PRIMO INSIGHTS
CLIMATE TECH

GREEN HORIZON: UNVEILING EMERGING TRENDS IN CLIMATE TECH

Primo Capital SGR SpA
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INTRODUCTORY REMARKS

Primo Insights is a curated series of papers delving into **trends, numbers** and **opportunities** of the **key technological sectors** in which Primo Capital SGR S.p.A. operates.

The objective is to **analyze** and **dissect emerging trends** regularly in few and **selected decisive sectors** (Space Economy, Healthcare and Climate Tech, etc...) to **identify** new **investment opportunities** and share them with our investors.

From left to right: Ezio Ravaccia, Giusy Cannone and Simone Molteni, the three General Partners of Primo Climate fund

After the first closing in July 2024 of our new Venture Capital fund dedicated to Climate Tech, **Primo Climate**, we chose to dedicate this first issue to the **green transition**.

WHAT IS CLIMATE TECH?

There is no single definition of **Climate Tech**. As defined herein, Climate Tech is synonymous of Greentech and Cleantech and it refers to an **array of technology solutions designed to address climate change** and **its environmental effects**.[1] Intending by effects a comprehensive set of topics which go well beyond CO2 emissions and encounter soil degradation, biodiversity, reduction of other gasses emissions, while also including adapting our systems to environmental changes. These technology solutions span from renewables energy, electric vehicles, bioremediation to circular economy, water preservations, energy efficiency and new materials.
In this instance we therefore define Climate Tech as **a diverse range of products, services and processes that harness renewable materials and energy sources to reduce the use of resources and cut or eliminate emissions and waste**.

SUMMARY

INTRODUCTION

THE CRITICAL ROLE OF CLIMATE TECH IN TODAY'S WORLD

Amidst the alarming backdrop of loss of species, escalating extreme weather events, and the role of human activity in it all, there arises an **urgent imperative for a sincere reassessment of our collective priorities** as a species.

The Intergovernmental Panel on Climate Change (IPCC) Climate Change 2023 report highlights a worrying reality: the average rate of sea level rise surged to 3.7mm per year between 2006 and 2018, a stark contrast to the 1.3mm observed from 1901 to 1971. This acceleration is most likely linked to **human-induced warming** of the land, atmosphere, and oceans. Moreover, the report underscores that over 3 billion people face **heightened vulnerability** to climate-related hazards, exposing them to escalating food and water insecurity [2].
Levels of greenhouse gas emissions cause projections to indicate a most likely **1.5°C increase in global temperatures** compared to pre-industrial era, exacerbating a multitude of extremes including droughts, intense precipitation and heatwaves.

The toll on human health is startling, with rising mortality and morbidity rates attributed to the surge in climate-related illnesses, such as food and water-borne diseases.

In the face of these mounting challenges, the need to innovate has never been clearer. The IEA's Net Zero report underscores the pivotal role of innovation, revealing that in a net-zero emission scenario, 48% of the reduction **in CO2 emissions will originate from technologies** that are **currently in the demonstration** or prototype **phase**.

This underscores the pressing need to explore new approaches to mitigate these trends and forge a sustainable path forward.
Innovation has become the primary means, in the public eye and in public policy, for **pursuing** both **mitigation** and, increasingly, **adaptation**.

In the midst of this daunting scenario, there is a glimmer of hope. Increasingly, **regulatory, fiscal,** and **policy commitments** from both **states** and **supranational organizations** reflect a growing **awareness** of the urgent **need** to **address global warming** and climate change with greater speed and determination.

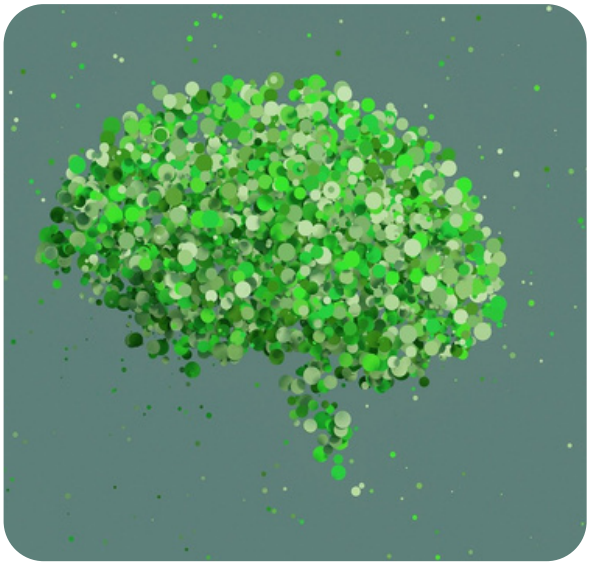
One notable development in this regard is the recent approval by the EU Commission of the "Energy Performance of Buildings Directive (EPBD)" in March 2024. This directive aims to accelerate the decarbonization process within the construction sector by targeting energy consumption and emissions from buildings.

Similarly, a new EU directive proposed in November 2023 aims to curb the environmental impact of the packaging industry and its associated waste. Among its ambitious objectives it includes a 15% reduction in packaging by 2040, a target to recycle 65% of packaging by 2030, and measures to ban unnecessary packaging and ultra-thin plastic bags.

Additionally, the European Parliament has taken decisive action by passing a new law targeting greenwashing and deceptive marketing practices in product promotion. This directive, known as Directive 2024/825, prohibits vague environmental claims and misleading marketing tactics, while encouraging transparent warranty information and sustainability labeling based on certified systems.

The implications are profound, as **industries** are now required to **substantiate** their **sustainability claims** with concrete actions, signaling a shift from mere promises to **tangible efforts toward decarbonization.**

These initiatives reflect a deepening commitment from institutional entities to foster the **development of innovative solutions related to decarbonization**, the transition to cleaner sources of energy and more sustainable levels of consumption. This engagement together with the regulatory evolutions stimulates the **emergence of new market niches** specializing in adaptation and mitigation strategies, such as alternative packaging, novel recycling supply chains, and sustainable building materials. Such developments not only drive the green transition forward but also **contribute** to a **robust economic growth**, opening new opportunities to **foster national** and **regional competitiveness** in cutting-edge sub-sectors.



INSIGHT FROM:

Simone Molteni, General Partner of Primo Climate

"Scientists, innovative companies and policy makers have been struggling to decarbonize our economies for years with little success. Why should it be different now and in the next few years?

First, it is important to understand that decarbonizing an industrial sector is not an easy task, no magic wands are available and complexity reigns. Any disruptive technology must find its place in a specific supply chain where you have to deal with what is before and after the single technology.
This means understanding and navigating through a lot of market laws and habits of different stakeholders based in different countries or continents. Even if the new technology is not changing their turnover or margin, it would probably require some changes in supply chain habits, and this alone can be a very frustrating issue to overcome.

In other words: unlike digital innovations, in climate tech you are more obliged to deal with existing industries that are often not inclined to innovation and change.

Here comes the good news: climate change is now pushing all companies from all supply chains to decarbonize themselves. Governments are asking it with new norms and regulations and consumers with green products demand. All this is happening worldwide and this is what makes a difference: every stakeholder is looking for possibilities to decarbonize its supply chain and this makes it much easier to find a fertile ground for cooperation and innovation."

WHY CLIMATE TECH INVESTMENTS MATTERS

Undeniably, the Climate Tech investment landscape is witnessing a surge in interest. Given that climate risk can affect every business, investment efforts in this peculiar sector should be considered an overarching theme rather than a specific asset class to diversify a portfolio.

Over the past decade, **VC investments** in **Climate Tech** have increased by 12.5x[1] (2013-2023). Despite the market downturn experienced in 2023, **CAGR** of Climate Tech investments since 2020 remains robust at **23%.**[3]

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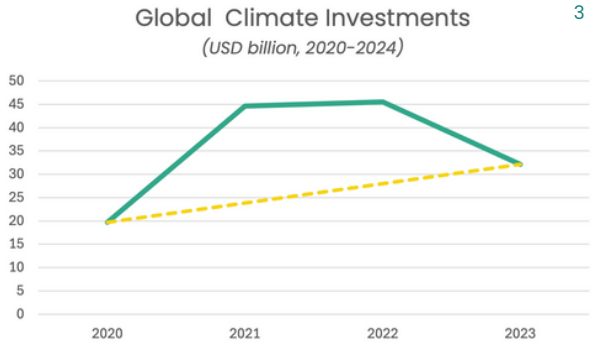

Not only is the total capital flowing into Climate Tech following an upward trajectory, but it is also **claiming a larger share of total startup investments**, reaching 10.2% in 2023 and growing by 3.2 percentage points in just five years.[4]

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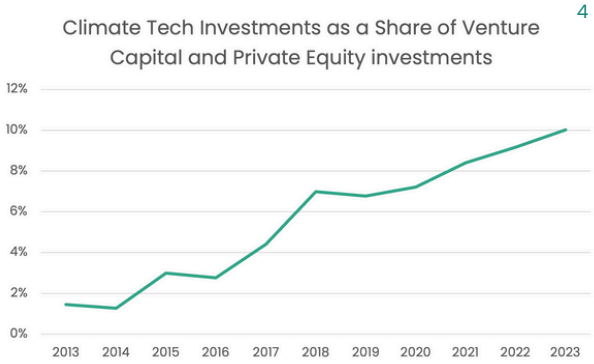
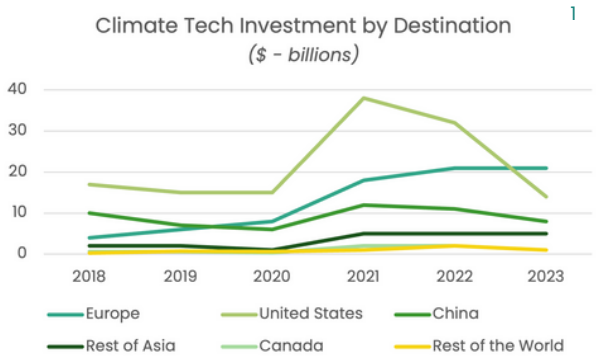


Despite these encouraging signs, several analyses emphasize the **substantial funding gap** required for an effective ecological transition. This gap becomes even more pertinent when considering that many climate change solutions are still in their early stages of development. The IPCC report identifies a consistent adaptation gap, highlighting the **inadequacy of current global financial flows** destined to adaptation. The World Fund estimates that **$100 to $150 trillion** will be **necessary** to accelerate net-zero goals by 2050.

While discrepancies in definitions may impact the figures significantly, **Europe** has emerged as a **prominent force**, dominating the Climate Tech sector. Remarkably, sustainable fund flows in the US have decreased (-$5.1M in Q4 2023), whereas they saw positive growth in Europe (+$3.3M in Q4 2023). Europe experienced its most successful quarter in Q3 2023, with $10B invested in European Climate Tech solutions. When considering the number of funds, Europe represents 73% of the market, while the US stands at 9%.[1] Similarly, in terms of Assets Under Management, Europe commands 84% compared to 11% for the US.

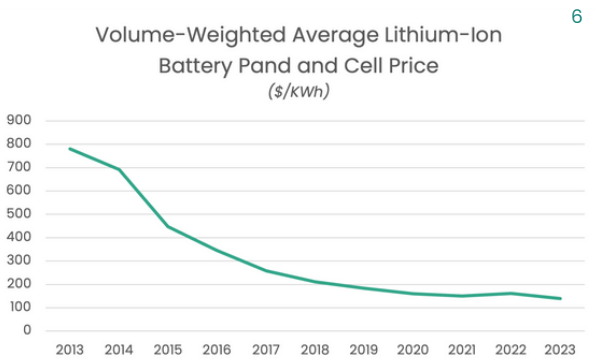
This underscores **Europe's potential** to **lead** the **green transition** in terms of tech investments.



[1]

Furthermore, achieving **profitability** is no longer as elusive with climate-related technologies. Many **mature climate solutions** have already **reached cost-parity** or even offer discounts compared to fossil-based alternatives. These solutions are rapidly becoming **cost-effective**, as indicated by the IPCC report, which illustrates a over 55% **decrease in the unit cost** of solar energy, wind energy, and lithium-ion batteries between 2010 and 2019. The next step is to **allow them to scale** to fully express their potential and level up their impact.

As an example, lithium-ion battery prices declined rapidly in the last decade, registering a record low in 2023.[6]



[6]

In conclusion, we acknowledge that we are experiencing an **unprecedented urgency to counteract climate change** and to put in place adaptation practices where its effects are already irreversible. To do so **we must invest in innovation** and state-of-the-art technologies bringing to us efficient and cost-effective solutions. The **existing funding gap is evident,** we must increase financial flows dedicated to enhancing climate technologies to boost an economy always more oriented to do good to the planet.

The paradigm of "do no harm" must now be substituted by an intention to **sustain** those **entrepreneurs** which are capable to solve the most urgent climate challenges.

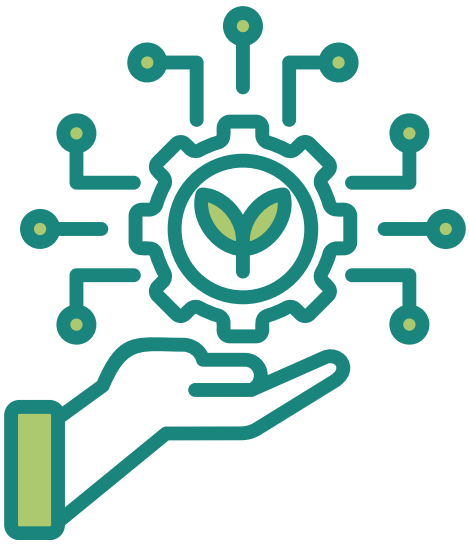
INSIGHT FROM:

Giusy Cannone, General Partner of Primo Climate

"Europe today has the potential, the maturity and the commitment to lead the green transition in terms of tech investments. This posit European Climate Tech VC funds in a very competitive position by:

- *attracting international talents and startups;*
- *collaborating with corporates in a very positive environment for potential exits."*

EMERGING CLIMATE TECH TRENDS



The discipline around climate change evolves rapidly, we identified six trends that we consider worth exploring because of their **relevance** in opening **new markets** that can produce **efficient** and **cost-effective solutions** for the **most urgent effects of climate change**, thus moving the needle when it comes to the **ecological transition**.

RENEWABLE ENERGY AND BESS AS KEY PILLARS FOR THE ENERGY TRANSITION

The IPCC estimates that the carbon dioxide (CO2) emissions from burning fossil fuels account for around 65% of all greenhouse gas emissions that contribute to climate change.
Encouragingly, recent trends show promise, with **renewables energies experiencing substantial growth** and taking an increasingly **high percentage in the split of the energy mix**, with solar and wind at the forefront of the trend.

In 2023 alone, the installation of solar energy saw an impressive addition of 440GW, nearly doubling the capacity installed in 2022 (252GW).

When looking at cumulative capacity installed, numbers are quite impressive: 1TW seems outstanding if we think that 2008 recorded a total 5GW installed[7].

Talking about **wind and solar energy,** some of the results achieved are outstanding: in the first half of 2024, the two sources **outperformed fossil**[8] in power generation across the European Union, highlighting the expansive potential of renewable sources.

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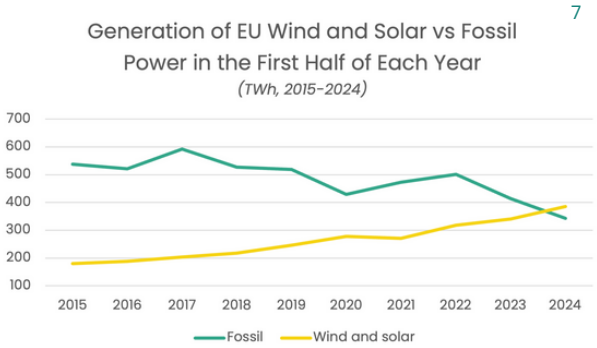

These developments showcase how **renewable energies are key pillars for the ongoing energy transition**, which indeed saw a peak of percentage of energy consumption sourced from renewables in 2023[8].

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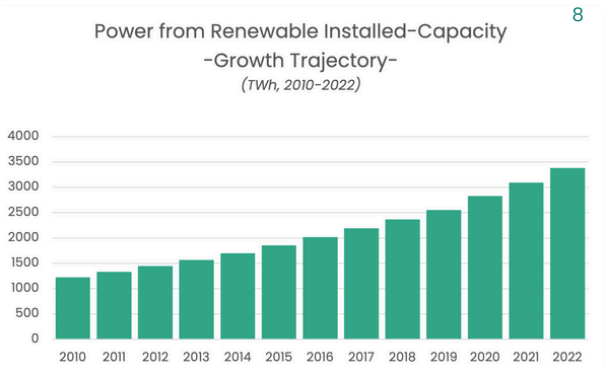
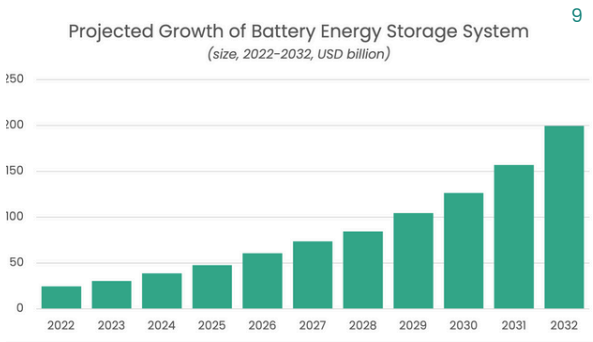


Yet, to sustain and accelerate this transition, concerted efforts in investing and nurturing emerging technologies are imperative. Financial effort together with strategic support for their integration into the market is pivotal for ensuring a successful transition.

Within the energy sector, it must well be pointed out that **Battery Energy Storage Systems** (BESS) also play a pivotal role in the transition. These systems **store excess energy** generated from renewable sources and release it when needed. They **facilitate the integration of renewables** as solar and wind, by storing excess energy during periods of low demand and supplying it when needed. Also, BESS plays a **key role in maintaining grid stability and resilience**, and could contribute to a stronger EV infrastructure, more spread charging stations that could smooth out grid fluctuations. Ranging in a very large span of technologies (i.e.lithium-ion, sodium-sulfur, flow, nickel cadmium batteries), the market has been growing massively and will continue to do so.



[9]

FACING THE SOIL CRISIS: THE URGENT NEED TO PROTECT SOIL HEALTH AND COMBAT ENVIRONMENTAL DEGRADATION

Encouragingly, progress has been made in curbing deforestation, with a notable 50% year-on-year reduction observed in Amazon deforestation. However, challenges persist, particularly concerning soil quality. Reports from the Food and Agriculture Organization (FAO) indicate **alarming levels of soil degradation,** attributed to chemical pollution, that is in turn jeopardizing our ecosystems. Within the EU alone, there are over 2.5 million contaminated industrial sites[10].
The European Joint Research Center underscores the severity of soil erosion, affecting 20% of the EU's surface at an alarming rate of 10 tons/ha per year. Additionally, land sealing contributes to the annual loss of 1,000 km2 of productive land, significantly impacting the agricultural sector.

Moreover, the Mediterranean region faces an acute risk of desertification, with countries like Cyprus and Italy particularly vulnerable. Such environmental degradation not only exacerbates food insecurity and biodiversity loss but also triggers mass emigration, underscoring the interconnectedness of environmental and socio-economic challenges and the **urgency to find innovative solutions** to put a stop to this chain of events.

RISING DEMAND, SHRINKING SUPPLY: THE CRITICAL ROLE OF WATER TECH IN GLOBAL SUSTAINABILITY

According to data from CB Insights, **investment in water technology reached $7.1** billion globally in 2021, reflecting a significant increase compared to previous years.
This is due to the fact that water is becoming a very urgent problem, not just in terms of the amount that is being wasted but also in terms of significant **increase in water demand**.

In fact, the United Nations reports that by 2040, **global water demand** is projected to **exceed supply by 40%**, leading to increased pressure on water resources. And the World Health Organization, on its side, estimates that 2.2 billion people worldwide **lack access to safely managed drinking water** services, highlighting the **urgent need for improved water infrastructure and technologies.**

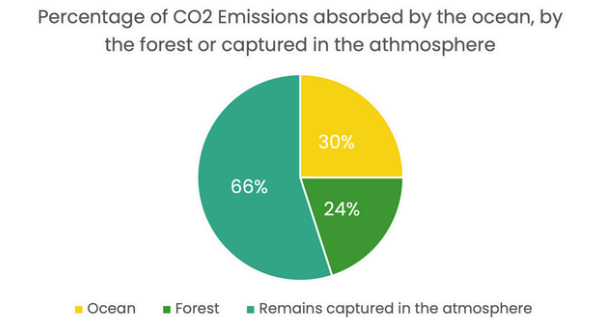
To face the problem, governments worldwide are implementing stricter **regulations** and **incentives** to promote **water conservation and sustainable management practices**.
Investment opportunities to support companies that are active in the management of water losses (with hardware and/or software solutions) are slowly emerging and as Barclays' most recent study on water tech suggest, there are several related sub-sectors that can be of interest:

- digital water,
- precision irrigation,
- advanced water treatment & recycling,
- desalination, and
- atmospheric water generation.

FROM EMISSIONS TO SOLUTIONS: HOW CARBON REMOVAL TECHNOLOGIES ARE ESSENTIAL FOR A NET-ZERO FUTURE

According to the International Energy Agency (IEA), 2024 is projected to be a milestone year for **technology-based carbon dioxide removal** (CDR) efforts. Rapid **advancements in CDR technologies**, coupled with growing recognition of the need for aggressive climate action, are expected to drive **increased investment** and **deployment** of CDR solutions globally.

The Intergovernmental Panel on Climate Change has emphasized the critical role of CDR in achieving net-zero emissions targets and limiting global warming to 1.5°C above pre-industrial levels. In fact, we emit around 37bn tons of CO2 per year, and while around 24% is being absorbed by the ocean and 30% by the forest, all the rest stays captured in the atmosphere. This is why CDR is key: even if we would stop today to produce emissions, this would not fight the remaining block of past ones.



Solutions in the industry are still in their infancy, **efficiency levels must** still **be improved** drastically.
The spectrum of technologies is quite broad, ranging from hard tech solutions (as the most famous Direct Air Capture) to the ones that leverage natural processes to sequester CO2 as the natural carbon cycle does (as Enhanced Weathering and Mineralization). **Investment in research and development** to optimize these processes and scale up deployment is crucial.

CIRCULAR ECONOMY: A BIG OPPORTUNITY FOR ITALY TO ACCELERATE THE GREEN TRANSITION

In 2022 only 7,2% of the world economy could be regarded as being circular, compared to 9% five years ago. The **global economy consumption** amounts to 100 billion tons per year. According to estimates, these figures are expected to grow or even double by 2050 compared to 2015 levels. In this worrisome framework, **accelerating a transition to a circular economy model would significantly contribute to improving our planet's conditions**. In particular, the mining of virgin materials could decrease by more than a third (-34%) and greenhouse gas emissions could be substantially reduced, thus helping to limit the global temperature rise to below 2°C.

The importance of promoting the circularity of our economies is increasingly evident and further highlighted by the critical international context we live in.
The war in Ukraine has entailed, among its repercussions, also increases in price of raw materials, in particular of fossil fuels, restating the urgency to move to a **different model of managing our resources.** Despite the consequent economic slowdown starting from the third quarter of 2022, Italy still managed to achieve an average +3.8% GDP increase.

This growth was accompanied, again in 2022, by an increase in imports of raw materials. From a circular economy perspective, it is important to evaluate in what terms the **economic recovery** recorded in 2022 was also followed by a growth in **net imports of materials**. A more efficient use of resources instead would have resulted in a **decoupling** of these two indicators.

As can be seen in the following Figure, starting from an index value of 100 in relation to 2017, over the last six years there **has not been a significant decoupling between GDP and net import trend** (resulting from the difference between imports and exports). The choice of this latter indicator to evaluate the consumption of materials at a national level is linked to the fact that Italy is a country historically poor in raw materials and that has always depended on a high supply from abroad.

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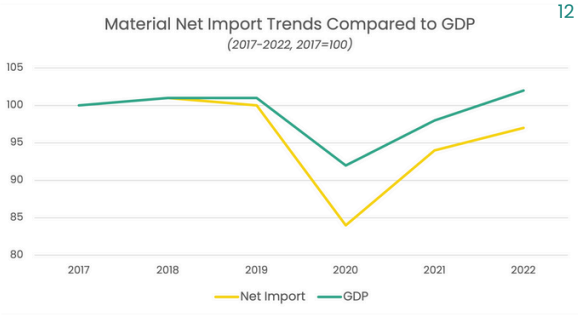


The overall stability of both indicators until 2019 was followed by a substantial decrease during the first year of the Covid-19 pandemic (-16 points for imports, -9 points for GDP in 2020).

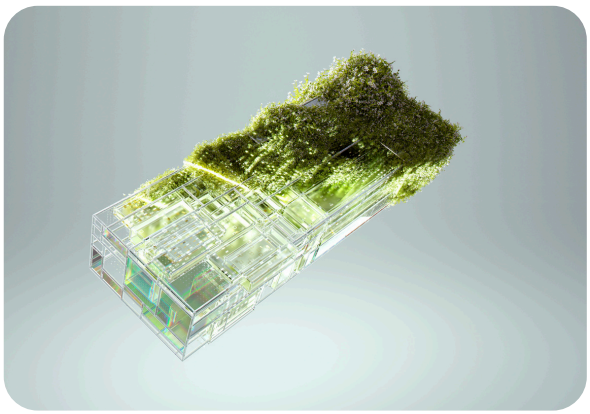
Then, the foreseeable rebound in 2021-2022 highlighted once again the difficulty in de-coupling the consumption of materials from the GDP, which went back to the pre-pandemic values in 2022.

Despite this dire scenario, **Italy** confirms its **leadership** among the **top five EU economies for circularity practices**. The overall ranking is based on seven indicators: waste recycling rate; utilization rate of materials from recycling; resource productivity; waste production and material consumption ratio; share of energy from renewable sources in total gross energy consumption; repair; soil consumption. Italy ranks first suggesting that opportunities for circularity are being created but they need to be able to get the resources to be catalyzed and amplified.

GRID MANAGEMENT AND DIGITALIZATION IN THE ENERGY SECTOR ARE BECOMING THE KEY ELEMENTS TO INCREASE FLEXIBILITY

Lots is being said about shifting energy sources to renewables, little attention is instead reserved to the **role of grid management**, which is **pivotal** for **accommodating** the **increasing percentage of renewable energy** entered in the grid.

The **grid challenge** related to transitioning from fossil fuel-based energy sources to renewable energy, such as solar, lies in the inherent **differences in generation patterns, intermittency**, and geographical distribution, which **require grid upgrades and flexibility measures** to ensure reliable supply with integrated energy inputs, and to address issues like grid congestion, voltage fluctuations.



Furthermore, according to a report by the International Energy Agency, **digitalization in the energy sector** could unlock $80 trillion in value by 2040 through increased efficiency and flexibility[13]. The interesting angle relies on grid management technologies' capability to **reduce system operation costs** (10-20% as per estimates by the IEA) and to enable **more renewable energy integration** (by 50% more by 2040 as per estimated by IEA).

Companies working on grid management and innovation, play a crucial role in ensuring grid stability and facilitating the integration of renewable energy.

One of the major Italian players in this field has announced its Industrial Plan for 2022-2026 with planned investment for €7.8 billion over the 2022-2026 period and with a significant portion allocated to grid reinforcement projects, automation, and digital grid solutions.
Overall, **corporates show commitment to enhance grid flexibility and desire for innovation** in such an industry opening to niche markets that will need further capital inflows to make a difference.

CONCLUSIONS

It is undeniable: we will have to find ways to deal with the human-induced consequences of global warming, which is accelerating sea level rise, worsening extreme weather, and increasing risks to billions of people and their health. As seen through this report the **role of innovation in achieving climate goals is vital**, with nearly half of energy sector emissions reductions relying on emerging technologies. Furthermore, EU regulation seems to move in the right direction, targeting decarbonization in construction, packaging, and marketing, and reflecting growing policy commitment to sustainability and to the **stimulus of new green market opportunities**.

Despite the significant growth and surge in interest that the Climate Tech investment landscape is experiencing, **there remains a substantial funding gap**, with an estimated $100 to $150 trillion needed to achieve net-zero goals by 2050, calling for the **attraction of new capital**, through different means, to the sector. **Europe** is **leading** the charge in Climate Tech investment demonstrating to be poised to take the lead **in the green transition** and sustainable **alternatives** are becoming increasingly **more cost-effective**, highlighting the urgent need to scale these technologies for maximum impact in addressing climate change. Not all is lost.

By deep diving in some of the most promising sub-sectors of climate technology we wanted to **spotlight new emerging market niches that will provide a high return on investment**, both in terms of **financial opportunities** and in terms of **capacity to address one of the most pressing challenges of the 21st century**. We firmly believe that it is now time to direct investments towards the Climate Tech sector.

INSIGHT FROM:

Ezio Ravaccia, General Partner of Primo Climate

"Entities should not look at decarbonization investments as a burden, but instead as a way to create stakeholder's value in the long term. Primo Climate, as a responsible investor, will contribute to create an eco-system whereby all the players - Government, Corporate, Innovators, Investors- will activate their knowledge and resources to contribute to a smoother green transition. Climate Tech will surge as innovative asset class to lead this change."

WHO WE ARE

Primo Climate

Primo Climate is an investment fund focused on Climate Tech solutions.

With the commitment of CDP Venture Capital SGR and the Green Transition Fund, and a first closing at over 40 million euros reached in June 2024, Primo Climate has started its operations.

Primo Cliamte is a growth-focused VC fund that aims at fueling the green transition by decarbonizing the economy. It invests in startups working on both cutting-edge and established technologies in the Climate Tech landscape.

In line with Primo Capital's commitment, the fund is classified as ex. Art.8 under the SFDR regulation.

Primo Capital

Primo Capital SGR S.p.A. is the leading independent Italian platform for alternative investments focused on cutting-edge technology in sectors that are crucial for economic development.

Active in the Venture Capital and Private Equity segments, the company now has over 500 million euros committed over multiple funds specializing in the Digital, Healthcare, Climate Tech and Space Economy sectors.

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