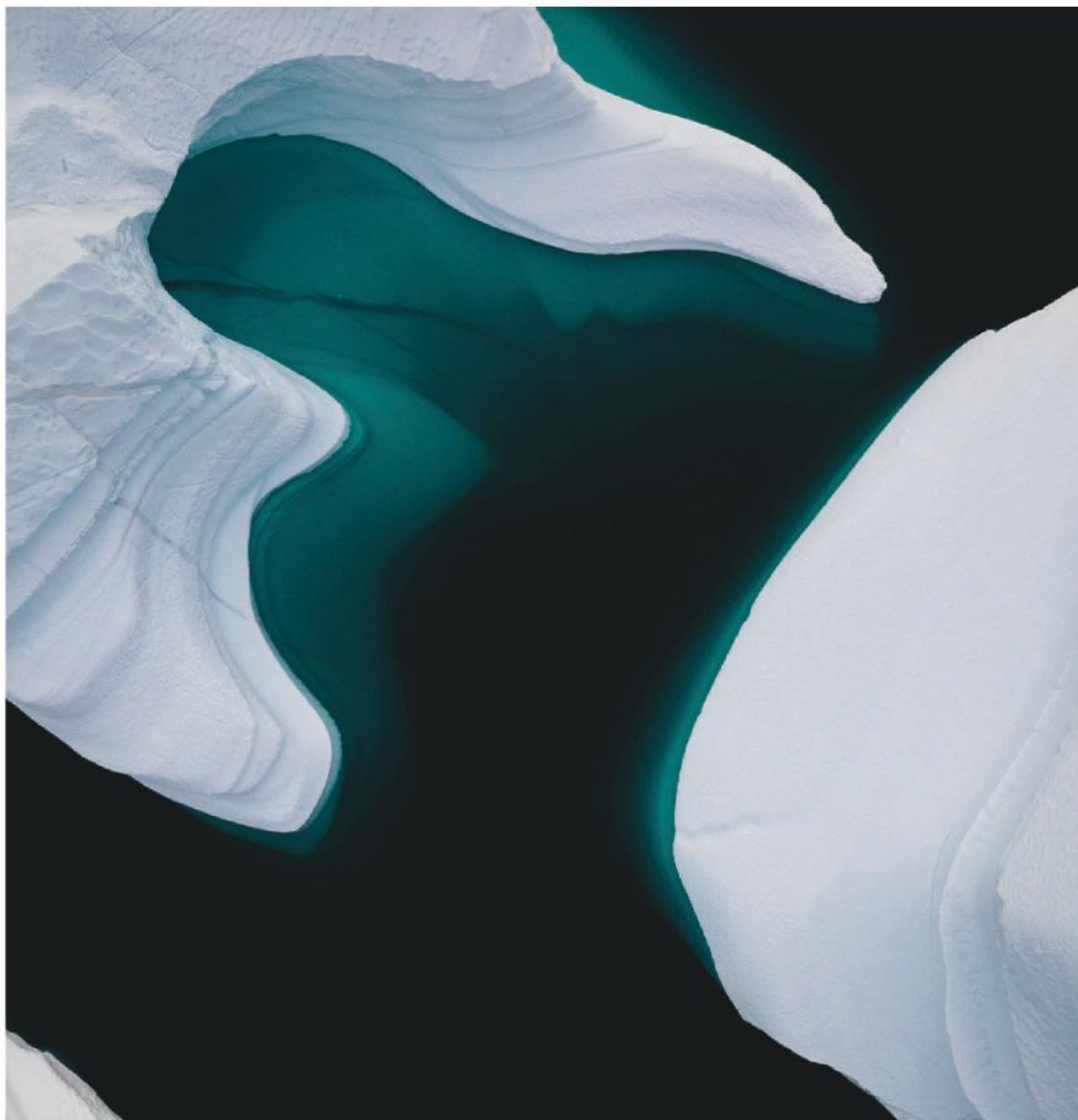


citizen mint



INVEST TO IMPACT

Net Zero Investing:

5 Ways to Counter Climate Change





¹ Climate change is an environmental issue but it has also become a financial one. Exposure to the damaging impacts of climate change – including extreme temperatures, floods, droughts, wildfires – is increasingly seen as a financial risk and included in the analysis of most investments, from real estate to corporate and government securities. Not surprisingly, more capital is being invested in products and services to mitigate or adapt to climate change.

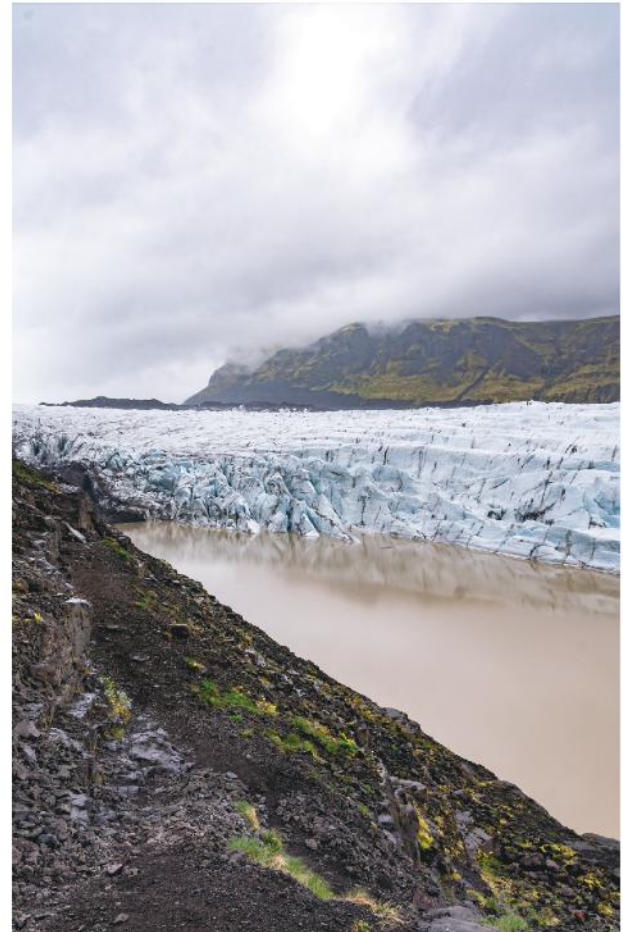


CLIMATE CHANGE INVESTMENT OPPORTUNITIES

Citizen Mint believes climate change is likely to drive one of the greatest capital investment cycles in history, leading to significant innovation across all parts of the economy. As such, we believe it will be one of the most promising investment opportunities of our lifetime, and is one of the reasons we created the Citizen Mint platform.

The scope of the challenge is immense. Greenhouse gases known to cause climate change come mostly from the burning of fossil fuels (coal, oil, natural gas) to power transport, industry, and electric utilities. Although great strides have been made in developing renewable energy in the past 10 years (solar, wind, hydroelectric and biomass), around 80% of power generated in the U.S. is still generated by fossil fuels.

Getting to “net zero” -- no additional greenhouses gases added to atmosphere -- will take massive global investment in vital sectors: renewable energy, resource sustainability, transportation, water use, food and agriculture. In this paper, we discuss potential investment opportunities in each of these five areas, which the Citizen Mint team will prioritize in our research and analysis.



2 PATHWAYS FOR CLIMATE SOLUTIONS

Mitigation

Products or services that reduce production of harmful emissions, such as renewable energy production, more efficient use of energy, electric vehicles, protein alternatives, etc.

Adaptation

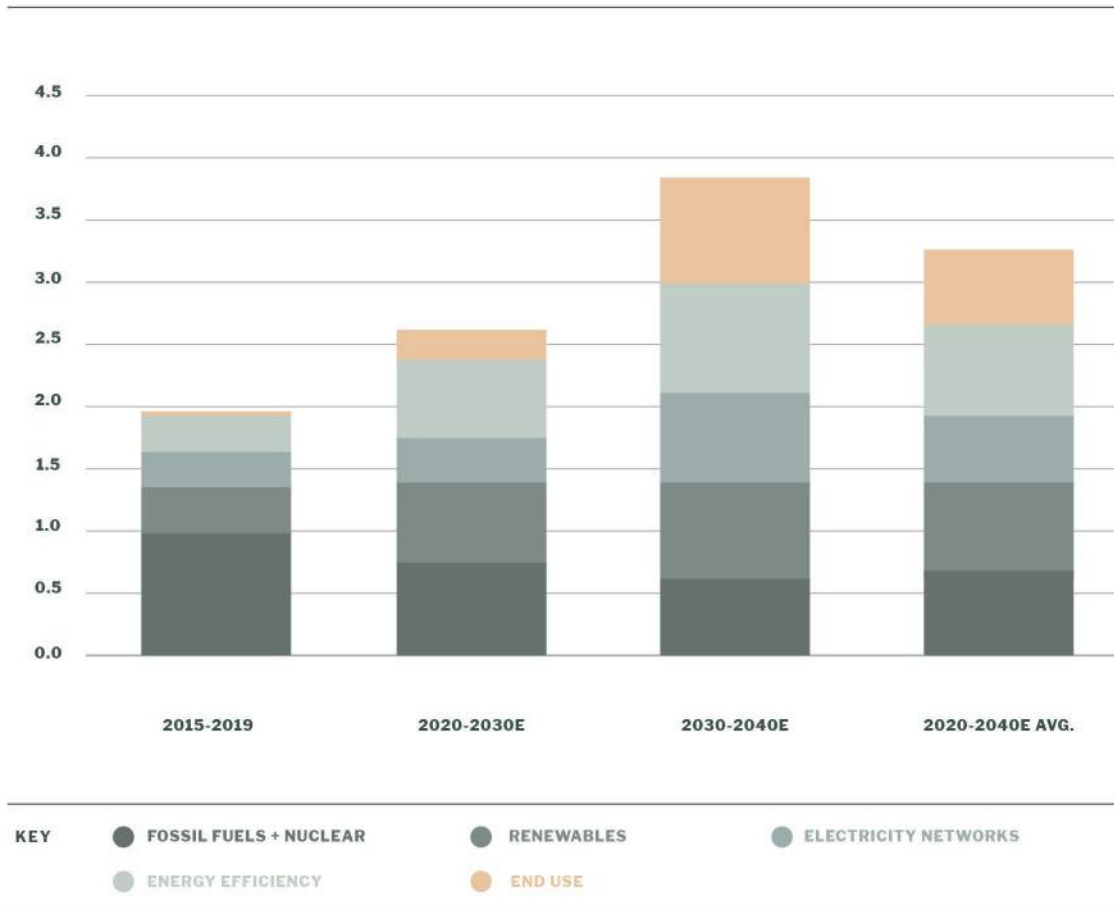
Products or services that help companies as well as people and communities deal with climate change. This could include back-up power systems, water security, farm management software, supply chain resilience, etc.



Net zero by the year 2040 (no additional greenhouse gas emissions generated) is the goal for avoiding dire climate change. Getting there will require a global commitment and worldwide investment of **\$1-\$2 trillion each year** (about 1% to 2% of global GDP), according to estimates by Wellington Investment Management, a leader in climate investing in both public and private markets.

SPENDING NEEDED TO ACHIEVE NET-ZERO EMISSIONS BY 2040

\$1 - \$2 TRILLION PER YEAR IN
INCREMENTAL CAPEX REQUIRED

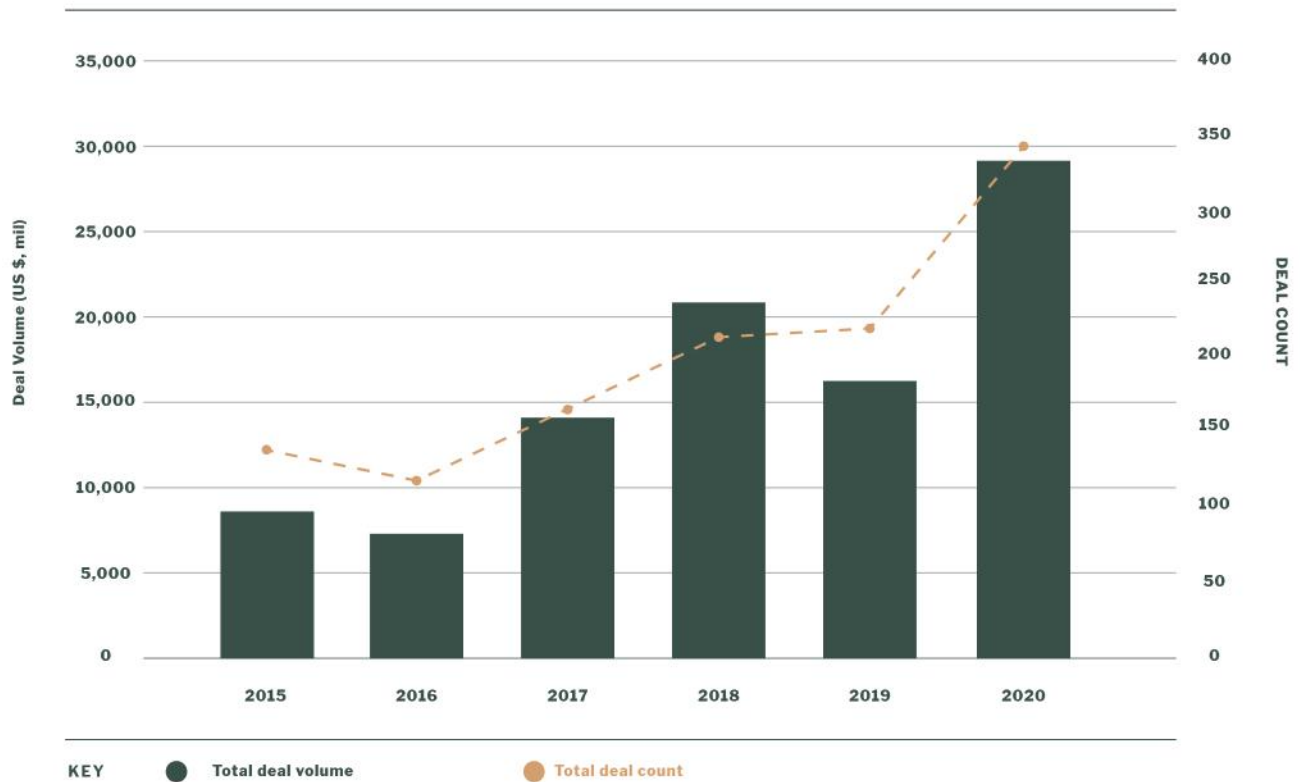


For illustrative purposes only: Sources: International Energy Agency, Wellington Management



Investment opportunities in climate-related solutions are rising. The chart below shows the dramatic increase in deal activity in the private markets from 2015 – 2020. We expect the number of investment opportunities to continue growing above trend as companies look to innovate in this space. And we will be analyzing and including what we think are the most promising of these opportunities on the Citizen Mint platform.

PRIVATE CLIMATE DEAL ACTIVITY



Source: PitchBook, Wellington Management, data presented from 2015-2020



Top 5 Areas to Invest to Counter Climate Change

01

Renewable
Energy

02

Resource Sustainability
& Efficiency

03

Water Efficiency
& Infrastructure

04

Transportation

05

Food &
Agriculture



01

Renewable Energy:

Renewable energy is usually the first thing that comes to mind in countering climate change. Specifically, wind and solar projects will be the greatest source of new energy generation globally over the next three decades. This is possible because the cost of renewable energy production has plummeted over time. The price for wind-generated energy has dropped 70% per megawatt hour (MWh) and 90% for solar over roughly the last decade, reducing the need for government subsidies while also accelerating the plans of large electric utilities to switch from fossil fuels (oil and coal) to renewables.

Megawatt hour (MWh) is the amount of energy it takes to power roughly 750 homes instantaneously for one hour.

Source: California Independent System Operator (ISO)

ATTRACTIVE ECONOMICS FOR RENEWABLE GENERATION

Estimated cost per MWh by 2025*



*Represents projected cost per MWh for new-build wind, solar, and natural gas installations after 2024; excludes production tax credits for wind and assumes a 10% investments tax credit for solar; projected per MWh operating cost including fuel for existing nuclear and coal; based on NextEra Energy estimates.

Source: Adapted from NextEra Energy presentation at the Edison Electric Institute Conference, November 2020



ANTICIPATED SHIFT TO RENEWABLE ENERGY 2020-2050

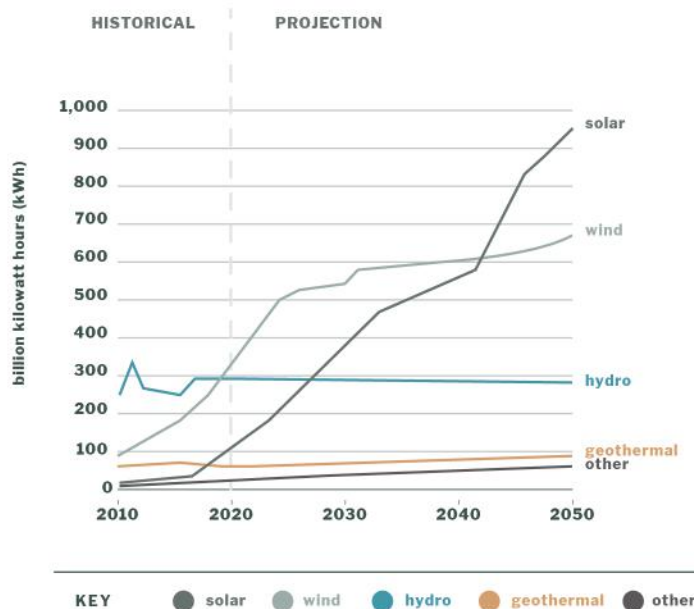
The following chart shows the dramatic projected increase in renewable energy versus other sources of electricity generation. As you can see, renewables are expected to roughly triple between 2020 and 2030.

ANNUAL US ELECTRICITY GENERATION (PAST & FUTURE PROJECTS)



Source: US Energy Information Administration, 2021

PROJECTED RENEWABLE ENERGY SEGMENTS



The chart to the left displays the projected growth of several renewable power sources over the next 10 years. Solar and wind will be the main new sources of power with hydro expected to decrease slightly over this time.

Source: US Energy Information Administration, 2021

While wind and solar are enormous investment opportunities, renewable energy is also seeing dramatic innovation in batteries and waste-to-energy.

- ⚡ **Batteries are key to the renewable energy transition** as solar and wind generated power needs to be stored efficiently for use when the sun is not shining, wind is limited, or there are spikes in energy demand. Innovation is happening rapidly in this space and opportunities to invest are plentiful.
- ♻️ **Waste-to-energy** is also likely to play a role. This includes turning garbage and wet/solid/gaseous waste of farm animals into biofuels or to generate heat and electricity. The key benefits of waste-to-energy is cheap inputs, no land-use changes, and productive waste disposal.





02

Resource Sustainability & Efficiency:

Our planet is being strained by population growth, urbanization and industrialization. As such, we need solutions that let us use limited resources efficiently and sustainably. Investment opportunities include:



Energy Efficiency Solutions:

Energy is a precious resource much of which is wasted in transmission, so efficiency measures would go a long way. This could be through innovative heating and AC systems, building optimizations, intelligent manufacturing, better recycling technology and logistics optimization.



Carbon Capture & Storage (CSS):

Capturing and storing millions of metric tons of carbon dioxide (CO₂) could dramatically lower emissions from carbon intensive industries. Carbon would no longer be released into the atmosphere and could potentially be used to create concrete and other chemicals.



Reforestation:

Forests naturally act as a carbon capture mechanism that can be incredibly powerful in reducing carbon trapped in the atmosphere at a marginal cost. Secondly, new wood-building products such as cross-laminated timber that is as strong as concrete or steel, reduce dependence on those carbon-intensive industries.



Environmental Remediation:

The removal of contaminants from soil, surface water, groundwater and sediment. This can be a required process by governments and communities and allows an area to have limited future negative externalities on the ecosystem and environment.



Fire Monitoring & Prevention:

Fires are becoming a bigger danger for communities across the globe. In addition to massive destruction, they release significant CO₂ and toxic emissions into the atmosphere. The monitoring and prevention of fires is critical and requires innovation and capital investment.



03

Water Efficiency & Infrastructure:

Only 3% of the earth's water is fresh. Of this fresh water, approximately 80% is not accessible because it is either too polluted, too hard to extract from glaciers/atmosphere, or too deep underground. This means less than 0.5% of water is available for human use, making fresh water one of earth's most precious resources.



Water Efficiency:

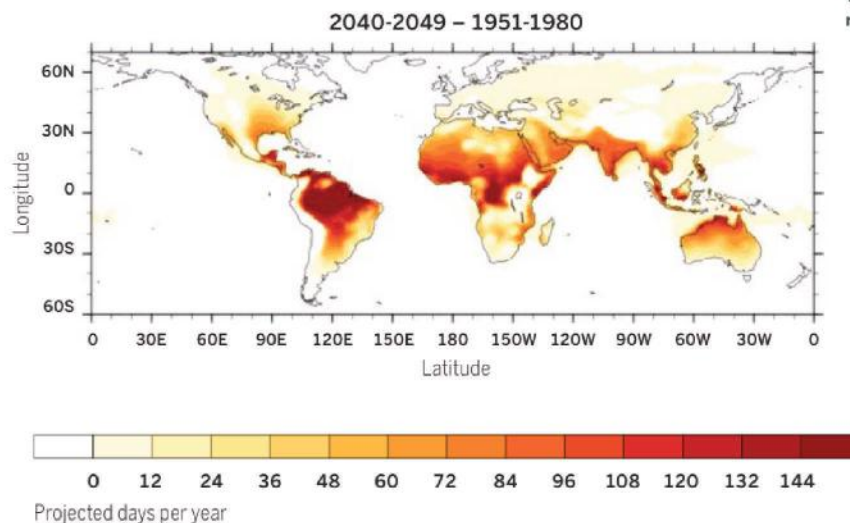
Currently, farming accounts for 70% of freshwater use globally, and the need to feed 10 billion people by 2050 is expected to increase that use by 50% (Source: *Worldbank.org*). New processes and innovations to reduce water use are critical, including in water-intensive manufacturing (i.e. semiconductors, clothing, shoes), in buildings, and in homes.



Water Treatment & Security:

The unpredictable nature of climate change and the scarcity of fresh water is likely to necessitate countries to significantly increase investment in water treatment and security. Forecasts by Woodwell Climate Research shows large swaths of the planet are likely to experience months of temperatures above 103 degrees (see dark red regions in the charts below). Extremely hot temperatures can trigger long droughts, water scarcity, and socioeconomic instability.

WOODWELL PROJECTS CHALLENGING HEAT IN COMING DECADES



Additional days per year National Weather Service danger zone. World based on 1951-1980 reference period

Source: National Weather Service | Danger one is defined as the National Weather Service Heat Index danger and extreme danger zones, which include heat index values about 103°F. This is the source for heat advisories. | The target data presented is hypothetical in nature. No assurance or guarantee is made that any target data can or will be achieved. Actual experience may not reflect all of the data or may be outside of stated ranges.



04

Transportation



Electric Vehicles:

Products and services related to the production and operation of electric vehicles (EVs), including electric-powered trucks and trains, and self-driving vehicles, are seeing major investment.



Logistics Software:

The efficient management of supply chains – input sourcing, product production, packaging, shipping, distribution – is critical in reducing CO₂ emissions as well as making supply chains more reliable and efficient and reducing bottlenecks.



Sensors & Monitoring:

New types of sensors and monitoring in transportation and across the supply chain can create better real time data for decision-making to reduce carbon output and increase efficiency.



05

Food & Agriculture



Plant-based and cell-based foods:

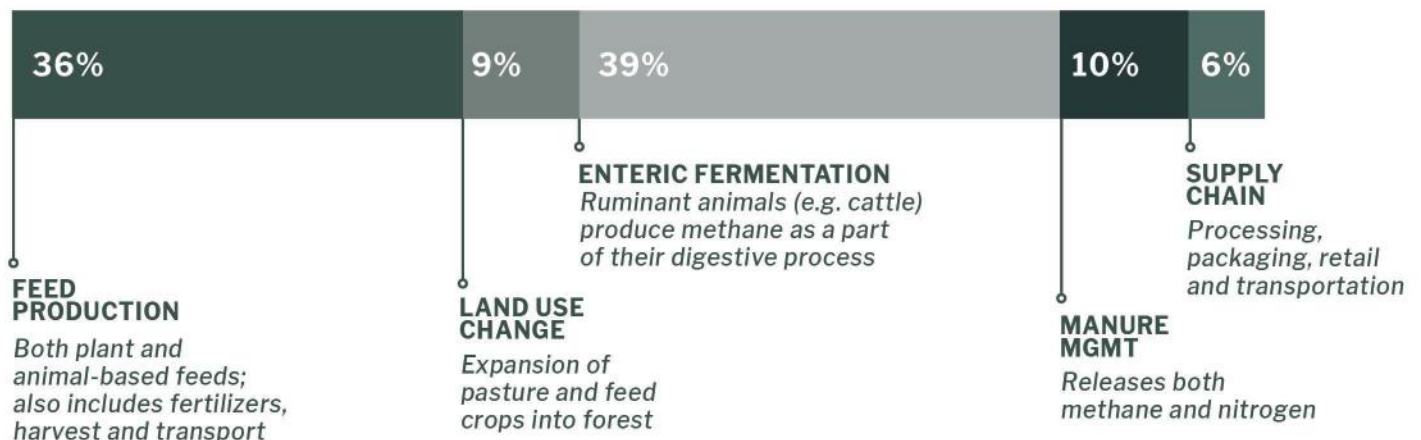
As the world's population increases from 7 billion people to a projected 10 billion over the next three decades, food demand is expected to increase by more than 50% (Source: Wellington Investment Management). Demand for meat and other animal products is expected to rise more than 65% during this time given the sizeable increase in the middle class (Source: Wellington Investment Management). If that is the case, a 100% increase in farmland will be required which would be equivalent to a 70% projected increase in greenhouse gases (GHG) released into the atmosphere if current GHG emissions from animal products remains the same. (Source: World Resources Report, Creating a Sustainable Food Future (2018); Brookings Institute, AgFunder).



Farm animals and other livestock account for nearly 17% of global greenhouse gas emissions each year, mostly due to methane release from cows burping and manure. This is equivalent to roughly 145 billion gasoline powered cars/trucks driven for one year.

Source: Wellington, Twine, R. "Emissions from Agriculture-16.5% is the new minimum figure" (2021)
US Environmental Protection Agency

GHG EMISSIONS ACROSS LIVESTOCK VALUE CHAIN (GT CO₂ EQ)

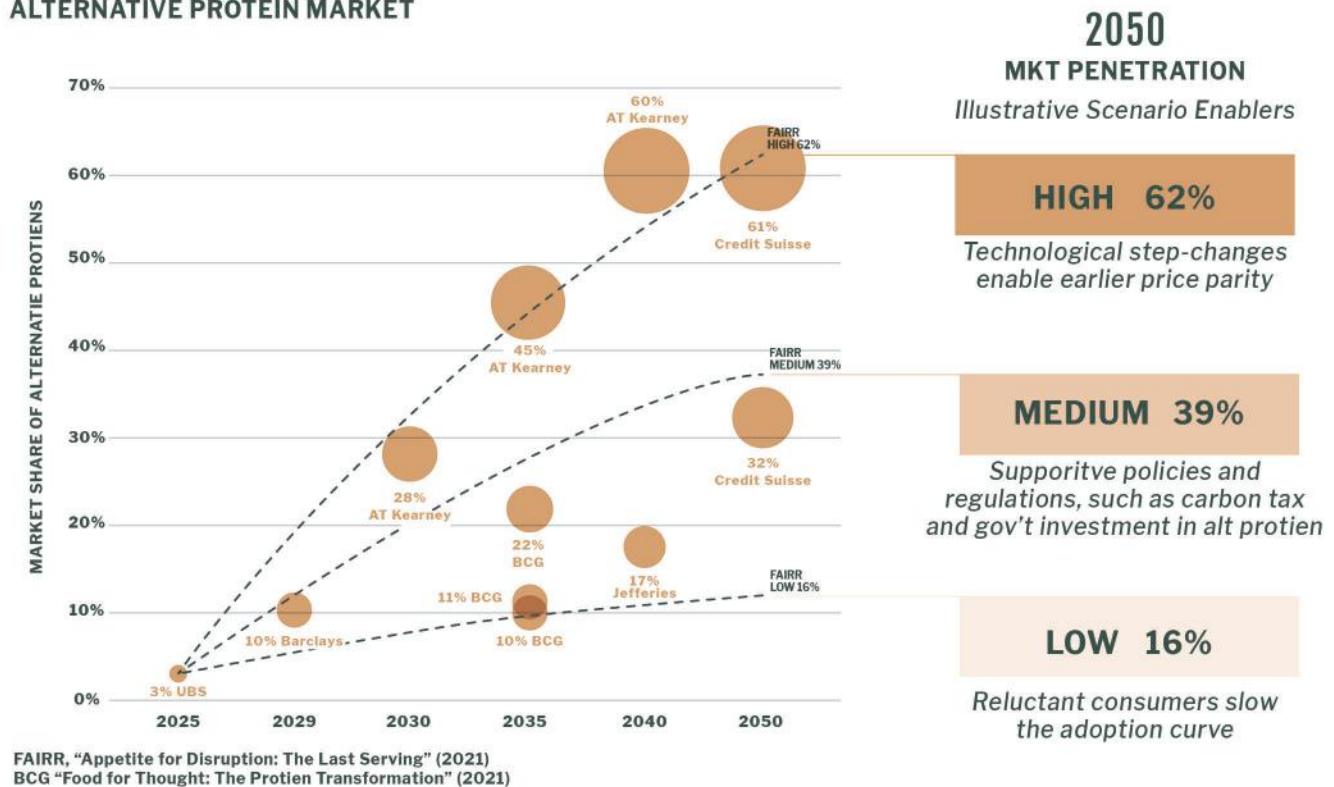


1. Total estimate annual CO₂-eq emissions from animal agriculture is ~8.1tT
Twin, R. "Emissions from Agriculture-16.5% is the new minimum figure" (2021)
Food & Agriculture Organization of the United Nations "Tackling Climate Change through Livestock" (2013)



Citizen Mint believes global meat consumption at current and forecast levels is not sustainable. One solution is likely to be dramatic growth in non-animal sources of protein. By 2050, it is expected that alternative (non-animal) proteins will account for between 15% to 60% of all protein sold (vs. some 3% currently) (Source: FAIRR "Appetite for Disruption: The Last Serving 2021"). The long-term growth of the alternative protein market presents a major investment opportunity.

POTENTIAL GROWTH SCENARIOS FOR ALTERNATIVE PROTEIN MARKET





Food Waste Reduction:

An estimated 24% of all food calories produced globally are not eaten (Source: World Resources Institute). Problem areas include transportation, storage, presentation and distribution. Large efforts can and should be made by the private sector and governments to find ways to use food more effectively to feed the world as populations grow.



Climate Resilient Crops:

Many farmers across the world will need to look to new crop types as global warming changes what they can grow in their region. This adaption will take time, money and resources to ensure food security. These crops will allow the farmers to maintain or increase yields under stressed conditions.



Weather Analytics:

Climate change is introducing new weather patterns and increasing the violence of droughts, storms and other weather-related incidents. We believe innovations in predictive analytics could identify risks and issues around food and water security.



Indoor Farming:

We expect a dramatic increase in indoor farming over the next few decades given numerous benefits including:

- Vertical farms have higher output per acre
- Less dependency on farm equipment powered by oil
- More efficient use of water
- Artificial lighting allows for year-round growing
- Little or no need for pesticide given closed environment
- Food produced locally, decreasing shipping and logistics costs
- Food safety can be monitored more easily

THE BOTTOM LINE:

Citizen Mint believes that while climate change produces very difficult and distinct challenges, it will also drive innovative solutions and investment opportunities.

Find out how you can be part of the solution.



[LEARN MORE](#)



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