

ECOSYSTEM REVIEW



TSKB

Economic Research

Issue No: 20

2026

From an Ecosystem Review Perspective: COP31- Antalya



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Upcoming Events

The COP30 conference, organized by "more determined" countries on phasing out fossil fuels, will be held in Colombia on April 28-29.

The 2026 Bonn Climate Change Conference will take place in Bonn, Germany, from June 8-18.

The 17th General Assembly Meeting of the UN Convention to Combat Desertification (UNCCD) (COP17) will be held in Ulaanbaatar, Mongolia, from August 17-28.

The pioneering COP Leaders Summit, themed "Climate, Energy and Security," will be held in Perth, Australia, on September 18.

COP31 will take place in Antalya, Türkiye, from November 9-20.

COP31 and the Renaissance of Development Banks

35 years ago, when Edgar Moring and Anne-Brigette Kerne introduced the concept of "polycrisis", we thought the world had been enjoying the second longest peace-period in history. This, of course, was in an age before smart phones, where AI had yet to enter our daily lives and the Paris Climate Accord had not been signed yet. It all seems like ancient history now!

The term polycrisis defines multiple and distinct crises occurring at the same time while the interaction between them amplifies their impact. Although this term was deemed pessimistic when first touted, it perfectly fits the world we are witnessing today. When one faces the reality of polycrisis it became more obvious that what the global economy needs is not short-term resilience, but lasting strength built through transformation.

My colleagues at the TSKB Economic Research Department underline the [framework](#) of the "Triple Transformation" that stands on the green, technological and social transformation. If only it was so simple! Just think about it - the whole world is talking about transformation. When the world and your peers are transforming at the same time but not necessarily at the same pace, it becomes a significant challenge to plan. Financing this huge and multiple transformation need also presents a serious hurdle. All these challenges may tend to bring about reform fatigue, partially explaining why the world is lagging behind when it comes to meeting the climate targets despite years of effort and the broadly accepted nature of the green transformation.

The weakening in some macro fundamentals and the need to catch up require us to move away from old practices. For instance, in a study of more than 170 countries, the World Bank [found](#) that potential growth has declined by an average of 1 percentage point in many of these countries. This raised the question of what could be behind this loss of potential, recalling the fact that it has happened in a period of ample liquidity in the markets accompanied by advancing technology. The answer is surprisingly close to home. Criticizing its 30-year long approach to industrial policy, the World Bank [points](#) at the paths we need to explore to climb up the ladder. Considering the new global landscape of rising protectionism, an aging population and a sense of

impatience in meeting the climate targets, we need to focus more on the combination set of industrial and social policies.

Following the 2008 crisis, global liquidity has been directed to re-financing activities or financial markets, driving excess financialisation and partially explaining the loss of growth potential. To correct this path, and bearing in mind that supporting potential growth is not the same as supporting headline growth, we need “patience finance” of development banks. Investing in fixed capital formation is required, but not itself enough. We need to invest in areas such as social capital, education, health, green-tech and productivity.

Let me summarise where we should stand up to the plate and not step back: in the new era of triple transformation, we [need](#) “active and regenerative economic policies, supporting price stability as well as financial stability”. Obviously, this reformative framework requires both financing and vision, including two important functions for development - the provision of the means for investment and the promotion of a source of investment opportunities.

With the vision they provided alongside the financing opportunities they extend, the “patient finance” of development banks has grown more important than ever in our contemporary world. In early 1960s, there were 300-400 development banks. Today this number has reached some 500. While only some 5% of the existing banks serve as development banks, they [finance](#) 10% of global investment. While the traditional approach of development finance is focused on market failures, the risk of public policy failure has been also rising especially when it comes to green targets. Hence development financing has a wider area of impact through transformative financing facilities as well as investment banking and consultancy activities.

This special issue of the Ecosystem Review is dedicated to COP, where my colleagues in the TSKB Economic Research team discuss the ecosystem crisis and related solution proposals from different perspectives. We offer you a horizon tour extending from finance, natural capital, the technological transformation and competitiveness to our emissions and investment story to the period beyond COP31. With this issue, we aim to proactively initiate a productive brainstorming session with our stakeholders and deliberately bring forward a marathon that will accelerate as COP31 approaches.

COP31 might serve as an important milestone in supporting the [Renaissance of Development Banks](#), a topic that has not only become more widely discussed in the world but also more urgent. Let Turkish hospitality add much needed impetus to this Renaissance!



COP31 Antalya, “The COP of the Future”

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Türkiye will host and chair a major international summit this year. After almost three decades at the heart of global climate diplomacy, the Conference of the Parties (COP) will convene in **Antalya**. Australia will be chair the negotiations in the he meeting, scheduled to take place between 9–20 November. COP gatherings, organized under the United Nations Framework Convention on Climate Change (UNFCCC), bring together the governments, corporations, academics and representatives from NGOs from around 200 nations. These conferences are regarded as the most important diplomatic platform on which the direction of global climate policy is set.

Attempting to answer the question “What should we expect from COP31 Antalya?” is essential for establishing the context of this issue of our journal and in providing a general overview of the COP meetings.

To seek that answer, we need to travel back to B el em, the site of last year’s COP. COP meetings, after all, are part of a continuing process; the decisions taken each year, agenda items which are put off and issues left unresolved all roll over onto the agenda of the next conference.

The situation emerging after COP30 was summed up by United Nations Secretary General Ant onio Guterres as follows: “*The gap between where we are and what the science demands is frighteningly large*”. Those words raise the following question: while we talk about large scale transformations, are we still taking only modest steps?

At COP30, which is referred to as the “COP of reality,” the increase of financing dedicated to climate adaptation was a prominent topic. It included a commitment to triple adaptation finance by 2035.



Another highlighted item concerned fossil fuels, one of the most contentious issues at the summit. Although the subject was heavily debated, the final decision text of the “COP of reality” did not mention any specific fossil fuel. However, the Brazilian government announced that it would launch a process to gather views in order to develop a road map.

It may prove instructive to review the outstanding items carried over from previous meetings to gain an idea of the agenda for the COP31 in Antalya. The feasibility of the decisions taken in Belém will be examined at this conference, and the question “What road map should be followed to achieve a tripling in adaptation finance?” will be on the agenda. At the same time, the issue of fossil fuels will be back on the table in Antalya. Some countries determined to keep the spotlight on the transition away from fossil fuels will hold a conference in Santa Marta on 28-29 April 2026, and the outcomes of that conference are expected to play an important role in shaping the agenda of the COP31 Antalya.

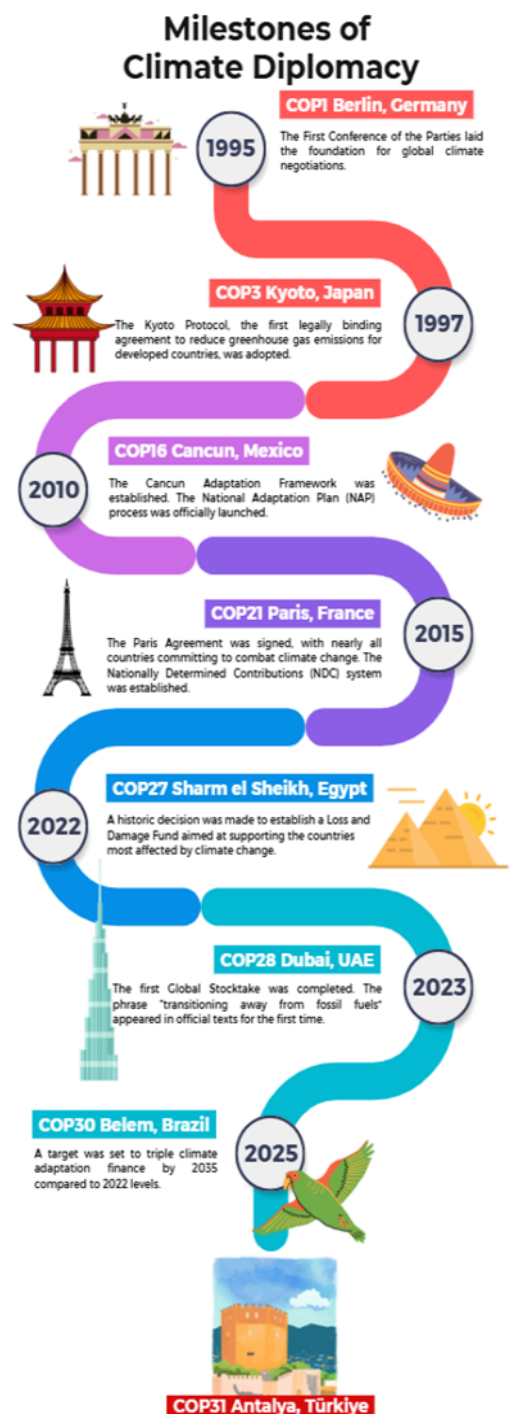
Furthermore, the “nature-positive” theme, which has so far struggled to receive the attention it deserves in COP agendas, but has repeatedly been covered by TSKB Economic Research could become a concrete agenda item this year. The Antalya summit may see an increased emphasis on the economic and social dimensions of the ecosystems crisis. In this context, the Antalya COP may also be seen as an opportunity to lay the groundwork for a conceptual broadening of the COP framework.

The primary goal of the meeting will be to implement the decisions adopted at previous conferences. Considering that global warming is projected remains closer to 2.8°C by the end of the century, the gap highlights the importance of shifting to an implementation focused approach at the COP31. The Minister of Environment, Urbanization, and Climate Change, Murat Kurum, described COP31 as the “The COP of the Future” and clearly outlined its three main objectives: dialogue, consensus and action.

What Will COP31 Antalya Mean for “Us”?

If COP30 was a summit where facts were put on the table, then the so called “The COP of the Future” must be about the arrival of concrete implementation steps. What matters even more than the decisions themselves is their practicability and their binding force.

Beyond its diplomatic weight in the climate arena, the COP31 in Antalya holds a special significance for Türkiye, the host nation. Success of this conference should not be measured merely by “good hospitality”, but rather in whether it sets a new milestone on the global climate agenda.





Ezgi İpek Koçlu

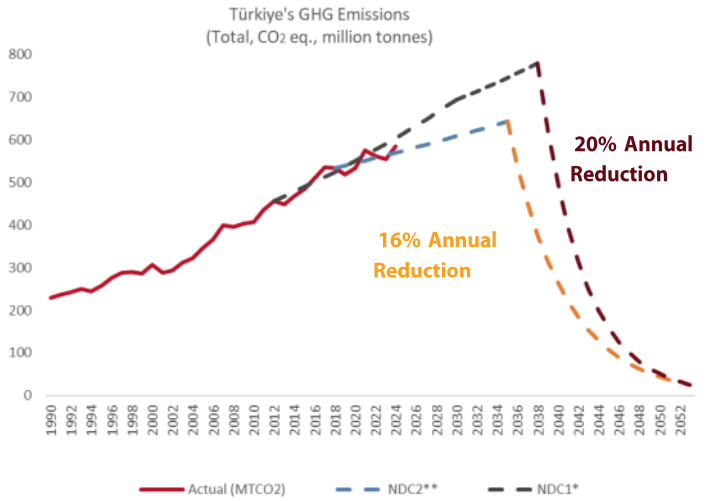
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Türkiye's Net Zero Pathway

One of the steps Türkiye has taken towards meeting its emission targets was the submission of its Intended Nationally Determined Contribution (INDC) in 2015. Through the INDC, Türkiye pledged to reduce its emissions by 21% by 2030 relative to a business as usual (BAU) reference scenario and [outlined](#) the policies that it would pursue in sectors such as energy, industry and transport. Likewise, since 2015 we have continued to see Türkiye's emission-reduction objectives reflected in development plans and in the action plans of various ministries.

In 2022 Türkiye [published](#) its updated First NDC (NDC1), pledging a 41% reduction by 2030 relative to the 2012 base year of the business-as-usual (BAU) reference scenario. Accordingly, emissions that were projected to reach 1.175 million tonnes of CO₂-equivalent (MtCO₂e) in 2030 under the BAU would be limited to 695 Mt CO₂e - a 41% cut - under the NDC1. The statement also indicated that emissions would peak in 2038 and that the country would achieve "Net Zero" by 2053. Compared with the 2012 reference year, this target requires the annual growth in emissions to be kept down to at about 2.4% up to 2030. The pathway from the 2038 peak to Net Zero in 2053 points to a need to cut emissions by roughly 20% per year. However, according to the most recent [data](#), after declines of 2.4% in 2022 and 1.1% in 2023, Turkish emissions rose by 5.3% in 2024.



Source: TÜİK, UNFCCC, TSKB Economic Research
*NDC1 linear growth assumption (2,4%), for pathway towards 2038 peak half of this speed (1,2%)
**NDC2 linear growth assumption (1,1%)
LULUCF's trend is half of 2010-2021 period (-1,9%)

In 2025, Türkiye announced its Second NDC (NDC2), stating that emissions would be [capped](#) at 458.8 MtCO₂e by 2035. The reference year for the second NDC is 2018, while achieving the 2035 target would require the annual increase in emissions to be limited to 1.1%. The methodological assumptions and sectoral projections underlying NDC2 are set to be presented in the country's next Biannual Transparency Report. According to these figures, reaching the Net-Zero Pathway by 2053 would necessitate cutting emissions by about 16% per year from 2035.

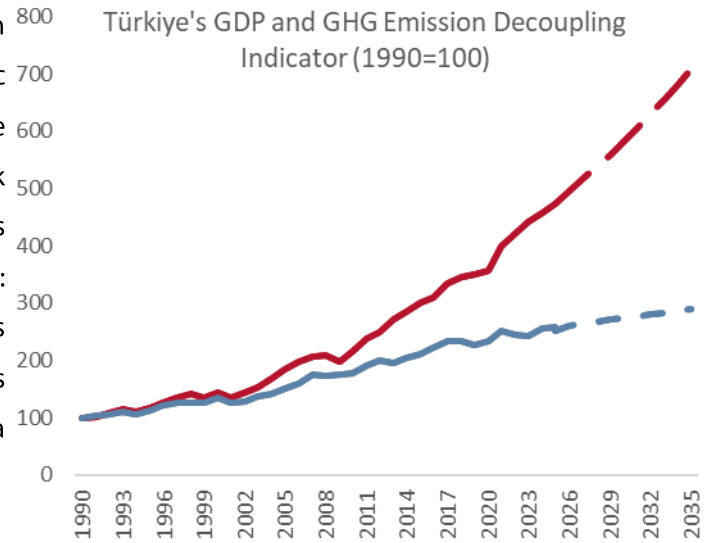
While annual cuts in emissions that Türkiye would need to implement to achieve its net zero goal are more modest under NDC2 than they were in NDC1, yet when those figures are compared with historical trends the required

reduction still appears very large. One of the factors driving this need is Land Use, Land Use Change and Forestry (LULUCF). The decline in the amount of carbon that Türkiye can sequester through LULUCF makes the net zero pathway considerably more [difficult](#).

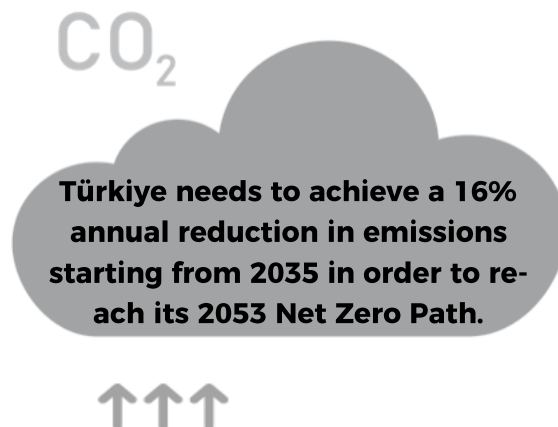
Despite this difficult pathway, it is worth noting that in Türkiye the relationship between gross domestic product (GDP) and emissions has decoupled. The concept of decoupling refers to the breaking of the link between economic growth and environmental impacts and is examined under two distinct categories: Absolute decoupling refers to a decline in emissions while the economy continues to expand, whereas relative decoupling is increase in emissions, but at a pace slower than the rate of economic growth.

Accordingly, this decoupling has become especially noticeable for Türkiye since around 2010. When the growth rates are compared, the rise in emissions remains lower the expansion in GDP; that is to say, a relative decoupling is observed. This decoupling is even more pronounced in the 2035 scenario built on NDC2.

Relative decoupling indicates that Türkiye can, in principle, meet its emission targets, but it does not appear able to achieve the Net Zero pathway set out in NDC2 on its own. The country needs to move from merely achieving economic growth while emissions rise more slowly to reducing emissions while the economy continues to expand—that is, it needs to achieve absolute decoupling. In this context, the targets for emission reductions must also incorporate measures that expand carbon sinks. Increasing sink capacity under the Net Zero pathway will require the effective implementation of [ecosystem restoration](#) practices such as [regenerative agriculture](#), tackling deforestation and large scale [reforestation](#).



Source: TÜİK, TSKB Economic Research



Energy Transition: Renewables and Beyond



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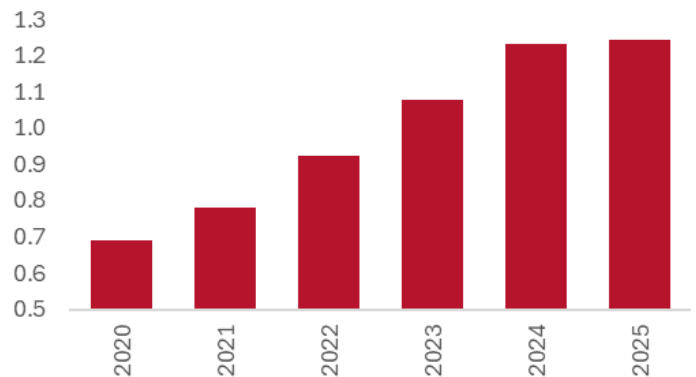
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Energy transition is often defined as the shift from fossil fuels to renewable energy sources. In particular, the reduction in costs of solar and wind technologies over the past twenty years has made these sources the cheapest electricity generation technologies. This has allowed global renewable energy capacity to rise from 0.9 terawatts (TW) in 2005 to 5.1 TW in 2025. In the same period, the share of renewable energy sources in total electricity capacity increased from 22.1% to [49.4%](#). However, the shift toward renewable energy sources is only one part of the energy transition.

The energy transition is not only about electricity generation; it is a holistic process that also encompasses transmission and distribution infrastructure, storage technologies, the critical minerals that serve as raw materials for these technologies, and consequently mining. This process brings with it critical challenges such as the increasing integration of intermittent energy sources like solar and wind into the system and the need to ensure grid flexibility. The most important of these challenges is guaranteeing system flexibility. Accordingly, new or reinforced transmission and distribution lines and “smart grid” applications lie at the heart of the energy transition. This highlights that infrastructure investments are among the most important components of the energy transition process.

According to a report published by BloombergNEF, global grid investments in 2025 increased by 17% compared with the previous year, reaching [\\$483 billion](#). Another stakeholder, storage technologies, are among the cost declining technologies such as wind and solar. Storage technologies not only facilitate the integration of intermittent renewable electricity sources like solar and wind into the system but also enable the electricity generated by these plants to be delivered to the grid in a more widespread and flexible manner. The total global investment in electricity storage technologies, which is also on Türkiye’s agenda, amounted to roughly \$79 billion in 2025. In this context, the total amount allocated to renewable energy, grid, and storage technologies in 2025 has exceeded \$1.24 trillion. When the energy transition investment data are examined, investments in these technologies have almost doubled over the past six years.

Renewable Energy, Electricity Grid and Storage Investments (trillion dollars)



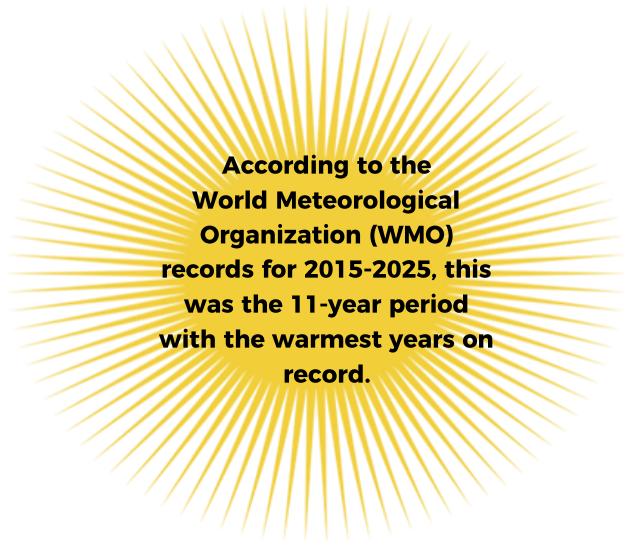
Source: BNEF, TSKB Economic Research

The growing need and increasing investments also drive higher demand for raw materials. Consequently, demand is rising for critical minerals such as lithium, nickel, copper, cobalt, and rare earth elements. The International Energy Agency (IEA), in its 2025 publication "Global Critical Minerals Outlook 2025," notes that demand for lithium in 2040 will be 3.5 times higher than in 2024, and it emphasizes that demand for other critical minerals will also [increase](#). The increase in mining that will occur alongside the request needs to be addressed so that it does not create serious pressure on the ecosystem.

The increase in wind and solar investments and capacity over the past two decades, the integration of electricity storage facilities into the system, and the reinforcement of grid infrastructure to support these technologies are playing an important role in Türkiye's energy transition. The National Energy Plan released in 2022, the Renewable Energy Roadmap to 2035 released in 2024, and the Long Term Climate Strategy outline the targets that shape Türkiye's pathway for energy transition. In this context, a rise in Türkiye's demand for critical minerals appears inevitable. The 694 million ton rare earth element reserve discovered in Beylikova, Eskişehir, in 2019 will help meet the country's future critical mineral [requirements](#). In the context, we will be

watching to see if COP31 will be a meeting where Türkiye's renewable energy targets are reviewed and perhaps more ambitious targets will be set.

The energy transition not only involves the widespread deployment of renewable energy technologies but also the sustainable production of the raw materials required for those technologies. This reminds us that we must focus on reducing the environmental impacts and risks associated with critical mineral mining. Therefore, when discussing the energy transition, we need to talk not only about phasing out fossil fuels and expanding renewable energy sources, but also about making the mining sector -which supplies inputs to all technologies- sustainable.



External Dependence in Energy and the Use of Renewable Energy Sources



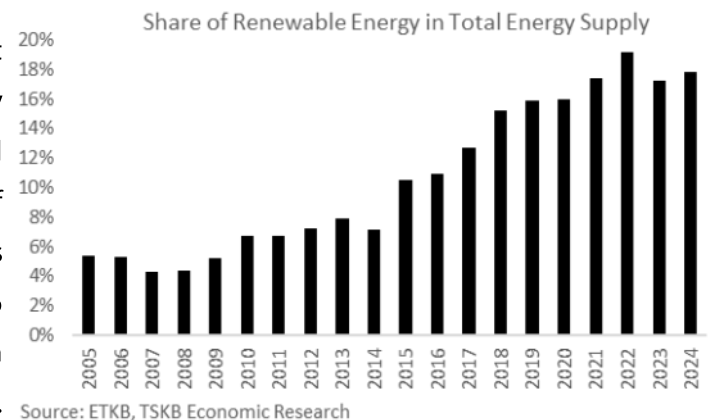
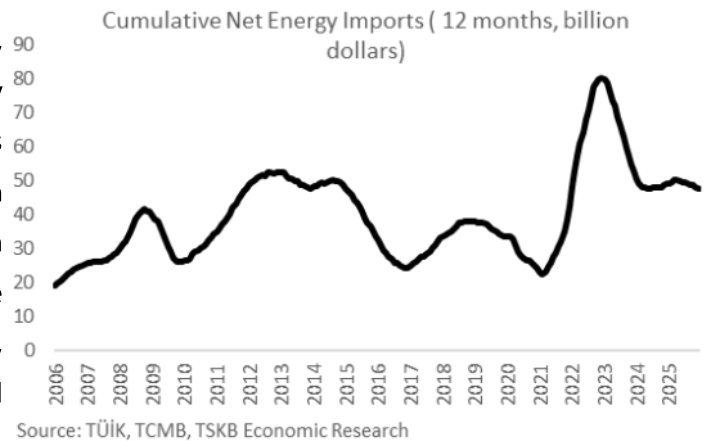
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Türkiye is a country characterized by a high external dependence on energy, as is demonstrated in the annual net energy import figures. Over the last 20 years, net energy imports have averaged around USD 40 billion per year, equivalent to about 4,6% of GDP. In 2025, despite relatively supportive trends in global energy prices, net energy imports reached USD 47,3 billion. This high external dependence on energy is one of the main drivers of Türkiye's current account deficit. In fact, when energy is excluded, the current account balance recorded a surplus of USD 13,5 billion in 2025, highlighting how energy imports are putting downward pressure on the overall balance. Consequently, the resulting current account deficit financing increases the need for foreign exchange, creating fragility for Türkiye's external balance.

Among the recent positive developments, the most important is the increasing share of renewable energy sources in the energy supply. According to national energy balance tables [provided](#) by the Ministry of Energy and Natural Resources, the share of renewables in total energy supply rose from 5,4% in 2005 to 17,8% in 2024 with a noticeable acceleration after 2014, with the share of renewables peaking at 19,2% in 2022. Greater exploitation of domestic resources such as wind, water, solar and geothermal have reduce the need for fossil fuels such as oil, natural gas and coal. Since a significant portion of these fossil fuels are imported, shifting to renewables also cuts external dependence.



According to our calculations, the increased use of renewable energy over the past 20 years has saved USD 78billion on the energy import bill.

The shift toward renewables in electricity generation supports the current account and foreign exchange reserves, and by reducing greenhouse gas emissions from fossil fuels, constitutes one of the most important steps in [Türkiye's Net Zero Pathway](#). Although the rise in the share of renewables after 2014 appears promising, the pace slowed somewhat after 2020. While there is some way to go to meet the environmental targets, the country's renewable energy potential may provide a durable solution for further progress.

Türkiye's hosting of the COP 31 may emerge as an opportunity to pick up pace in renewable-energy capacity, secure new commitments, plan further expansions and obtain financing from multilateral development banks. This may (1) reduce external energy dependence, thereby narrow the current account balance and (2) build momentum toward achieving the net zero targets.



Artificial Intelligence: Useful but Not a Silver Bullet



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On the first day of COP30, science, technology, and artificial intelligence (AI) were among the [thematic focus areas](#). Although AI had been mentioned in previous meetings, it was [added](#) to the conference agenda as a theme for the first time at COP30. At the same conference, the [AI Climate Institute](#) was established, with a core mission to enable Global South countries to design, adapt, and implement their own AI-based climate solutions. The Green Digital Action, launched at COP28 under the leadership of the International Telecommunication Union (ITU) to advance sustainability through digital innovations, was also featured at COP30. A presentation by the Climate TRACE coalition—which uses satellite imagery, remote sensing, AI, and machine learning to track the sources of greenhouse gas emissions—illustrated one of AI's most important application areas. The prize of the “AI for Climate Action” competition, which seeks to encourage open-source, AI-driven solutions focused on climate change adaptation and mitigation, was awarded to a [project](#) from Laos that uses AI in agriculture and irrigation.

AI can play an effective role in addressing the ecosystem crisis, a role that truly deserves the spotlight it received at COP30. In particular, extracting meaningful patterns from big data, making forecasts, and thereby enabling resources to be used more efficiently is one of the most fundamental benefits of AI applications. For example, AI is used in [agriculture](#) to reduce fertilizer and water use, to control pests and diseases, and to predict harvests. AI can also directly impact the energy sector by making renewable-energy systems operate more efficiently, thereby saving energy and reducing greenhouse gas emissions. By using sensor, satellite, and meteorological data, [AI based early warning systems](#) can be developed and employed to reduce losses and accelerate recovery in disasters such as floods, storms, wildfires, and landslides.

The manufacturing sector is [estimated](#) to generate about 1.9 petabits (1.9 million gigabits) of data per year, making it the world's most data-intensive industry. By using temperature or vibration data collected from Internet of Things sensors, AI can detect anomalies in advance and prevent failures. Smart heating and cooling in factories can optimize energy consumption. AI driven autonomous robotic arms can perform their tasks even in highly complex situations. Computer vision systems powered by AI make it easier to detect production defects or assess product quality. For instance, a flat-steel producer in Türkiye can assess product quality with high accuracy using machine learning techniques without taking physical samples, thereby reducing product loss and indirect emissions.

When we consider all the AI applications mentioned so far, a robust pattern emerges: AI is being used in agriculture and manufacturing primarily to reduce resource use, lower costs, and increase efficiency.

However, it is worth keeping in mind that we will need far more than the benefits AI can provide to address the ecosystem crisis. In sectors with high energy and emissions intensity—such as steel and cement production—we must go beyond efficiency gains and make these activities competitive by switching to renewable energy. Let us focus on steel. Conventional coal-based steelmaking via the blast furnace–basic oxygen furnace (BF-BOF) route [generates](#) 1.5–2.1 t of CO₂ for every tonne of crude steel produced. Electric arc furnaces integrated with direct reduced iron (EAF-DRI) – which use electricity and natural gas rather than coal to produce iron that is then melted into steel – are a serious alternative. EAFs can also use a far higher share of [scrap steel](#) as feedstock compared with BOFs, thereby reducing carbon emissions from several streams at once. For example, Japan’s largest steel producer, [Nippon Steel](#), aims to cut its carbon emissions by 42% by 2029 by converting three plants from BF-BOF

to EAF-DRI technology. Consequently, the set of technologies required to address the ecosystem crisis is a broader cluster that includes AI but extends far beyond it. The continued technological progress across many domains is crucial.

As the AI Climate Institute itself points out, AI is not a silver bullet. It is only one of many existing or forthcoming technologies that we can draw on to respond to the ecosystem crisis. It will be important to see this emphasis reflected in the decisions made at COP31 regarding climate change and technology.



A Significant Milestone in Adaptation at COP30



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Although humanity has witnessed droughts, floods, wildfires and storms throughout history, the increasing frequency and intensity of weather and climate events as a result of climate change has raised disaster risk to an unprecedented level. According to data published by the World Meteorological Organization, the 605 weather events that took place in 2024 caused 1,700 deaths and injured 1.1 million [people](#), while figures on global economic losses also serve to confirm this alarming picture. In addition, since damage records are often incomplete in many [disasters](#), particularly in developing countries, the recorded data on economic losses should be viewed as “optimistic estimates”.

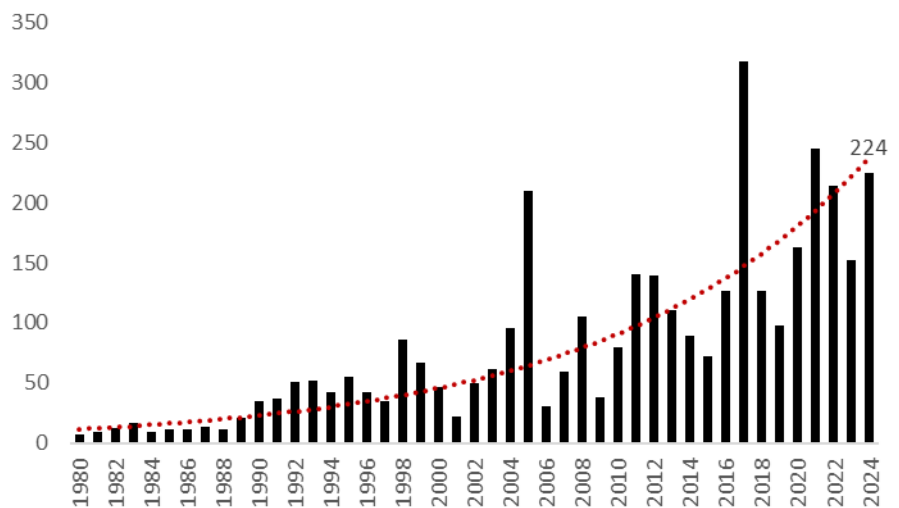
Under these conditions, it is crucial to close the adaptation gap, which reflects the difference between the level of financing, planning and implementation needed to address the current and future impacts of climate change and the measures

that are actually being implemented. According to figures published by the United Nations Environment Programme (UNEP), global adaptation finance remained at around USD 26 billion in 2023, with no steady increase over the years while falling short of the USD 40 billion target set at COP26 for 2025. Moreover, this level indicates that meeting the UNEP’s estimated adaptation finance needs of USD 310-365 billion by 2035 will depend on achieving a 12- to 14-fold increase over the next [decade](#). In

view of this data, one of the most significant developments on the adaptation front at COP30 was the commitment to increase financing in this area to triple the previous target, reaching USD 120 billion by 2035. Although this would only correspond to about one-third of the projected need, it was regarded as a step forward.

COP30 also witnessed another important development beyond finance. In the culmination of two years of intensive efforts, efforts to establish a coherent and

Economic Losses from Extreme Weather and Climate Events (billion dollars)



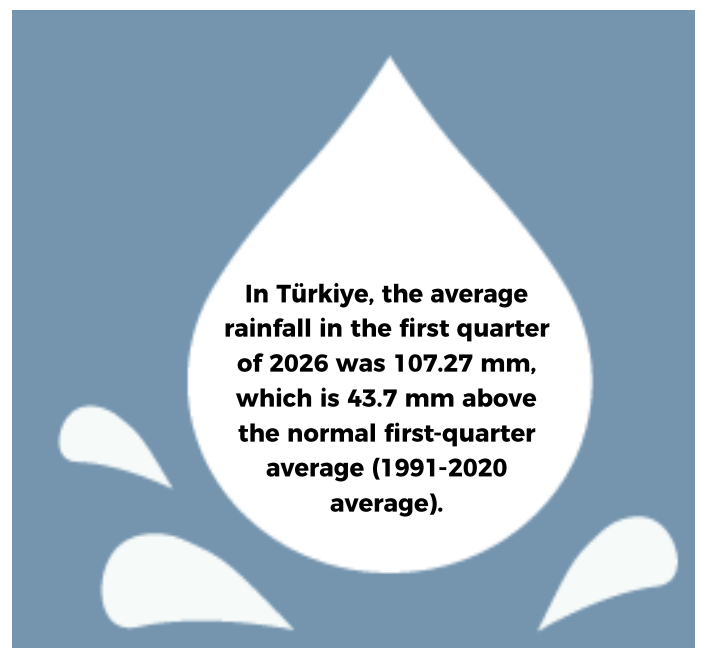
Source: EM-DAT, CRED, TSKB Economic Research



meaningful set of global adaptation indicators have yielded results. Following extensive discussions, the adoption of a list of 59 indicators in Belém demonstrates that a common baseline, albeit an initial one, has been established for measuring progress in adaptation. Although these indicators have been subject to criticism due to their voluntary nature, they are expected to facilitate the assessment of collective progress on adaptation in the second Global Stocktake planned for 2028. In the two-year period leading up to COP32, we may see a process of policy alignment aimed at bringing these indicators into operation. Indeed, many countries will need to build additional institutional and technical capacity to carry out such reporting. The summit to be held this year in Antalya is a valuable step in that it will enhance Türkiye's visibility in climate diplomacy; however, it could also mark an important turning point for the world through the discussions and frameworks it will bring to the adaptation agenda on issues such as water security, food safety, health systems and ecosystem resilience.

In the ten years since the Paris Climate Agreement, adaptation has gradually become one of the main pillars of climate policy. In 2015, adaptation to climate change was discussed against a backdrop of very limited financing, insufficient indicators,

underdeveloped national plans and scattered projects implemented across different regions. Over time, however, there has been significant progress in the adaptation process in terms of policy objectives, institutional frameworks and international cooperation. At the end of this long and challenging journey, reaching an agreement at COP30 on the tools that will enable the tracking of progress marked an important milestone. In the period ahead, the focus will be on scaling up adaptation finance in a way that can address growing climate risks and on contributing to the resilience of economies by establishing a more systematic structure for adaptation efforts at the national level.



The Human Dimension of Climate-Resilient Development



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We now recognize that the ecosystem crisis is no longer merely a matter of technical “carbon accounting” or a matter confined to global warming; rather, it marks a profound transformation, involving the destabilization of interconnected natural systems and the dynamics of life on our planet. To manage this complex landscape effectively, we must move beyond viewing industry, technology and society as isolated domains and instead integrate them within a “triple transition” framework. While the eco-friendly and technological overhaul of production is fundamentally reshaping sectors, this process only gains real meaning when complemented by a social transformation, one which is interwoven with shifting social dynamics such as an aging workforce, the capacity of young people to adapt to next-generation skills, and the increased participation of women in the economy. The reality on the ground informs us that unless this transformation places social justice and universal upskilling at its core, its costs will once again fall on the shoulders of the most vulnerable. This is not only a matter of fairness but a prerequisite for ensuring that the transition is embraced across all segments of society. At this juncture, a critical question emerges: Will this great transition truly be inclusive for all?

A [just transition](#) emerges as the precise strategic framework in response to this challenging transformation. In its simplest terms, it refers to maximizing social and economic opportunities by fostering an enabling environment for sustainable businesses while progressing toward a low-carbon and climate-resilient economy, thus managing the associated challenges in a way that “leaves no one behind.” This approach moves climate policy beyond a narrow focus on “reducing emissions” and elevates the issue to a multidimensional plane that spans employment, education, regional development and social justice.

This theoretical framework is evolving into a concrete field of application as Türkiye commits to a low-carbon development pathway. The targets set out in Türkiye’s second Nationally Determined Contribution (NDC 3.0) necessitate a gradual transformation of fossil fuel-based investments. However, for Türkiye, fossil fuels represent more than just an energy input; they are a critical source of employment concentrated in specific regions. Because fossil fuel-dependent sectors serve as an anchor in these local economies, the transition transcends mere technical energy choices, with the regional development and livelihood dimensions being more vital. Consequently, a just transition also demands the reintegration of the workforce from these sectors into the system through local economic diversification and a comprehensive reskilling process.

[The International Labour Organization \(ILO\)](#) highlights the decisive role that social protection systems play in the success of such structural shifts. While Türkiye’s existing social protection networks offer a degree of inclusion, the limited scope of mechanisms that actively and dynamically support labour force transitions remain a major hurdle,

hindering the transfer of workers from contracting sectors into emerging ones, thereby directly increasing the social cost of the transformation.

The skills dimension represents a critical link in the transition process. While the [green transition](#) undoubtedly promises new job opportunities, these roles often rely less on traditional technical skills and more on advanced analytical and cognitive competencies, such as critical thinking, active learning and complex problem-solving. [A report by the World Bank](#) highlights a fundamental structural challenge: more than 60% of workers in Türkiye's carbon-intensive sectors have a secondary education at most. Furthermore, with nearly half of these workers under the age of 34, solutions cannot rely solely on policies like "early retirement." Instead, they must be built around robust upskilling and reskilling programs tailored to the young workforce. The report also notes that in some regions, the share of those requiring skills development may reach 15% of total employment, meaning a locally grounded, regional development-oriented governance approach is imperative.



The business world is also acutely aware of this multi-dimensional shift. According to the [World Economic Forum](#), companies in Türkiye identify digitalization and economic pressures as key catalysts for industrial transformation; however, they also place far more priority on investments in carbon emission reduction and climate adaptation than the global average. To manage this transformation, cognitive competencies such as analytical thinking, resilience and agility are the top priorities for companies today. Furthermore, the rise of AI, big data

and technological literacy as the skills most in demand leading up to 2030 underscores a vital point: this transformation depends not only on deploying new technologies but on a workforce equipped with the high analytical capacity to manage them. The potential for high-quality employment promised by the green transition can only be realized through an inclusive "skills mobilization" that equips the workforce with these next-generation competencies.

This overall picture brings perhaps the most sensitive layer of a just transition to the surface – that is, structural inequality. Low-income groups and workers in precarious employment feel the risks of this shift most acutely, yet they remain the segment with the most limited access to the opportunities it creates. This reality proves that the green transition is not merely a technical change in economic modelling, but an inherently inclusive societal process. Consequently, social dialogue mechanisms, local participation and targeted public policies must not be treated as auxiliary elements; they must be designed as the primary components of this transformation.

From Türkiye's perspective, the strategic priority is clear. A just transition is not only about creating new areas of employment but about ensuring that access to these opportunities is possible for all. Designing social protection frameworks, skills development programs and regional development instruments through a holistic approach will play a decisive role in the inclusion and success of the transition.

In the runup to COP31, this emerges as the critical juncture. The success of climate policies will be measured not only by ambitious targets on paper, but by how inclusive and implementable those targets are for different segments of society. In this context, a just transition is not a mere "aspiration" appended to the climate agenda; rather, it is the fundamental framework of legitimacy that determines the pace of the transformation, the extent to which it generates societal consent, and the ultimate sustainability of that consent.



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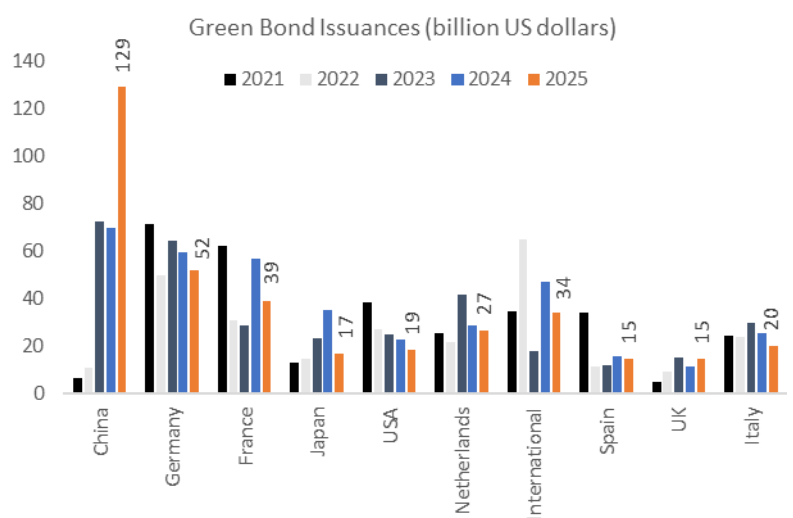
The Green Transition and Türkiye: The Power of Capital Markets

The green transition offers one of the largest investment opportunities of the coming era. According to current estimates, global climate finance flows had reached USD 1.9 trillion as of 2023. However, this remains insufficient, with investment needing to rise to USD 8.6 trillion by 2030 to align with the climate goals. This implies a near 4.5-fold increase from current levels and global capital markets have a major role to play in meeting this enormous financing need.

In recent years, the green transition has been ably supported by both the public and private sectors. While solutions with proven economic viability, such as solar and wind energy, battery technologies and electric vehicles, are expected to continue expanding across many regions, the pace of adoption for earlier-stage and more costly technologies, such as low-carbon hydrogen and carbon capture, utilisation and storage depends largely on the existence, scope, and continuity of local incentives. Capital market instruments such as development bank loans, green bonds, green and sustainability-linked loans and public-private partnerships will also stand out when it comes to financing all of these investments, alongside tax incentives and guarantee mechanisms.

Given the scale and nature of green finance, the need for a diverse range of instruments becomes increasingly evident. Capital markets could serve as the main lever in transforming funds provided by millions of investors with different objectives, motivations and constraints into large-scale investment volumes.

Indeed, the green bond market has now expanded to a meaningful scale. According to Bloomberg data, total green bond issuances reached USD 559.6 billion in 2025, with China,



Source: Bloomberg, TSKB Economic Research

Germany and France leading issuance volumes, respectively. This figure had reached a record USD 578.0 billion in 2024, with the decline in 2025 driven largely by advanced economies such as the United States, Japan, Germany and France. The rise in China helped offset a significant portion of the overall decline.

In terms of lending, data from the Institute of International Finance (IIF) finds that green and sustainability-linked loan volumes peaked in 2022, lost considerable momentum in 2023, and then resumed their upward trend in 2024.

In terms of the country breakdown for 2024, the latest year for which data is available, the United States stood out with a clearly positive divergence, while France and Germany ranked second and third.

As far as equity is concerned, data from the London Stock Exchange Group (LSEG) indicates that the market capitalisation of publicly listed green economy companies worldwide had risen to USD 7.9 trillion by the first quarter of 2025, equivalent to 8.6% of total public equity markets. In addition, the market capitalisation of this segment has grown at a compound annual rate of 15% over the past decade.

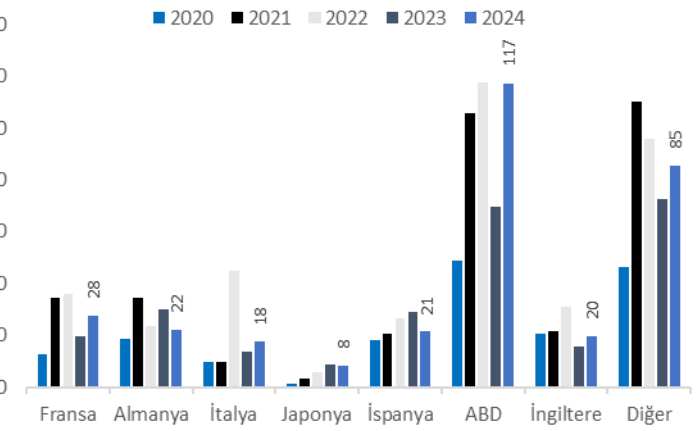
Although the definitions of bonds, loans and equity may vary considerably, rendering direct comparisons across instruments difficult, it is clear that all of these financing alternatives have reached a scale that can

no longer be ignored across global capital markets. That said, when compared with the annual USD 8.6 trillion financing requirement needed to remain on a climate-aligned pathway, current volumes still indicate ample room for expansion, suggesting a more pronounced growth potential in these areas in the period ahead.

Looking at the figures for Türkiye, green finance activity appears limited compared with other countries. According to Bloomberg data, following the country's first green bond issuance in 2019, total issuances had reached USD 6.9 billion by 2026, peaking in 2023 when there were USD 3.3 billion of issuances before beginning to decline in line with global trends. After just USD 110 million of issuances in 2024, the amount rose to USD 1.8 billion in 2025. Even in the peak year of 2023, green issuances only accounted for 3.1% of total bond issuances, close to the global ratio of 3.2% in the same year. By 2025, however, the share of green bond issuance in Türkiye had fallen to 1.2% of the total.



Green and Sustainability Linked Loans (billion US dollars)



Source: IIF, TSKB Economic Research

This picture suggests that the capital markets remain one of the most powerful levers for accelerating the allocation of resources. Türkiye's hosting of the COP31 provides the country with an important opportunity to bring its green transition agenda to the international investor base, regulatory authorities, financial institutions and the real sector within a common framework. If this opportunity is to produce a lasting impact, it is vital that İstanbul is positioned not only as a regional financial center, but also as a green finance hub that stands out in the issuance, trading and distribution of green bonds, loans, and equity instruments.



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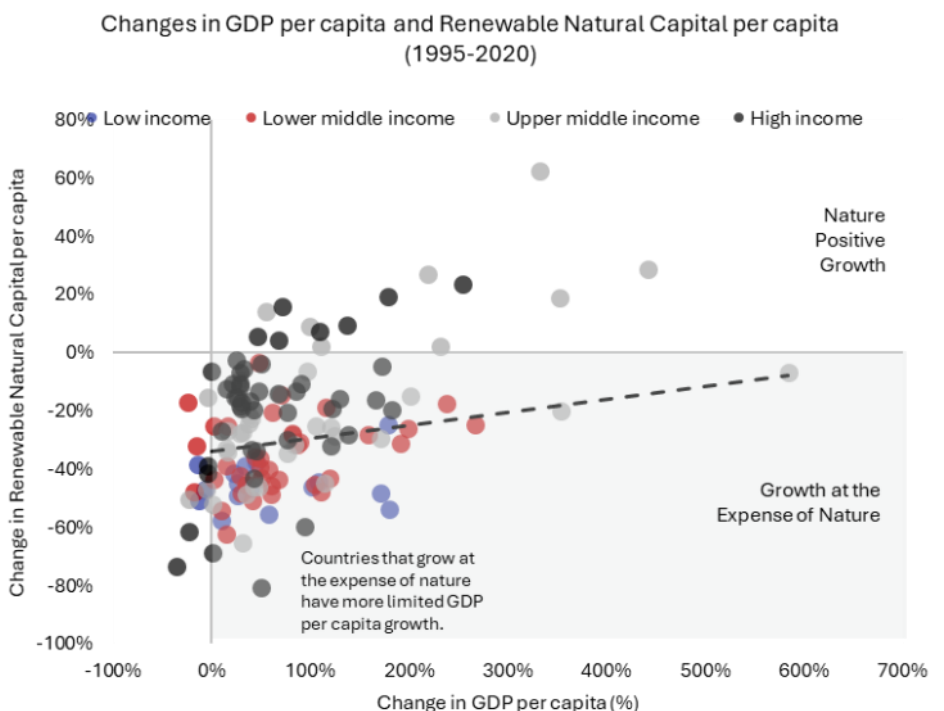
The (Natural) Wealth of Nations

What makes a nation wealthy? Since 2011, the World Bank has published a study titled [The Changing Wealth of Nations](#) that proposes a comprehensive understanding of wealth to better assess national performance. According to the study, when discussing a nation's wealth, it is necessary to consider not only produced (manufactured) capital but also a nation's human and natural capital. [The Dasgupta Report](#), released in 2021, argues that the value created by nature should be at the heart of the economy. The report states that nature, through the ecosystem services it provides, is one of our most valuable assets that essentially pays dividends. However, because humanity has mismanaged the "global portfolio," nature is increasingly struggling to deliver these services. According to the [Changing Wealth of Nations](#) report, renewable natural resources per capita have declined by more than 20% over the 25 year period from 1995 to 2020. As the graph shows, in roughly 80% of countries economic growth has occurred at the expense

of a decline in renewable natural capital. Moreover, in the past 25 years the countries that have lost the most renewable natural capital have experienced more modest GDP growth. This situation poses a significant threat to the wellbeing of future generations.

So what has brought us to this point? The ecosystem crisis is one side of the coin. The demand that current production and consumption systems place on nature has reached an unsustainable level. In fact,

calculations for 2025 indicate that, given the way the economic system operates today, nature and ecosystems are being used [1.8](#) times faster than they can renew themselves. The other side of the coin is that, because we cannot quantify the damage caused by the ecosystem crisis, we fail to see it. As the Dasgupta Report notes, the "silent and invisible" destruction in nature is not reflected in market prices. The 2006 [Stern Report](#) also treats the mispricing of the





climate crisis impacts of activities as a major market failure. Yet every rupture in nature eventually reverberates in the economy. We can observe this in the disruptions to [supply chains](#) caused by increasingly frequent and severe extreme weather events, and in the decline of [agricultural yields](#) due to heatwaves—both consequences of the ecosystem crisis. So, how do we solve the problem of nature degradation, which is fundamentally an environmental issue but also has economic repercussions?

Reducing the damage that nature endures is no longer a sufficient solution. Beyond merely curbing the degradation, we must also be willing to commit resources to repair the harm that has already been inflicted. Yet it is clear that we still have a long way to go. According to the United Nations report [The State of Finance for Nature](#), public financing for nature conservation increased dramatically in 2024—by 22% compared with 2022 and by 55% compared with 2015. However, despite this positive trend, a massive imbalance remains: based on 2023 data, for every \$1 allocated to restoring nature, \$30 is spent on activities that damage it. This situation underscores the urgent need to scrutinize where our financial resources are flowing if we are to halt and reverse the harm to nature. This year's COP31 summit in Türkiye appears to be an ideal opportunity to do just that.

An Opportunity for Türkiye to Leave a Lasting Mark



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It is quite meaningful to evaluate COPs as a process. Over the course of more than 30 years, involving over 190 countries, lengthy negotiations have taken place, difficult decisions have been made, and various targets have been set. However, at the point we have reached today, it is clear that these targets are not sufficient to deliver the progress needed to combat the climate crisis. Indeed, even if the announced policies are fully implemented, global warming is projected to reach [2.5 degrees](#) by the end of the century.

The issue is not only the adequacy of the targets; there is also a serious delay in their implementation. For this reason, the focus of COP processes in recent times has shifted from setting new and more ambitious targets to ensuring the implementation of existing ones. In other words, the question is moving away from “what should we do?” toward “how should we do it?”, and the focus of discussions is changing accordingly.

In this shift in focus, developments such as the withdrawal of the United States—one of the world’s largest actors in terms of production and emissions—from the Paris Agreement can also be considered influential. As a matter of fact, the absence of the United States, which plays a critical role in decision-making mechanisms, poses a risk to the ambition of other countries. Nevertheless, the picture presented by climate scientists is clear: if current trends continue, the crisis will deepen. Therefore, it is necessary not only to accelerate

implementation but also to make targets more ambitious. Otherwise, it seems inevitable that the response of nature and ecosystems will be much harsher.

In a period where COP discussions can be grouped under two main axes—“increasing ambition” and “improving implementation”—expanding the space for a third axis through a contribution that offers a new perspective to the struggle could be possible. Bringing the concepts of nature and regeneration, which have gained increasing importance in recent years, to the center of policy discussions could be an important step/contribution toward enriching the current perspective.

As a matter of fact, the issue is an [ecosystem crisis](#) that encompasses not only the climate crisis but also a much broader interaction of natural systems. At the core of this perspective lie findings that humanity has exceeded the safe boundaries of the planet. If the planet’s limits have been surpassed, it is no longer sufficient to address natural resources solely from a “sustainable use” perspective; rather, a “regenerative” and “nature-positive” approach [must be adopted](#). By contributing to this transformation and making COP31 a turning point where this new approach is concretized, Türkiye can seize the opportunity to leave a lasting mark in the fight against the ecosystem crisis.

Ecosystem 101

In the 20th issue of Ecosystem Review, we bring together Ecosystem 101s we've been sharing since 2020, to present fundamental concepts before COP31.

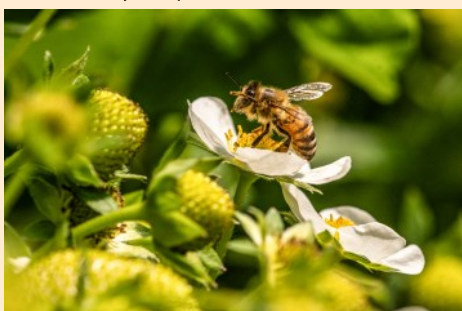
Air Pollution: The event that takes place when air pollutants in the atmosphere exceed certain thresholds as a result of emissions caused by nature or human beings, and negatively affect living and non-living things under appropriate meteorological conditions



Biodiversity Footprint: Gains or losses occurring in biodiversity as a result of human activities

Biodiversity Net Gain: Increasing the biodiversity value of a region by creating habitats

Biodiversity: The variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part



Black Carbon: Produced both naturally and by human activities such as emissions from diesel engine, cook stove, wood burning and forest fires, black carbon differs from carbon dioxide as its particles strongly absorb sunlight and give soot its black color but remains in the atmosphere for only a few weeks

Blue Bonds: Innovative financing instruments exclusively designed for ocean-friendly and critical clean water resources protection projects that are aligned with green bond and green loan principles

Blue Carbon: Carbon dioxide (CO₂) captured

and stored by world's ocean and coastal ecosystems

Blue Economy: The sustainable use of ocean resources for economic growth, improved livelihoods, and job creation while preserving the health of ocean ecosystems

Carbon Budget: Carbon budget refers to the total cumulative emissions of a single entity or the globe can produce to reach their designated maximum

Carbon Capture, Utilization, and Storage (CCUS): CCUS is a form of carbon sequestration which aims to reduce or eliminate carbon emissions from traditional processes such as power generation, transport, or manufacturing by capturing carbon from the point of emission and using it in a range of applications or storing it within the nature

Carbon Credit: A convertible and transferable instrument that allows an organization to financially benefit from reductions in or avoidance of emissions

Carbon Intensity: The amount of CO₂ measured in terms of grams that are released to generate a kilowattour (kWh) of electricity

Carbon Leakage: Carbon leakage is a situation when production out of a country with stricter climate policies to a country with laxer regulations, resulting in an increase in greenhouse gas emissions

Carbon Neutral: A state in which the net amount of carbon dioxide or other carbon compounds emitted into the atmosphere is reduced to zero because it is balanced by actions to reduce or offset these emissions

Clean Technologies: Clean technologies refer to technologies or businesses aimed at finding environmentally friendly alternatives to limit the damaging impacts of existing "conventional" technologies such as coal, oil, mining, transportation, and manufacturing to achieve clean water, air, energy, recycled waste, etc.

Climate Change: A long-term or permanent change in extreme weather events caused by an increase in the average temperature of the Earth (global warming) since the 1800s.

Climate Neutrality: Climate neutrality means reaching net-zero greenhouse gas (GHG) emissions by emitting equal or lower level of emissions than those absorbed by the planet, either via natural absorption or by removing carbon from the atmosphere

Climate Technologies: Climate technologies are technology-based solutions that are specifically aimed at combating climate change including almost all aspects of it such as adaptation and mitigation as well as reducing greenhouse gas emissions

Contamination: Refers to the concentration of a chemical or substance higher than would occur naturally but is not necessarily causing harm

COP (Conference of Parties): Annual meetings where countries covered by the United Nations Framework for the Convention on Climate Change (UNFCCC) come together to negotiate on a global climate agreement

Desertification: A fall in precipitation and water holding capacity of land in arid and semi-arid climate zones, with soil erosion occurring as result of the loss of natural vegetation



Ecosystem Restoration: The process of halting and reversing nature degradation, resulting in improved ecosystem services and recovered biodiversity

Ecosystem Services: Direct and indirect contributions of ecosystems to life and nature as well as social and economic welfare

Emissions Gap: The difference between emission reduction pledges and necessary emission reductions by 2030

Emissions Trading System (ETS): ETS is a market-based approach towards reducing

greenhouse gas emissions through which governments issue market tradable permits to economic operators for each tonne of GHG released, hence setting a limit on emissions

Energy Transition: The transition of energy by moving away from a fossil fuel-focused approach and put renewable energy sources, energy distribution, storage technologies and sustainable mining into center

Environmental, Social and Governance (ESG): ESG refers to environmental, social and governance risk management activities that provide investors with information about the overall sustainability of companies within the scope of their operations

EU Taxonomy: EU taxonomy is a classification system for environmentally sustainable economic activities

Eutrophication: Eutrophication is defined as excess of nutrient in bodies of water mainly coming from land, leading to excessive plant growth, and damaging animal life due to a resulting lack of oxygen

Fit for 55 Package: Fit for 55 Package refers to various legislative proposals that are proposed or implemented since 2021 by the European Union to reduce overall carbon emissions by 55% by 2030 compared to 1990 levels.

Food Security: State when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life

Food Supply Chain: Refers to the processes that describe how food from a farm ends up on our tables, including production, distribution, consumption and disposal

Global Stocktake: An assessment of progress on global warming since the Paris Agreement

Green Bonds: Industrial debt instruments where collected funds are used to support climate and environmentally friendly production capabilities

Green jobs: 'decent work' that contributes to the 'preservation' and 'regeneration' of our environment whether in traditional sectors or in new, green such as renewable energy and energy efficiency

Greenhouse Gas: Gases such as carbon dioxide, methane, nitrous oxide, fluorogases

and water vapor which occur naturally (and/or by human-made factors) in the atmosphere and play an important role in the regulation of air temperature

Greenwashing: Refers to turning the environmental impacts of projects implemented by countries, companies or any other actors to be seen more "climate friendly" than they really are in terms of their carbon emissions or any other climate dimension

Heat Pump: A heat pump is an electrical alternative to heaters operating with traditional fossil fuels, with units that heat and cool buildings by pumping heat from inside the building to outdoors in warm weather, and from the outdoors during cold weather by compressing it along the way

Heat Wave: A heat wave is a period of hotter than historical average temperatures for a given area that lasts for two or more days



Historical Responsibility: Historical responsibility refers to the cumulative amount of greenhouse gas emissions at the country level - and the share of country's total emissions in global emissions - since the start of the industrial revolution, taken as the year 1850

Insetting: Insetting refers to investments in projects aimed at carbon reduction or carbon removal on companies' own land or the land of their suppliers, instead of buying carbon credits from unrelated third parties (offsetting)

International Panel on Climate Change (IPCC): IPCC is a branch of the United Nations that assesses and publishes reports on the scientific aspects of climate change

Invasive Species: Organisms which are not native or indigenous to a particular ecosystem that cause economic and environmental damage to the area where they flourish

Just Transition: Enhancing the opportunities offered by the triple aspects

and enhancing the direction in a manner that leaves no one behind

Land Biodiversity: Refers to the diversity of living organisms on all surfaces out of the oceans from genes to ecosystem including soil and can include live evolutionary, ecological and cultural processes

Land Use, Land Use Change and Forestry (LULUCF): Land use, land use change and agricultural activities resulting from human activity in terrestrial sink files

Lithium-ion Battery: Rechargeable battery consisting of an anode and cathode (storing the lithium), separator, electrolyte and two (positive and negative) current collectors

Mineral: Naturally occurring homogenous solid with a definite chemical composition and a highly ordered atomic arrangement

Mitigation: Steps taken to limit greenhouse gas emissions and improve energy

Modern Irrigation Technologies: Technologies such as sprinkler and drip irrigation, which consume less water and use water more efficiently than traditional irrigation methods

Nationally Determined Contributions (NDC): A statement containing non-binding national actions to be taken towards the goal of limiting global warming, including limiting global greenhouse gas emissions, by member states party to the Paris Agreement on Climate Distribution and Gains

Nature Positive: Enhancing the resilience of nature, the planet and society by stopping and reversing losses to nature

Nature: The natural world with an emphasis on its living components that includes categories such as biodiversity, ecosystems, evolution, the biosphere, humankind's shared evolutionary heritage, and biocultural diversity

Nature-based Solutions (NbS): NbS refers to actions aimed at mitigating or adapting to climate change that are based on protecting and restoring the ability of nature and ecosystems to minimize the adverse effects of climate change

Net Zero: Equalizing the amount of greenhouse gases emitted into the atmosphere with the amount of greenhouse gases removed from the atmosphere naturally or technologically, leading to net zero greenhouse gas emissions

Ocean Economy: The sum of the economic

activities of ocean-based industries, assets, goods and services of marine ecosystems

Paris Agreement: Agreement which was signed in 2015 in Paris under United Nations Framework Convention on Climate Change, aiming to limit increase in global warming by 2°C.



Parts per million: The scientific term used to indicate the concentration of pollutants, which represents one particle in each one million particles

Photovoltaics: The process of generating power by converting energy from light into electricity through semiconducting materials

Physical Risk: Risks stemming from nature loss and transformation and its interaction with other environmental threats

Pollution: Refers to the presence of a chemical or substance out of place and/or present at higher-than-normal concentration that has adverse effects on any non-targeted organism



PROGREEN: PROGREEN, the Global Partnership for Sustainable and Resilient Landscapes is a World Bank program supporting efforts to improve livelihoods of the rural poor while tackling climate change, loss of biodiversity and forests, deteriorating land fertility, and uncontrolled forest fires

Rare Earth Elements (REEs): Soft and easily processable elements generally used in electronics, nuclear and solar energy. (For example: Lanthanum, cerium, praseodymium etc.)

Regenerative Agriculture: Agricultural practices that increase soil biodiversity and

the amount of carbon retained in the soil by regenerating soil organic matter and restoring the health of the ecosystem

Renewable Energy: Energy derived from natural sources that are replenished at a higher rate than they are consumed



Renewable Fresh Water Supply: The term used to indicate the combination of precipitation water flowing into rivers and returning to aquifers with surface and groundwater flowing from neighboring regions

Renewable Natural Capital: Natural assets such as agricultural land and forests which can regenerate themselves when managed sustainably

Social Capital: the mutual relationships between the individuals in a society based on shared values and a high level of trust

Social Cost of Carbon: The total damage that each extra ton of carbon dioxide emissions causes to the economy, society and the environment, as calculated in monetary terms

Social Transformation: the restructuring of all aspects of life; from culture to social relations; from politics to economy; from the way we think to the way we live

Social Trust: the belief in the integrity and the reliability of other individuals in a society

Soil Degradation: Reducing or losing the soil's biological and economical productivity capacity due to human activity, with increasing dimensions amid the process of climate change and biodiversity loss, in a process exacerbated by natural processes

Soil Moisture: Soil moisture is the amount of water stored in soil and depends on precipitation, air and land temperature, soil characteristics, etc.

Soil Organic Carbon: The carbon component of the organic material in the soil

Soil Sealing: A procedure that alters the

composition of soil by overlaying it with impermeable substances like concrete, metal, and asphalt.

Soil: The upper layer of the Earth's crust transformed by weathering and physical, chemical, and biological processes and composed of mineral particles, organic matter, water, air and living organisms organized in genetic soil horizons

Transition Risk: Risks to the economy and financial system stemming from policies aimed at addressing nature loss

Triple Transition: The transition to an ecosystem-friendly approach, technological transformation and social uses progressing together in a disruptive manner

Turbidity: Turbidity refers to the degree of cloudiness in water which can be caused by silt, sand, mud, bacteria, and other gems as well as chemical precipitates

UNFCCC: A global agreement that defines international actions to address climate change. Signed in 1992, it was enacted in 1994

Urban Heat Island: The difference in temperature between an urban area and nearby rural regions, which affects factors such as water flow, heat retention, surface reflectivity, and more

Urban Microclimate: A localized collection of atmospheric conditions within a relatively small region (typically spanning up to 100 m) that contrast with the weather patterns in the surrounding areas

Urban Resilience: The capacity of a city and its individual components to anticipate, absorb, adapt to, or bounce back from the impacts of a hazardous event promptly and effectively, which involves safeguarding, restoring, or enhancing its essential structures and functions

Waste Heat: Unused heat generated by the transfer of excess heat emitted by machinery, transport systems, cooling systems, or industrial processes.

Waste Management: Refers to all actions and plans to manage waste from minimizing its production to composting or recycling

Water Stress: Insufficient water resources to meet the current water demand or unavailability of water resources due to poor quality



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