MCJ Proposal: Investment Framework for a More Sustainable World

Our core intention is to deploy capital in order to cap global temperature rise below 2°C by the year 2100, while considering full life-cycle impacts on ecosystem health and society.

To do this, we must invest in "gap technologies," which, through direct and induced emissions reductions or removals, can have a catalyzing impact on reducing global emissions and limiting temperature rise to no more than 2°C by 2100. This is in line with the Paris Agreement and supports efforts to avoid systemic tipping points (e.g. Amazon deforestation, permafrost melt).

Achieving this goal requires a different approach to evaluating potential investments. This new assessment framework must consider far more metrics and diverse contexts around the world. It must also consider the large uncertainties in quantifying these broad areas while being tractable and usable for investors.

We perceive investment opportunities with widespread cross-sector impacts to be the most attractive from both a decarbonization/climate perspective as well as from a financial perspective. We identify and highlight key investment areas, as well as implications across sectors. We also emphasize addressing hurdles to adoption of "gap technologies" as a key consideration for our investment framework.

Investment Framework

Principle 1: Emissions Considerations. Carbon equivalent emissions (CO2e, which include carbon dioxide, methane, nitrous oxide as well as fluorinated gases) are the main contributors to temperature rise. Therefore, reducing CO2e is our leading indicator to ensure we are on the right path. Our target, in line with the 2°C cap stated above, is to drive annual emissions down from current 55 gigatons (GT) to 6 GT per year by 2100.

Investment decisions will be made by analyzing the potential GT of CO2e removed or avoided with the following considerations:

A. **Rigorously estimate** the investment's projected **annual potential emissions reductions (or avoidance)**, where 'potential' is the impact the technology would have if it saturated its market. While an individual business may not realistically saturate the full market, the metric helps to understand the exponential potential of the technology itself. This projection includes all net emissions that are a direct result of the investment, including the creation and use of the technology to replace the business as usual (BAU) technology. All emissions from the supply chain and disposal of products should be considered in the accounting of these emissions. Emissions caused by end-of-life processes should also be accounted for in order to ensure a comprehensive assessment. Wherever possible, emissions should be verified and/or certified with the latest measuring techniques.
B. **Rigorously estimate** the investment's projected **annual potential induced emissions reductions (or avoidance)**, where the induced emissions reductions are a result of a newly created market or circumstance. *This metric should specifically consider the cross-sectorial emissions reductions that may result from successful deployment of the investment.* In addition, changes that help induce lower-emissions behavior should be considered. As an example, a company that produces bamboo as a regulatory-approved

building material alternative to steel may also find that bamboo has applications in furniture, roofing and floors, and bike production. Considering these new sectors or applications requires an open and creative examination of the potential of the new technology and the timelines and likelihood of use in other sectors.

C. **IEA Technology Readiness Level (TRL)** Given that time is a factor, it is important for a technology to have a high-certainty of CO2e reduction or removal within 10 years. The TRL for a given technology indicates both the certainty of estimates for that technology and how close the technology is to deployment and real-world emissions reductions.

Principle 2: Ecosystem Health Considerations. We realize the need for long term viability of this portfolio and that the global economy relies on healthy ecosystems; therefore, evaluation of any investment should incorporate its full life-cycle impact. The economic activity caused by an investment could negatively affect planetary life, particularly when full supply chains are considered. Ecosystem health and biodiversity are intertwined, but investments may directly affect one more strongly than the other.

Ecosystem health and biodiversity are challenging concepts to measure with existing tools, and the effects of potential investments should be openly examined with the goal of clarifying to what extent natural systems could be damaged or enhanced by the investment/technology. In this proposal, we do not include specific quantitative metrics for how each investment should be evaluated on life-cycle impacts. However, we will consider using the quantitative tools currently under development by the Task Force on Nature-related Financial Disclosures (TNFD). In the interim, existing qualitative tools (e.g. indicators for the UN Sustainable Development Goals (SDGs)) should be used to assess the ecosystem and biodiversity impacts of investments.

Investments should be chosen to help accelerate the global transition to sustainable and regenerative resource use. Investments that only shift or delay unsustainable resource use should be avoided.

Principle 3: Societal Impact. Investments that facilitate improvements in human health, education, and standard of living should be preferred. Similar to Principle 2, this can be a challenging metric to quantify, but we propose developing an evaluation framework using both existing (e.g. SDG indicators) and future metrics in this area.

Financial Considerations and Structure

We recommend an investment strategy for a purely profit-seeking enterprise, rather than one that includes advocacy or not-for-profit endeavors (though in some cases, non-investment activities can have significant positive impacts towards the goals of this framework).

We propose to focus on two types of activities:

1. Investments that **reduce CO2e emissions,** either through direct emissions reductions or induced emissions reductions
2. Investments that **remove, sequester, and/or utilize atmospheric carbon**

There are multiple factors that may drive ultimate investment selection under these broad categories, including internal staff expertise, financial or political risk appetite, macro sector/stage allocation considerations, access to deal flow, internal financial hurdles and metrics, time horizons, reinvestment policies, and more. Without presuming to know specific details for any of these factors, we propose some broad selection considerations that may be useful in weighing trade-offs in allocating across stage and type of vehicle:

1. **OpCo strategy**
    a. Buy an existing incumbent and implement new business practices in support of the principles above
    b. Buy a newer entrant that is disrupting incumbents through strategies that support the principles above

In either of these approaches, the financial considerations will be similar to a traditional WholeCo acquisition strategy, with concomitant considerations of capital structure, leverage, profitability, operating team profile, and so on. This approach may be the simplest way to deploy large sums (>$100 million) into single vehicles. Companies in the (1a) category above are most likely to exist in sectors where sustainable practices can improve existing products in established markets. Food, agriculture and land use is one sector that lends itself to scale strategies of this type, as reaching the stated targets without significant operational transformation in this sector will be very difficult (see Table 1 below). Companies at scale in the (1b) category above are most likely to be found in renewable power today. Examples of specific potential strategies under these broad categories could range from rolling up food producers or farmland and implementing regenerative practices, to acquiring power project developers and implementing renewable power projects and/or disrupting fossil fuel projects.

2. **InvestCo strategy**
    a. **Venture Capital** – invest (directly or through LP positions) in a large portfolio of emerging technologies and business models.
    b. **Growth equity** – invest in a concentrated portfolio of better-established technologies and business models.
    c. **Project finance** – provide project equity or debt as a pure financial investor for infrastructure projects such as power plants or EV charging stations.
    d. **Public markets (activism)** – independently or in consortia, take minority positions in major incumbents in order to drive board-level decisions about positive climate impact and appropriate costing of climate risks.
    e. **Public markets (non-activism)** – take long or short positions in debt or equity, based on assessments of climate risks. This may be a less attractive strategy in pursuit of the principles listed above. Passive investments of this type would not be expected to have immediate emissions effects, though could have long-run market influence.

While controlling equity positions may be possible in (2a), (2b), and (2c) above, we recognize that all of these strategies are feasible if the investor does not require control. There is an urgent need to catalyze massive investments in gap technologies over the next decade, and it is worth considering how different approaches and strategies may affect total impact. Wherever possible, given the scale and complexity of the problem, and the fact that the required annual climate investment to meet the goals stated above is around **$1 trillion per year**, we propose actively seeking to unlock multiplicative effects on the core challenges – through syndicates and consortia, through non-dilutive financing (including coordination with government programs), through the appropriate use of leverage, and through third-party capital when appropriate.

However, in all cases, we propose to weigh decisions toward maximizing pro-climate benefits while not prejudicing Principles 2 and 3. For instance, a solar development that displaces planned or existing coal-fired generation in a specific location might be considered more favorably than a stand-alone solar development in a different location, all else equal. Depending on internal financial considerations, in some cases it could make sense to accept a lower financial return from an investment that produces a substantially higher climate impact.

A Note on Trade-offs and Cross-Sector Impacts

One key challenge of implementing this framework is dealing with the inevitable trade-offs. Is an additional 10% return better than an additional 1 gigaton of carbon reduction? What about fewer biodiversity impacts versus greater social inclusion in the developing world? These challenges require at a bare minimum full transparency on what the trade-offs are, and transparency requires asking the right questions and collecting as much data on the potential investments as possible. Only a few trade-offs can be managed by simple conversions. Carbon pricing is one example of the financial return and CO2e trade-off. Others are not as easy to quantify. Furthermore, investments that pose a significant danger to ecosystems/biodiversity must prove how their *positive* financial, environmental, and social benefits will compensate for the potential harms.

On the other hand, there are positive externalities from each of these broad areas. Emissions reduction can help reduce negative impacts on ecosystems and biodiversity (e.g. reducing temperature change can alleviate species extinction rates), and on human development (slowing climate change reduces rates of human migration, natural disasters, and agricultural losses). Protected ecosystems also help facilitate human development - as an example, billions of people depend on a thriving ocean for their primary protein source. Likewise, human development can help reduce threats to ecosystems as well as reduce CO2e emissions (e.g. 3 billion people use open fires to cook, which emit high volumes of CO2e and black carbon. Providing clean alternatives will improve local health and ecosystems, while reducing global emissions).

Illustrative Examples

In the following section, we'll examine three hypothetical opportunities to demonstrate the application of our framework. However, we first want to show the complexity of investing broadly across the climate opportunity set. Table 1 sets out approximate CO2e emissions by sector, including the breakdown of electrical power emissions across end-use sectors.

Table 1: Worldwide CO2e emissions by economic sector (2010)

Economic Sector	Share of total annual emissions (%)	Allocation of *Electric Power* emissions to End-use Sectors (%)	Share of total annual emissions for End-use Sectors (%)
Electric power	25	N/A	N/A
Food, agriculture, and land use	24	0.9	25
Industry	21	11	32
Transportation	14	0.3	14
Buildings	6	12	18
Other energy	10	1.4	11
TOTAL	**100**	**25**	**100**

Source: IPCC 2014 based on 2010 data

Table 2, from Project Drawdown, offers a specific view of climate technologies and their emissions reduction potential. This could serve as one starting point for prioritizing investment opportunities. For the sake of brevity, we only include categories with an estimated impact of greater than 10 GT of CO2e reduced by 2050, but the potential opportunities are diverse.

Table 2: Solutions to reduce/sequester GT CO2e (GT CO2e reduced over 2020 - 2050)

Forest restoration (>120)	*Reduced food waste (95)*	*Plant-rich diets (92)*	*Improved clean cookstoves (73)*
Distributed solar photovoltaics (69)	*Refrigerant management (58)*	*Alternative refrigerants (51)*	*Concentrated solar power (24)*
Public transit (23)	*Building insulation (19)*	*Alternative cement (16)*	*Electric cars (16)*
Improved rice production+system of rice intensification (>15)	*Solar hot water (14)*	*High-performance glass (13)*	

Source: Project Drawdown, 2020

Taken together, these tables illustrate the broad range of opportunities available in the climate impact sector, and the massive scale of the problem to avoid global temperature rise above 2°C. It also suggests the range of expertise that may be required to effectively evaluate opportunities across the landscape.

The following examples demonstrate how the framework may be applied across three hypothetical investment opportunities. We purposefully avoid the myriad of financial considerations that might influence choices here, in the interest of demonstrating how our framework forces discussion about a broader set of strategic and environmentally holistic considerations.

Here, we compare an advanced lithium-ion battery (Investment A), hempcrete construction blocks (Investment B), and an alternative refrigerant (Investment C). All of the technologies must reduce emissions without violating Principles 2 and 3; additionally, feasibility of producing financial returns should be considered. (All emissions reductions data here is hypothetical.)

Table 3: Comparison of Three Potential Hypothetical Investments

Principles	Investment A (Advanced battery)	Investment B (Hempcrete)	Investment C (Refrigerant)
1.A: Annual Potential Emissions Reductions	0.6 GT CO2e	1.3 GT CO2e	1.5 GT CO2e
1.B: Annual Potential Induced Emissions Reductions	1.6 GT CO2e	TBD	TBD
1.C: Technology Readiness Level	Level 5 - Components proven in conditions to be deployed	Level 11 - Proof of stability: predictable growth	Level 7 - Pre-commercial demonstration: solution working in

			expected conditions
2: Ecosystem Impacts	Negative environmental effects (e.g., water contamination, land clearing) for further mining of metals/rare earths used in this battery technology.	Positive (regenerative agriculture, carbon sequestration, non-toxic). As this technology scales, negative impacts could come from increasing land use.	Current leaks and poorly understood disposal requirements have had adverse impacts on air quality and significantly added to CO2e.
3: Societal Impacts	Increased awareness surrounding the emissions from fossil fuel burning cars, those without electric vehicles are shamed into driving fewer miles. Expired batteries begin to flood recycling plants leaking into water sources.	As a natural and non-toxic material, hempcrete has shown to improve health for home dwellers (e.g. better sound absorption, non-toxic walls). As this technology scales, negative impacts could come from increasing land use.	As global temperatures rise, the demand for refrigerants will only increase to save lives and preserve perishable foods.

Investment A - Advanced Lithium-ion Batteries (Mobility / EVs)
Summary: The rapid growth in electric vehicle adoption worldwide (41% fleet growth in 2019) might be paused by the COVID-19 pandemic, but high growth rates are likely to resume once the economy returns to normal. This represents significant demand for advanced Lithium-ion (Li-ion) batteries that increase capacity over typical Li-ion batteries and extend vehicular range. There is also potential to expand to related industries such as e-bikes, home storage, and renewable electricity grids. Expected emissions impacts are quite favorable. The ecosystem and societal impacts are mixed, however, indicating that though potentially rewarding from a financial and climate perspective, the risks to ecosystem contamination and subsequent impacts on human water sources must be made transparent. A strategy for investment in this technology may include using ***OpCo strategy 1a*** *(buy an incumbent)* above where the acquired company makes adjustments to its supply chain and services to reduce ecosystem and societal impacts. For a major battery producer, ***InvestCo strategy 2d*** *(public market activism)* might also be an attractive option, where board decisions can be influenced on a broader industry scale.

Investment B - Hempcrete Construction Blocks (Agriculture / Buildings / Industry)
Summary: Hempcrete utilizes industrial hemp and limestone to create a direct substitute for concrete (a carbon-intensive material). Because the price and application are similar to traditional concrete, hempcrete can reach a significant global market. Hemp sequesters carbon during growth (1.3 GT CO2e potential annual emissions reductions) while also providing natural benefits to the soil and surrounding ecosystem. Finally, as a natural and non-toxic material, homes built with hempcrete can improve health for dwellers (e.g., better sound absorption, non-toxic walls). Beyond affecting jobs in the current concrete industry, the only major environmental and societal risk is complications from growing land use. Due to the disruption to an established market, this technology may use ***OpCo strategy 1b*** *(buy a new entrant)* above.

Given that this is a relatively new technology without large scale adoption, ***InvestCo strategy 2a*** (*VC investment*) may also be appropriate.

Investment C - Alternative Refrigerant (Industry / Buildings)
Summary: Refrigerants have several applications across industry, buildings, and transport. Furthermore, rising temperatures and economic growth are increasing demand: higher global temperatures and higher wealth create more cooling demand worldwide. \ the same time, international agreements to phase out refrigerants with damaging ozone and climate effects are driving change industry-wide. Given the existing wide-scale use, inefficiencies of existing systems, near-certain expansion into additional applications, and continued policy action, there is a market opportunity for a low-carbon solution. Numerous alternatives exist, which means there is uncertainty in both the technology and market opportunity. Some alternatives also have safety risks (e.g. toxic or explosive materials). Due to the uncertainties, using ***InvestCo strategy 2a*** (*VC investment*) to invest in a promising startup might be an appropriate approach to enter this market.

An investment methodology that incorporates our framework would consider the details above, in addition to financial, strategic, and operational considerations, when assessing opportunities.

Based on Investment A's potential emissions reductions of 2.2 GT per year – in particular, by inducing emissions reductions across the horizontal battery market and the vertical markets of transportation and electricity generation – it has a significant advantage over Investment B (1.3 GT CO2e) and Investment C (1.5 GT CO2e). However, the advanced battery technology is less mature (TRL 5) than B and C, making its emissions reduction estimates less certain. Furthermore, the full battery life-cycle can stress ecosystems (e.g., land clearing, water contamination, etc.).

Although Investment B has lower emissions potential, it possesses several strong benefits. This includes a mature TRL – thereby increasing impact estimate certainty and increasing speed to deployment – as well as a positive impact through regenerative agriculture, contrary to investments A and C. However, this picture becomes more complicated as the technology scales, considering industrial hemp requires significant land use. Potential concerns could include monocultures and conflicts over land for food production.

Investment C (Alternative Refrigeration) has significant direct emissions reductions of 1.5 GT CO2e per year. The technology has a lower emissions potential than Investment A, but a greater TRL, indicating that it's closer to deployment and has more certain projections. On the other hand, Investment C has not reached commercial deployment - the technology must ensure that it will be a non-flammable replacement for existing coolants. Further, there are significant hurdles to implementation and compliance with new standards given the number of fridge and AC manufacturers globally.

Evident in the analysis above, these decisions rely on complex considerations and trade-offs. In any context, the user of the framework must make the best of the data available to manage key principles while positioning capital to optimally serve the 2°C target.

Authors: A joint proposal from members of *My Climate Journey*, one of the world's most impactful and vibrant climatech communities. To encourage others to contribute to this evolving and open-source framework, we have published this on Github.