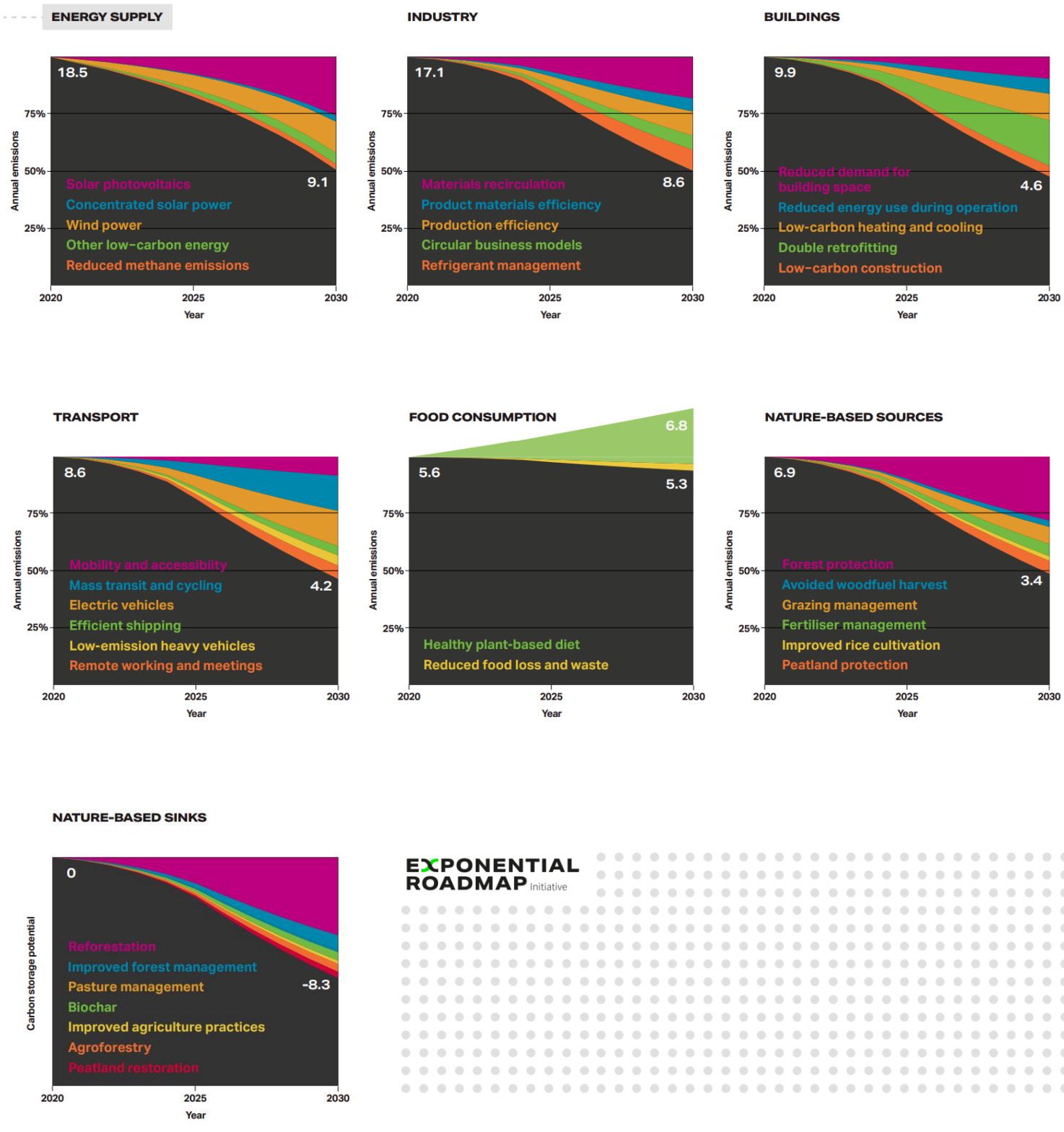
Shift Production	Min. CO_2e	Max. CO_2e
Onshore Wind Turbines	47.2	147.7
Micro Wind Turbines	0.1	0.1
Landfill Methane Capture	-0.1	0.2
Biomass Power	2.5	3.6
Geothermal Power	6.2	9.8
Waste-to-Energy	0.5	0.9
Utility-Scale Solar Photovoltaics	42.3	119.1
Distributed Solar Photovoltaics	28.0	68.0
Concentrated Solar Power	18.6	24.0
Offshore Wind Turbines	10.4	11.4
Small Hydropower	1.7	3.3
Ocean Power	1.4	1.4
Methane Digesters	2.3	3.6
Nuclear Power	2.7	3.2

Enhance Efficiency	Min. CO_2e	Max. CO_2e
LED Lighting	16.1	17.1
District Heating	4.6	7.2
Building Automation Systems	4.9	7.9
Insulation	3.8	4.3
Smart Thermostats	3.1	3.3
High Performance Glass	2.0	2.4
Water Distribution Efficiency	0.7	0.9
Dynamic Glass	0.2	0.3
Low-Flow Fixtures	0.2	0.4
Green and Cool Roofs	0.7	1.3
Solar Hot Water	0.8	3.2

PROJECT DRAWDOWN

3. EXPONENTIAL ROADMAP

Alongside Project Drawdown, we used work done by the Exponential Roadmap initiative. The Exponential Roadmap Initiative is a cross sector collaboration between businesses focusing on halving emissions by 2030 in line with the Paris Agreement. Members focus on their own operations and those of their value chain. Their flagship publication, 'The Exponential Roadmap', focuses on scaling 36 key solutions in order to achieve the 2030 target. We triangulated their findings with those of Project Drawdown to outline our investable universe. The 36 solutions are shown in the graphs below, lifted directly from the report.



EXPONENTIAL ROADMAP Initiative

GLOBAL TAILWINDS

4

With awareness of the dangers of climate change growing, there are a number of tailwinds behind approaches that contribute to making progress on these roadmaps. These are primarily driven by regulatory changes, technological developments and consumer behavior shifts.

REGULATORY FACTORS INFLUENCING CLIMATE INVESTMENTS

Across the globe regulatory changes are being made that mandate or incentivize companies and individuals to lower their emissions. The box below shows some key examples as of Autumn 2022.

The 2015 Paris Agreement: The foundation of all else. This enshrined Net Zero by 2050 as the goal with a series of binding and non-binding provisions. It set a program whereby countries would keep returning with improved commitments, underpinning the Glasgow Climate Pact of 2021. 17 countries including the UK, Germany and Russia now have a Net Zero target enshrined in law, while 33, including China, have it in a policy document.

EU Green Deal: In 2020 the European Commission committed €1 trillion to cutting emissions and restoring biodiversity. Since this plan, termed the 'EU Green Deal', was adopted, ambitions have been raised in response to Russia's invasion of Ukraine. The bloc has now committed to reaching a 45% clean grid by 2030, installing 320GW of solar by 2025. The original plan contains measures to support green hydrogen, low carbon mobility, energy efficiency and diets.

Sustainability disclosures: The UK has made reporting mandatory in line with TCFD guidelines from 2022 for certain disclosures, and by 2025 for all. The US SEC has proposed a landmark similar measure. Elsewhere, a number of different standards are being merged in order to provide one standardized guideline for climate related disclosure, under the auspices of the newly formed ISSB.

US Inflation Reduction Bill: After months of negotiation during which it seemed that centrist Democrat Joe Manchin had scuppered Joe Biden's climate ambitions, an abrupt U-turn in late July saw the birth of the 'Inflation Reduction Bill', which included tax credits, subsidies and grants for a wide range of decarbonizing technologies.

ICE car bans: Over 14 countries now have bans on the sale of new internal combustion engine vehicles in place. Leading the charge is the UK, where new passenger ICEs can't be sold beyond 2030. This regulation is combined with incentives for charging stations and EV makers.

China's commitment to being Net Zero by 2060: Announced in September 2020, will require it to double annual investment in solar, quadruple investment in wind, and increase its efforts to develop green hydrogen, energy storage and offshore wind.

Halting deforestation: In what was a key moment of COP26, the leaders of over 100 countries pledged to end deforestation by 2030. While this allows nine more years of the devastating trend, ending the practice would be a huge achievement, with major ramifications for both climate change and biodiversity loss.

MARKET FORCES INFLUENCING CLIMATE INVESTMENTS

In addition to regulatory factors, market forces are driving a transition to lower carbon living. This is in part driven by changing consumer preferences, but also by technological breakthroughs and steady price deflation. Notable examples include the following:

Wind: Wind power has become increasingly price competitive over a long period. In July 2022, a UK auction saw a new record, with 11GW of capacity sold at a rate that makes generation four times cheaper than gas.

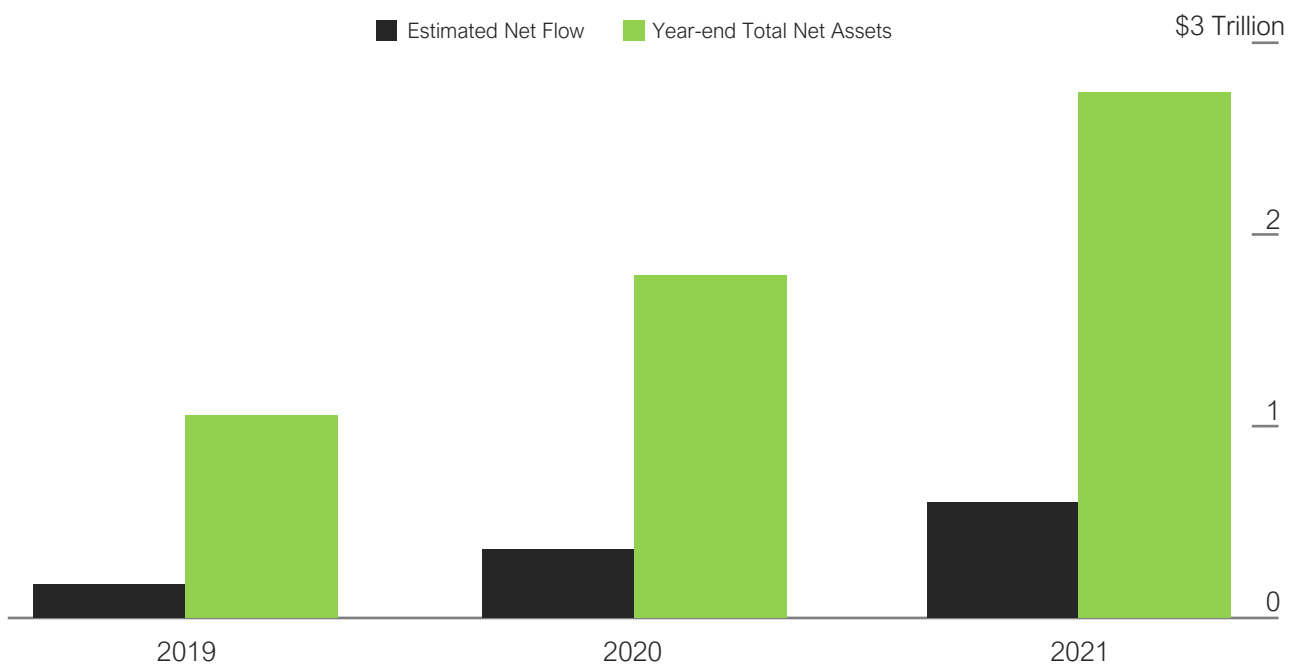
Solar: In its 2020 World Energy Outlook, the IEA proclaimed that many solar schemes now offer the 'cheapest … electricity in history'. With 2022's energy crisis driving up fossil fuel costs, the trend is only continuing.

Plant-based diets: According to a Bloomberg study, the plant-based food market could grow to $162 billion by 2030, making up 7.7% of the total market for proteins. Vegetarianism and veganism are generally on the rise, with a 2021 study finding that Britons have cut their meat consumption by 17% over the last decade.

Electrification of transport: Electric vehicles sales doubled in 2021 to a record high 6.6 million. China in particular is seeing rapid adoption, with the median price only 10% more than ICE alternatives.

Sustainable finance: Demand for ESG products is booming, with combined AUM projected to reach $41 trillion in 2022 and $50 trillion by 2025. While still insufficient, climate related financial flows have risen from $364 billion to $632 billion over the past decade. There is a growing focus on the impact of investments.

Total assets and inflows into sustainable mutual funds and ETFs 2019-21.
Accounting for stricter rules which cut over 1000 funds from the 'sustainable' universe (Bloomberg)



HOW TO SOLVE THE PROBLEM?
KEY SOLUTIONS

5

What are the solutions benefitting from these tailwinds?
This section offers a brief outline of the key low carbon technologies.

Solar and wind energy are the two cornerstones of efforts to decarbonize the economy. They are also now, in the majority of cases, the cheapest form of power. The cost reductions in the key technologies are shown in the table below, taken from IRENA. There is a major debate over how much storage is needed to facilitate a grid based primarily on solar and wind. Estimates vary, with factors such as cost and demand playing major roles, but the majority of studies show that it is entirely possible (see here, and here, for example).

	Total Installed Costs (2020 USD/kW)			Levelised Cost of Electricity (2020 USD/kW)		
	2010	2020	% change	2010	2020	% change
Solar PV	4731	883	-81%	0.381	0.057	-85%
CSP	9095	4581	-50%	0.340	0.108	-68%
Onshore wind	1971	1355	-31%	0.089	0.039	-56%
Offshore wind	4706	3185	-32%	0.162	0.084	-48%

Examples: SolarEdge Technologies Inc, Vestas Wind Systems A/S.

Hydrogen is a fascinating case. Described by many as a 'swiss army knife' in our efforts to decarbonize the economy, so called 'green' hydrogen has a variety of potential uses throughout the economy. Hydrogen is already used across the world, primarily in industry for producing methanol and ammonia feedstock, as well as in oil refining and steel production. Natural gas is currently the source of three quarters of the global 70 million tonnes annual production, accounting for 6% of global natural gas and 2% of global coal demand, producing annual carbon dioxide emissions equivalent to those of the UK and Indonesia combined. Currently, less than 0.1% of hydrogen is so called 'green' hydrogen, which comes from water electrolysis using renewable sources. It is this that is being touted as a key climate solution.

Despite some early interest in hydrogen cars, particularly from Japanese players like Toyota, most analysts now see batteries as a clear winner in the passenger vehicle space. Hydrogen is now seen instead as the key to deep decarbonisation, able to do what batteries can't. There are three key uses:

- Heavy duty transport
  To generate the power necessary to run a truck, plane or ship batteries would have to be obstructively large, heavy and costly. Hydrogen can step in as an alternative fuel using a fuel cell that combines H_2 and O_2 to produce electricity, with just water and heat as by-products.

- Industry
  Replacing the hydrogen currently used with green hydrogen is the lowest hanging fruit of hydrogen-based decarbonisation.

- Energy storage
  While batteries are more efficient in the short term, they self-discharge over longer timescales. What is more, the stable chemical bonds of hydrogen are more conducive to conversion and transportation than electric charge. In an energy system increasingly reliant on intermittent renewable sources, long duration storage is going to be vitally important.

Examples: FuelCell Energy Inc, Plug Power Inc.

3.

SMART, SECURE ENERGY SYSTEMS

As we electrify our energy systems and bring online a higher proportion of renewable sources, the characteristics of the system are going to have to change. New infrastructure will be needed to counterbalance the intermittent nature of renewables. Storage will be crucial for this, in the form of batteries, pumped hydro and green hydrogen, as will transmission grids to rapidly share energy between locations. On top of this, there is both an increasing need, and increasing technological capacity, for grids to become 'smart' in order to deal with fluctuations in generation, power and voltage. This would see grids managing load of their own accord in order to maximize stability and cost efficiency.

Whereas traditional grids are built around large, centralized fossil fuel power plants, the introduction of more renewable sources means there is also potential for grids to become far more localized. The result of this could be a system made up of 'virtual power plants', which are groups of interconnected generation and storage assets, often arrayed at the community level. Such distributed generation could provide a solution to the infamous energy 'trilemma' of security, affordability and sustainability, turning consumers currently at the mercy of global price shocks into empowered 'prosumers', able to make money off selling excess energy back to the grid.

Examples: Schneider Electric S.E., Enphase Energy Inc.

4. LOW-CARBON TRANSPORT

Worldwide, transport accounts for around 16.2% of greenhouse gas emissions. The majority of this (73%) is road transport, followed by aviation (12%), shipping (10%) and then rail (2%). Passenger vehicles account for roughly 60% of road transport emissions, and efforts are well underway to limit these. In November 2021, over 180 countries, cities, companies and financial institutions signed the COP26 declaration on accelerating the transition to 100% zero emission cars and vans, which committed signatories to 'work[ing] towards all sales of new cars and vans being zero emission globally by 2040, and by no later than 2035 in leading markets.' The electric vehicle industry is ramping up to fill what will thus be skyrocketing demand. Already there are 16.5 million EVs on roads compared to 5 million in 2018 as consumers look to get ahead of the curve.

A key component of the EV industry is the charging infrastructure required to support it, and there are fears that this may hold back adoption, many arguing that this is a classic 'chicken and egg' problem. Government response to this stumbling block has been mixed, but charging infrastructure is steadily building out worldwide. The IEA forecasts that 22 million charging points are now needed annually in order for us to meet the pledges made, with 90% of these being private chargers. The companies and the technologies are there, we simply need to overcome the initial economic hurdles that exist while the market is small.

While batteries are a clear winner in the passenger space, they are less suitable for heavy duty applications such as trucking, aviation and shipping due to the size and cost of the batteries that would be required. A variety of options are being proposed for these segments, from catenary wires for trucks through ammonia for shipping and sustainable fuels for aviation. Hydrogen is once again likely to play a role in many of these cases, although it will have to be used sufficiently widely to achieve economies of scale and break down cost barriers.

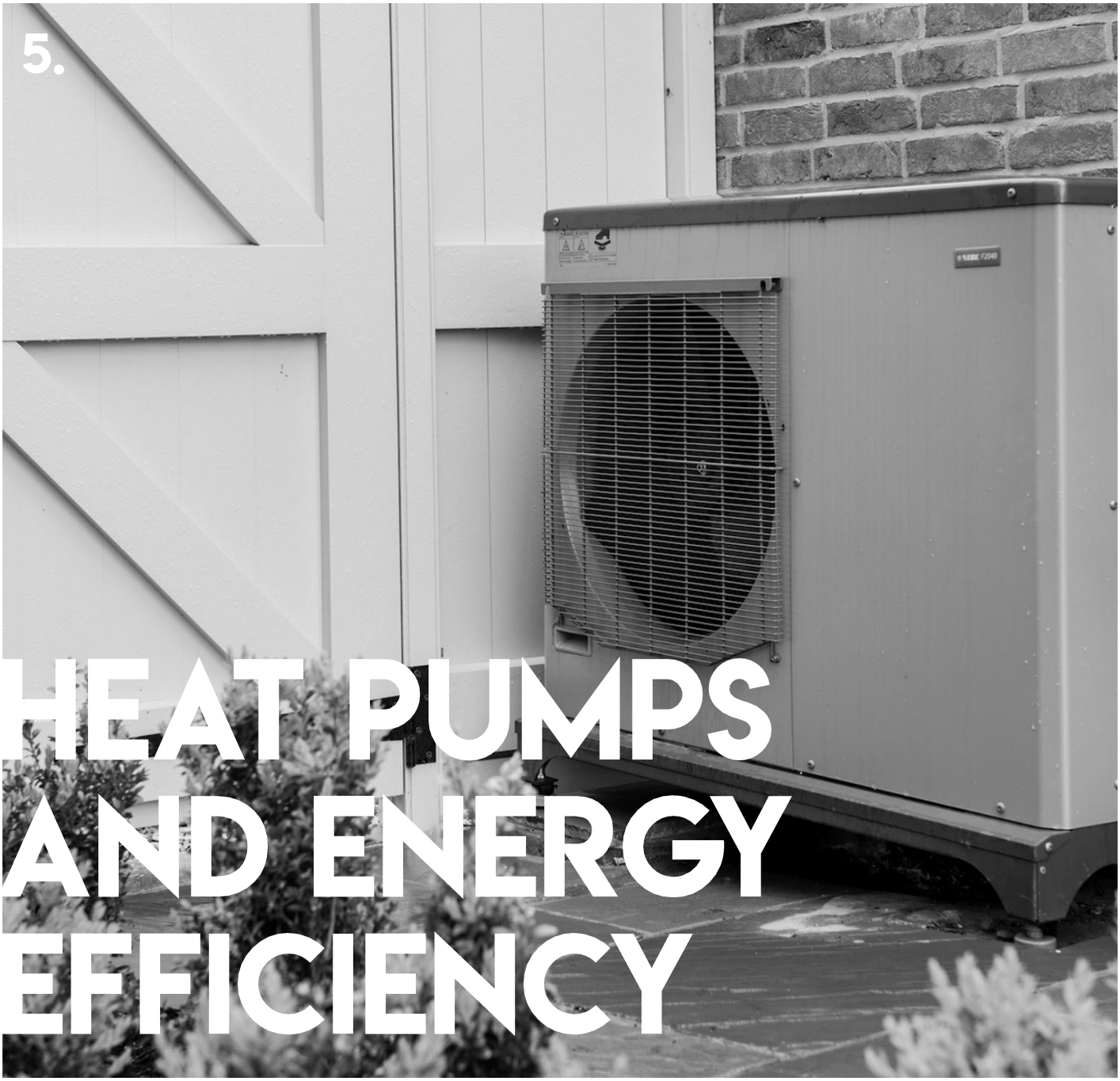
Examples: Proterra Inc, Tesla Inc.

5.

MEAT AND DAIRY ALTERNATIVES

According to the IPCC, food systems account for 21-37% of all greenhouse gas emissions. Crucially, not all food is created equal, and meat and dairy play an outsized role this statistic. Together, they are responsible for 60% of global agricultural emissions, despite providing only 18% of the calories we consume. Decarbonizing these industries will require a combination of improving production methods, shifting consumer demand and fostering a thriving market of alternatives. During our research on the topic, we found that the latter was the singular most important condition for a successful transition. Having low cost, healthy and tasteful alternatives readily available massively shifts the consumer choice architecture, making a switch far more likely. This is particularly important in the food sector, where governments and corporations are wary of the political implications of encouraging behavior change, as food is seen as a cultural artefact and choice an individual right in a way that energy source or steel production method isn't.

Examples: Oatly Group AB, Beyond Meat Inc.



5. HEAT PUMPS AND ENERGY EFFICIENCY

Heating buildings accounts for nearly a quarter of emissions in the UK. There are two main options for decarbonizing heating: green hydrogen and electric heat pumps. Heat pumps are widely seen as favorite on a cost basis, particularly in the UK, but with existing gas networks able to support the use of hydrogen this could vary over time and by jurisdiction. Heat pumps are effectively 'fridges running in reverse', transferring ambient heat from air, water or soil into a building. They are powered by electricity which, when driven by renewable sources, makes them almost zero carbon. They are also highly efficient.

Energy efficiency is seen by the IEA as the world's 'first fuel', and a vital tool in the race to Net Zero, for no unit of energy is more sustainable than the unit of energy not used. Efficiency can include insulation, smart energy management, energy benchmarking and smart lighting. Prominent modelling undertaken in the UK in the middle of the 2022 energy crisis has shown that energy bills for the period were nearly £1 billion higher than they would have been if energy efficiency subsidies had not been gutted by the coalition government. Efficiency is mooted as a low cost, low regret option to improve energy security, sustainability and affordability.

Examples: Kingspan Group Plc, NIBE Industrier AB.

THE FLAWS IN CURRENT INVESTMENT APPROACHES

6

As demonstrated, the solutions are now available. While policymakers can have significant influence over their uptake, the financial sector also has a major role to play. As the IPCC noted in their sixth Assessment Report in mid-2022, neither group are doing enough. Here we delve into the flaws that we perceive in the way that investors currently deal with climate change, with a particular focus on the public equity market. This sets the scene for the introduction of iClima's unique approach in the following section.

The investment world has been increasingly channeling resources to products deemed to align with climate goals, and the Exchange Traded Fund (ETF) market is no different. Research from Morningstar shows capital flows to sustainable mutual funds and ETFs rose 53% in 2021 to $2.7 trillion. Europe has led this growth.

As mentioned above, the demand for sustainable products has been driven by regulatory changes and consumer demand, but also a growing awareness of the material impact sustainable investments can have on long-term financial performance. The problem, however, is that there is no clear standard for what counts as sustainable.

The leading type of responsible investment are those that score well on Environmental, Social and Governance (ESG) ratings. The concept of ESG emerged from a UNEP working group in 2004, and was rooted in the best principles and practices of the UN SDGs. While it is important to remember the immense positive impact the term has had, it has now been somewhat coopted and de-valued. There are three major flaws in current investment approaches, most of which fall under the broad banner of ESG. For more detail on these themes, please see our 2021 Impact Report.

1. OPAQUE RATINGS

ESG ratings are calculated by a small number of providers, and are usually provided at a very high level, making them effectively a 'black box' in terms of methodology. What is more, the correlation between providers is often very low, with two of the most prominent estimates being only 0.45 and 0.54, compared to 0.99 for credit ratings.

2. PREDOMINANCE OF CORPORATE RISK

In many cases, what is cleverly framed as risk to the environment actually measures risk to a company's activities created by the environment. If an environmentally damaging practice doesn't create a material financial risk for a company, it is often ignored. This situation was blown open by a Bloomberg BusinessWeek investigation in late 2021.

3. THE 'DOING LESS HARM' PARADIGM

Even if companies were rated in a robust and transparent manner with a focus on environmental impact, there would remain the issue that the companies coming out on top would be those simply doing 'less harm'. To elaborate, data is usually backwards looking, and rewards companies for incremental improvements or for simply having intrinsically low footprints. ESG indices thus often end up dominated by tech giants like Apple and Google, who's business model has nothing directly to do with solving climate change. At iClima, we believe that this will not enable the required systemic change.

THE CLMA APPROACH

iClima Earth set out, then, to provide a climate focused investment solution grounded in forward looking data rather than opaque ESG scorecards, with a mission to reward the solution providers who can enable systemic change. We therefore spent the past two years analyzing companies to find those that have the greatest impact on a singular goal – reducing the volume of carbon released into the atmosphere.

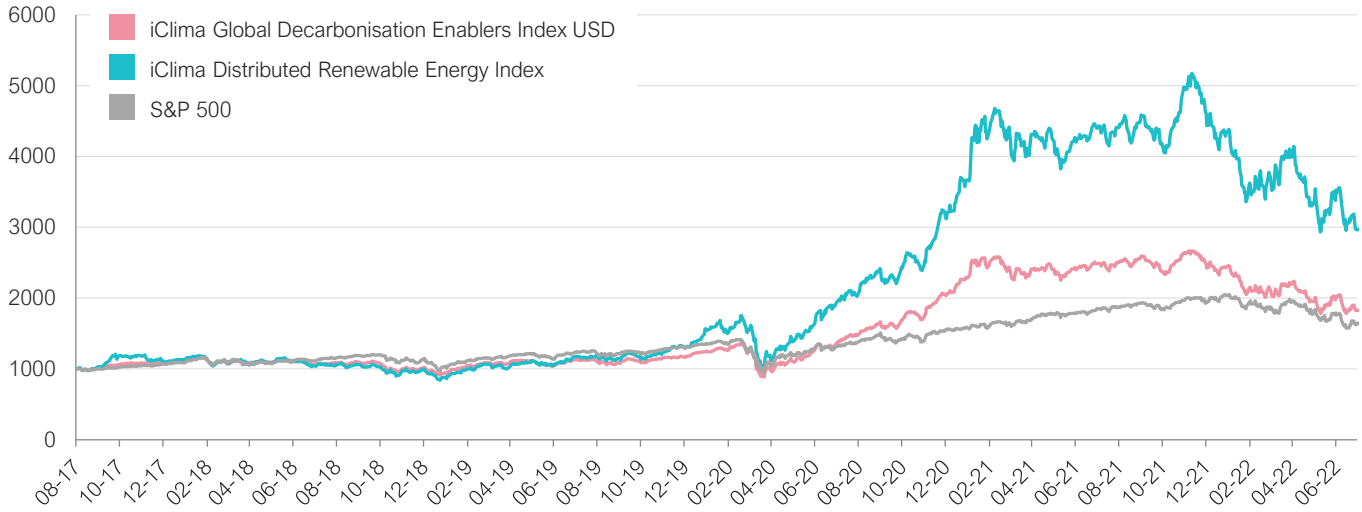
Our approach uses an innovative methodology. Using Project Drawdown and The Exponential Roadmap, we started with a top-down analysis of the industries and segments that have the most potential to displace more CO_2e intensive products and services. We then found the listed companies in each of those segments that meet our financial criteria, including minimum daily liquidity volumes and market capitalisation.

Finally, we calculated the amount of CO_2e that is avoided annually by the sale of these companies' products, a concept pioneered by Mission Innovation but underutilized in finance.

The result is the CLMA index of companies offering products and services that displace emission-producing alternatives – thus enabling CO_2e avoidance. iClima calls the companies in its index 'Climate champions' because they are delivering impactful solutions measured by the CO_2e avoidance potential of their products.

The CLMA index is a proprietary benchmark comprised of 151 of these Climate Champion companies that we calculate have the greatest impact on reducing carbon on our planet. This benchmark went live in September 2020, and has performed well financially: in back-testing, CLMA TR is up 68.7% for the one-year period up to 23/11/20, compared to 15.0% for the S&P index and 14.4% for the MSCI ACWI Low Carbon Target Index as shown below. The CLMA TR index is up 62.5% year to date, and 88.9% in the past 3 years.

Index Performance 02-08-2017 to 31-08-2022



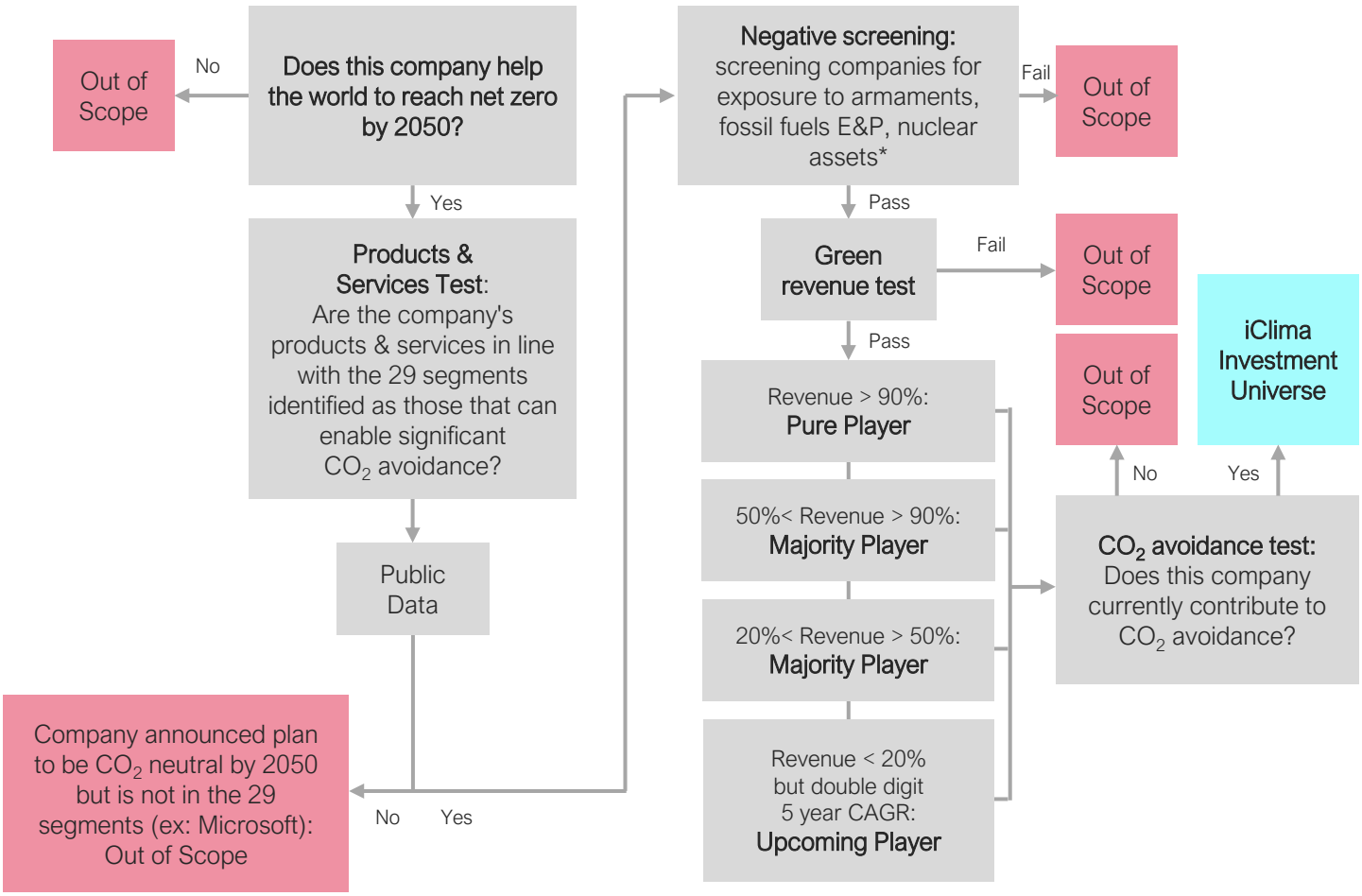
iClima Global Decarbonisation Enablers Index USD NTR

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD
2022	-12.79%	1.16%	1.69%	-10.86%	2.23%	-8.89%	12.05%	-3.66%					**-19.61%**
2021	6.32%	-2.00%	-0.01%	1.22%	0.24%	3.14%	0.41%	2.32%	-6.79%	9.14%	-3.18%	-2.73%	**7.33%**
2020	1.32%	-3.42%	-16.25%	11.01%	9.23%	8.06%	10.13%	11.37%	1.55%	1.92%	21.41%	10.87%	**83.51%**
2019	10.54%	3.63%	-0.60%	3.87%	-7.01%	8.29%	-0.13%	-3.07%	2.38%	2.39%	2.97%	5.98%	**31.91%**
2018	3.79%	-4.98%	-0.03%	0.65%	0.34%	-3.15%	2.53%	0.70%	-1.12%	-9.30%	2.91%	-6.85%	**-14.40%**
2017									5.36%	2.43%	0.17%	1.37%	

(to 31st Aug 2022)

iCLIMA'S METHODOLOGY FOR COMPANY SELECTION

iClima's methodology for company selection is built on a data-based methodology. Inspired by Project Drawdown and the EU Green Taxonomy as mentioned above, iClima identified five segments that can make a significant impact on CO_2e levels. Companies within each of these segments were included based on a rules-based funneling system as described in the following flow chart:



Additional checks: Company cannot be pre-revenue, or have negative revenue growth for 3 or more years, Market cap must be larger than $200MM

CLMA COMPANIES

The 170 Climate Champion companies in the CLMA index cover a wide range of activities and markets that are likely to provide both diversification and growth to investors. The CLMA index was built using a tiered approach, meaning there is no over-exposure to large cap companies (weights range from 1.15% to 0.18%). This is reflected in the index, as the top 10 companies by holding size represent only ca. 11% of the index, limiting the risk linked to individual companies. Here we highlight some of the most exciting companies in our index.

TESLA

The iconic Californian automaker has seen its value skyrocket over the past few years, this trend culminating in the crown of first car maker to reach a $1 trillion market cap. Importantly, sales have kept increasing despite pandemic related supply chain issues, almost doubling in 2021. In late 2021 the company made headlines by declaring that it would sell 20 million electric vehicles per year by 2030. Alongside its EV business, charismatic CEO Elon Musk has made bold claims about the potential of the company's growing solar and energy storage business, just as deployments rose 32% in 2021. Solar in particular increased by 68%. Having thrown everything at EVs until this point, the next few years could see Tesla pushing thousands more homes towards full self-sufficiency.

Bloomenergy

Bloom Energy is a pioneering player in the field of solid oxide fuel cells. Located in San Jose, California, the company emerged from 'stealth mode' in 2010 after eight years of research and development with the backing of an array of politicians and Silicon Valley experts. Crucially, Bloom's fuel cells use no precious metals or corrosive acids, the key component instead being a solid ceramic electrolyte. The technology has multiple uses including converting green hydrogen into electricity, capturing carbon dioxide and even producing green hydrogen in the first place. Bloom achieved record Q2 revenue in 2022, deploying their first fuel cells in the EU in partnership with Ferrari. Leadership continue to affirm that the technology's flexibility is its greatest strength, particularly as policy continues to fluctuate in response to the global energy crisis.

ENPHASE.

Enphase was the first pure play solar company to be added to the S&P 500. Formed in 2007, the company's founder Martin Fornage sought to tackle a distinct problem, namely that traditional solar arrays, connected in 'string' to a central inverter were held back by the worst performing panel. Enphase's gamechanging 'microinverter' ensured that each panel could operate at its maximum individual capacity. On the back of this successful product, Enphase has broadened its focus into battery energy storage and electric vehicle charging stations. In 2021 the company made a series of acquisitions which place it in the emerging software as a service space. Enphase is thus at the heart of the distributed energy market, an area that has received rocketing attention during the global energy crisis of 2022. The company's earnings per share is predicted to grow 64% through 2022.

AppHarvest

Based in America's central Appalachian region, within a day's drive of 70% of US consumers, AppHarvest are on a mission to offer more sustainable produce. Their solution is to use hydroponic agriculture to grow fruit and vegetables in greenhouses, which reduces both carbon emissions and pressure on land, while using up to 90% less water. Their process involves solar power rather than LEDs, a closed loop water system and AI technology to help with precision growing. The company is committed to zero waste. With one farm currently operating, the company is hoping to open three more to diversify its product offering beyond tomatoes to salad greens and berries. The company achieved a 39% YoY sales increase in 2Q22, and has secured a $50 million USDA-backed loan, one of the largest ever supporting controlled environment agriculture (CEA).

iCLIMA'S METHODOLOGY FOR CALCULATING CO_2E

iClima based its methodology for calculating CO_2e avoidance on the outline provided by the Avoided Emissions Framework. The final number is a 'raw' figure for potential avoided emissions enabled by all companies in the CLMA index, measured in megatons of CO_2e.

According to the World Resources Institute's Greenhouse Gas Protocol, avoided emissions are emission reductions that occur as a result of a product or service that provides the same or similar function as existing products in the marketplace, but with significantly less emissions, or that enables the emission reductions of a third party.

Following this definition, avoided emissions can be translated into a formula, as the difference between GHG emissions from a business-as-usual (BAU) baseline scenario and GHG emissions from a climate change solution enabled scenario:

Net Avoided Emissions	=	BAU Baseline Emissions	—	Emissions of the Solution Enabled Scenario

Where:

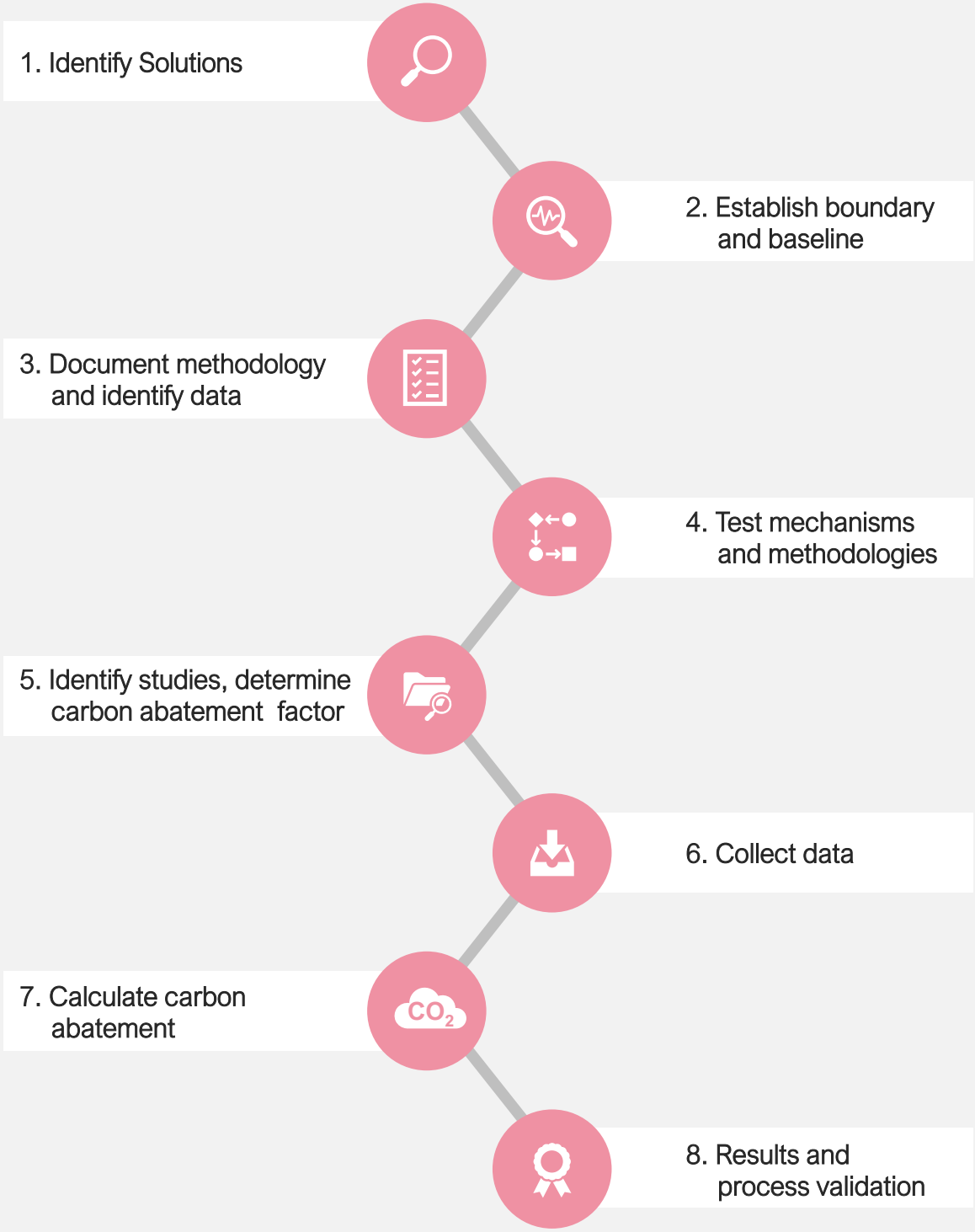
- The **BAU baseline emissions** are GHG emissions occurring in the absence of the enabling solution.
- The **solution-enabled scenario** is where the enabling effect takes place. The enabling effect is the avoided emissions from replacing the BAU with the climate change mitigation solution.

Emissions are measured in tonnes of CO_2 equivalent (tCO_2e), which is the functional unit for quantifying the impact of greenhouse gases relative to one unit of carbon dioxide (CO_2). At present iClima focuses solely on the primary enabling effect, which is the immediate effect of products and services sold and used on an annual basis.

The complete life cycle emissions of solutions plus their rebound effects are not yet part of the analysis due to the lack of data available in the public domain.

Each individual enabling solution is assessed by determining a carbon avoidance factor that reflects the net avoided emissions per unit of the solution implemented. To calculate overall CO_2e avoidance of a solution over a specific time period, the carbon avoidance factor is multiplied by the volume of the solution deployed. iClima uses annual sales volumes to allow comparability across solutions.

Calculating the carbon avoidance factor is complex and can vary regionally to reflect local emission factors and differing solution applications. As per the outline provided by the Avoided Emissions Framework, the calculation contains the following steps:



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